KONGU ENGINEERING COLLEGE

(Autonomous Institution Affiliated to Anna University, Chennai)

PERUNDURAI ERODE - 638 060

TAMILNADU INDIA



REGULATIONS, CURRICULUM & SYLLABI – 2022

(CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION)

(For the students admitted during 2022 - 2023 and onwards)

BACHELOR OF ENGINEERING DEGREE IN ELECTRONICS AND COMMUNICATION ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



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KONGU ENGINEERING COLLEGE PERUNDURAI ERODE – 638 060 (Autonomous)

INSTITUTE VISION

To be a centre of excellence for development and dissemination of knowledge in Applied Sciences, Technology, Engineering and Management for the Nation and beyond.

INSTITUTE MISSION

We are committed to value based Education, Research and Consultancy in Engineering and Management and to bring out technically competent, ethically strong and quality professionals to keep our Nation ahead in the competitive knowledge intensive world.

QUALITY POLICY

We are committed to

- Provide value based quality education for the development of students as competent and responsible citizens.
- Contribute to the Nation and beyond through research and development
- Continuously improve our services

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION

To be a centre of excellence for development and dissemination of knowledge in Electronics and Communication Engineering for the Nation and beyond

MISSION

Department of Electronics and Communication Engineering is committed to:

- MS1: To impart industry and research based quality education for developing value based electronics and communication engineers
- MS2: To enrich the academic activities by continual improvement in the teaching learning process
- MS3: To infuse confidence in the minds of students to develop as entrepreneurs
- MS4: To develop expertise for consultancy activities by providing thrust for Industry Institute Interaction
- MS5: To endeavor for constant upgradation of technical expertise for producing competent professionals to cater to the needs of the society and to meet the global challenges

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

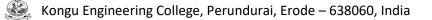
Graduate of Electronics and Communication programme will:

- PEO1: Succeed in industry and higher education by applying knowledge of mathematics, science and engineering principles
- PEO2: Analyze, design and implement electronics based solutions to meet the real world problems, with constant update of domain knowledge
- PEO3: Demonstrate Soft skills, Professional and Ethical values and an aptitude for lifelong learning needed for a successful professional career

WAPPIN	NG OF MISSION S	TATEMENTS (MS)	WITH FEUS
MS\PEO	PEO1	PEO2	PEO3
MS1	3	3	3
MS2	3	3	2
MS3	3	3	3
MS4	3	3	2
MS5	2	3	3

MAPPING OF MISSION STATEMENTS (MS) WITH PEOS

1 – Slight, 2 – Moderate, 3 – Substantial



PROGRAM OUTCOMES (POs)

Graduates of Electronics and Communication Engineering will:

- **PO1** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2 Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3 Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11 Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Graduates of Electronics and Communication will:

- **PSO1 Products Development :** Apply multidisciplinary knowledge and skills to develop products for providing solutions for the real world problems in Industry, Agriculture, Healthcare, Communication etc.
- **PSO2** Development of Entrepreneurship: Have an aptitude to take up the applied research to become Entrepreneurs in Electronics and Communication Engineering by combining the skills of project management and finance.

PEO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEO1	3	3	3	3	3	1	-	2	2	2	1	2	3	1
PEO2	3	3	3	3	3	3	3	3	1	2	3	3	3	3
PEO3	-	1	2	-	-	3	3	3	3	3	3	3	3	3

MAPPING OF PEOs WITH POS AND PSOs

1 – Slight, 2 – Moderate, 3 – Substantial

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE - 638060

(Autonomous)

REGULATIONS 2022

CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION

BACHELOR OF ENGINEERING (BE) / BACHELOR OF TECHNOLOGY (BTech) DEGREE PROGRAMMES

These regulations are applicable to all candidates admitted into BE/BTech Degree programmes from the academic year 2022 – 2023 onwards.

1. DEFINITIONS AND NOMENCLATURE

In these Regulations, unless otherwise specified:

- i. "University" means ANNA UNIVERSITY, Chennai.
- ii. "College" means KONGU ENGINEERING COLLEGE.
- iii. "Programme" means Bachelor of Engineering (BE) / Bachelor of Technology (BTech) Degree programme
- iv. "Branch" means specialization or discipline of BE/BTech Degree programme, like Civil Engineering, Information Technology, etc.
- v. "Course" means a Theory / Theory cum Practical / Practical course that is normally studied in a semester like Mathematics, Physics etc.
- vi. "Credit" means a numerical value allocated to each course to describe the candidate's workload required per week.
- vii. "Grade" means the letter grade assigned to each course based on the marks range specified.
- viii. "Grade point" means a numerical value (0 to 10) allocated based on the grade assigned to each course.
- ix. "Principal" means Chairman, Academic Council of the College.
- x. "Controller of Examinations (COE)" means authorized person who is responsible for all examination related activities of the College.
- xi. "Head of the Department (HOD)" means Head of the Department concerned.



2. PROGRAMMES AND BRANCHES OF STUDY

The following programmes and branches of study approved by Anna University, Chennai and All India Council for Technical Education, New Delhi are offered by the College.

Programme	Branch					
	Civil Engineering					
	Mechanical Engineering					
	Electronics and Communication Engineering					
	Computer Science and Engineering					
BE	Electrical and Electronics Engineering					
	Electronics and Instrumentation Engineering					
	Mechatronics Engineering					
	Automobile Engineering					
	Computer Science and Design					
	Chemical Engineering					
	Information Technology					
BTech	Food Technology					
	Artificial Intelligence and Data Science					
	Artificial Intelligence and Machine Learning					

3. ADMISSION REQUIREMENTS

3.1 First Semester Admission

The candidates seeking admission to the first semester of the eight semester BE / BTech Degree Programme:

Should have passed the Higher Secondary Examination (10 + 2) in the academic stream with Mathematics, Physics and Chemistry as three of the four subjects of study under Part-III subjects of the study conducted by the Government of Tamil Nadu or any examination of any other University or authority accepted by the Anna University, Chennai as equivalent thereto.

(OR)

Should have passed the Higher Secondary Examination of Vocational stream (Vocational groups in Engineering / Technology) as prescribed by the Government of Tamil Nadu.

They should also satisfy other eligibility conditions as prescribed by the Anna University, Chennai and Directorate of Technical Education, Chennai from time to time.

3.2 Lateral Entry Admission

The candidates who hold a Diploma in Engineering / Technology awarded by the State Board of Technical Education, Tamilnadu or its equivalent are eligible to apply for Lateral entry admission to the third semester of BE / BTech.

(OR)

The candidates who hold a BSc degree in Science(10+2+3 stream) with mathematics as one of the subjects at the BSc level from a recognised University are eligible to apply for Lateral entry

admission to the third semester of BE / BTech. Such candidates shall undergo two additional Engineering course(s) in the third and fourth semesters as prescribed by the College.

They should also satisfy other eligibility conditions prescribed by the Anna University, Chennai and Directorate of Technical Education, Chennai from time to time.

4. STRUCTURE OF PROGRAMMES

4.1 Categorisation of Courses

The BE / BTech programme shall have a curriculum with syllabi comprising of theory, theory cum practical, practical courses in each semester, professional skills training/industrial training, project work, internship, etc that have been approved by the respective Board of Studies and Academic Council of the College. All the programmes have well defined Programme Outcomes (PO), Programme Specific Outcomes (PSO) and Programme Educational Objectives (PEOs) as per Outcome Based Education (OBE). The content of each course is designed based on the Course Outcomes (CO). The courses shall be categorized as follows:

- i. Humanities and Social Sciences (HS) including Management Courses, English Communication Skills, Universal Human Values and Yoga & Values for Holistic Development.
- ii. Basic Science (BS) Courses
- iii. Engineering Science (ES) Courses
- iv. Professional Core (PC) Courses
- v. Professional Elective (PE) Courses
- vi. Open Elective (OE) Courses
- vii. Employability Enhancement Courses (EC) like Project work, Professional Skills/Industrial Training, Comprehensive Test & Viva, Entrepreneurships/Start ups and Internship / In-plant Training in Industry or elsewhere
- viii. Audit Courses (AC)
- ix. Mandatory Courses (MC) like Student Induction Program and Environmental Science.
- x. Honours Degree Courses (HC)

4.2 Credit Assignment and Honours Degree

4.2.1. Credit Assignment

Each course is assigned certain number of credits as follows:

Contact period per week	Credits
1 Lecture / Tutorial Period	1
2 Practical Periods	1
2 Project Work Periods	1
40 Training / Internship Periods	1

The minimum number of credits to complete the BE/BTech programme is 168.

4.2.2 Honours Degree

If a candidate earns 18 to 20 additional credits in an emerging area, then he/she can be awarded with Honours degree mentioning that emerging area as his/her specialization. The respective board of studies shall recommend the specializations for honours degree and appropriate additional courses to be studied by the candidate which shall get approval from Academic Council

of the institution. A candidate shall have not less than 7.5 CGPA and no history of arrears to opt for the honours degree and has to maintain the same during the entire programme. Various specializations for various branches recommended by the respective boards of studies are given below:

SNo	Specializations for Honours degree in emerging areas	To be offered as Honours, Only for the following branches mentioned against the specialization
1.	Construction Technology	BE – Civil Engineering
2.	Smart Cities	BE – Civil Engineering
3.	Smart Manufacturing *	BE – Mechanical Engineering
4.	Computational Product Design *	BE – Mechanical Engineering
5.	Intelligent Autonomous Systems *	BE – Mechatronics Engineering
6.	E-Mobility *	BE – Automobile Engineering
7.	Artificial Intelligence and Machine Learning	BE – Electronics and Communication Engineering
8.	System on Chip Design *	BE – Electronics and Communication Engineering
9.	Electric Vehicles	BE – Electrical and Electronics Engineering
10.	Microgrid Technologies	BE – Electrical and Electronics Engineering
11.	Intelligent Sensors Technology *	BE – Electronics and Instrumentation Engineering
12.	Smart Industrial Automation *	BE – Electronics and Instrumentation Engineering
13.	Data Science	BE – Computer Science and Engineering
14.	Cyber Security	BE – Computer Science and Engineering
15.	Data Science	BTech – Information Technology
16.	Cyber Security	BTech – Information Technology
17.	Petroleum and Petrochemical Engineering *	BTech – Chemical Engineering
18.	Waste Technology *	BTech – Chemical Engineering
19.	Food Processing and Management *	BTech – Food Technology
20.	Virtual and Augumented Reality	BE- Computer Science and Design
21.	Data Science	BE- Computer Science and Design
22.	Internet of Things (IoT)	BTech – Artificial Intelligence and Data Science
23.	Blockchain	BTech – Artificial Intelligence and Data Science
24.	Internet of Things (IoT)	BTech – Artificial Intelligence and Machine Learning
25.	Blockchain	BTech – Artificial Intelligence and Machine Learning

*Title by KEC

The courses specified under Honours degree in the emerging area may include theory, theory cum practical, project work, etc. under the particular specialization. A candidate can choose and study these specified courses from fourth semester onwards and he/she shall successfully complete the courses within the stipulated time vide clause 5. Total number of credits earned in each semester may vary from candidate to candidate based on the courses chosen. The registration, assessment & evaluation pattern and classification of grades of these courses shall be the same as that of the courses in the regular curriculum of the programme of the candidate vide clause 6, clause 7 and clause 15 respectively. A candidate can earn Honours degree in only one specialization during the entire duration of the programme.

4.3 Employability Enhancement Courses

A candidate shall be offered with the employability enhancement courses like project work, internship, professional skills training/industrial training, comprehensive test & viva, and entrepreneurships/start ups during the programme to gain/exhibit the knowledge/skills.

4.3.1 Professional Skills Training/ Indsutrial Training/Entrepreneurships/Start Ups/ Inplant Training

A candidate may be offered with appropriate training courses imparting programming skills, communication skills, problem solving skills, aptitude skills etc. It is offered in two phases as phase I in fourth semester and phase II in fifth semester including vacation periods and each phase can carry two credits.

(OR)

A candidate may be allowed to go for training at research organizations or industries for a required number of hours in fifth semester vacation period. Such candidate can earn two credits for this training course in place of Professional Skills Training course II in fifth semester. He/She shall attend Professional Skills Training Phase I in fourth semester and can earn two credits.

(OR)

A candidate may be allowed to set up a start up and working part-time for the start ups by applying his/her innovations and can become a student entrepreneur during BE/BTech programme. Candidates can set up their start up from fifth semester onwards either inside or outside of the college. Such student entrepreneurs may earn 2 credits in place of Professional Skills Training II. The area in which the candidate wants to initiate a start up may be interdisciplinary or multidisciplinary. The progress of the startup shall be evaluated by a panel of members constituted by the Principal through periodic reviews.

4.3.2 Comprehensive Test and Viva

The overall knowledge of the candidate in various courses he/she studied shall be evaluated by (i) conducting comprehensive tests with multiple choice questions generally with pattern similar to GATE and/or (ii) viva-voce examination conducted by a panel of experts assigned by the Head of the department. The members can examine the knowledge of the candidate by asking questions from various domains and the marks will be assigned based on their answers. This course shall carry two credits.

4.3.3 Full Time Project through Internships

The curriculum enables a candidate to go for full time project through internship during a part of seventh semester and/or entire final semester and can earn credits vide clause 7.6 and clause 7.11.

A candidate is permitted to go for full time projects through internship in seventh semester with the following condition: The candidate shall complete a part of the seventh semester courses with a total credit of about 50% of the total credits of seventh semester including Project Work-II Phase-I in the first two months from the commencement of the seventh semester under fast track mode. The balance credits required to complete the seventh semester shall be earned by the candidate through either approved One/Two Credit Courses /Online courses / Self Study Courses or Add/Drop courses as per clause 4.4 and clause 4.5 respectively.

A candidate is permitted to go for full time projects through internship during eighth semester. Such candidate shall earn the minimum number of credits required to complete eighth semester other than project through either approved One / Two Credit Courses /Online courses / Self Study Courses or Add/Drop courses as per clause 4.4 and clause 4.5 respectively.

Assessment procedure is to be followed as specified in the guidelines approved by the Academic Council.

4.3.4 A student shall go for in-plant training for duration of two weeks during the entire programme. It is mandatory for all the students.

4.4 One / Two Credit Courses / Online Courses / Self Study Courses

The candidates may optionally undergo One / Two Credit Courses / Online Courses / Self Study Courses as elective courses.

- **4.4.1 One / Two Credit Courses:** One / Two credit courses shall be offered by the college with the prior approval from respective Board of Studies. A candidate can earn a maximum of six credits through one / two credit courses during the entire duration of the programme.
- **4.4.2 Online Courses:** Candidates may be permitted to earn credits for online courses, offered by NPTEL / SWAYAM / a University / Other Agencies, approved by respective Board of Studies.
- **4.4.3** Self Study Courses: The Department may offer an elective course as a self study course. The syllabus of the course shall be approved by the respective Board of Studies. However, mode of assessment for a self study course will be the same as that used for other courses. The candidates shall study such courses on their own under the guidance of member of the faculty following due approval procedure. Self study course is limited to one per semester.
- **4.4.4** The elective courses in the final year may be exempted if a candidate earns the required credits vide clause 4.4.1, 4.4.2 and 4.4.3 by registering the required number of courses in advance.
- **4.4.5** A candidate can earn a maximum of 30 credits through all one / two credit courses, online courses and self study courses.

4.5 Flexibility to Add or Drop Courses

- **4.5.1** A candidate has to earn the total number of credits specified in the curriculum of the respective programme of study in order to be eligible to obtain the degree. However, if the candidate wishes, then the candidate is permitted to earn more than the total number of credits prescribed in the curriculum of the candidate's programme.
- **4.5.2** From the first to seventh semesters the candidates have the option of registering for additional elective/Honours courses or dropping of already registered additional elective/Honours courses within two weeks from the start of the semester. Add / Drop is only an option given to the candidates.
- **4.6** Maximum number of credits the candidate can enroll in a particular semester cannot exceed 30 credits.
- **4.7** The blend of different courses shall be so designed that the candidate at the end of the programme would have been trained not only in his / her relevant professional field but also would have developed to become a socially conscious human being.
- **4.8** The medium of instruction, examinations and project report shall be English.

5. DURATION OF THE PROGRAMME

- **5.1** A candidate is normally expected to complete the BE / BTech Degree programme in 8 consecutive semesters/4 Years (6 semesters/3 Years for lateral entry candidate), but in any case not more than 14 semesters/7 Years (12 semesters/6 Years for lateral entry candidate).
- **5.2** Each semester shall consist of a minimum of 90 working days including continuous assessment test period. The Head of the Department shall ensure that every teacher imparts instruction as per the number of periods specified in the syllabus for the course being taught.

5.3 The total duration for completion of the programme reckoned from the commencement of the first semester to which the candidate was admitted shall not exceed the maximum duration specified in clause 5.1 irrespective of the period of break of study (vide clause 11) or prevention (vide clause 9) in order that the candidate may be eligible for the award of the degree (vide clause 16). Extension beyond the prescribed period shall not be permitted.

6. COURSE REGISTRATION FOR THE EXAMINATION

- **6.1** Registration for the end semester examination is mandatory for courses in the current semester as well as for the arrear courses failing which the candidate will not be permitted to move on to the higher semester. This will not be applicable for the courses which do not have an end semester examination.
- **6.2** The candidates who need to reappear for the courses which have only continuous assessment shall enroll for the same in the subsequent semester, when offered next, and repeat the course. In this case, the candidate shall attend the classes, satisfy the attendance requirements (vide clause 8) and earn continuous assessment marks. This will be considered as an attempt for the purpose of classification.
- **6.3** If a candidate is prevented from writing end semester examination of a course due to lack of attendance, the candidate has to attend the classes, when offered next, and fulfill the attendance requirements as per clause 8 and earn continuous assessment marks. If the course, in which the candidate has a lack of attendance, is an elective, the candidate may register for the same or any other elective course in the subsequent semesters and that will be considered as an attempt for the purpose of classification.
- 6.4 A candidate shall register for the chosen courses as well as arrear courses (if any vide clause 6.2 and 6.3) from the list of courses specified under Honours degree.

7. ASSESSMENT AND EXAMINATION PROCEDURE FOR AWARDING MARKS

7.1 The BE/BTech programmes consist of Theory Courses, Theory cum Practical courses, Practical courses, Comprehensive Test and Viva, Project Work, Industrial Training /Professional Skills Training, Internship/In-plant Training and Entrepreneurships/ Start ups. Performance in each course of study shall be evaluated based on (i) Continuous Assessments (CA) throughout the semester and (ii) End Semester Examination (ESE) at the end of the semester except for the courses which are evaluated based on continuous assessment only. Each course shall be evaluated for a maximum of 100 marks as shown below:

SI. No.	Category of Course	Continuous Assessment Marks	End Semester Examination Marks
1.	Theory	40	60
2.	Theory cum Practical (The distribution of marks shall be decided based on the credit weightage assigned to theory and practical components.)	50	50
3.	Practical	60	40
4.	Professional Skills Training / Comprehensive Test & Viva / Entrepreneurships / Start ups / Project Work I / Mandatory Course/Industrial Training/ Universal Human Values / Yoga and Values for Holistic Development	100	
5.	Project Work II Phase I / Project Work II Phase II / Internships	50	50
6.	One / Two credit Course	The distribution of marks shall be decided	
7.	All other Courses	based on the credit weightage assigned	

7.2 Examiners for setting end semester examination question papers for theory courses, theory cum practical courses and practical courses and evaluating end semester examination answer scripts, project works, internships and entrepreneurships/start ups shall be appointed by the Controller of Examinations after obtaining approval from the Principal.

7.3 Theory Courses

For all theory courses out of 100 marks, the continuous assessment shall be 40 marks and the end semester examination shall be for 60 marks. However, the end semester examinations shall be conducted for 100 marks and the marks obtained shall be reduced to 60. The continuous assessment tests shall be conducted as per the schedule laid down in the academic schedule. The total of the continuous assessment marks and the end semester examination marks shall be rounded off to the nearest integer.

SI. No.	Туре	Max. Marks	Remarks	
1.	Test - I	20		
ι.	Test - II	20	Average of best 2 tests (20 marks)	
	Test - III	20	(20 marks)	
2.	Tutorial: (Tutorial/Problem Solving (or) Simulation (or) Simulation & Mini Project (or) Mini Project (or) Case Studies (or) Any other relevant to the course)	15	Type of assessment is to be chosen based on the nature of the course and to be approved by Principal	
3.	Others: Assignment / Paper Presentation in Conference / Seminar / Comprehension / Activity based learning / Class notes	05	To be assessed by the Course Teacher based on any one type.	
	Total	40	Rounded off to the one decimal place	

7.3.1 The assessment pattern for awarding continuous assessment marks shall be as follows:

However, the assessment pattern for awarding the continuous assessment marks may be changed based on the nature of the course and is to be approved by the Principal.

- **7.3.2** A reassessment test or tutorial covering the respective test or tutorial portions may be conducted for those candidates who were absent with valid reasons (Sports or any other reason approved by the Principal).
- **7.3.3** The end semester examination for theory courses shall be for a duration of three hours and shall be conducted between November and January during odd semesters and between April and June during even semesters of every year.

7.4 Theory cum Practical Courses

For courses involving theory and practical components, the evaluation pattern as per the clause 7.1 shall be followed. Depending on the nature of the course, the end semester examination shall be conducted for theory and the practical components. The apportionment of continuous assessment and end semester examination marks shall be decided based on the credit weightage assigned to theory and practical components approved by Principal.

7.5 Practical Courses

For all practical courses out of 100 marks, the continuous assessment shall be for 60 marks and the end semester examination shall be for 40 marks. Every exercise / experiment shall be evaluated based on the candidate's performance during the practical class and the candidates' records shall be maintained.

7.5.1 The assessment pattern for awarding continuous assessment marks for each course shall be decided by the course coordinator based on rubrics of that particular course, and shall be based on rubrics for each experiment.

7.5.2 The end semester examination shall be conducted for a maximum of 100 marks for duration of 3 hours and reduced to 40 marks. The appointment of examiners and the schedule shall be decided by chairman of Board of Study of the relevant board.

7.6 Project Work II Phase I / Project Work II Phase II

- **7.6.1** Project work shall be assigned to a single candidate or to a group of candidates not exceeding 4 candidates in a group. The project work is mandatory for all the candidates.
- **7.6.2** The Head of the Department shall constitute review committee for project work. There shall be two assessments by the review committee during the semester. The candidate shall make presentation on the progress made by him/her before the committee.
- **7.6.3** The continuous assessment and end semester examination marks for Project Work II Phase I /Project Work II Phase II and the Viva-Voce Examination shall be distributed as below.

		Continuous (Max. 5	End Semester Examination (Max. 50 Marks)						
Zeroth Review I		Review II Max. 30 Marks)		Report Evaluatio n (Max. 20 Marks)	Viva - \ /lax. 30)		
Rv.	Supe	Review	Sup	Review	Super	Ext. Exr.	Sup	Exr.	Exr.
Co	r	Committ	ervis	Committe	visor		er	1	2
m	visor	ee	or	е			visor		
		(excludin		(excludin					
		g		g					
		supervis		superviso					
		or)		r)					
0	0	10	10	15	15	20	10	10	10

- **7.6.4** The Project Report prepared according to approved guidelines and duly signed by the Supervisor shall be submitted to Head of the Department. The candidate(s) must submit the project report within the specified date as per the academic schedule of the semester. If the project report is not submitted within the specified date then the candidate is deemed to have failed in the Project Work and redo it in the subsequent semester.
- **7.6.5** If a candidate fails to secure 50% of the continuous assessment marks in the project work, he / she shall not be permitted to submit the report for that particular semester and shall have to redo it in the subsequent semester and satisfy attendance requirements.
- **7.6.6** The end semester examination of the project work shall be evaluated based on the project report submitted by the candidate in the respective semester and viva-voce examination by a committee consisting of two examiners and supervisor of the project work.
- **7.6.7** If a candidate fails to secure 50 % of the end semester examination marks in the project work, he / she shall be required to resubmit the project report within 30 days from the date of declaration of the results and a fresh viva-voce examination shall be conducted as per clause 7.6.6.
- **7.6.8** A copy of the approved project report after the successful completion of viva-voce examination shall be kept in the department library.

7.7 Project Work I / Industrial Training

The evaluation method shall be same as that of the Project Work II as per clause 7.6 excluding 7.6.3, 7.6.5, 7.6.6 and 7.6.7. The marks distribution is given below.

Continuous Assessment (Max. 100 Marks)									
Zoroth Poviow						Review III (Max. 50 Marks)			
		Review I (Max 20 Marks)		Review II 1ax 30 Marks)		Report Evaluation (Max. 20	Viva - Voce (Max. 30 Marks)		
Revie	Supo	Review	Supa	Review	Sup	Marks) Review	Supor	Review	
w	Supe r	Committee	Supe r	Committ	er	Committe	Super visor	Committee	
Com mittee	visor	(excluding supervisor)	visor	ee (excludin	visor	е			
				g supervis or)					
0	0	10	10	15	15	20	10	20	

If a candidate fails to secure 50 % of the continuous assessment marks in this course, he / she shall be required to resubmit the project report within 30 days from the date of declaration of the results and a fresh viva-voce examination shall be conducted.

7.8 Professional Skills Training

Phase I training shall be conducted for minimum of 80 hours in 3rd semester vacation and during 4th semester. Phase II training shall be conducted for minimum of 80 hours in 4th semester vacation and during 5th semester. The evaluation procedure shall be approved by the board of the offering department and Principal.

7.9 Comprehensive Test and Viva

A candidate can earn 2 credits by successfully completing this course. The evaluation procedures shall be approved by the Principal.

7.10 Entrepreneurships/ Start ups

A start up/business model may be started by a candidate individually or by a group of maximum of three candidates during the programme vide clause 4.3.1. The head of the department concerned shall assign a faculty member as a mentor for each start up.

A review committee shall be formed by the Principal for reviewing the progress of the Start ups / Business models, innovativeness, etc. The review committee can recommend the appropriate grades for academic performance for the candidate(s) involved in the start ups. This course shall carry a maximum of two credits in fifth semester and shall be evaluated through continuous assessments for a maximum of 100 marks vide clause 7.1. A report about the start ups is to be submitted to the review committee for evaluation for each start up and the marks will be given to Controller of Examinations after getting approval from Principal.

7.11 In-Plant Training

Each candidate shall go for In-Plant training for a duration of minimum of two weeks during the entire programme of study and submit a brief report about the training undergone and a certificate issued from the organization concerned.

7.12 One / Twe Credit Courses

For all one/ two credit courses out of 100 marks, the continuous assessment shall be 50 marks and the model examination shall be for 50 marks. Minimum of two continuous assessments tests shall be conducted during the one / two credit course duration by the offering department concerned. Model examination shall be conducted at the end of the course.

7.13 Online Course

The Board of Studies will provide methodology for the evaluation of the online courses. The Board can decide whether to evaluate the online courses through continuous assessment and end semester examination or through end semester examination only. In case of credits earned through online mode from NPTEL / SWAYAM / a University / Other Agencies approved by Chairman, Academic Council, the credits may be transferred and grades shall be assigned accordingly.

7.14 Self Study Course

The member of faculty approved by the Head of the Department shall be responsible for periodic monitoring and evaluation of the course. The course shall be evaluated through continuous assessment and end semester examination. The evaluation methodology shall be the same as that of a theory course.

7.15 Audit Course

A candidate may be permitted to register for specific course not listed in his/her programme curriculum and without undergoing the rigors of getting a 'good' grade, as an Audit course, subject to the following conditions.

The candidate can register only one Audit course in a semester starting from second semester subject to a maximum of two courses during the entire programme of study. Such courses shall be indicated as 'Audit' during the time of registration itself. Only courses currently offered for credit to the candidates of other branches can be audited.

A course appearing in the curriculum of a candidate cannot be considered as an audit course. However, if a candidate has already met the Professional Elective and Open Elective credit requirements as stipulated in the curriculum, then, a Professional Elective or an Open Elective course listed in the curriculum and not taken by the candidate for credit can be considered as an audit course.

Candidates registering for an audit course shall meet all the assessment and examination requirements (vide clause 7.3) applicable for a credit candidate of that course. Only if the candidate obtains a performance grade, the course will be listed in the semester Grade Sheet and in the Consolidated Grade Sheet along with the grade SC (Successfully Completed). Performance grade will not be shown for the audit course.

Since an audit course has no grade points assigned, it will not be counted for the purpose of GPA and CGPA calculations.

7.16 Mandatory Courses

A candidate joined in first semester shall attend and complete a mandatory course namely Student Induction Program of duration three weeks at the beginning of first semester. The candidates studying in second year shall attend and complete another one mandatory course namely Environmental Science. No credits shall be given for mandatory courses and shall be evaluated through continuous assessment tests only vide clause 7.1 for a maximum of 100 marks each. Upon the successful completion, these courses will be listed in the semester grade sheet and in the consolidated grade sheet with the grade "SC" (Successfully Completed). Since no grade points are assigned, these courses will not be counted for the purpose of GPA and CGPA calculations.

7.17 Universal Human Values (UHV) and Yoga and Values for Holistic Development (YVHD)

Courses YVHD shall be offered to all first year candidates of all BE/ BTech programmes to impart knowledge on yoga and human values. Course UHV shall be offered to all the second year BE/ BTech students. These courses shall carry a maximum of 100 marks each and shall be evaluated through continuous assessment tests only vide clause 7.1. The candidate(s) can earn 2 credits for UHV and 1 credit for YVHD by successfully completing these courses. Two continuous assessment tests will be conducted and the average marks will be taken for the calculation of grades.



9.

8. REQUIREMENTS FOR COMPLETION OF A SEMESTER

- **8.1** A candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester and permitted to appear for the examinations of that semester.
 - **8.1.1** Ideally, every candidate is expected to attend all classes and secure 100 % attendance. However, a candidate shall secure not less than 80 % (after rounding off to the nearest integer) of the overall attendance taking into account the total number of working days in a semester.
 - **8.1.2** A candidate who could not satisfy the attendance requirements as per clause 8.1.1 due to medical reasons (hospitalization / accident / specific illness) but has secured not less than 70 % in the current semester may be permitted to appear for the current semester examinations with the approval of the Principal on payment of a condonation fee as may be fixed by the authorities from time to time. The medical certificate needs to be submitted along with the leave application. A candidate can avail this provision only twice during the entire duration of the degree programme.

A candidate who could not satisfy the attendance requirements as per clause 8.1.1 due to his/her entrepreneurships/ start ups activities, but has secured not less than 60 % in the current semester can be permitted to appear for the current semester examinations with the recommendation of review committee and approval from the Principal.

- **8.1.3** In addition to clause 8.1.1 or 8.1.2, a candidate shall secure not less than 60 % attendance in each course.
- **8.1.4** A candidate shall be deemed to have completed the requirements of study of any semester only if he/she has satisfied the attendance requirements (vide clause 8.1.1 to 8.1.3) and has registered for examination by paying the prescribed fee.
- 8.1.5 Candidate's progress is satisfactory.
- **8.1.6** Candidate's conduct is satisfactory and he/she was not involved in any indisciplined activities in the current semester.
- **8.2.** The candidates who do not complete the semester as per clauses from 8.1.1 to 8.1.6 except 8.1.3 shall not be permitted to appear for the examinations at the end of the semester and not be permitted to go to the next semester. They have to repeat the incomplete semester in next academic year.
- **8.3** The candidates who satisfy the clause 8.1.1 or 8.1.2 but do not complete the course as per clause 8.1.3 shall not be permitted to appear for the end semester examination of that course alone. They have to repeat the incomplete course in the subsequent semester when it is offered next.

REQUIREMENTS FOR APPEARING FOR END SEMESTER EXAMINATION

- **9.1** A candidate shall normally be permitted to appear for end semester examination of the current semester if he/she has satisfied the semester completion requirements as per clause 8, and has registered for examination in all courses of that semester. Registration is mandatory for current semester examinations as well as for arrear examinations failing which the candidate shall not be permitted to move on to the higher semester.
- **9.2** When a candidate is deputed for a National / International Sports event during End Semester examination period, supplementary examination shall be conducted for such a candidate on return after participating in the event within a reasonable period of time. Such appearance shall be considered as first appearance.
- **9.3** A candidate who has already appeared for a course in a semester and passed the examination is not entitled to reappear in the same course for improvement of letter grades / marks.



10. PROVISION FOR WITHDRAWAL FROM EXAMINATIONS

- **10.1** A candidate may, for valid reasons, be granted permission to withdraw from appearing for the examination in any regular course or all regular courses registered in a particular semester. Application for withdrawal is permitted only once during the entire duration of the degree programme.
- **10.2** The withdrawal application shall be valid only if the candidate is otherwise eligible to write the examination (vide clause 9) and has applied to the Principal for permission prior to the last examination of that semester after duly recommended by the Head of the Department.
- **10.3** The withdrawal shall not be considered as an appearance for deciding the eligibility of a candidate for First Class with Distinction/First Class.
- **10.4** If a candidate withdraws a course or courses from writing end semester examinations, he/she shall register the same in the subsequent semester and write the end semester examinations. A final semester candidate who has withdrawn shall be permitted to appear for supplementary examination to be conducted within reasonable time as per clause 14.
- **10.5** The final semester candidate who has withdrawn from appearing for project viva-voce for genuine reasons shall be permitted to appear for supplementary viva-voce examination within reasonable time with proper application to Controller of Examinations and on payment of prescribed fee.

11. PROVISION FOR BREAK OF STUDY

- 11.1 A candidate is normally permitted to avail the authorised break of study under valid reasons (such as accident or hospitalization due to prolonged ill health or any other valid reasons) and to rejoin the programme in a later semester. He/She shall apply in advance to the Principal, through the Head of the Department, stating the reasons therefore, in any case, not later than the last date for registering for that semester examination. A candidate is permitted to avail the authorised break of study only once during the entire period of study for a maximum period of one year. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for the break of study.
- **11.2** The candidates permitted to rejoin the programme after break of study / prevention due to lack of attendance shall be governed by the rules and regulations in force at the time of rejoining.
- **11.3** The candidates rejoining in new Regulations shall apply to the Principal in the prescribed format through Head of the Department at the beginning of the readmitted semester itself for prescribing additional/equivalent courses, if any, from any semester of the regulations in-force, so as to bridge the curriculum in-force and the old curriculum.
- **11.4** The total period of completion of the programme reckoned from the commencement of the semester to which the candidate was admitted shall not exceed the maximum period specified in clause 5 irrespective of the period of break of study in order to qualify for the award of the degree.

- **11.5** If any candidate is prevented for want of required attendance, the period of prevention shall not be considered as authorized break of study.
- 11.6 If a candidate has not reported to the college for a period of two consecutive semesters without any intimation, the name of the candidate shall be deleted permanently from the college enrollment. Such candidates are not entitled to seek readmission under any circumstances.

12. PASSING REQUIREMENTS

- **12.1** A candidate who secures not less than 50 % of total marks (continuous assessment and end semester examination put together) prescribed for the course with a minimum of 45 % of the marks prescribed for the end semester examination in all category of courses vide clause 7.1 except for the courses which are evaluated based on continuous assessment only shall be declared to have successfully passed the course in the examination.
- **12.2** A candidate who secures not less than 50 % in continuous assessment marks prescribed for the courses which are evaluated based on continuous assessment only shall be declared to have successfully passed the course. If a candidate secures less than 50% in the continuous assessment marks, he / she shall have to re-enroll for the same in the subsequent semester and satisfy the attendance requirements.
- **12.3** For a candidate who does not satisfy the clause 12.1, the continuous assessment marks secured by the candidate in the first attempt shall be retained and considered valid for subsequent attempts. However, from the fourth attempt onwards the marks scored in the end semester examinations alone shall be considered, in which case the candidate shall secure minimum 50 % marks in the end semester examinations to satisfy the passing requirements.

13. REVALUATION OF ANSWER SCRIPTS

A candidate shall apply for a photocopy of his / her semester examination answer script within a reasonable time from the declaration of results, on payment of a prescribed fee by submitting the proper application to the Controller of Examinations. The answer script shall be pursued and justified jointly by a faculty member who has handled the course and the course coordinator and recommended for revaluation. Based on the recommendation, the candidate can register for revaluation through proper application to the Controller of Examinations. The Controller of Examinations will arrange for revaluation and the results will be intimated to the candidate concerned. Revaluation is permitted only for Theory courses and Theory cum Practical courses where end semester examination is involved.

14. SUPPLEMENTARY EXAMINATION

If a candidate fails to clear all courses in the final semester after the announcement of final end semester examination results, he/she shall be allowed to take up supplementary examinations to be conducted within a reasonable time for the courses of final semester alone, so that he/she gets a chance to complete the programme.



15. AWARD OF LETTER GRADES:

For all the passed candidates, the relative grading principle is applied to assign the letter grades.

Marks / Examination Status	Letter Grade	Grade Point
	O (Outstanding)	10
	A+ (Excellent)	9
Deced on the valative grading	A (Very Good)	8
Based on the relative grading	B+ (Good)	7
	B (Average)	6
	C (Satisfactory)	5
Less than 50	U (Reappearance)	0
Successfully Completed	SC	0
Withdrawal	W	-
Absent	АВ	-
Shortage of Attendance in a course	SA	-

The Grade Point Average (GPA) is calculated using the formula:

$$GPA = \frac{\sum [(course credits) \times (grade points)] \text{ for all courses in the specific semester}}{\sum \sum (course credits) \times (grade points)] \text{ for all courses in the specific semester}}$$

 \sum (course credits) for all courses in the specific semester

The Cumulative Grade Point Average (CGPA) is calculated from first semester (third semester for lateral entry candidates) to final semester using the formula

$$CGPA = \frac{\sum [(course credits) \times (grade points)] \text{ for all courses in all the semesters so far}}{\sum (course credits) \text{ for all courses in all the semesters so far}}$$

The GPA and CGPA are computed only for the candidates with a pass in all the courses.

The GPA and CGPA indicate the academic performance of a candidate at the end of a semester and at the end of successive semesters respectively.

A grade sheet for each semester shall be issued containing Grade obtained in each course, GPA and CGPA.

A duplicate copy, if required can be obtained on payment of a prescribed fee and satisfying other procedure requirements.

Withholding of Grades: The grades of a candidate may be withheld if he/she has not cleared his/her dues or if there is a disciplinary case pending against him/her or for any other reason.

16. ELIGIBILITY FOR THE AWARD OF DEGREE

A candidate shall be declared to be eligible for the award of the BE / BTech Degree provided the candidate has

- i. Successfully completed all the courses under the different categories, as specified in the regulations.
- ii. Successfully gained the required number of total credits as specified in the curriculum corresponding to the candidate's programme within the stipulated time (vide clause 5).



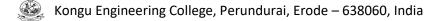
- iii. Successfully passed any additional courses prescribed by the respective Board of Studies whenever readmitted under regulations other than R-2022 (vide clause 11.3)
- iv. No disciplinary action pending against him / her.

17. CLASSIFICATION OF THE DEGREE AWARDED

17.1	First Class with Distinction:						
17.1.1.	A candidate who qualifies for the award of the degree (vide clause 16) and who satisfies the following conditions shall be declared to have passed the examination in First class with Distinction:						
	• Should have passed the examination in all the courses of all the eight semesters (six semesters for lateral entry candidates) in the First Appearance within eight consecutive semesters (six consecutive semesters for lateral entry candidates) excluding the authorized break of study (vide clause 11) after the commencement of his / her study.						
	• Withdrawal from examination (vide clause 10) shall not be considered as an appearance.						
	 Should have secured a CGPA of not less than 8.50 						
	(OR)						
17.1.2	A candidate who joins from other institutions on transfer or a candidate who gets readmitted and has to move from one regulations to another regulations and who qualifies for the award of the degree (vide clause 16) and satisfies the following conditions shall be declared to have passed the examination in First class with Distinction:						
	• Should have passed the examination in all the courses of all the eight semesters (six semesters for lateral entry candidates) in the First Appearance within eight consecutive semesters (six consecutive semesters for lateral entry candidates) excluding the authorized break of study (vide clause 11) after the commencement of his / her study.						
	 Submission of equivalent course list approved by the respective Board of studies. 						
	• Withdrawal from examination (vide clause 10) shall not be considered as an appearance.						
	Should have secured a CGPA of not less than 9.00						
17.2	First Class:						
	A candidate who qualifies for the award of the degree (vide clause 16) and who satisfies the following conditions shall be declared to have passed the examination in First class:						
	• Should have passed the examination in all the courses of all eight semesters (six semesters for lateral entry candidates) within ten consecutive semesters (eight consecutive semesters for lateral entry candidates) excluding authorized break of study (vide clause 11) after the commencement of his / her study.						
	• Withdrawal from the examination (vide clause 10) shall not be considered as an appearance.						
	 Should have secured a CGPA of not less than 6.50 						
17.3	Second Class: All other candidates (not covered in clauses 17.1 and 17.2) who qualify for the award of the						

All other candidates (not covered in clauses 17.1 and 17.2) who qualify for the award of the degree (vide clause 16) shall be declared to have passed the examination in Second Class.

17.4 A candidate who is absent for end semester examination in a course / project work after having registered for the same shall be considered to have appeared for that examination for the purpose of classification.



17.5 Honors Degree:

A candidate who qualifies for the award of the degree (vide clause 16) and who satisfies the following conditions shall be declared to have earned the BE/BTech degree with Honours (vide clause 16 and clause 4.2.2):

- Should have passed the examination in all the courses of all the eight semesters (six semesters for lateral entry candidates) in the **First Appearance** within eight consecutive semesters (six consecutive semesters for lateral entry candidates) excluding the authorized break of study (vide clause 11) after the commencement of his / her study.
- Withdrawal from examination (vide clause 10) shall not be considered as an appearance.
- Should have secured a CGPA of not less than 7.50

18. MALPRACTICES IN TESTS AND EXAMINATIONS

If a candidate indulges in malpractice in any of the tests or end semester examinations, he/she shall be liable for punitive action as per the examination rules prescribed by the college from time to time.

19. AMENDMENTS

Notwithstanding anything contained in this manual, the Kongu Engineering College through the Academic council of the College, reserves the right to modify/amend without notice, the Regulations, Curricula, Syllabi, Scheme of Examinations, procedures, requirements, and rules pertaining to its BE / BTech programme.

				Sur	nmary	of Cred	it Distri	bution		
Category				Sem	ester				Total number of credits	Curriculum Content (% of total number of credits of the program
	I	П	ш	IV	v	VI	VII	VIII		
HS	3	5	3	1			3		15	8.92
BS	8	8	4						20	11.90
ES	8	8	4	4					24	14.28
PC	3	4	12	16	15	8			58	34.52
PE					3	3	9	3	18	10.71
OE					4	4	3	3	14	8.33
EC				2	2	6	5	4	19	11.30
MC	0					0			0	0
Semester wise Total	22	25	23	23	24	21	20	10	168	100.00
				(Categor	у				Abbreviation
_ecture hours p	er week									L
Futorial hours p	er week									Т
Practical, Proje	ct work,	nternsh	ip, Profe	essional	Skill Tra	aining, Ir	ndustrial	Training	g hours per wee	ek P

		CATEGORISATION OF COURSES	6									
	HUMANITIES AND SOCIAL SCIENCE INCLUDING MANAGEMENT (HS)											
S. No.	Course Code	Course Name	L	т	Ρ	С	Sem					
1.	22EGT11	Communication Skills I	3	0	0	3	I					
2.	22TAM02	Tamils and Technology	1	0	0	1	П					
3.	22EGT21	Communication Skills II	3	0	0	3	П					
4.	22VEC11	Yoga and Values for Holistic Education				1	П					
5.	22TAM01	Heritage of Tamils	1	0	0	1	Ш					
6.	22GET31	Universal Human Values	2	0	0	2	Ш					
7.	22EGL31	Communication Skills Development Laboratory	0	0	2	1	IV					
8.	22GET71	Engineering Economics and Management	3	0	0	3	VII					
	То	tal Credits to be earned				15						

	BASIC SCIENCE (BS)										
S. No.	Course Code	Course Name	L	т	Р	С	Sem				
1.	22MAC11	Matrices and Ordinary Differential Equations	3	1*	2*	4	I				
2.	22CYT11	Chemistry for Electronics and Communication Engineering	3	0	0	3	Ι				
4.	22CYL11	Chemistry Laboratory for Electrical Systems	0	0	2	1	Ι				
6.	22PHT21	Physics for Electronics and Communication Engineering	3	0	0	3	П				
7.	22PHL21	Physics Laboratory for Electronics and Communication Engineering	0	0	2	1	П				
8.	22MAC21	Multivariable Calculus and Complex Analysis	3	1*	2*	4	П				
9.	22MAT33	Transforms and Probability Theory	3	1	0	4	111				
	Т	otal Credits to be earned				20					

		ENGINEERING SCIENCE (ES)					
S. No.	Course Code	Course Name	L	т	Р	С	Sem
1.	22MAC11	Problem Solving and Programming in C	3	0	2	4	I
2.	22ECT12	Basics of Electrical and Electronics Engineering	3	0	0	3	I
3.	22ECL11	Basics of Electrical and Electronics Engineering Laboratory	0	0	2	1	I
4.	22CSC21	Data Structures using C	3	0	2	4	П
5.	22MET11	Engineering Drawing	2	1	0	3	П
6.	22MEL11	Engineering Practices Laboratory	0	0	2	1	П
7.	22ITC31	Java Programming	3	0	2	4	Ш
8.	22ITC41	Programming In Python	3	0	2	4	IV
	Т	otal Credits to be earned				24	

		PROFESSIONAL COR	E (P	C)				
S. No.	Course Code	Course Name	L	т	Р	с	Sem	Domain/ Stream
1.	22ECT11	Circuits and Networks	3	0	0	3	I	EL
2.	22ECT21	Electromagnetic fields	3	1	0	4	П	EL
3.	22ECT31	Digital Electronics	3	0	0	3	111	VD
4.	22ECT32	Electronic Circuits	3	0	0	3	111	EL
5.	22ECC31	Linear Integrated Circuits	3	0	2	4	111	EL
6.	22ECL31	Digital Electronics Laboratory	0	0	2	1	111	VD
7.	22ECL32	Electronic Circuits Laboratory	0	0	2	1	111	EL
8.	22ECT41	Digital Signal Processing	3	1	0	4	IV	SIP
9.	22ECT42	Microprocessor and Microcontroller	3	0	0	3	IV	ES
10.	22ECT43	Transmission Lines and Waveguides	3	0	0	3	IV	CN
11.	22ECT44	Control Engineering	3	1	0	4	IV	EL
12.	22ECL41	Digital Signal Processing Laboratory	0	0	2	1	IV	VD
13.	22ECL42	Microprocessor and Microcontroller Laboratory	0	0	2	1	IV	ES
14.	22ECT51	VLSI Design	3	0	0	3	V	SIP
15.	22ECT52	Analog and Digital Communication	3	0	0	3	V	CN
16.	22ECC51	Embedded Systems and IoT	2	0	2	3	V	ES
17.	22ECC52	Antennas and Wave Propagation	3	0	2	4	V	CN
18.	22ECL51	VLSI Design Laboratory	0	0	2	1	V	SIP
19.	22ECL52	Analog and Digital Communication Laboratory	0	0	2	1	V	CN
20.	22ECT61	Microwave and Optical Communication	3	0	0	3	VI	CN
21.	22ECT62	Data Communication and Networking	3	0	0	3	VI	CN
22.	22ECL61	Microwave and Optical Communication Laboratory	0	0	2	1	VI	CN
23.	22ECL62	Data Communication and Networking Laboratory	0	0	2	1	VI	CN
	•	Total Credits to be earned				58		

. No.	Course Code	Course Name	L	Т	Ρ	С	Domain/ Stream
		Semester - V					
		Elective – I					
1.	22ECF01	Modern Electronic Instrumentation	2	0	2	3	EL
2.	22ECE01	Medical Electronics	3	0	0	3	EL
3.	22ECE02	Computer Architecture and Interfacing	3	0	0	3	EL
4.	22ECE03	Embedded System Design	3	0	0	3	ES
5.	22ECF02	Digital Image Processing and its Applications	2	0	2	3	SIP
6.	22ECF03	Artificial Intelligence and Machine Learning	2	0	2	3	SIP
7.	22ECF04	Linux Operating System	2	0	2	3	SD
8.	22ECE04	Data Science for Engineers	3	0	0	3	SD
	1	Semester - VI	I	I	I		I
	2250525	Elective – II	0	-		0	
9.	22ECE05	Mobile Communication	3	0	0	3	CN
10.	22ECE06	Embedded Architecture and Standards	3	0	0	3	ES
11.	22ECF05	Electronics Circuit Board Design	2	0	2	3	EL
12.	22ECF06	Single Board Computer	2	0	2	3	ES
13.	22ECF07	ASIC Design	2	0	2	3	VD
14.	22ECF08	Soft Computing Techniques	2	0	2	3	SIP
15.	22ECF09	DSP Processor and its Applications	2	0	2	3	SIP
16.	22ECF10	Deep Learning and its Applications	2	0	2	3	SIP
	1	Semester - VII	I	1	11		1
		Elective - III					
17.	22ECE07	Wireless Broadband Communication	3	0	0	3	CN
18.	22ECE08	Network Information Security	3	0	0	3	CN
19.	22ECE09	Real Time Operating System	3	0	0	3	ES
20.	22ECF11	Scripting languages for VLSI	2	0	2	3	VD
21.	22ECE10	Quantum Computing and Information	3	0	0	3	VD
22.	22ECF12	Wavelet Transform and its Applications	2	0	2	3	SIP
23.	22ECF133	Computer Vision	2	0	2	3	SIP
24.	22ECE11	Edge Computing	3	0	0	3	SD

		Elective – IV					
25.	22ECE12	Satellite Communication	3	0	0	3	CN
26.	22ECE13	Wireless Networks	3	0	0	3	CN
27.	22ECE14	RISC Architecture	3	0	0	3	ES
28.	22ECE15	System Verilog	3	0	0	3	VD
29.	22ECE16	Neural Science for Engineers	3	0	0	3	SIP
30.	22ECE17	Remote Sensing	3	0	0	3	SIP
31.	22ECE18	Natural Language Processing	3	0	0	3	SIP
32.	22ECE19	Blockchain Technology	3	0	0	3	SD
	1	Elective - V					
33.	22ECE20	Next Generation Wireless Communication Systems	3	0	0	3	CN
34.	22ECE21	Radar Engineering	3	0	0	3	CN
35.	22ECE22	Automotive Electronic Systems	3	0	0	3	EL
36.	22ECE23	Wireless Sensor Networks	3	0	0	3	ES
37.	22ECE24	Industry 4.0	3	0	0	3	ES
38.	22ECE25	Testing and Fault Diagnosis of VLSI Circuits	3	0	0	3	VD
39.	22ECE26	MEMS Design	3	0	0	3	VD
40.	22ECE27	Software Quality Assurance and Testing	3	0	0	3	SD
		Semester - VII	I				
		Elective - VI					
41.	22ECE28	Software Defined Radio	3	0	0	3	CN
42.	22ECE29	RF Communications	3	0	0	3	CN
43.	22ECF14	Wearable Technology	2	0	2	3	ES
44.	22ECE30	Cyber Physical Systems	3	0	0	3	ES
45.	22ECE31	NanoTechnology For Energy Sustainability	3	0	0	3	VD
46.	22ECE32	Low Power VLSI Design	3	0	0	3	VD
47.	22ECE33	Brain Computer Interface and Applications	3	0	0	3	SIP
	7	Fotal Credits to be earned				18	

* Domain/Stream Abbreviations: AUTO - Automobile, DSN - Design, EE–Electrical and Electronics, TF–Thermal and Fluid, MFG- Manufacturing, GE – General Engineering

	EMPLOYABILITY ENHANCEMENT COURSES (EC)									
S. No.	Course Code	Course Name	L	Т	Р	С	Sem			
1.	22GEL41	Professional Skills Training I	-	-	-	2	IV			
2.	22GEL51	Professional Skills Training II	-	-	-	2	V			
3.	22ECP61	Project Work I	0	0	8	4	VI			
4.	22GEP61	Comprehensive Test and Viva	2	0	0	2	VI			
5.	22ECP71	Project Work II Phase I	0	0	10	5	VII			
6.	22ECP81	Project Work II Phase II	0	0	8	4	VIII			
	Tot	tal Credits to be earned				19				

	MANDATORY COURSES (MC)										
S. No.	Course Code	Course Name	L	Т	Ρ	С	Sem				
1.	22MNT11	Student Induction Program				0	Ι				
2.	22MNT31	Environmental Science	2	0	0	0	VI				
	То	tal Credits to be earned				0					

LIST OF OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS (OEs)

S. No.	Course Code	Course Name	L	т	Ρ	С	Sem
1.	22ECX01	Basics of Electronics in Automation Appliances	3	0	2	4	V
2.	22ECX02	Image Processing	3	0	2	4	V
3.	22ECX03	PCB Design and Fabrication	3	0	2	4	VI
4.	22ECO01	Wearable Devices	3	0	0	3	VII
5.	22ECX04	Electronic Hardware and Troubleshooting	2	0	2	3	VII
6.	22ECO02	Optical Engineering	3	0	0	3	VIII

	OPEN ELECTIVE COURSES OFFERED BY OTHER DEPARTMENTS (OE)									
S. No.	Course Code	Course Name	L	т	Ρ	С	OFFERED BY			
		SEMESTER V								
1.	22CEX01	Remote Sensing and its Applications	3	0	2	4	CIVIL			
2.	22MEX01	Renewable Energy Sources	3	0	2	4	MECH			
3.	22MTO01	Design of Mechatronics Systems	3	1	0	4	MTS			
4.	22MTX01	Data Acquisition and Virtual Instrumentation	3	0	2	4	MTS			
5.	22MTX02	Factory Automation	3	0	2	4	MTS			
6.	22AUX01	Automotive Engineering	3	0	2	4	AUTO			

7.	22ECX01	Basics of Electronics in Automation Appliances	3	0	2	4	ECE
8.	22ECX02	Image Processing	3	0	2	4	ECE
9.	22EEO01	Solar and Wind Energy Systems	3	1	0	4	EEE
10.	22EEO02	Electrical Wiring and Lighting	3	1	0	4	EEE
11.	22EEO03	Programmable Logic Controller and SCADA	3	1	0	4	EEE
12.	22EEO04	Analog and Digital Electronics	3	1	0	4	EEE
13.	22EEO05	Power Electronics and Drives	3	1	0	4	EEE
14.	22EEO06	Sensors and Actuators	3	1	0	4	EEE
15.	22EIO01	Measurements and Instrumentation	3	1	0	4	EIE
16.	22EIO02	Biomedical Instrumentation and Applications	3	1	0	4	EIE
17.	22EIO03	Industrial Automation	3	1	0	4	EIE
18.	22CSX01	Fundamentals of Databases	3	0	2	4	CSE
19.	22CSX02	Data science for Engineers	3	0	2	4	CSE
20.	22CSX03	Enterprise Application Development Using Java	3	0	2	4	CSE
21.	22CSO01	Computational science for Engineers	3	1	0	4	CSE
22.	22CSO02	Formal Languages and Automata Theory	3	1	0	4	CSE
23.	22ITO01	Artificial Intelligence	3	1	0	4	IT
24.	22ITX01	Next Generation Databases	3	0	2	4	IT
25.	22GEX02	NCC Studies (Air Wing) - 1	3	0	2	4	IT
26.	22CDO01	Fundamentals of User Experience Design	3	1	0	4	CSD
27.	22ADO01	Data Warehousing and Data Mining	3	1	0	4	AIDS
28.	22ALO01	Business Intelligence	3	1	0	4	AIML
29.	22CHO01	Industrial Enzymology	3	1	0	4	CHEM
30.	22CHO02	Waste to Energy Conversion	3	1	0	4	СНЕМ
31.	22CHO03	Applied Nanotechnology	3	1	0	4	CHEM
32.	22FTX01	Baking Technology	3	0	2	4	FT
33.	22FTO01	Food Processing Technology	3	1	0	4	FT
34.	22MAO01	Mathematical Foundations for Machine Learning	3	1	0	4	MATHS
35.	22MAO02	Numerical Computing	3	1	0	4	MATHS
36.	22MAO03	Stochastic Processes and Queuing Theory	3	1	0	4	MATHS

37.	22MAO04	Statistics for Engineers	3	1	0	4	MATHS				
38.	22PHO01	Thin Film Technology	3	1	0	4	PHYSICS				
39.	22PHO02	High Energy Storage Devices	3	1	0	4	PHYSICS				
40.	22PHO03	Structural and Optical Characterization of Materials	3	1	0	4	PHYSICS				
41.	22CYO01	Instrumental Methods of Analysis	3	1	0	4	CHEMISTRY				
42.	22CYO02	Chemistry Concepts for Competitive Examinations	3	1	0	4	CHEMISTRY				
43.	22CYO03	Organic Chemistry for Industry	3	1	0	4	CHEMISTRY				
SEMESTER VI											
44.	22CEO01	Disaster Management	3	1	0	4	CIVIL				
45.	22MEX02	Design of Experiments	3	0	2	4	MECH				
46.	22MTO02	Robotics	3	1	0	4	MTS				
47.	22MTO03	3D Printing and Design	3	1	0	4	MTS				
48.	22AUO01	Automotive Electronics	3	1	0	4	ECE				
49.	22ECX03	PCB Design and Fabrication	3	0	2	4	ECE				
50.	22EEO07	Energy Conservation and Management	3	1	0	4	EEE				
51.	22EEO08	Microprocessors and Microcontrollers Interfacing	3	1	0	4	EEE				
52.	22EEO09	Electrical Safety	3	1	0	4	EEE				
53.	22EEO10	VLSI System Design	3	1	0	4	EEE				
54.	22EEO11	Automation for Industrial Applications	3	1	0	4	EEE				
55.	22EIO04	PLC Programming with High Level Languages	3	1	0	4	EIE				
56.	22EIO05	Virtual Instrumentation	3	1	0	4	EIE				
57.	22CSX04	Foundations of Machine Learning	3	0	2	4	CSE				
58.	22CSX05	Web Engineering	3	0	2	4	CSE				
59.	22ITX02	Advanced Java Programming	3	0	2	4	IT				
60.	22ITO02	Internet of Things	3	1	0	4	IT				
61.	22ITO03	Fundamentals of Software Development	3	1	0	4	IT				
62.	22ITO04	Mobile Application Development	3	1	0	4	IT				
63.	22CDX01	Fundamentals of User Interactive Design	3	0	2	4	CSD				
64.	22ADX01	Data Visualization	3	0	2	4	AIDS				
65.	22ALX01	Data Exploration and Visualization Techniques	3	0	2	4	AIML				
66.	22CHO04	Air Pollution Monitoring and Control	3	1	0	4	CHEM				

67.	22CHO05	Paints and Coatings	3	1	0	4	CHEM				
68.	22CHO06	Powder Technology	3	1	0	4	СНЕМ				
	22FTX02	Processing of milk and milk products	3	0	2	4	FT				
	22FTX03	Processing of Fruits and Vegetables	3	0	2	4	FT				
69.	22MAO05	Graph Theory and its Applications	3	1	0	4	MATHS				
70.	22MAX01	Data Analytics using R Programming	3	0	2	4	MATHS				
71.	22MAO06	Operations Research	3	1	0	4	MATHS				
72.	22MAO07	Number Theory and Cryptography	3	1	0	4	MATHS				
73.	22PHO04	Synthesis, Characterization and Biological Applications of Nanomaterials	3	1	0	4	PHYSICS				
74.	22PHO05	Techniques of Crystal Growth	3	1	0	4	PHYSICS				
75.	22CYO04	Corrosion Science and Engineering	3	1	0	4	CHEMISTRY				
76.	22CYO05	Chemistry of Cosmetics in Daily Life	3	1	0	4	CHEMISTRY				
77.	22CYO06	Nanocomposite Materials	3	1	0	4	CHEMISTRY				
		SEMESTER VII									
78.	22CEO02	Introduction to Smart Cities	3	0	0	3	CIVIL				
79.	22CEO03	Environmental Health and Safety	3	0	0	3	CIVIL				
80.	22MEO01	Fundamentals of Ergonomics	3	0	0	3	MECH				
81.	22MEO02	Principles of Management and Industrial Psychology	3	0	0	3	MECH				
82.	22MEO03	Waste Heat Recovery System and Storage	3	0	0	3	MECH				
83.	22MTO04	Drone System Technology	3	0	0	3	MTS				
84.	22AUO02	Vehicle Maintenance	3	0	0	3	AUTO				
85.	22ECO01	Wearable Devices	3	0	0	3	ECE				
86.	22ECX04	Electronic Hardware and Troubleshooting	2	0	2	3	ECE				
87.	22EEO12	Electric Vehicle	3	0	0	3	EEE				
88.	22EEO13	E-Waste Management	3	0	0	3	EEE				
89.	22EEO14	Embedded System Design	3	0	0	3	EEE				
90.	22EEO15	Energy Storage Systems and Controllers	3	0	0	3	EEE				
91.	22EEO16	AI Techniques for Engineering Applications	3	0	0	3	EEE				
92.	22EIO06	Introduction to Distributed Control Systems	3	0	0	3	EIE				
93.	22EIO07	Instrumentation in Aircraft Navigation and Control	3	0	0	3	EIE				

94.	22EIO08	Industry 4.0 with Industrial IoT	3	0	0	3	EIE				
95.	22EIO09	Industrial Data Communication	3	0	0	3	EIE				
96.	22EIO10	Wireless Instrumentation	3	0	0	3	EIE				
97.	22EIO11	Instrumentation Techniques in Agriculture	3	0	0	3	EIE				
98.	22CSO03	Nature Inspired optimization techniques	3	0	0	3	CSE				
99.	22ITO05	Fundamentals of Cloud Computing	3	0	0	3	IT				
100.	22CDO02	Introduction to Mobile Game Design	3	0	0	3	CSD				
101.	22CDO03	Introduction to Graphics Design	3	0	0	3	CSD				
102.	22ADO02	Neural Networks and Deep Learning	3	0	0	3	AIDS				
103.	22ALO02	Industrial Machine Learning	3	0	0	3	AIML				
104.	22CHO07	Hydrogen Energy	3	0	0	3	CHEM				
105.	22CHO08	Rubber Technology	3	0	0	3	CHEM				
106.	22FTO02	Principles of Food safety	3	0	0	3	FT				
107.	22FTO03	Fundamentals of Food Packaging and Storage	3	0	0	3	FT				
108.	22MAO08	Non-Linear Optimization	3	0	0	3	MATHS				
109.	22MAO09	Optimization for Engineers	3	0	0	3	MATHS				
110.	22CYO07	Waste and Hazardous Waste Management	3	0	0	3	CHEMISTRY				
111.	22CYO08	Chemistry in Every day Life	3	0	0	3	CHEMISTRY				
		SEMESTER VIII									
112.	22CEO04	Infrastructure Planning and Management	3	0	0	3	CIVIL				
113.	22CEO05	Environmental Laws and Policy	3	0	0	3	CIVIL				
114.	22MEO04	Safety Measures for Engineers	3	0	0	3	MECH				
115.	22MEO05	Energy Conservation in Thermal Equipments	3	0	0	3	MECH				
116.	22MEO06	Climate Change and New Energy Technology	3	0	0	3	MECH				
117.	22MTO05	Micro and Nano Electromechanical Systems	3	0	0	3	MTS				
118.	22AUO03	Public Transport Management	3	0	0	3	ECE				
119.	22AUO04	Autonomous Vehicles	3	0	0	3	ECE				
120.	22ECO02	Optical Engineering	3	0	0	3	EEE				
121.	22EEO17	Smart Grid Technologies	3	0	0	3	EEE				
122.	22EEO18	Biomass Energy Systems	3	0	0	3	EEE				
123.	22EIO12	Environmental Sensors	3	0	0	3	EIE				

124.	22EIO13	Pollution Control and Management	3	0	0	3	EIE
125.	22CSO04	Machine Translation	3	0	0	3	CSE
126.	22CSO05	Fundamentals of Blockchain	3	0	0	3	CSE
127.	22ITO06	Introduction to Ethical Hacking	3	0	0	3	IT
128.	22ITO07	Business Continuity Planning	3	0	0 3 17		IT
129.	22CDX02	/irtual Reality and Augmented Reality		0	0 0		CSD
130.	22ADO03	Business Analytics	3	0	0	3	AIDS
131.	22ALO03	Machine Learning for Smart Cities	3	0	0	3	AIML
132.	22CHO09	Industrial Accident Prevention and Management	3	0	0	3	CHEM
133.	22CHO10	Electrochemical Engineering	3	0	0	3	CHEM
134.	22CHO11	Smart and Functional Materials	3	0	0	3	CHEM
135.	22FTO04	Food Ingredients	3	0	0	3	FT
136.	22FTO05	Food and Nutrition	3	0	0	3	FT
137.	22CYO09	Chemistry of Nutrition for Women Health		0	0	3	CHEMISTRY

SNo	Course Code	Course Title	L	Т	Ρ	С	Offering Department	Semester
1.	22GEO01	German Language Level 1	4	0	0	4	ECE	ALL
2.	22GEO02	Japanese Language Level 1	4	0	0	4	ECE	ALL
3.	22GEO03	Design Thinking for Engineers	3	1	0	4	CSE	5
4.	22GEO04	Innovation and Business Model Development	3	1	0	4	MTS	6
5.	22GEO05	German Language Level 2	4	0	0	4	ECE	ALL
6.	22GEO06	German Language Level 3	3	0	0	3	ECE	ALL
7.	22GEO07	German Language Level 4	3	0	0	3	ECE	ALL
8.	22GEO08	Japanese Language Level 2	4	0	0	4	ECE	ALL
9.	22GEO09	Japanese Language Level 3	3	0	0	3	ECE	ALL
10.	22GEO10	Japanese Language Level 4	3	0	0	3	ECE	ALL
11.	22GEO11	French Language Level 1	4	0	0	4	ECE	ALL
12.	22GEO12	French Language Level 2	4	0	0	4	ECE	ALL
13.	22GEO13	French Language Level 3	3	0	0	3	ECE	ALL
14.	22GEO14	Spanish Language Level 1	4	0	0	4	ECE	ALL
15.	22GEO15	Spanish Language Level 2	4	0	0	4	ECE	ALL
16.	22GEO16	Spanish Language Level 3	3	0	0	3	ECE	ALL
17.	22GEO17	Entrepreneurship Development	3	0	0	3	MTS	7
18.	22GEX01	NCC Studies (Army Wing) - I	3	0	2	4	EEE	5/6
19.	22GEX02	NCC Studies (Air Wing) - 1	3	0	2	4	IT	5/6
20.	22MBO01	Cost Accounting for Engineers	3	1	0	4	MBA	5
21.	22MBO02	Economic Analysis for Decision Making	3	1	0	4	MBA	6
22.	22MBO03	Marketing Analytics	3	1	0	4	MBA	7

GENERAL OPEN ELECTIVE (Common to All BE/BTech branches)

KECR2022: SCHEDULING OF COURSES – BE (Electronics and Communication Engineering)

Total Credits: 168

Sem	Course1	Course2	Course3	Course4	Course5	Course6	Course7	Course8	Course9	Course10	сн
I	22EGT11 Communication Skills –I (3-0-0-3)	22MAC11 Matrices and Ordinary Differential Equations (3- 1*-2*-4)	22CYT11 Chemistry for Electronics and Communication Engineering (3-0-0-3)	22ECT11 Circuits and Networks (3-0-0-3)	22CSC11 Problem Solving and Programming in C (3-0-2-4)	22ECT12 Basics of Electrical and Electronics Engineering (3-0-0-3)	22ECL11 Basics of Electronics and Electrical Engineering Laboratory (0-0-2-1)	22CYL11 Chemistry Laboratory for Electrical Systems (0-0-2-1)	22MNT11 Student Induction Program (0)		22
11	22GET21 Communication Skills –II (3-0-0-3)	22MAC21 Multivariable Calculus and Complex Analysis (3-1*-2*-4)	22PHT21 Physics for Electronics and Communication Engineering (3-0-0-3)	22ECT21 Electromagnetic fields (3-1-0-4)	22CSC21 Data Structures using C (3-0-2-4)	22MET11 Engineering Drawing (2-1-0-3)	22TAM02 Tamils and Technology (1-0 -0 -1)	22PHL21 Physics Laboratory for Electronics and Communication Engineering (0-0-2-1)	22MEL11 Engineering Practices Laboratory (0-0-2-1)	22VEC11 Yoga and Values for Holistic Education (1)	25
	22MAT34 Transforms and Probability Theory (3-1-0-4)	22ITC31 Java Programming (3-0-2-4)	22ECT31 Digital Electronics (3-0-0-3)	22ECT32 Electronic Circuits (3-0-0-3)	22ECC31 Linear Integrated Circuits (3-0-2-4)	22GET31 Universal Human Values (2-0-0-2)	22TAM01 Heritage of Tamils (1-0-0-1)	22ECL31 Digital Electronics Laboratory (0-0-2-1)	22ECL32 Electronic Circuits Laboratory (0-0-2-1)		23
IV	22ITC41 Programming In Python (3-0-2-4)	22ECT41 Digital Signal Processing (3-1-0-4)	22ECT42 Microprocessor and Microcontroller (3-0-0-3)	22ECT43 Transmission Lines and Waveguides (3-0-0-3)	22ECT44 Control Engineering (3-1-0-4)	22ECL41 Digital Signal Processing Laboratory (0-0- 2-1)	22ECL42 Microprocessor and Microcontroller Laboratory (0-0-2-1)	22EGL311 Communication Skills Development Laboratory (0-0-2-1)	22GEL41 Professional Skills Training I (2-0 -0 -2)		23
v	22ECT51 VLSI Design (3-0-0-3)	22ECT52 Analog and Digital Communication (3-0-0-3)	22ECC51 Embedded Systems and IoT (3-0-2-4)	22ECC52 Antennas and Wave Propagation (2-0-2-3)	Professional Elective I (3/2-0-0/2-3)	Open Elective – I (3-1/0-0/2-4)	22ECL51 VLSI Design Laboratory (0-0-2-1)	22ECL52 Analog and Digital Communication Laboratory (0-0-2-1)	22GEL51 Professional Skills Training II (2-0 -0 -2)		24
VI	22ECT61 Microwave and Optical Communication (3-0-0-3)	22ECT62 Data Communication and Networking (3-0-0-3)	Professional Elective II (3/2-0-0/2-3)	Open Elective –II (3-1/0-0/2-4)	22ECL61 Microwave and Optical Communication Laboratory (0-0-2-1)	22ECL62 Data Communication and networking Laboratory (0-0-2-1)	22ECP61 Project Work I (0-0-4-2)	22MNT31 Environmental Science (2-0-0-0)	22GEP61 Comprehensive Test and Viva (2-0-0-2)		21
VII	22GET71 Engineering Economics and Management (3-0-0-3)	Professional Elective III (3/2-0-0/2-3)	Professional Elective IV (3/2-0-0/2-3)	Professional Elective V (3/2-0-0/2-3)	Open Elective III (3-0-0-3)	Project Work II Phase I (0-0-8-4)					20
VIII	Professional Elective VI (3-0-0-3)	Open Elective IV (3-0-0-3)	22ECP81 Project Work II Phase II (0-0-14-7)								10

MAPPING OF COURSES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
1	22EGT11	Communication Skills I						✓			1	1		~		
1	22MAC11	Matrices and Ordinary Differential Equations	1	1	~		~									
1	22CYT11	Chemistry for Electronics and Communication Engineering	~	~					~						~	~
1	22ECT11	Circuits and Networks	~	✓	✓									✓	✓	✓
1	22CSC11	Problem Solving and Programming in C	1	1	✓	✓										
1	22ECT12	Basics of Electrical and Electronics Engineering	1	~	~	~	1	~	~	~	~	~		~	~	~
1	22ECL11	Basics of Electronics and Electrical Engineering Laboratory	1	~	~	*	~	*	~	*	~	~		~	*	~
1	22CYL11	Chemistry Laboratory For Electrical Systems	1	✓		✓			✓						✓	✓
1	22GCL12	Foundation Engineering Laboratory II	1	✓	~											
2	22EGT21	Communication Skills II						1			~	✓		~		
2	22MAC21	Multivariable Calculus and Complex Analysis	1	~	✓		1									
2	22PHT21	Physics for Electronics and Communication Engineering	1	~	~						~	~		~	~	~
2	22ECT21	Electromagnetic Fields	1	1			1				~	✓			✓	
2	22CSC21	Data Structures using C	1	✓												
2	22MET11	Engineering Drawing	1	~			~					~		~	~	~
2	22TAM02	Tamils and Technology						1		1	1	✓		✓		
2	22PHL21	Physics Laboratory for Electronics and Communication Engineering	1	1	~	~					~	1		~	~	
2	22MEL11	Engineering Practices Laboratory	1		~	~	~				✓	✓		~	✓	✓
2	22GCL11	Foundation Engineering Laboratory I	1	✓	~		~				1	1		~		
2	22VEC11	Yoga and Values for Holistic Education						1		1	1					
3	22MAT33	Transforms and Probability theory	1	1	✓		✓	1							✓	

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Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
3	22ITC31	Java Programming	✓	1												
3	22ECT31	Digital Electronics	✓	✓	~	✓	✓				~			✓	✓	✓
3	22ECT32	Electronic Circuits	~	1	✓	✓	~	~	1		~	✓		✓	✓	
3	22ECC31	Linear Integrated Circuits	1	1	1	✓	~	1	1	1	1			1	1	✓
3	22GET31	Universal Human Values	~	1												
3	22TAM01	Heritage of Tamils						1		1	1	1		1		
3	22ECL31	Digital Electronics Laboratory	1	1	~	✓	✓	1			~	✓		1	✓	✓
3	22ECL32	Electronic Circuits Laboratory	1	1	1	✓	~	~		1	1	1		1	1	✓
4	22ITC41	Programming In Python	1	1												
4	22ECT43	Transmission Lines and Waveguides	1	1	~	✓				1					1	✓
4	22ECT44	Control Engineering	1	1	1	~	✓				1	✓		1	1	✓
4	22ECT41	Digital Signal Processing	1	1	1	✓	~				1	1		1	1	
4	22ECT42	Microprocessor and Microcontroller	1	1				~				1		1	1	✓
4	22ECL41	Digital Signal Processing Laboratory	1	1	1	✓	~	1	1		1		1		1	1
4	22ECL42	Microprocessor and Microcontroller Laboratory	1	1							1	1		1	1	
4	22EGL31	Communication Skills Development Laboratory									~	~		~		
4	22GCL41	Professional Skills Training - I	~	1				~	~		~	~	~	~		
5	22ECT51	VLSI Design	✓	✓	~		✓				~			✓	✓	✓
5	22ECT52	Analog and Digital Communication	~	1	1	✓	1		1	~	~	~	~	✓	~	
5	22ECC51	Embedded Systems and IoT	1	1	~	✓	✓			1	~		1	1	✓	✓
5	22ECC52	Antennas and Wave Propagation	1	1	~	1	~		1	1	~	✓		1	✓	✓
5	22ECL51	VLSI Design Laboratory	1	1	~	1	1				1			1	1	1
5	22ECL52	Analog and Digital Communication Laboratory	✓	1	✓	1	1				1	✓	1	1	✓	
5	22GEL51	Professional Skills Training - II	✓	✓				~	✓		✓	✓	✓	✓		

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
6	22ECT61	Microwave and Optical Communication	✓	1	1		✓	✓		✓			✓	1	✓	✓
6	22ECT62	Data Communication and Networking	✓	1	1	✓	✓		✓	✓	✓	✓		1	✓	✓
6	22ECL61	Microwave and Optical Communication Laboratory	~	~	~		~				~		~	~	~	~
6	22ECL62	Data Communication and Networking Laboratory	✓	~	~	~		~			~	~		~	~	
6	22ECP61	Project Work I	1	1	1	✓	✓	✓	✓	✓	~	✓	✓	1	✓	✓
6	22MNT31	Environmental Science	1	✓					✓							
7	22GCT71	Engineering Economics and Management	✓	~	1			✓	✓	✓	✓	✓	✓	✓	✓	✓
7	22ECP71	Project Work II Phase I	1	~	~	✓	1	1	1	1	✓	~	1	~	~	✓
8	22ECP81	Project Work II Phase II	1	✓	~	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Professional Electives														
5	22ECF01	Modern Electronic Instrumentation	✓	1		✓	✓				1	✓		1	✓	✓
5	22ECE01	Medical Electronics	1	✓	✓			✓		✓	✓			✓	✓	
5	22ECE02	Computer Architecture and Interfacing	✓	~	~	~	✓							✓	~	✓
5	22ECE03	Embedded System Design	1	✓	~	✓	✓	✓	✓	✓		~		✓	✓	✓
5	22ECF02	Digital Image Processing and its Applications	✓	1	1	1	✓	✓		✓	✓	✓		1	✓	✓
5	22ECF03	Artificial Intelligence and Machine Learning	✓	~	1	~	~	✓			✓	✓		✓	✓	
5	22ECF04	Linux Operating System	✓	1	1		✓									
5	22ECE04	Data Science for Engineers	✓	1	1	1	✓						1	1	✓	✓
6	22ECE05	Mobile Communication	✓	1	1	1	1							1	1	
6	22ECE06	Embedded Architecture and Standards	✓	1	1	✓	1	1	1	1			1	1	1	✓
6	22ECF05	Electronics Circuit Board Design	✓	1	~	~	1	1	1	1	✓	✓		1	1	✓
6	22ECF06	Single Board Computer	✓	~	1	~	1	1			1	~	1	~	~	✓
6	22ECF07	ASIC Design	~	~	~		1				✓	✓		~	✓	✓
6	22ECF08	Soft Computing Techniques	✓	~	~		~	1	✓	1	✓	~		~	✓	

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
6	22ECF09	DSP Processor and its Applications	~	1	1	1	~	1			~	✓		~	~	
6	22ECF10	Deep Learning and its Applications	✓	1	1	~	✓	1		1	1	✓		~	1	✓
7	22ECE07	Wireless Broadband Communication	✓	✓	✓	✓	✓					✓	✓	✓	4	
7	22ECE08	Network Information Security	✓	✓	✓	✓				✓					✓	
7	22ECE09	Real Time Operating System	✓	1	✓	✓	✓	1		1	1		✓	✓	✓	✓
7	22ECF11	Scripting languages for VLSI	~	1	1	1	1				~	~		1	1	✓
7	22ECE10	Quantum Computing and Information	✓	1	1									~	~	
7	22ECF12	Wavelet Transform and its Applications	1	~	~	~	✓				1	1			✓	
7	22ECF13	Computer Vision	✓	~	✓	✓	✓				1			1	1	✓
7	22ECE11	Edge Computing	✓	✓	✓		✓			✓	✓					
7	22ECE12	Satellite Communication	~	✓	✓	✓		1		1				1	1	✓
7	22ECE13	Wireless Networks	✓	1	✓	1	✓	1								
7	22ECE14	RISC Architecture	✓	1	✓	✓	✓	✓	✓	✓	✓	✓	~	✓	1	✓
7	22ECE15	System Verilog	~		1									~	~	✓
7	22ECE16	Neural Science for Engineers	~	1	1	~	✓	1		1				~		✓
7	22ECE17	Remote Sensing	✓	1			✓	1	✓	1	~			✓	~	✓
7	22ECE18	Natural Language Processing	1	~	~	✓	~	1		1	1				1	✓
7	22ECE19	Blockchain Technology	✓	✓	✓	✓								~	1	
7	22ECE20	Next Generation Wireless Communication Systems	~	~	~	~				1	~	✓	~	~	~	
7	22ECE21	Radar Engineering	✓	✓	✓	✓		✓	✓	✓				✓	✓	✓
7	22ECE22	Automotive Electronic Systems	~	1	1	1	1	1	✓	1				~	~	✓
7	22ECE23	Wireless Sensor Networks	~	1	1	1				1	~		1	~	~	✓
7	22ECE24	Industry 4.0	✓	✓	1	1	1	1	1			✓	~		1	✓
7	22ECE25	Testing and Fault Diagnosis of VLSI Circuits	✓	~	~									~	~	✓

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
7	22ECE26	MEMS Design	1	1	1	1	1							✓	✓	
7	22ECE27	Software Quality Assurance and Testing	1	✓	~	1	✓			✓			✓	✓	✓	✓
8	22ECE28	Software Defined Radio	~	~	~		1		1	1	~	~			~	✓
8	22ECE29	RF Communications	~	~	~	~				~		~	~	~	~	
8	22ECF14	Wearable Technology	~	~	1	1	1	1	1	1	1	1	1	1	✓	✓
8	22ECE30	Cyber Physical Systems	~	~	~	1		1		1					✓	✓
8	22ECE31	NanoTechnology For Energy Sustainability	~	~	1	1	1	1	1		1	1			✓	
8	22ECE32	Low Power VLSI Design	~	1	1									✓	✓	✓
8	22ECE33	Brain Computer Interface and Applications	~	1	1	1	✓			1				✓	✓	✓
5	22ECX01	Basics of Electronics in Automation Appliances	~	✓	~	1		1	1	✓			✓	✓		
6	22ECX02	Image Processing	~	1	✓	1	~				~	✓		✓		
6	22ECX03	PCB Design and Fabrication	~	✓	~	1	1	1	1	1	1	✓		✓		
7	22ECO01	Wearable Devices	~	~	~	~	~	1	~		*	1	1	~		
7	22ECX04	Electronic Hardware and Troubleshooting	~	✓	1	~	✓	✓	~	✓	~	✓		✓		
8	22ECO02	Optical Engineering	~	~	~	~		~		~	1			~		
		Open Elective Courses														
5	22CEX01	Remote Sensing and its Applications	✓	✓	✓	✓		✓			✓			✓		
5	22MEX01	Renewable Energy Sources	✓		✓	✓	✓	✓	✓	✓	✓					
5	22MTO01	Design of Mechatronics Systems	✓	✓	✓	✓	✓							✓		
5	22MTX01	Data Acquisition and Virtual Instrumentation	✓	~	✓	✓	~							~		
5	22MTX02	Factory Automation	✓	✓	✓	✓	✓				✓	✓		✓		
5	22AUX01	Automotive Engineering	✓	✓	✓			✓	✓		✓	✓		✓		

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
5	22ECX01	Basics of Electronics in Automation Appliances	✓	✓	✓	✓		✓	✓	✓			✓	✓		
5	22ECX02	Image Processing	✓	✓	✓	✓	✓				✓	✓		✓		
5	22EEO01	Solar and Wind Energy Systems	✓	✓	✓			✓	✓					✓		
5	22EEO02	Electrical Wiring and Lighting	✓	✓	✓	✓	✓							✓		
5	22EEO03	Programmable Logic Controller and SCADA	~	✓	~	~		~			~			~		
5	22EEO04	Analog and Digital Electronics	✓	✓	✓	✓	✓							✓		
5	22EEO05	Power Electronics and Drives	✓	✓	✓	✓	✓	✓			✓					
5	22EEO06	Sensors and Actuators	✓	✓	✓			✓						✓		
5	22EIO01	Measurements and Instrumentation	✓	✓	✓	✓	✓									
5	22EIO02	Biomedical Instrumentation and Applications	✓	✓	✓	✓	✓	✓		✓						
5	22EIO03	Industrial Automation	✓	✓	✓	✓	✓									
5	22CSX01	Fundamentals of Databases	✓	✓	✓											
5	22CSX02	Data science for Engineers	✓	✓	✓	✓	✓									
5	22CSX03	Enterprise Application Development Using Java	~	~	~	~	~	~	~	✓	~	~	~	~		
5	22CSO01	Computational science for Engineers	✓	✓	✓											
5	22CSO02	Formal Languages and Automata Theory	✓	✓	✓											
5	22ITO01	Artificial Intelligence	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			
5	22ITX01	Next Generation Databases	✓	✓	✓	✓	✓	✓	✓	✓	1	✓	✓			
5	22CDO01	Fundamentals of User Experience Design	✓	✓	✓	✓	✓				✓	✓	✓			
5	22ADO01	Data Warehousing and Data Mining	✓	✓	✓											
5	22ALO01	Business Intelligence	✓	✓	✓											
5	22CHO01	Industrial Enzymology	✓	✓	✓							✓	✓	✓		
5	22CHO02	Waste to Energy Conversion	✓	✓												
5	22CHO03	Applied Nanotechnology	✓	✓	✓	✓	✓	✓	✓	✓		Ì		✓	Ì	

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	P012	PSO1	PSO2
5	22FTX01	Baking Technology	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		
5	22FTO01	Food Processing Technology	✓	✓	✓	✓		✓				✓		✓		
5	22MAO01	Mathematical Foundations for Machine Learning	~	✓	~	~	~									
5	22MAO02	Numerical Computing	✓	✓	✓											
5	22MAO03	Stochastic Processes and Queuing Theory	✓	✓	✓											
5	22MAO04	Statistics for Engineers	✓	✓	✓											
5	22PHO01	Thin Film Technology	✓	✓	✓						✓	✓		✓		
5	22PHO02	High Energy Storage Devices	✓	✓	✓						✓	✓		✓		
5	22PHO03	Structural and Optical Characterization of Materials	~	✓	~						~	~		~		
5	22CYO01	Instrumental Methods of Analysis	✓	✓	✓	✓										
5	22CYO02	Chemistry Concepts for Competitive Examinations	✓	✓	~											
5	22CYO03	Organic Chemistry for Industry	✓	✓	✓	✓										
5	22MBO01	Cost Accounting for Engineers										✓	✓	✓		
6	22CEO01	Disaster Management	✓	✓	✓			✓	✓					✓		
6	22MEX02	Design of Experiments	✓	✓	✓	✓	✓				✓					
6	22GEO04	Innovation and Business Model Development	✓	✓	✓	✓	✓	~	✓	~	✓	✓	~	1		
6	22MTO02	Robotics	✓	✓	✓	✓	✓							✓		
6	22MTO03	3D Printing and Design	✓	✓			✓							✓		
6	22AUO01	Automotive Electronics	✓	✓	✓	✓								✓		
6	22ECX03	PCB Design and Fabrication	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		
6	22EEO07	Energy Conservation and Management	✓	✓	✓		✓		✓	✓	✓			✓		
6	22EEO08	Microprocessors and Microcontrollers Interfacing	✓	✓	~	✓	✓	~	✓	~		✓	~	~		
6	22EEO09	Electrical Safety	1	✓	✓				✓	✓			✓	✓		

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
6	22EEO10	VLSI System Design	✓	✓	✓	✓	✓				✓		✓	✓		
6	22EEO11	Automation for Industrial Applications	✓	✓	✓	✓			✓		✓			✓		
6	22EIO04	PLC Programming with High Level Languages	✓	✓	✓	✓	✓									
6	22EIO05	Virtual Instrumentation	✓	✓	✓	✓	✓									
6	22CSX04	Foundations of Machine Learning	✓	✓	✓											
6	22CSX05	Web Engineering	✓	✓	✓											
6	22ITX02	Advanced Java Programming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
6	22ITO02	Internet of Things	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			
6	22ITO03	Fundamentals of Software Development	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			
6	22ITO04	Mobile Application Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
6	22CDX01	Fundamentals of User Interactive Design	✓	✓	✓	✓										
6	22ADX01	Data Visualization	✓	✓	✓											
6	22ALX01	Data Exploration and Visualization Techniques	✓	✓	✓											
6	22CHO04	Air Pollution Monitoring and Control	✓	✓	✓			✓	✓							
6	22CHO05	Paints and Coatings	✓	✓	✓				✓							
6	22CHO06	Powder Technology	✓	✓	✓			✓	✓					✓		
6	22FTX02	Processing of milk and milk products	✓	✓	✓		✓	✓		✓	✓	✓		✓		
6	22FTX03	Processing of Fruits and Vegetables	✓	✓	✓		✓	✓		✓	✓	✓		✓		
6	22MAO05	Graph Theory and its Applications	✓	✓	✓											
6	22MAX01	Data Analytics using R Programming	✓	✓	✓	✓	✓									
6	22MAO06	Operations Research	✓	✓	✓											
6	22MAO07	Number Theory and Cryptography	✓	✓	✓		✓									
6	22PHO04	Synthesis, Characterization and Biological Applications of Nanomaterials	✓	~	~						~	~		~		
6	22PHO05	Techniques of Crystal Growth	✓	✓	✓						✓	✓		✓		

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
6	22CYO04	Corrosion Science and Engineering	✓	~	✓	✓										
6	22CYO05	Chemistry of Cosmetics in Daily Life	✓	✓	✓											
6	22CYO06	Nanocomposite Materials	✓	✓	✓	✓										
6	22MBO02	Economic Analysis for Decision Making					✓					✓	✓			
7	22CEO02	Introduction to Smart Cities	✓	✓	✓	✓	✓									
7	22CEO03	Environmental Health and Safety	1	✓	✓			✓	✓							
7	22MEO01	Fundamentals of Ergonomics	✓	✓	✓	✓	✓	✓	✓					✓		
7	22MEO02	Principles of Management and Industrial Psychology	✓					✓				✓	✓			
7	22MEO03	Waste Heat Recovery System and Storage	✓	✓	✓	✓			✓							
7	22GEO05	Entrepreneurship Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
7	22MTO04	Drone System Technology	✓	✓	✓	✓	✓							✓		
7	22AUO02	Vehicle Maintenance	✓	✓			✓		✓					✓		
7	22ECO01	Wearable Devices	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
7	22ECX04	Electronic Hardware and Troubleshooting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		
7	22EEO12	Electric Vehicle	✓	✓	✓	✓		✓	✓		✓			✓		
7	22EEO13	E-Waste Management	✓	✓	✓	✓		✓	✓					✓		
7	22EEO14	Embedded System Design	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		
7	22EEO15	Energy Storage Systems and Controllers	✓	✓	✓			✓			✓		✓	✓		
7	22EEO16	AI Techniques for Engineering Applications	✓	✓	1	✓										
7	22EIO06	Introduction to Distributed Control Systems	✓	✓	✓	✓	✓			✓		✓				
7	22EIO07	Instrumentation in Aircraft Navigation and Control	✓	✓	✓	✓	~									
7	22EIO08	Industry 4.0 with Industrial IoT	✓	✓	✓	✓	✓			✓						
7	22EIO09	Industrial Data Communication	✓	✓	✓	✓	✓	✓								
7	22EIO10	Wireless Instrumentation	✓	✓	✓	✓	✓		✓							

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
7	22EIO11	Instrumentation Techniques in Agriculture	✓	✓	✓	✓	✓									
7	22CSO03	Nature Inspired optimization techniques	✓	✓	✓											
7	22ITO05	Fundamentals of Cloud Computing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7	22ITO06	Introduction to Ethical Hacking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7	22CDO02	Introduction to Mobile Game Design	✓	✓	✓	✓										
7	22CDO03	Introduction to Graphics Design	✓	✓	✓	✓										
7	22ADO02	Neural Networks and Deep Learning	✓	✓	✓	✓										
7	22ALO02	Industrial Machine Learning	✓	✓	✓											
7	22CHO07	Hydrogen Energy	✓	✓										✓		
7	22CHO08	Rubber Technology	✓	✓				✓	✓					✓		
7	22FTO02	Principles of Food safety	✓	✓	✓			✓	✓	✓		✓		✓		
7	22FTO03	Fundamentals of Food Packaging and Storage	~	~	~	~	~	~		~		~		~		
7	22MAO08	Non-Linear Optimization	✓	✓	✓											
7	22MAO09	Optimization for Engineers	✓	✓	✓											
7	22CYO07	Waste and Hazardous Waste Management	✓	~	~	✓			✓							
7	22CYO08	Chemistry in Every day Life	✓	✓	✓	✓										
7	22MBO03	Marketing Analytics										✓	✓	✓		
8	22CEO04	Infrastructure Planning and Management	✓	✓	✓		✓									
8	22CEO05	Environmental Laws and Policy	✓	✓			✓									
8	22MEO04	Safety Measures for Engineers	✓					✓	✓	✓						
8	22MEO05	Energy Conservation in Thermal Equipments	✓		✓		✓	✓	✓					✓		
8	22MEO06	Climate Change and New Energy Technology	✓		✓			✓	✓	✓						
8	22MTO05	Micro and Nano Electromechanical Systems	✓	~	✓	✓								✓		



Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
8	22AUO03	Public Transport Management	✓	✓				✓	✓	✓				✓		
8	22AUO04	Autonomous Vehicles	✓	✓	✓	✓	✓	✓	✓					✓		
8	22ECO02	Optical Engineering	✓	✓	✓	✓		✓	✓	✓	✓			✓		
8	22EEO17	Smart Grid Technologies	✓	✓	✓	✓	✓			✓				✓		
8	22EEO18	Biomass Energy Systems	✓	✓	✓			✓	✓				✓	✓		
8	22EIO12	Environmental Sensors	✓	✓	✓	✓	✓		✓							
8	22EIO13	Pollution Control and Management	✓	✓	✓	✓	✓	✓		✓						
8	22CSO04	Machine Translation	✓	✓	✓											
8	22CSO05	Fundamentals of Blockchain	✓	✓	✓											
8	22ITO07	Business Continuity Planning	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓			
8	22CDX02	Virtual Reality and Augmented Reality	✓	✓	✓	✓										
8	22ADO03	Business Analytics	✓	✓	✓	✓										
8	22ALO03	Machine Learning for Smart Cities	✓	✓	✓	✓										
8	22CHO09	Industrial Accident Prevention and Management	✓		~	~		✓	✓	~	~	✓	✓	~		
8	22CHO10	Electrochemical Engineering	\checkmark	✓	✓											
8	22CHO11	Smart and Functional Materials	\checkmark	✓					✓	✓	✓			✓		
8	22FTO04	Food Ingredients	~	✓	✓			✓		✓		✓		✓		
8	22FTO05	Food and Nutrition	~	✓	✓			✓				✓		✓		
8	22CYO09	Chemistry of Nutrition for Women Health	✓	~	✓											
		General Open Elective Courses														
ALL	22GEO01	German Language Level 1								✓	✓	✓		✓		
ALL	22GEO02	Japanese Language Level 1								✓	1	✓		✓		
5	22GEO03	Design Thinking for Engineers	✓	✓	1	1										
6	22GEO04	Innovation and Business Model Development	~	✓	~	~	~	✓	~	~	~	~	~	~		

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ALL	22GEO05	German Language Level 2								✓	✓	✓		✓		
ALL	22GEO06	German Language Level 3								✓	✓	✓		✓		
ALL	22GEO07	German Language Level 4								✓	✓	✓		✓		
ALL	22GEO08	Japanese Language Level 2								✓	✓	✓		✓		
ALL	22GEO09	Japanese Language Level 3								✓	✓	✓		✓		
ALL	22GEO10	Japanese Language Level 4								✓	✓	✓		✓		
ALL	22GEO11	French Language Level 1								✓	✓	✓		✓		
ALL	22GEO12	French Language Level 2								✓	✓	✓		✓		
ALL	22GEO13	French Language Level 3								✓	✓	✓		✓		
ALL	22GEO14	Spanish Language Level 1								✓	✓	✓		✓		
ALL	22GEO15	Spanish Language Level 2								✓	✓	✓		✓		
ALL	22GEO16	Spanish Language Level 3								✓	✓	✓		✓		
7	22GEO17	Entrepreneurship Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
5/6	22GEX01	NCC Studies (Army Wing) - I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
5/6	22GEX02	NCC Studies (Air Wing) - 1	✓	✓	✓	✓	✓	✓	✓	✓	1	✓				
5	22MBO01	Cost Accounting for Engineers										✓	✓	1		
6	22MBO02	Economic Analysis for Decision Making					✓					✓	✓			
7	22MBO03	Marketing Analytics										✓	✓	✓		

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Course Code	Course Title	L	т	Р	Credit	CA	ESE	Total	Category
Theory/Theory	with Practical								
22EGT11	Communication Skills –I	3	0	0	3	40	60	100	HS
22MAC11	Matrices and Ordinary Differential Equations	3	1*	2*	4	50	50	100	BS
22CYT11	Chemistry for Electronics and Communication Engineering	3	0	0	3	40	60	100	BS
22ECT11	Circuits and Networks	3	0	0	3	40	60	100	PC
22CSC11	Problem Solving and Programming in C	3	0	2	4	100	0	100	ES
22ECT12	Basics of Electrical and Electronics Engineering	3	0	0	3	40	60	100	ES
Practical / Em	ployability Enhancement								
22ECL11	Basics of Electrical and Electronics Engineering Laboratory	0	0	2	1	60	40	100	ES
22CYL11	Chemistry Laboratory For Electrical Systems	0	0	2	1	60	40	100	BS
22MNT11	Student Induction Program				0	100	0	100	MC
	Total Credits to be earned	•			22			•	

*Alternate weeks

Course Code	Course Title	Но	urs / V	/eek	Credit	Max	Category		
		L	Т	Ρ	Credit	CA	ESE	Total	Category
Theory/Theory	v with Practical								
22EGT21	Communication Skills –II	3	0	0	3	40	60	100	HS
22MAC21	Multivariable Calculus and Complex Analysis	3	1*	2*	4	50	50	100	BS
22PHT21	Physics for Electronics and Communication Engineering	3	0	0	3	40	60	100	BS
22ECT21	Electromagnetic fields	3	1	0	4	40	60	100	PC
22CSC22	Data Structures using C	3	0	2	4	50	50	100	ES
22MET11	Engineering Drawing	2	1	0	3	40	60	100	ES
22TAM01	Heritage of Tamils	1	0	0	1	100	0	100	HS
Practical / Em	ployability Enhancement								
22PHL21	Physics Laboratory for Electronics and Communication Engineering	0	0	2	1	60	40	100	BS
22MEL11	Engineering Practices Laboratory	0	0	2	1	60	40	100	ES
22VEC11	Yoga and Values for Holistic Education				1	100	0	100	HS
Total Credits to be earned					25				•

*Alternate weeks

SEMESTER -	Ш	-							-
Course Code	Course Title	Hours / Week			Credit	Max	kimum	Cate gory	
Code		L	Т	Р		СА	ESE	Total	
Theory/Theor	y with Practical								
22MAT33	Transforms and Probability Theory	3	1	0	4	40	60	100	BS
22ITC31	Java Programming	3	0	2	4	50	50	100	ES
22ECT31	Digital Electronics	3	0	0	3	40	60	100	PC
22ECT32	Electronic Circuits	3	0	0	3	40	60	100	PC
22ECC31	Linear Integrated Circuits	3	0	2	4	50	50	100	PC
22GET31	Universal Human Values	2	0	0	2	100	0	100	HS
22TAM02	Tamils and Technology	1	0	0	1	100	0	100	HS
Practical / Em	ployability Enhancement								
22ECL31	Digital Electronics Laboratory	0	0	2	1	60	40	100	PC
22ECL32	Electronic Circuits Laboratory	0	0	2	1	60	40	100	PC
	Total Credits to be earned								

Course Code	Course Title	Но	Hours / Week			Мах	timum	Cate gory	
Code		L	т	Р]	CA	ESE	Total	
Theory/Theo	ry with Practical								
22ITC41	Programming In Python	3	0	2	4	50	50	100	ES
22ECT41	Digital Signal Processing	3	1	0	4	40	60	100	PC
22ECT42	Microprocessor and Microcontroller	3	0	0	3	40	60	100	PC
22ECT43	Transmission Lines and Waveguides	3	0	0	3	40	60	100	PC
22ECT44	Control Engineering	3	1	0	4	40	60	100	PC
Practical / Er	nployability Enhancement								
22ECL41	Digital Signal Processing Laboratory	0	0	2	1	60	40	100	PC
22ECL42	Microprocessor and Microcontroller Laboratory	0	0	2	1	60	40	100	PC
22EGL31	Communication Skills Development Laboratory	0	0	2	1	60	40	100	HS
22GEL41	Professional Skills Training I	2	0	0	2	100	0	100	EC

SEMESTER	R – V								
Course Code	Course Title	Но	Hours / Week		Credit	Мах	timum	Cate gory	
		L	Т	Р		CA	ESE	Total	
Theory/The	ory with Practical								
22ECT51	VLSI Design	3	0	0	3	40	60	100	PC
22ECT52	Analog and Digital Communication	3	0	0	3	40	60	100	PC
22ECC51	Embedded Systems and IoT	3	0	2	4	50	50	100	PC
22ECC52	Antennas and Wave Propagation	2	0	2	3	50	50	100	PC
	Professional Elective - I	3/2	0	0/2	3	40/ 50	60/ 50	100	PE
	Open Elective – II	3	1/0	0/2	4	40/ 50	60/ 50	100	OE
Practical / I	Employability Enhancement								
22ECL51	VLSI Design Laboratory	0	0	2	1	60	40	100	PC
22ECL52	Analog and Digital Communication Laboratory	0	0	2	1	60	40	100	PC
22GEL51	Professional Skills Training II	2	0	0	2	100	0	100	EC
	Total Credits to be earned								

R – VI								
Course Title	Но	urs / V	Veek	Credit	Max	kimum	Cate gory	
	L	т	Р		CA	ESE	Total	
ory with Practical								
Microwave and Optical Communication	3	0	0	3	40	60	100	PC
Data Communication and Networking	3	0	0	3	40	60	100	PC
Professional Elective - II	3/2	0	0/2	3	40/ 50	60/ 50	100	PE
Open Elective - II	3	1/0	0/2	4	40/ 50	60/ 50	100	OE
Employability Enhancement								
Microwave and Optical Communication Laboratory	0	0	2	1	60	40	100	PC
Data Communication and Networking Laboratory	0	0	2	1	60	40	100	PC
Project Work I	0	0	8	4	50	50	100	EC
Environmental Science	2	0	0	0	100	0	100	MC
Comprehensive Test and Viva	2	0	0	2	100	0	100	EC
Total Credits to be earned	•		-	21		•		
	Course Title Ory with Practical Microwave and Optical Communication Data Communication and Networking Professional Elective - II Open Elective - II Open Elective - II Employability Enhancement Microwave and Optical Communication Laboratory Data Communication and Networking Laboratory Project Work I Environmental Science Comprehensive Test and Viva	HoCourse TitleHoImage: colspan="2">Image: colspan="2" Image: colspan="2"	Hours / VLTTory with PracticalIMicrowave and Optical Communication3Data Communication and Networking3Open Elective - II3/2Open Elective - II3Microwave and Optical Communication Laboratory0Open Elective - II0Microwave and Optical Communication Laboratory0Project Work I0Environmental Science2Comprehensive Test and Viva2	Hours / WeekLTPory with PracticalIIMicrowave and Optical Communication300Data Communication and Networking300Professional Elective - II3/200/2Open Elective - II31/00/2Imployability EnhancementIIIMicrowave and Optical Communication Laboratory002Project Work I002Project Work I008Environmental Science200Comprehensive Test and Viva200	Hours / WeekCreditLTPITPImage: Norw with Practical300Microwave and Optical Communication3003Data Communication and Networking3003Professional Elective - II3/200/23Open Elective - II31/00/24Image: Microwave and Optical Communication Laboratory0021Microwave and Optical Communication Laboratory0021Data Communication and Networking Laboratory0021Project Work I0084Environmental Science2002Comprehensive Test and Viva2002	Hours / WeekCreditMaxLTPCAory with PracticalIIIIMicrowave and Optical Communication300340Data Communication and Networking300340Professional Elective - II3/200/23 $\frac{40}{50}$ Open Elective - II31/00/24 $\frac{40}{50}$ The professional Elective - II31/00/24 $\frac{40}{50}$ Open Elective - II31/00/24 $\frac{40}{50}$ Imployability EnhancementIIIIIMicrowave and Optical Communication Laboratory002160Data Communication and Networking Laboratory008450Project Work I008450Environmental Science2000100Comprehensive Test and Viva2002100	Hours / Week Credit Maximum L T P CA ESE ory with Practical I I O 3 40 60 Microwave and Optical Communication 3 0 0 3 40 60 Data Communication and Networking 3 0 0 3 40 60 Professional Elective - II 3/2 0 0/2 3 $\frac{40/}{50}$ $\frac{60/}{50}$ Open Elective - II 3/2 0 0/2 4 $\frac{40/}{50}$ $\frac{60/}{50}$ Employability Enhancement I I I I I I Microwave and Optical Communication Laboratory 0 0 2 1 $\frac{60}{40}$ $\frac{40}{50}$ $\frac{50}{50}$ Employability Enhancement I I I I I I I I I I I I I I I I I I I I I <tdi< td=""><td>Hours / Week $Credit Maximum Marks L T P Credit CA ESE Total ory with Practical - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -$</td></tdi<>	Hours / Week $Credit Maximum Marks L T P Credit CA ESE Total ory with Practical - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - $

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SEMESTER	R – VII								
Course	Course Title	Но	Hours / Week			Maximum Marks			Cate gory
Code		L	Т	Р		CA	ESE	Total	
Theory/The	eory with Practical								
22GCT71	Engineering Economics and Management	3	0	0	3	40	60	100	HS
	Professional Elective – III	3/2	0	0/2	3	40/ 50	60/ 50	100	PE
	Professional Elective – IV	3/2	0	0/2	3	40/ 50	60/ 50	100	PE
	Professional Elective – V	3/2	0	0/2	3	40/ 50	60/ 50	100	PE
	Open Elective - III	3	0	0	3	40	60	100	OE
Practical / I	Employability Enhancement								
22ECP71	Project Work II Phase I	0	0	10	5	50	50	100	EC
	Total Credits to be earned							-	

SEMESTER	R – VIII								
Course Code	Course Title	Но	Hours / Week			Max	kimum	Category	
		L	Т	Р		CA	ESE	Total	
Theory/The	ory with Practical								
	Professional Elective - VI	3	0	0	3	40	60	100	PE
	Open Elective - IV	3	0	0	3	40	60	100	OE
Practical /	Employability Enhancement								
22ECP81	Project Work II Phase II	0	0	8	4	50	50	100	EC
	Total Credits to be earned						•	•	

Total Credits : 168

LIST OF PROFESSIONAL ELECTIVES (PEs)												
S. No.	Course Code	Course Name	L	т	Ρ	С	Domain/ Stream					
		Semester - V Elective – I										
1.	22ECF01	Modern Electronic Instrumentation	2	0	2	3	EL					
2.	22ECE01	Medical Electronics	3	0	0	3	EL					
			3	-	0	3	EL					
3.	22ECE02	Computer Architecture and Interfacing		0	_							
4.	22ECE03	Embedded System Design	3	0	0	3	ES					
5.	22ECF02	Digital Image Processing and its Applications	2	0	2	3	SIP					
6.	22ECF03	Artificial Intelligence and Machine Learning	2	0	2	3	SIP					
7.	22ECF04	Linux Operating System	2	0	2	3	SD					
8.	22ECE04	Data Science for Engineers	3	0	0	3	SD					
		Semester - VI										
		Elective – II			1							
9.	22ECE05	Mobile Communication	3	0	0	3	CN					
10.	22ECE06	Embedded Architecture and Standards	3	0	0	3	ES					
11.	22ECF05	Electronics Circuit Board Design	2	0	2	3	EL					
12.	22ECF06	Single Board Computer	2	0	2	3	ES					
13.	22ECF07	ASIC Design	2	0	2	3	VD					
14.	22ECF08	Soft Computing Techniques	2	0	2	3	SIP					
15.	22ECF09	DSP Processor and its Applications	2	0	2	3	SIP					
16.	22ECF10	Deep Learning and its Applications	2	0	2	3	SIP					
		Semester - VII										
17.	22ECE07	Elective - III Wireless Broadband Communication	3	0	0	3	CN					
17.	22ECE07	Network Information Security	3	0	0	3	CN					
19.	22ECE09	Real Time Operating System	3	0	0	3	ES					
20.	22ECF11	Scripting languages for VLSI	2	0	2	3	VD					
21.	22ECE10	Quantum Computing and Information	3	0	0	3	VD					
22.	22ECF12	Wavelet Transform and its Applications	2	0	2	3	SIP					
23.	22ECF13	Computer Vision	2	0	2	3	SIP					



	_		1		1		_
24.	22ECE11	Edge Computing	3	0	0	3	SD
		Elective – IV					
25.	22ECE12	Satellite Communication	3	0	0	3	CN
26.	22ECE13	Wireless Networks	3	0	0	3	CN
27.	22ECE14	RISC Architecture	3	0	0	3	ES
28.	22ECE15	System Verilog	3	0	0	3	VD
29.	22ECE16	Neural Science for Engineers	3	0	0	3	SIP
30.	22ECE17	Remote Sensing	3	0	0	3	SIP
31.	22ECE18	Natural Language Processing	3	0	0	3	SIP
32.	22ECE19	Blockchain Technology	3	0	0	3	SD
		Elective - V					
33.	22ECE20	Next Generation Wireless Communication Systems	3	0	0	3	CN
34.	22ECE21	Radar Engineering	3	0	0	3	CN
35.	22ECE22	Automotive Electronic Systems	3	0	0	3	EL
36.	22ECE23	Wireless Sensor Networks	3	0	0	3	ES
37.	22ECE24	Industry 4.0	3	0	0	3	ES
38.	22ECE25	Testing and Fault Diagnosis of VLSI Circuits	3	0	0	3	VD
39.	22ECE26	MEMS Design	3	0	0	3	VD
40.	22ECE27	Software Quality Assurance and Testing	3	0	0	3	SD
		Semester - VIII					
	1	Elective - VI	•	I		I	
41.	22ECE28	Software Defined Radio	3	0	0	3	CN
42.	22ECE29	RF Communications	3	0	0	3	CN
43.	22ECF14	Wearable Technology	2	0	2	3	ES
44.	22ECE30	Cyber Physical Systems	3	0	0	3	ES
45.	22ECE31	Nano Technology For Energy Sustainability	0	0	0	3	VD
46.	22ECE32	Low Power VLSI Design	3	0	0	3	VD
47.	22ECE33	Brain Computer Interface and Applications	3	0	0	3	SIP
	T	otal Credits to be earned				18	
* D		eviations: · EL - Electronics VD- VLSI Design					Naturalia OID

* Domain/Stream Abbreviations: : EL – Electronics, VD- VLSI Design, CN- Communication & Networks, SIP – Signal & Image Processing, ES – Embedded Systems, SD – Software Development

SEMESTER -					_				-
Course Code	Course Title	Но	urs / V	Veek	Credit	Maximum Marks			Category
Course Coue	Course Title	L	Т	Р	Credit	CA	ESE	Total	Category
Theory/Theory	with Practical								
22EGT11	Communication Skills –I	3	0	0	3	40	60	100	HS
22MAC11	Matrices and Ordinary Differential Equations	3	1*	2*	4	50	50	100	BS
22CYT11	Chemistry for Electronics and Communication Engineering	3	0	0	3	40	60	100	BS
22ECT11	Circuits and Networks	3	0	0	3	40	60	100	PC
22CSC11	Problem Solving and Programming in C	3	0	2	4	100	0	100	ES
22TAM01	Heritage of Tamils	1	0	0	1	100	0	100	HS
Practical / Emp	oloyability Enhancement								
22GCL12	Foundation Laboartary – Electrical, IOT and Web	0	0	6	3	100	0	100	ES
22CYL11	Chemistry Laboratory For Electrical Systems	0	0	2	1	60	40	100	BS
22MNT11	Student Induction Program				0	100	0	100	MC
	Total Credits to be earned								

*Alternate weeks

SEMESTER -		Hours / Week				Maximum Marks			Cotomorry
Course Code	Course Title	L	Т	Р	Credit	CA	ESE	Total	Category
Theory/Theory	with Practical								
22EGT21	Communication Skills –II	3	0	0	3	40	60	100	HS
22MAC21	Multivariable Calculus and Complex Analysis	3	1*	2*	4	50	50	100	BS
22PHT21	Physics for Electronics and Communication Engineering	3	0	0	3	40	60	100	BS
22CSC22	Data Structures using C	3	0	2	4	50	50	100	ES
22MET11	Engineering Drawing	2	1	0	3	40	60	100	ES
22TAM02	Tamils and Technology	1	0	0	1	100	0	100	HS
Practical / Em	ployability Enhancement								
22PHL21	Physics Laboratory for Electronics and Communication Engineering	0	0	2	1	60	40	100	BS
22GCL11	Foundation Laboratory – Manufacturing, Design and Robotics	0	0	6	3	100	0	100	ES
22VEC11	Yoga and Values for Holistic Education				1	100	0	100	HS
Total Credits to be earned					23				•

*Alternate weeks

SEMESTER -	III								
Course Code	Course Title	Hours / Week			Credit	Max	timum	Cate gory	
0000		L	Т	Р		CA	ESE	Total	
Theory/Theor	y with Practical								
22MAT33	Transforms and Probability Theory	3	1	0	4	40	60	100	BS
22ITC31	Java Programming	3	0	2	4	50	50	100	ES
22ECT31	Digital Electronics	3	0	0	3	40	60	100	PC
22ECT32	Electronic Circuits	3	0	0	3	40	60	100	PC
22ECT21	Electromagnetic fields	3	1	0	4	40	60	100	PC
22GET31	Universal Human Values	2	0	0	2	100	0	100	HS
Practical / En	ployability Enhancement								
22ECL31	Digital Electronics Laboratory	0	0	2	1	60	40	100	PC
22ECL32	Electronic Circuits Laboratory	0	0	2	1	60	40	100	PC
	Total Credits to be earned							-	

SEMESTER -	- IV								
Course Code	Course Title	Но	urs / V	Veek	Credit	Max	kimum	Cate gory	
Code		L	Т	Р		CA	ESE	Total	
Theory/Theo	ry with Practical								
22ITC41	Programming In Python	3	0	2	4	50	50	100	ES
22ECT41	Digital Signal Processing	3	1	0	4	40	60	100	PC
22ECT42	Microprocessor and Microcontroller	3	0	0	3	40	60	100	PC
22ECT43	Transmission Lines and Waveguides	3	0	0	3	40	60	100	PC
22ECC31	Linear Integrated Circuits	3	0	2	4	50	50	100	PC
Practical / Er	mployability Enhancement								
22ECL41	Digital Signal Processing Laboratory	0	0	2	1	60	40	100	PC
22ECL42	Microprocessor and Microcontroller Laboratory	0	0	2	1	60	40	100	PC
22EGL31	Communication Skills Development Laboratory	0	0	2	1	60	40	100	HS
22GEL41	Professional Skills Training I	0	0	0	2	100	0	100	EC
	Total Credits to be earned						•		•

Course	Course Title	Но	Hours / Week			Мах	timum	Cate gory	
Code		L	LT			СА	ESE	Total	
Theory/The	ory with Practical								
22ECT51	VLSI Design	3	0	0	3	40	60	100	PC
22ECT52	Analog and Digital Communication	3	0	0	3	40	60	100	PC
22ECC51	Embedded Systems and IoT	3	0	2	4	50	50	100	PC
22ECT44	Control Engineering	3	1	0	4	40	60	100	PC
	Professional Elective - I	3/2	0	0/2	3	40/ 50	60/ 50	100	PE
	Open Elective – I	3	1/0	0/2	4	40/ 50	60/ 50	100	OE
Practical / I	Employability Enhancement								
22ECL51	VLSI Design Laboratory	0	0	2	1	60	40	100	PC
22ECL52	Analog and Digital Communication Laboratory	0	0	2	1	60	40	100	PC
22GEL51	Professional Skills Training II	0	0	0	2	100	0	100	EC
	Total Credits to be earned								•

SEMESTER	2 – VI								
Course Code	Course Title	Но	Hours / Week			Мах	timum	Cate gory	
Ode		L	Т	Р		CA	ESE	Total	
Theory/The	ory with Practical								
22ECT61	Microwave and Optical Communication	3	0	0	3	40	60	100	PC
22ECT62	CT62 Data Communication and Networking 3 0				3	40	60	100	PC
	Professional Elective - II	3/2	0	0/2	3	40/ 50	60/ 50	100	PE
	Open Elective - II	3	1/0	0/2	4	40/ 50	60/ 50	100	OE
Practical / E	Employability Enhancement								
22ECL61	Microwave and Optical Communication Laboratory	0	0	2	1	60	40	100	PC
22ECL62	Data Communication and Networking Laboratory	0	0	2	1	60	40	100	PC
22ECP62	Project Work I	0	0	10	5	50	50	100	EC
22MNT31	Environmental Science	2	0	0	0	100	0	100	MC
22GEP61	2GEP61 Comprehensive Test and Viva 2 0 0						0	100	EC
	Total Credits to be earned								

SEMESTER – VII										
Course	Course Title	Но	Hours / Week			Мах	timum	Cate gory		
Code		L	Т	Р		CA	ESE	Total		
Theory/Theory with Practical										
22GCT71	Engineering Economics and Management	3	0	0	3	40	60	100	HS	
22ECC52	Antennas and Wave Propagation	2	0	2	3	50	50	100	PC	
	Professional Elective – III	3/2	0	0/2	3	40/ 50	60/ 50	100	PE	
	Professional Elective – IV	3/2	0	0/2	3	40/ 50	60/ 50	100	PE	
	Open Elective - III	3	0	0	3	40	60	100	OE	
Practical / B	Practical / Employability Enhancement									
22ECP72	Project Work II Phase I	0	0	12	6	50	50	100	EC	
	Total Credits to be earned						•			

SEMESTER	SEMESTER – VIII										
Course	Course Title	Hours / Week			Credit	Max	kimum	Category			
Code		L	Т	Ρ		CA	ESE	Total	90.9		
Theory/The	heory/Theory with Practical										
	Professional Elective - V	3	0	0	3	40	60	100	PE		
Open Elective - IV			0	0	3	40	60	100	OE		
Practical /	Practical / Employability Enhancement										
22ECP81	Project Work II Phase II	0	0	8	4	50	50	100	EC		
	Total Credits to be earned						•				

Total Credits : 168

		LIST OF PROFESSIONAL ELECTIVE	ES (P	Es)			
S. No.	Course Code	Course Name	L	Т	Ρ	С	Domain/ Stream
		Semester - V					·
	r	Elective – I		r			1
1.	22ECF01	Modern Electronic Instrumentation	2	0	2	3	EL
2.	22ECE01	Medical Electronics	3	0	0	3	EL
3.	22ECE02	Computer Architecture and Interfacing	3	0	0	3	EL
4.	22ECE03	Embedded System Design	3	0	0	3	ES
5.	22ECF02	Digital Image Processing and its Applications	2	0	2	3	SIP
6.	22ECF03	Artificial Intelligence and Machine Learning	2	0	2	3	SIP
7.	22ECF04	Linux Operating System	2	0	2	3	SD
8.	22ECE04	Data Science for Engineers	3	0	0	3	SD
		Semester - VI					
		Elective – II					
9.	22ECE05	Mobile Communication	3	0	0	3	CN
10.	22ECE06	Embedded Architecture and Standards	3	0	0	3	ES
11.	22ECF05	Electronics Circuit Board Design	2	0	2	3	EL
12.	22ECF06	Single Board Computer	2	0	2	3	ES
13.	22ECF07	ASIC Design	2	0	2	3	VD
14.	22ECF08	Soft Computing Techniques	2	0	2	3	SIP
15.	22ECF09	DSP Processor and its Applications	2	0	2	3	SIP
16.	22ECF10	Deep Learning and its Applications	2	0	2	3	SIP
		Semester - VII					•
		Elective - III				1	Τ
17.	22ECE07	Wireless Broadband Communication	3	0	0	3	CN
18.	22ECE08	Network Information Security	3	0	0	3	CN
19.	22ECE09	Real Time Operating System	3	0	0	3	ES
20.	22ECF11	Scripting languages for VLSI	2	0	2	3	VD
21.	22ECE10	Quantum Computing and Information	3	0	0	3	VD



Zz. Computer Vision 2 0 2 3 SIP 23. 22ECE11 Edge Computing 3 0 0 3 SIP 24. 22ECE11 Edge Computing 3 0 0 3 SD Elective – IV 25. 22ECE12 Satellite Communication 3 0 0 3 CN 26. 22ECE13 Wireless Networks 3 0 0 3 CN 27. 22ECE14 RISC Architecture 3 0 0 3 SIP 28. 22ECE16 Neural Science for Engineers 3 0 0 3 SIP 30. 22ECE18 Natural Language Processing 3 0 0 3 SIP 31. 22ECE21 Redra Engineering 3 0 0 3 CN 33. 22ECE21 Redar Engineering 3 0 0 3 EL 36				-	-		-	015
23. Image: Computing 3 0 0 3 SD 24. 22ECE11 Edge Computing 3 0 0 3 SD Elective – IV 25. 22ECE12 Satellite Communication 3 0 0 3 CN 26. 22ECE13 Wireless Networks 3 0 0 3 CN 27. 22ECE14 RISC Architecture 3 0 0 3 CN 28. 22ECE16 Neural Science for Engineers 3 0 0 3 SIP 30. 22ECE17 Remote Sensing 3 0 0 3 SIP 31. 22ECE18 Natural Language Processing 3 0 0 3 SIP 32. 22ECE19 Blockchain Technology 3 0 0 3 CN 33. 22ECE21 Radar Engineering 3 0 0 3 CN 34. 22ECE22 Automotive Electronic Systems 3 0 0 3	22.	22ECF12	Wavelet Transform and its Applications	2	0	2	3	SIP
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25. 22ECE12 Satellite Communication 3 0 0 3 CN 26. 22ECE13 Wireless Networks 3 0 0 3 CN 27. 22ECE14 RISC Architecture 3 0 0 3 ES 28. 22ECE15 System Verilog 3 0 0 3 SIP 30. 22ECE16 Neural Science for Engineers 3 0 0 3 SIP 30. 22ECE17 Remote Sensing 3 0 0 3 SIP 31. 22ECE18 Natural Language Processing 3 0 0 3 SIP 32. 22ECE19 Blockchain Technology 3 0 0 3 CN 33. 22ECE21 Radar Engineering 3 0 0 3 CN 34. 22ECE22 Automotive Electronic Systems 3 0 0 3 EE 36. 22ECE24 Industry 4.0 3 0 0 3 ES <td< td=""><td>24.</td><td>22ECE11</td><td>Edge Computing</td><td>3</td><td>0</td><td>0</td><td>3</td><td>SD</td></td<>	24.	22ECE11	Edge Computing	3	0	0	3	SD
23. Image: Constraint of the second seco		l	Elective – IV					
Zb. Image: Constraint of the second seco	25.	22ECE12	Satellite Communication	3	0	0	3	CN
27.	26.	22ECE13	Wireless Networks	3	0	0	3	CN
28. 1 1 1 1 1 1 1 29. 22ECE16 Neural Science for Engineers 3 0 0 3 SIP 30. 22ECE17 Remote Sensing 3 0 0 3 SIP 31. 22ECE18 Natural Language Processing 3 0 0 3 SIP 32. 22ECE19 Blockchain Technology 3 0 0 3 SD 33. 22ECE20 Next Generation Wireless Communication Systems 3 0 0 3 CN 34. 22ECE21 Radar Engineering 3 0 0 3 CN 35. 22ECE22 Automotive Electronic Systems 3 0 0 3 EL 36. 22ECE24 Industry 4.0 3 0 0 3 ES 37. 22ECE25 Testing and Fault Diagnosis of VLSI Circuits 3 0 0 3 VD 38. 22ECE26 MEMS Design 3 0 0 3 CN	27.	22ECE14	RISC Architecture	3	0	0	3	ES
29. 3 0 0 3 30. 22ECE17 Remote Sensing 3 0 0 3 SIP 31. 22ECE18 Natural Language Processing 3 0 0 3 SIP 32. 22ECE19 Blockchain Technology 3 0 0 3 SD 33. 22ECE20 Next Generation Wireless Communication Systems 3 0 0 3 CN 34. 22ECE21 Radar Engineering 3 0 0 3 CN 35. 22ECE22 Automotive Electronic Systems 3 0 0 3 EL 36. 22ECE23 Wireless Sensor Networks 3 0 0 3 ES 37. 22ECE24 Industry 4.0 3 0 0 3 VD 38. 22ECE25 Testing and Fault Diagnosis of VLSI Circuits 3 0 0 3 VD 40. 22ECE26 MEMS Design 3 0 0 3 CN 41. 22ECE28	28.	22ECE15	System Verilog	3	0	0	3	VD
30. 22ECE18 Natural Language Processing 3 0 0 3 SIP 31. 22ECE19 Blockchain Technology 3 0 0 3 SD 32. 22ECE19 Blockchain Technology 3 0 0 3 SD 33. 22ECE20 Next Generation Wireless Communication Systems 3 0 0 3 CN 34. 22ECE21 Radar Engineering 3 0 0 3 EL 36. 22ECE23 Automotive Electronic Systems 3 0 0 3 ES 37. 22ECE24 Industry 4.0 3 0 0 3 ES 38. 22ECE25 Testing and Fault Diagnosis of VLSI Circuits 3 0 0 3 VD 40. 22ECE27 Software Quality Assurance and Testing 3 0 0 3 CN 41. 22ECE28 Software Defined Radio 3 0 0 3 CN 42. 22ECE29 RF Communications 3 0 <t< td=""><td>29.</td><td>22ECE16</td><td>Neural Science for Engineers</td><td>3</td><td>0</td><td>0</td><td>3</td><td>SIP</td></t<>	29.	22ECE16	Neural Science for Engineers	3	0	0	3	SIP
31. 22ECE19 Blockchain Technology 3 0 0 3 SD 32. 22ECE20 Next Generation Wireless Communication 3 0 0 3 CN 33. 22ECE21 Radar Engineering 3 0 0 3 CN 34. 22ECE21 Radar Engineering 3 0 0 3 CN 35. 22ECE22 Automotive Electronic Systems 3 0 0 3 EL 36. 22ECE23 Wireless Sensor Networks 3 0 0 3 ES 37. 22ECE24 Industry 4.0 3 0 0 3 VD 38. 22ECE25 Testing and Fault Diagnosis of VLSI Circuits 3 0 0 3 VD 39. 22ECE26 MEMS Design 3 0 0 3 SD 41. 22ECE27 Software Defined Radio 3 0 0 3 CN 42. 22ECE29 RF Communications 3 0 0 3 CN	30.	22ECE17	Remote Sensing	3	0	0	3	SIP
32. Image: Constraint of the second systems of the	31.	22ECE18	Natural Language Processing	3	0	0	3	SIP
33. Systems 3 0 0 3 34. 22ECE21 Radar Engineering 3 0 0 3 CN 35. 22ECE22 Automotive Electronic Systems 3 0 0 3 EL 36. 22ECE23 Wireless Sensor Networks 3 0 0 3 ES 37. 22ECE24 Industry 4.0 3 0 0 3 ES 38. 22ECE25 Testing and Fault Diagnosis of VLSI Circuits 3 0 0 3 VD 39. 22ECE26 MEMS Design 3 0 0 3 VD 40. 22ECE27 Software Quality Assurance and Testing 3 0 0 3 CN 41. 22ECE28 Software Defined Radio 3 0 0 3 CN 42. 22ECE29 RF Communications 3 0 0 3 CN 43. 22ECF14 Wearable Technology 2 0 2 3 ES 44. 22EC	32.	22ECE19	Blockchain Technology	3	0	0	3	SD
34. 22ECE21 Radar Engineering 3 0 0 3 CN 35. 22ECE22 Automotive Electronic Systems 3 0 0 3 EL 36. 22ECE23 Wireless Sensor Networks 3 0 0 3 ES 37. 22ECE24 Industry 4.0 3 0 0 3 ES 38. 22ECE25 Testing and Fault Diagnosis of VLSI Circuits 3 0 0 3 VD 39. 22ECE26 MEMS Design 3 0 0 3 VD 40. 22ECE27 Software Quality Assurance and Testing 3 0 0 3 SD 41. 22ECE28 Software Defined Radio 3 0 0 3 CN 42. 22ECE29 RF Communications 3 0 0 3 CN 43. 22ECF14 Wearable Technology 2 0 2 3 ES 44. 22ECE31 Nano Technology For Energy Sustainability 0 0 3 VD	33.	22ECE20		3	0	0	3	CN
35. 3 0 0 3 36. 22ECE23 Wireless Sensor Networks 3 0 0 3 ES 37. 22ECE24 Industry 4.0 3 0 0 3 ES 38. 22ECE25 Testing and Fault Diagnosis of VLSI Circuits 3 0 0 3 VD 39. 22ECE26 MEMS Design 3 0 0 3 VD 40. 22ECE27 Software Quality Assurance and Testing 3 0 0 3 SD 41. 22ECE28 Software Defined Radio 3 0 0 3 CN Semester - VIII Elective – V 42. 22ECE29 RF Communications 3 0 0 3 CN 43. 22ECF14 Wearable Technology 2 0 2 3 ES 44. 22ECE30 Cyber Physical Systems 3 0 0 3 VD 45. 22ECE31 Nano Technology For Energy Sustainability 0	34.	22ECE21		3	0	0	3	CN
36. 3 0 0 3 0 0 3 37. 22ECE24 Industry 4.0 3 0 0 3 ES 38. 22ECE25 Testing and Fault Diagnosis of VLSI Circuits 3 0 0 3 VD 39. 22ECE26 MEMS Design 3 0 0 3 VD 40. 22ECE27 Software Quality Assurance and Testing 3 0 0 3 SD 41. 22ECE28 Software Defined Radio 3 0 0 3 CN 42. 22ECE29 RF Communications 3 0 0 3 CN 43. 22ECF14 Wearable Technology 2 0 2 3 ES 44. 22ECE30 Cyber Physical Systems 3 0 0 3 VD 45. 22ECE31 Nano Technology For Energy Sustainability 0 0 0 3 VD	35.	22ECE22	Automotive Electronic Systems	3	0	0	3	EL
37. Image: Constraint of the second seco	36.	22ECE23	Wireless Sensor Networks	3	0	0	3	ES
38. 0 0 3 0 0 3 VD 39. 22ECE26 MEMS Design 3 0 0 3 VD 40. 22ECE27 Software Quality Assurance and Testing 3 0 0 3 SD 41. 22ECE28 Software Defined Radio 3 0 0 3 CN Semester - VIII Elective - V 42. 22ECE29 RF Communications 3 0 0 3 CN 43. 22ECF14 Wearable Technology 2 0 2 3 ES 44. 22ECE30 Cyber Physical Systems 3 0 0 3 ES 45. 22ECE31 Nano Technology For Energy Sustainability 0 0 0 3 VD	37.	22ECE24	Industry 4.0	3	0	0	3	ES
39. 3 0 0 3 0 0 3 40. 22ECE27 Software Quality Assurance and Testing 3 0 0 3 SD 41. 22ECE28 Software Defined Radio 3 0 0 3 CN Semester - VIII Elective – V 42. 22ECE29 RF Communications 3 0 0 3 CN 43. 22ECF14 Wearable Technology 2 0 2 3 ES 44. 22ECE30 Cyber Physical Systems 3 0 0 3 VD 45. 22ECE31 Nano Technology For Energy Sustainability 0 0 0 3 VD	38.	22ECE25	Testing and Fault Diagnosis of VLSI Circuits	3	0	0	3	VD
40. Image: Constraint of the second seco	39.	22ECE26	MEMS Design	3	0	0	3	
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42.22ECE29RF Communications3003CN43.22ECF14Wearable Technology2023ES44.22ECE30Cyber Physical Systems3003ES45.22ECE31Nano Technology For Energy Sustainability0003VD								
43.22ECF14Wearable Technology2023ES44.22ECE30Cyber Physical Systems3003ES45.22ECE31Nano Technology For Energy Sustainability0003VD22ECE32Low Power VI SI DesignVDVDVDVD	42.	22ECE29		3	0	0	3	CN
44. 22ECE30 Cyber Physical Systems 3 0 0 3 ES 45. 22ECE31 Nano Technology For Energy Sustainability 0 0 0 3 VD		22ECF14	Wearable Technology	2	0	2	3	
45. 22ECE31 Nano Technology For Energy Sustainability 0 0 0 3 VD		22ECE30	Cyber Physical Systems	3	0	0	3	ES
22ECE32 Low Power VI SI Design	45.	22ECE31	Nano Technology For Energy Sustainability		0	0	3	VD
	46.	22ECE32	Low Power VLSI Design	3	0	0	3	VD
47. 22ECE33 Brain Computer Interface and Applications 3 0 0 3 SIP	47.	22ECE33	Brain Computer Interface and Applications	3	0	0	3	SIP
Total Credits to be earned 18		T	btal Credits to be earned				18	

SNo	Course Code	Course Title	L	Т	Ρ	C	Offering Department	Semester
1.	22GEO01	German Language Level 1	4	0	0	4	ECE	ALL
2.	22GEO02	Japanese Language Level 1	4	0	0	4	ECE	ALL
3.	22GEO03	Design Thinking for Engineers	3	1	0	4	CSE	5
4.	22GEO04	Innovation and Business Model Development	3	1	0	4	MTS	6
5.	22GEO05	German Language Level 2	4	0	0	4	ECE	ALL
6.	22GEO06	German Language Level 3	3	0	0	3	ECE	ALL
7.	22GEO07	German Language Level 4	3	0	0	3	ECE	ALL
8.	22GEO08	Japanese Language Level 2	4	0	0	4	ECE	ALL
9.	22GEO09	Japanese Language Level 3	3	0	0	3	ECE	ALL
10.	22GEO10	Japanese Language Level 4	3	0	0	3	ECE	ALL
11.	22GEO11	French Language Level 1	4	0	0	4	ECE	ALL
12.	22GEO12	French Language Level 2	4	0	0	4	ECE	ALL
13.	22GEO13	French Language Level 3	3	0	0	3	ECE	ALL
14.	22GEO14	Spanish Language Level 1	4	0	0	4	ECE	ALL
15.	22GEO15	Spanish Language Level 2	4	0	0	4	ECE	ALL
16.	22GEO16	Spanish Language Level 3	3	0	0	3	ECE	ALL
17.	22GEO17	Entrepreneurship Development	3	0	0	3	MTS	7
18.	22GEX01	NCC Studies (Army Wing) - I	3	0	2	4	EEE	5/6
19.	22GEX02	NCC Studies (Air Wing) - 1	3	0	2	4	IT	5/6
20.	22MBO01	Cost Accounting for Engineers	3	1	0	4	MBA	5
21.	22MBO02	Economic Analysis for Decision Making	3	1	0	4	MBA	6
22.	22MBO03	Marketing Analytics	3	1	0	4	MBA	7

GENERAL OPEN ELECTIVE (Common to All BE/BTech branches)





	LIST OF OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS (OEs)											
S. No.	Course Code	Course Name	L	т	Ρ	С	Sem					
1.	22ECX01	Basics of Electronics in Automation Appliances	3	0	2	4	V					
2.	22ECX02	Image Processing	3	0	2	4	V					
3.	22ECX03	PCB Design and Fabrication	3	0	2	4	VI					
4.	22ECO01	Wearable Devices	3	0	0	3	VII					
5.	22ECX04	Electronic Hardware and Troubleshooting	2	0	2	3	VII					
6.	22ECO02	Optical Engineering	3	0	0	3	VIII					

S.No	Course Code	Course Title	L	т	Ρ	С	Offering Dept.	Se m.
1	22CEX01	Remote Sensing and its Applications	3	0	2	4	Civil	5
2	22MEX01	Renewable Energy Sources	3	0	2	4	Mech	5
3	22MTO01	Design of Mechatronics Systems	3	1	0	4	MTS	5
4	22MTX01	Data Acquisition and Virtual Instrumentation	3	0	2	4	MTS	5
5	22MTX02	Factory Automation	3	0	2	4	MTS	5
6	22AUX01	Automotive Engineering	3	0	2	4	Auto	5
7	22AUO01	Automotive Electronics	3	1	0	4	Auto	5
8	22ECX01	Basics of Electronics in Automation Appliances	3	0	2	4	ECE	5
9	22ECX02	Image Processing	3	0	2	4	ECE	5
10	22EEO01	Solar and Wind Energy Systems	3	1	0	4	EEE	5
11	22EEO02	Electrical Wiring and Lighting	3	1	0	4	EEE	5
12	22EEO03	Electrical Safety	3	1	0	4	EEE	5
13	22EEO04	Analog and Digital Electronics	3	1	0	4	EEE	5
14	22EEO05	Power Electronics and Drives	3	1	0	4	EEE	5
15	22EEO06	Sensors and Actuators	3	1	0	4	EEE	5
16	22EIO01	Biomedical Instrumentation and Applications	3	1	0	4	EIE	5
17	22EIO02	Industrial Automation	3	1	0	4	EIE	5
18	22CSX01	Fundamentals of Databases	3	0	2	4	CSE	5
19	22CSX02	Data science for Engineers	3	0	2	4	CSE	5
20	22CSX03	Enterprise Application Development Using Java	3	0	2	4	CSE	5
21	22CSO01	Computational Science for Engineers	3	1	0	4	CSE	5
22	22CSO02	Formal Languages and Automata Theory	3	1	0	4	CSE	5

LIST OF OPEN ELECTIVE COURSES OFFERED UNDER R2022



			1					
23	22ITO01	Artificial Intelligence	3	1	0	4	IT	5
24	22ITX01	Next Generation Databases	3	0	2	4	IT	5
25	22CHO01	Industrial Enzymology	3	1	0	4	Chem	5
26	22CHO02	Waste to Energy Conversion	3	1	0	4	Chem	5
27	22CHO03	Applied Nanotechnology	3	1	0	4	Chem	5
28	22FTX01	Baking Technology	3	0	2	4	FT	5
29	22FTO01	Food Processing Technology	3	1	0	4	FT	5
30	22CDO01	Fundamentals of User Experience Design	3	1	0	4	CSD	5
31	22ADO01	Data Warehousing and Data Mining	3	1	0	4	AI	5
32	22ALO01	Business Intelligence	3	1	0	4	AI	5
33	22MAO01	Mathematical Foundations of Machine Learning	3	1	0	4	Maths	5
34	22MAO02	Numerical Computing	3	1	0	4	Maths	5
35	22MAO03	Stochastic Processes and Queuing Theory	3	1	0	4	Maths	5
36	22MAO04	Statistics for Engineers and Data Scientists	3	1	0	4	Maths	5
37	22PHO01	Thin Film Technology	3	1	0	4	Physics	5
38	22PHO02	High Energy Storage Devices	3	1	0	4	Physics	5
39	22PHO03	Structural and optical Characterization of Materials	3	1	0	4	Physics	5
40	22CYO01	Instrumental Methods of Analysis	3	1	0	4	Chemistry	5
41	22CYO02	Chemistry Concepts for Competitive Examinations	3	1	0	4	Chemistry	5
42	22CYO03	Organic Chemistry for Industry	3	1	0	4	Chemistry	5
43	22CEO01	Disaster Management	3	1	0	4	Civil	6
44	22MEX02	Design of Experiments	3	0	2	4	Mech	6
45	22MTO02	Robotics	3	1	0	4	MTS	6
46	22MTO03	3D Printing and Design	3	1	0	4	MTS	6
47	22AUO02	Vehicle Maintenance	3	1	0	4	Auto	6
48	22ECX03	PCB Design And Fabrication	3	0	2	4	ECE	6



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49	22EIO03	PLC Programming and its Applications	3	1	0	4	EIE	6
50	22EIO04	Virtual Instrumentation	3	1	0	4	EIE	6
51	22EEO07	Energy Conservation and Management	3	1	0	4	EEE	6
52	22EEO08	Microprocessors and Microcontrollers Interfacing	3	1	0	4	EEE	6
53	22EEO09	Programmable Logic Controller and SCADA	3	1	0	4	EEE	6
54	22EEO10	VLSI System Design	3	1	0	4	EEE	6
55	22EEO11	Industrial Automation	3	1	0	4	EEE	6
56	22CSX04	Foundations of Machine Learning	3	0	2	4	CSE	6
57	22CSX05	Web Engineering	3	0	2	4	CSE	6
58	22ITX02	Advanced Java Programming	3	0	2	4	IT	6
59	22ITO02	Internet of Things	3	1	0	4	IT	6
60	22ITO03	Fundamentals of Software Development	3	1	0	4	IT	6
61	22ITO04	Mobile Application Development	3	1	0	4	IT	6
62	22CHO04	Air Pollution Monitoring and Control	3	1	0	4	Chem	6
63	22CHO05	Paints and Coatings	3	1	0	4	Chem	6
64	22CHO06	Powder Technology	3	1	0	4	Chem	6
65	22FTX02	Processing of milk and milk products	3	0	2	4	FT	6
66	22FTX03	Processing of Fruits and Vegetables	3	0	2	4	FT	6
67	22CDX01	Fundamentals of User Interactive Design	3	0	2	4	CSD	6
68	22ADX01	Data Visualization	3	0	2	4	AI	6
69	22ALX01	Data Exploration and Visualization Techniques	3	0	2	4	AI	6
70	22MAO05	Graph Theory and its Applications	3	1	0	4	Maths	6
71	22MAX01	Data Analytics Using R Programming	3	0	2	4	Maths	6
72	22MAO06	Operations Research	3	1	0	4	Maths	6
73	22MAO07	Number Theory and Cryptography	3	1	0	4	Maths	6



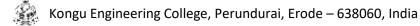
74422PH000Synthesis, Characterization And Biological Applications Of Nanomaterials3104Physics67522PH000Techniques of Crystal Growth3104Physics67622CY004Corrosion Science and Engineering3104Chemistry67722CY005Chemistry of Cosmetics in Daily Life3104Chemistry67822CY006Nano composite Materials33003Civil78022CE002Introduction to Smart Cites3003Civil78122ME001Funciples of Management and Industrial Psychology3003Mech78222ME002Principles of Management and Industrial Psychology3003Mech78322ME003Waste Heat Recovery System and Storage3003Mech78422MT004Drone System Technology3003Mech78522AU003Public Transport Management3003EEEE78622EC014Electronic Hardware And Troubleshooting203EEEE78722EC015Electronic Hardware And Troubleshooting3003EEEE78022EC014Electronic Hardware And Troubleshooting3003 <th></th> <th>1</th> <th></th> <th></th> <th></th> <th>-</th> <th></th> <th>r</th> <th></th>		1				-		r	
7622CYO04Corrosion Science and Engineering3104Chemistry67722CYO05Chemistry of Cosmetics in Daily Life3104Chemistry67822CYO06Nano composite Materials3104Chemistry67922CEO02Introduction to Smart Cities3003Civil78022CEO03Environmental Health and Safety3003Mech78122MEO01Fundamentals of Ergonomics3003Mech78222MEO02Principles of Management and Industrial Psychology3003Mech78322MEO03Waste Heat Recovery System and Storage3003Mech78422MTO04Drone System Technology3003Auto78522AUO03Public Transport Management3003ECE78622ECO1Wearable Devices3003EEE78722EEO13Elvaste Management3003EEE78922EEO14Elnebroded System Design3003EEE79022EEO15Energy Storage Systems and Controllers3003EEE79122EEO16Digital Image Processing3003<	74	22PHO04		3	1	0	4	Physics	6
7722CYO05Chemistry of Cosmetics in Daily Life3104Chemistry67822CYO06Nano composite Materials3104Chemistry67922CEO02Introduction to Smart Cities3003Civil78022CEO03Environmental Health and Safety3003Civil78122MEO01Fundamentals of Ergonomics3003Mech78222MEO02Principles of Management and Industrial Psychology3003Mech78322MEO03Waste Heat Recovery System and Storage3003Mech78422MTO04Drone System Technology3003Auto78522AU03Public Transport Management3003ECE78622ECO1Wearable Devices3003ECE78722ECX04Electronic Hardware And Troubleshooting203EEE78922EEO13E-Waste Management3003EEE79022EEO14Embedded System Design3003EEE79122EEO15Energy Storage Systems and Controllers3003EEE79222EEO16Digital Image Processing3003EEE<	75	22PHO05	Techniques of Crystal Growth	3	1	0	4	Physics	6
7822CYO06Nano composite Materials3104Chemistry67922CEO02Introduction to Smart Cities3003Civil78022CEO03Environmental Health and Safety3003Civil78122MEO01Fundamentals of Ergonomics3003Mech78222MEO02Principles of Management and Industrial Psychology3003Mech78322MEO03Waste Heat Recovery System and Storage3003Mech78422MTO04Drone System Technology3003Autoo78522AUO03Public Transport Management3003Actoo78622ECO14Vearable Devices3003EEE78722ECX04Electroic Hardware And Troubleshooting203EEE78822EEO13Elvers tenicle3003EEE79022EEO14Embedded System Design3003EEE79122EEO15Industry 4.0 with Industrial IoT3003EEE79222EEO16Industry 4.0 with Industrial IoT3003EEE79322EIO06Industry 4.0 with Industrial IoT3003EIE	76	22CYO04	Corrosion Science and Engineering	3	1	0	4	Chemistry	6
7922CEO02Introduction to Smart Cities3003Civil78022CEO03Environmental Health and Safety3003Civil78122MEO01Fundamentals of Ergonomics3003Mech78222MEO02Principles of Management and Industrial Psychology3003Mech78322MEO03Waste Heat Recovery System and Storage3003Mech78422MTO04Drone System Technology3003Auto78522AUO03Public Transport Management3003Auto78622EC01Wearable Devices33003ECE78722EC02Electronic Hardware And Troubleshooting203EEE78922EE013E-Waste Management3003EEE79022EE014Enbedded System Design3003EEE79122EE015Energy Storage Systems and Controllers3003EEE79222EE016Digital Image Processing3003EEE79322EE017Al techniques for Engineering Applications3003EEE79422EI006Industrial Data Communication3003 <td>77</td> <td>22CYO05</td> <td>Chemistry of Cosmetics in Daily Life</td> <td>3</td> <td>1</td> <td>0</td> <td>4</td> <td>Chemistry</td> <td>6</td>	77	22CYO05	Chemistry of Cosmetics in Daily Life	3	1	0	4	Chemistry	6
8022CEO03Environmental Health and Safety3003Civil78122MEO01Fundamentals of Ergonomics3003Mech78222MEO02Principles of Management and Industrial Psychology3003Mech78322MEO03Waste Heat Recovery System and Storage3003Mech78422MTO04Drone System Technology3003Mech78522AU003Public Transport Management3003Auto78622EC001Wearable Devices3003ECE78722ECX04Electronic Hardware And Troubleshooting2023EEE78922EE012Electric Vehicle3003EEE79022EE014Embedded System Design3003EEE79122EE015Energy Storage Systems and Controllers3003EEE79222EE016Digital Image Processing3003EEE79322EE017Al techniques for Engineering Applications3003EEE79422EI006Industrial Data Communication3003EIE79522EI007Wireless Instrumentation Techniques in Agriculture30 <td>78</td> <td>22CYO06</td> <td>Nano composite Materials</td> <td>3</td> <td>1</td> <td>0</td> <td>4</td> <td>Chemistry</td> <td>6</td>	78	22CYO06	Nano composite Materials	3	1	0	4	Chemistry	6
8122MEO01Fundamentals of Ergonomics3003Mech78222MEO02Principles of Management and Industrial Psychology3003Mech78322MEO03Waste Heat Recovery System and Storage3003Mech78422MTO04Drone System Technology3003Mech78522AU003Public Transport Management3003Auto78622EC01Wearable Devices3003ECE78722EEO12Electric Hardware And Troubleshooting2023EEE78822EEO12Electric Vehicle3003EEE79022EEO14Embedded System Design3003EEE79122EEO15Energy Storage Systems and Controllers3003EEE79222EEO16Digital Image Processing3003EEE79322EEO17Al techniques for Engineering Applications3003EEE79422EIO06Industrial Data Communication3003EIE79522EIO07Wireless Instrumentation Techniques in Agriculture3003EIE79622EIO07Industrial Data Communication300	79	22CEO02	Introduction to Smart Cities	3	0	0	3	Civil	7
B222MEO02Principles of Management and Industrial Psychology3003Mech78322MEO03Waste Heat Recovery System and Storage3003Mech78422MTO04Drone System Technology3003Mech78522AUO03Public Transport Management3003Auto78622EC001Wearable Devices3003ECE78722ECX04Electronic Hardware And Troubleshooting2023EEE78822EEO12Electric Vehicle3003EEE78922EEO13E-Waste Management3003EEE79022EEO14Embedded System Design3003EEE79122EEO15Energy Storage Systems and Controllers3003EEE79322EEO17Al techniques for Engineering Applications3003EEE79422EIO05Industrial Data Communication3003EIE79522EIO07Wireless Instrumentation3003EIE79622EIO08Industrial Data Communication3003EIE79722EIO08Industrial Data Communication3003EIE	80	22CEO03	Environmental Health and Safety	3	0	0	3	Civil	7
8222MEO02Psychology3003003Mech78322MEO03Waste Heat Recovery System and Storage3003Mech78422MTO04Drone System Technology3003MTS78522AU003Public Transport Management3003Auto78622EC001Wearable Devices33003ECE78722EC012Electroic Hardware And Troubleshooting2023ECE78822EE012Electric Vehicle3003EEE79022EE014Embedded System Design3003EEE79122EE015Energy Storage Systems and Controllers3003EEE79222EE016Digital Image Processing3003EEE79322EI007Al techniques for Engineering Applications3003EEE79422EI006Industrial Data Communication3003EIE79522EI007Wireless Instrumentation Techniques in Agriculture3003EIE79722EI008Instrumentation Techniques in Agriculture3003EIE7	81	22MEO01	Fundamentals of Ergonomics	3	0	0	3	Mech	7
8422MTO04Drone System Technology30003MTS78522AU003Public Transport Management3003Auto78622EC001Wearable Devices3003ECE78722ECX04Electronic Hardware And Troubleshooting2023ECE78822EE012Electric Vehicle3003EEE78922EE013E-Waste Management3003EEE79022EE014Embedded System Design3003EEE79122EE015Energy Storage Systems and Controllers3003EEE79222EE016Digital Image Processing3003EEE79322EE016Industry 4.0 with Industrial IoT3003EIE79422EI005Industry 4.0 with Industrial IoT3003EIE79522EI006Industrial Data Communication3003EIE79622EI007Wireless Instrumentation3003EIE79722EI008Instrumentation Techniques in Agriculture3003EIE7	82	22MEO02		3	0	0	3	Mech	7
8522AUO03Public Transport Management3003Auto78622ECO01Wearable Devices3003ECE78722ECX04Electronic Hardware And Troubleshooting2023ECE78822EEO12Electric Vehicle3003EEE78922EEO13E-Waste Management3003EEE79022EEO14Embedded System Design3003EEE79122EEO15Energy Storage Systems and Controllers3003EEE79222EEO16Digital Image Processing3003EEE79322EEO17Al techniques for Engineering Applications3003EEE79422EIO05Industry 4.0 with Industrial IoT3003EIE79522EIO06Industrial Data Communication3003EIE79622EIO07Wireless Instrumentation Techniques in Agriculture3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	83	22MEO03	Waste Heat Recovery System and Storage	3	0	0	3	Mech	7
8622ECO01Wearable Devices30003ECE78722ECX04Electronic Hardware And Troubleshooting2023ECE78822EEO12Electric Vehicle3003EEE78922EEO13E-Waste Management3003EEE79022EEO14Embedded System Design3003EEE79122EEO15Energy Storage Systems and Controllers3003EEE79222EEO16Digital Image Processing3003EEE79322EIO05Industry 4.0 with Industrial IoT3003EIE79422EIO06Industrial Data Communication3003EIE79522EIO07Wireless Instrumentation3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	84	22MTO04	Drone System Technology	3	0	0	3	MTS	7
8722ECX04Electronic Hardware And Troubleshooting2023ECE78822EEO12Electric Vehicle3003EEE78922EEO13E-Waste Management3003EEE79022EEO14Embedded System Design3003EEE79122EEO15Energy Storage Systems and Controllers3003EEE79222EEO16Digital Image Processing3003EEE79322EEO17Al techniques for Engineering Applications3003EEE79422EIO05Industry 4.0 with Industrial IoT3003EIE79522EIO06Industrial Data Communication3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	85	22AUO03	Public Transport Management		0	0	3	Auto	7
8822EEO12Electric Vehicle3003EEE78922EEO13E-Waste Management3003EEE79022EEO14Embedded System Design3003EEE79122EEO15Energy Storage Systems and Controllers3003EEE79222EEO16Digital Image Processing3003EEE79322EEO17Al techniques for Engineering Applications3003EEE79422EIO05Industry 4.0 with Industrial IoT3003EIE79522EIO06Industrial Data Communication3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	86	22ECO01	Wearable Devices	3	0	0	3	ECE	7
Image: Normal stateImage: Normal	87	22ECX04	Electronic Hardware And Troubleshooting	2	0	2	3	ECE	7
9022EEO14Embedded System Design3003EEE79122EEO15Energy Storage Systems and Controllers3003EEE79222EEO16Digital Image Processing3003EEE79322EEO17AI techniques for Engineering Applications3003EEE79422EIO05Industry 4.0 with Industrial IoT3003EIE79522EIO06Industrial Data Communication3003EIE79622EIO07Wireless Instrumentation3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	88	22EEO12	Electric Vehicle	3	0	0	3	EEE	7
9122EEO15Energy Storage Systems and Controllers3003EEE79222EEO16Digital Image Processing3003EEE79322EEO17AI techniques for Engineering Applications3003EEE79422EIO05Industry 4.0 with Industrial IoT3003EIE79522EIO06Industrial Data Communication3003EIE79622EIO07Wireless Instrumentation3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	89	22EEO13	E-Waste Management	3	0	0	3	EEE	7
9222EEO16Digital Image Processing3003EEE79322EEO17AI techniques for Engineering Applications3003EEE79422EIO05Industry 4.0 with Industrial IoT3003EIE79522EIO06Industrial Data Communication3003EIE79622EIO07Wireless Instrumentation3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	90	22EEO14	Embedded System Design	3	0	0	3	EEE	7
9322EEO17AI techniques for Engineering Applications3003EEE79422EIO05Industry 4.0 with Industrial IoT3003EIE79522EIO06Industrial Data Communication3003EIE79622EIO07Wireless Instrumentation3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	91	22EEO15	Energy Storage Systems and Controllers	3	0	0	3	EEE	7
9422EIO05Industry 4.0 with Industrial IoT3003EIE79522EIO06Industrial Data Communication3003EIE79622EIO07Wireless Instrumentation3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	92	22EEO16	Digital Image Processing	3	0	0	3	EEE	7
9522EIO06Industrial Data Communication3003EIE79622EIO07Wireless Instrumentation3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	93	22EEO17	AI techniques for Engineering Applications	3	0	0	3	EEE	7
9622EIO07Wireless Instrumentation3003EIE79722EIO08Instrumentation Techniques in Agriculture3003EIE7	94	22EIO05	Industry 4.0 with Industrial IoT	3	0	0	3	EIE	7
97 22EIO08 Instrumentation Techniques in Agriculture 3 0 0 3 EIE 7	95	22EIO06	Industrial Data Communication	3	0	0	3	EIE	7
	96	22EIO07	Wireless Instrumentation	3	0	0	3	EIE	7
9822CSO03Nature Inspired optimization techniques3003CSE7	97	22EIO08	Instrumentation Techniques in Agriculture	3	0	0	3	EIE	7
	98	22CSO03	Nature Inspired optimization techniques	3	0	0	3	CSE	7
9922ITO05Fundamentals of Cloud Computing3003IT7	99	22ITO05	Fundamentals of Cloud Computing	3	0	0	3	IT	7



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100	22ITO06	Introduction to Ethical Hacking	3	0	0	3	IT	7		
101	22CHO07	Hydrogen Energy	3	0	0	3	Chem	7		
102	22CHO08	Rubber Technology	3	0	0	3	Chem	7		
103	22FTO02	Principles of Food safety	3	0	0	3	3 FT			
104	22FTO03	Fundamentals of Food Packaging and Storage	3	0	0	3	FT	7		
105	22CDO02	Introduction to Mobile Game Design	3	0	0	3	CSD	7		
106	22ADO02	Neural Networks and Deep Learning	3	0	0	3	AI	7		
107	22ALO02	Industrial Machine Learning	3	0	0	3	AI	7		
108	22MAO08	Non-Linear Optimization	3	0	0	3	Maths	7		
109	22MAO09	Optimization for Engineers	3	0	0	3	Maths	7		
110	22CYO07	Waste and Hazardous Waste Management	3	0	0	3	Chemistry	7		
111	22CYO08	Chemistry in Everyday Life		0	0	3	Chemistry	7		
112	22CEO04	Infrastructure Planning and Management			0	3	Civil	8		
113	22CEO05	Environmental Laws and Policy	3	0	0	3	Civil	8		
114	22MEO04	Safety Measures for Engineers	3	0	0	3	Mech	8		
115	22MEO05	Energy Conservation in Thermal Equipments	3	0	0	3	Mech	8		
116	22MEO06	Climate Change and New Energy Technology	3	0	0	3	Mech	8		
117	22MTO05	Micro and Nano Electromechanical Systems	3	0	0	3	MTS	8		
118	22MTO06	Virtual and Augment Reality in Industry 4.0	3	0	0	3	MTS	8		
119	22AUO04	Autonomous Vehicles	3	0	0	3	Auto	8		
120	22ECO02	Optical Engineering	3	0	0	3	ECE	8		
121	22EEO18	Smart Grid technologies	3	0	0	3	EEE	8		
122	22EEO19	Biomass Energy System	3	0	0	3	EEE	8		
123	22EIO09	Environmental Sensor	3	0	0	3	EIE	8		
124	22EIO10	Pollution Control and Management	3	0	0	3	EIE	8		



125	22CSO04	Machine Translation	3	0	0	3	CSE	8
126	22CSO05	Fundamentals of Block chain	3	0	0	3	CSE	8
127	22ITO07	Business Continuity Planning	3	0	0	3	IT	8
128	22CHO09	Industrial Accident Prevention and Management	3	0	0	3	Chem	8
129	22CHO10	Electrochemical Engineering	3	0	0	3	Chem	8
130	22CHO11	Smart and Functional Materials	3	0	0	3	Chem	8
131	22FTO04	Food Ingredients	3	0	0	3	FT	8
132	22FTO05	Food and Nutrition	3	0	0	3	FT	8
133	22CDO03	Introduction to Graphics Design	3	0	0	3	CSD	8
134	22CDX02	Virtual Reality and Augmented Reality	2	0	2	3	CSD	8
135	22ADO03	Business Analytics	3	0	0	3	AI	8
136	22ALO03	Machine Learning for Smart Cities	3	0	0	3	AI	8
137	22CYO09	Chemistry of Nutrition for Women Health	3	0	0	3	Chemistry	8



LIST OF OPEN ELECTIVES OFFERED TO OTHER DEPARTMENTS (Common to all BE/ BTech branches including ECE branch)

1	22GEO01	German Language Level 1	4	0	0	4	ECE	V/VI/VII/VIII
2	22GEO02	Japanese Language Level 1		0	0	4	ECE	V/VI/VII/VIII
3	22GEO03	Design Thinking for Engineers	3	1	0	4	CSE	V
4	22GEO04	Innovation and Business Model Development	3	1	0	4	MTS	VI
5	22GEO05	German Language Level 2	4	0	0	4	ECE	V/VI/VII/VIII
6	22GEO06	German Language Level 3	3	0	0	3	ECE	V/VI/VII/VIII
7	22GEO07	German Language Level 4	3	0	0	3	ECE	V/VI/VII/VIII
8	22GEO08	Japanese Language Level 2	4	0	0	4	ECE	V/VI/VII/VIII
9	22GEO09	Japanese Language Level 3	3	0	0	3	ECE	V/VI/VII/VIII
10	22GEO10	Japanese Language Level 4	3	0	0	3	ECE	V/VI/VII/VIII
11	22GEO11	French Language Level 1	4	0	0	4	ECE	V/VI/VII/VIII
12	22GEO12	French Language Level 2	4	0	0	4	ECE	V/VI/VII/VIII
13	22GEO13	French Language Level 3	3	0	0	3	ECE	V/VI/VII/VIII
14	22GEO14	Spanish Language Level 1	4	0	0	4	ECE	V/VI/VII/VIII

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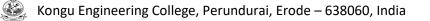
15	22GEO15	Spanish Language Level 2	4	0	0	4	ECE	V/VI/VII/VIII
16	22GEO16	Spanish Language Level 3	3	0	0	3	ECE	V/VI/VII/VIII
17	22GEO17	Entrepreneurship Development	3	0	0	3	MTS	VIII
18	22GEX01	NCC Studies (Army Wing) - I	3	0	2	4	EEE	V/VI
19	22GEX02	NCC Studies (Air Wing) - 1	3	0	2	4	IT	V/VI
20	22MBO01	Cost Accounting for Engineers	4	0	0	4	MBA	V
21	22MBO02	Economic Analysis for Decision Making	4	0	0	4	MBA	VI
22	22MBO03	Marketing Analytics	4	0	0	4	MBA	VII



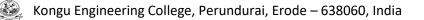
	(Common to All Engineering and Te	chnology Branches)						
Programme & Branch	gramme & All R E /R Toch Branchos							
Prerequisites	Nil	I	HS	3	0	0	3	
Preamble	This course is designed to impart required levels of Concessary for different professional contexts.	ommunication Skills	and Proficiend	cy in E	nglisl	n lan	guage	
Unit – I	Grammar, Vocabulary, Listening, Speaking, Readi	ng & Writing					9	
Types of Reading Unit – II Grammar: Voice listening - Lister	ort talks - TV shows - Speaking: Verbal & Non-verbal c g – Intensive: scanning, word by word, survey - Writing: Grammar, Vocabulary, Listening, Speaking, Readi es - Impersonal passives - Vocabulary: Homonyms, ning to announcements & radio broadcasts - Speaking: F hension - Articles from Newspapers/Magazines - Cloze e	<u>Dialogue writing, Int</u> ng & Writing Homophones & Hor Persuasive & Improm	formal Letters nographs - L ptu talks - Nar	- Para	ngrap ng: l a sto	h wri mpoi ry - F	ting 9 tance o Reading	
Unit – III	Grammar, Vocabulary, Listening, Speaking, Readi	U	soay whing,	oumbre	10 30		•	
Grammar: Prepo	ositions - Vocabulary: Compound Nouns - Listening:	Listening to TED Ta	alks, Comme	ntaries	- Sr	beak	ing: Se	
Introduction - Re Formal letters: Se	eading: Extensive: speed, skimming - Identifying lexical & eeking permission for Industrial visits & Inviting guests	& contextual meaning						
Introduction - Re Formal letters: So Unit – IV	eading: Extensive: speed, skimming - Identifying lexical a eeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Readi	& contextual meaning	gs - Writing: I	Instruc	tions	& W	arnings 9	
Introduction - Re Formal letters: So Unit – IV Grammar: Artic Listening: Lister Paraphrasing & S	eading: Extensive: speed, skimming - Identifying lexical & eeking permission for Industrial visits & Inviting guests	& contextual meaning ng & Writing ry - Analogy - Unsci Skill Sharing - N	gs - Writing: I rambling word lote-taking - I	Instruc Is - L Readir	tions .ogica	& W al rea lote	arnings 9 asoning making	
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		UTCON		the stu	udents will b	e able to						T Mappe ghest Lev				
CO1	CO1 use language effectively by acquiring vocabulary and syntax in context												Applying (K3)			
CO2 listen and comprehend different spoken discourses from a variety of situations											Applying (K3)					
CO3	3 speak confidently in different professional contexts and with peers											Creating (K6)				
CO4	comprehend different genres of texts by adopting various reading strategies											rstanding	g (K2)			
CO5	write legibly and flawlessly at varied professional contexts proficiently with appropriate choice of words and structures											eating (K	(6)			
					Мар	ping of C	Os with P	Os and PSC	Ds							
COs/P	POs	PO1	PO2	PO	3 PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012			
CO	1						2			1	3	1	1			
CO	2									2	3		1			
CO	3									2	3		2			
CO4	4						1				3	1	1			
CO	5										3		2			
1 – Sli	ight, 2	2 – Mode	erate, 3 – Su	bstanti	al, BT- Bloom	n's Taxono	omy									
					ASS	ESSMEN	T PATTER	N – THEOF	RY							
	/ Blo atego		Remembe (K1) %		Understand (K2) %	ling A	Applying (K3) %	Analyzin (K4) %		aluating K5) %	Creating (K6) %	Тс	otal %			
CAT1					37		30				33		100			
CAT2				30		30				40		100				
	CAT3	}			33		34				33					
	ESE				17		63				20		100			

	(Common to all Engi	neering and Technology br	anches)				
Programm Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisi	es Nil	1	BS	3	1*	2 *	4
Preamble	To provide the skills to the stude ordinary differential equations.	nts for solving different real ti	me problems b	у ар	plyin	g ma	trices and
Eigen vector Orthogonal Reduction vectors: St	Matrices: - Characteristic equation – Eigen values rs (without proof) – Cayley – Hamilton t transformation of a symmetric matrix t of quadratic form to canonical form by o retching of an elastic membrane.	theorem (Statement and app o diagonal form – Quadration rthogonal transformation – A	ications only) ; form – Natu	- Ort re of	hogo Qua	onal r adrat	natrices ic forms and Eiger
Unit – II	Ordinary Differential Equations – Solutions of First order differential equations		untiona Laib	nitz'	. Lin	oor E	9
Bernoulli's	equation –Clairaut's equation - Application	ns: Law of natural growth and	decay.	TILZ S		cai E	-qualion -
Unit – III	Ordinary Differential Equations						9
– cosax	ential equations of second and higher or / sinax – $x^n - e^{ax}x^n$, $e^{ax}sinbx$ and $e^{ax}c$ Euler-Cauchy's equation – Legendre's e	der with constant coefficients cosbx – x ⁿ sinax and x ⁿ cosa					
Unit – IV	Applications of Ordinary Differ						9
	ariation of parameters – Simultaneous fi						
to be given Unit – V	Laplace Transform:	ectric circuits (Differential equ	ations and ass	ocia	ted c	ondit	ions need 9
to be given Unit – V Laplace Traintegrals of functions. I Convolution	Laplace Transform: nsform: Conditions for existence – Tran transforms –Transforms of derivatives ar nverse Laplace transform: Inverse Lapla theorem (Statement only) – Applications	ectric circuits (Differential equestion sform of elementary function ad integrals – Transform of ur ace transform of elementary	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Traintegrals of functions. I Convolution	Laplace Transform: nsform: Conditions for existence – Tran transforms –Transforms of derivatives ar nverse Laplace transform: Inverse Laplace theorem (Statement only) – Applications PERIMENTS / EXERCISES:	ectric circuits (Differential equestion sform of elementary function ad integrals – Transform of ur ace transform of elementary	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Traintegrals of functions. I Convolution	Laplace Transform: nsform: Conditions for existence – Tran transforms –Transforms of derivatives ar nverse Laplace transform: Inverse Lapla theorem (Statement only) – Applications	ectric circuits (Differential equestion sform of elementary function ad integrals – Transform of ur ace transform of elementary	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Traintegrals of functions. I Convolution	Laplace Transform: nsform: Conditions for existence – Tran transforms –Transforms of derivatives ar nverse Laplace transform: Inverse Laplace theorem (Statement only) – Applications PERIMENTS / EXERCISES:	ectric circuits (Differential equestion sform of elementary function and integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Traintegrals of functions. I Convolution LIST OF E 1. Int 2. Co	Laplace Transform: Insform: Conditions for existence – Tran transforms –Transforms of derivatives ar hverse Laplace transform: Inverse Lapla theorem (Statement only) – Applications (PERIMENTS / EXERCISES: oduction to MATLAB	ectric circuits (Differential equ sform of elementary function ad integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace ⊤ra integrals of functions. I Convolution LIST OF E 1. Int 2. Cc 3. Pla	Laplace Transform: Insform: Conditions for existence – Transforms –Transforms of derivatives ar Inverse Laplace transform: Inverse Laplace transform: Inverse Laplace transform: Inverse Laplace theorem (Statement only) – Applications (PERIMENTS / EXERCISES: Inverse to MATLAB Inputation of eigen values and eigen vectors	ectric circuits (Differential equals sform of elementary function and integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se tors	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Traintegrals of functions. I Convolution LIST OF E 1. Int 2. Cc 3. Plo 4. Sc	Laplace Transform: nsform: Conditions for existence – Tran transforms –Transforms of derivatives ar nverse Laplace transform: Inverse Lapla theorem (Statement only) – Applications PERIMENTS / EXERCISES: oduction to MATLAB mputation of eigen values and eigen vectors tting and visualizing single variable funct	ectric circuits (Differential equals sform of elementary function and integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se tors	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Traintegrals of functions. I Convolution LIST OF E 1. Int 2. Co 3. Plo 4. So 5. So	Laplace Transform: nsform: Conditions for existence – Transforms – Transforms of derivatives ar hverse Laplace transform: Inverse Laplace transform: Inverse Laplace transform: Inverse Laplace theorem (Statement only) – Applications (PERIMENTS / EXERCISES: oduction to MATLAB mputation of eigen values and eigen vector tting and visualizing single variable funct ving first and second order ordinary diffe	ectric circuits (Differential equals sform of elementary function and integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se tors ions rential equations	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Tra integrals of functions. I Convolution LIST OF E 1. Int 2. Co 3. Plo 4. So 5. So 6. So	Laplace Transform: Insform: Conditions for existence – Transforms – Transforms of derivatives ar transforms – Transforms of derivatives ar theorem (Statement only) – Applications CPERIMENTS / EXERCISES: oduction to MATLAB mputation of eigen values and eigen vect tting and visualizing single variable funct ving first and second order ordinary diffe ution of Simultaneous first order ODEs	ectric circuits (Differential equals sform of elementary function and integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se tors ions rential equations	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Tra integrals of functions. I Convolution LIST OF E 1. Int 2. Co 3. Plo 4. So 5. So 6. So 7. De	Laplace Transform: Insform: Conditions for existence – Transforms –Transforms of derivatives are transforms –Transforms of derivatives are theorem (Statement only) – Applications PERIMENTS / EXERCISES: oduction to MATLAB Imputation of eigen values and eigen vector tting and visualizing single variable funct ving first and second order ordinary different ution of Simultaneous first order ODEs ving second order ODE by variation of para	ectric circuits (Differential equals sform of elementary function and integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se tors ions rential equations arameters ansform of basic functions	ations and ass s – Basic prop it step function functions – P	ertie – Ti artia	ted c s – C ransf I frac	Ondit	ions need 9 atives and of periodic method -
to be given Unit – V Laplace Traintegrals of functions. Integrals of functing and functions. Integrals of functing and functing	Laplace Transform: Insform: Conditions for existence – Transforms – Transforms of derivatives are transforms – Transforms of derivatives are transforms (Statement only) – Applications Theorem (Statement only) – Applications CPERIMENTS / EXERCISES: oduction to MATLAB mputation of eigen values and eigen vector tring and visualizing single variable funct ving first and second order ordinary difference ution of Simultaneous first order ODEs ving second order ODE by variation of parentining Laplace and inverse Laplace transformer	ectric circuits (Differential equesion sform of elementary function and integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se tors ions rential equations arameters ansform of basic functions g Laplace transforms	ations and ass s – Basic prop it step function functions – P	ocia ertie a – Tı artia h co	ted c s – E ransf I frac nstar	Deriva orm o ction nt coe	9 atives and of periodid method - efficients.
to be given Unit – V Laplace Tra integrals of functions. I Convolution LIST OF E 1. Int 2. Co 3. Plo 4. So 5. So 6. So 7. De	Laplace Transform: Insform: Conditions for existence – Transforms –Transforms of derivatives are transforms –Transforms of derivatives are theorem (Statement only) – Applications (PERIMENTS / EXERCISES: oduction to MATLAB mputation of eigen values and eigen vector tting and visualizing single variable funct ving first and second order ordinary different ution of Simultaneous first order ODEs ving second order ODE by variation of para termining Laplace and inverse Laplace transformer ution of Second order ODE by employing	ectric circuits (Differential equesion sform of elementary function and integrals – Transform of ur ace transform of elementary s: Solution of linear ODE of se tors ions rential equations arameters ansform of basic functions g Laplace transforms	ations and ass s – Basic prop it step function functions – P cond order wit	ocia ertie a – Tı artia h co	ted c s – E ransf I frac nstar	Deriva orm o ction nt coe	ions need 9 atives and of periodic method - officients.



1.	Kreysz	ig E	E, "Adva	anced E	ngine	ering Math	ematics	s ", 10 th	Editio	n, John '	Wiley, I	lew Delh	i, India, 2	2016.	
2.						and Guna , New Del		(., "Eng	ineerin	ig Mathe	matics	For First \	∕ear B.E/	B.Tech"	, Reprint
3.	Durais	amy	/ C., Ve	engataa	salam	S., Arun Delhi, 201	Prakasł	n K. and	d Sure	sh M., "	Engine	ering Mat	hematics	s - I", 2 nd	Edition,
4.	Grewa	I B.S	S., "Hig	her Eng	ineeri	ng Mather	matics"	44thEd	ition, k	Khanna F	Publishe	ers, New	Delhi, 20	18.	
5.	Matric	es a	nd Ord	inary Di	fferen	tial Equati	ons Lab	oratory	/ Manu	ıal.					
COURS	SE OUT	COI	MES:											ВТ Мар	ped
On con	npletio	n of	the co	urse, th	e stu	dents will	be abl	e to						ighest L	,
CO1	solve	eng	ineerin	g proble	ms wl	nich needs	s matrix	compu	Itations	5.				pplying (nipulatio	
CO2	identi	y th	e appro	opriate r	netho	d for solvir	ng first o	order or	dinary	differen	tial equ	ations.	Ma	pplying (nipulatio	n (S2)
CO3	solve	high	ner orde	er linear	differ	ential equa	ations w	vith con	stant a	ind varia	ble coe	fficients.		pplying (
CO4			concep ng prob		nary c	lifferential	equatio	ons for r	nodelii	ng and fi	nding s	olutions to		pplying (
CO5	apply	Lap	lace Tr	ansform	to fin	d solution	s of Line	ear Ord	linary [Different	ial Equa	ations		pplying (
													IVIO	inpulatio	n (32)
						Mapping	1 of CO	s with	POs a	nd PSO	s				(52)
COs/P	Os PO)1	PO2	PO3	PO4	Mapping	of CO PO6	s with PO7	POs a PO8	1	s PO10	P011	PO12	PSO1	PS02
COs/Po			PO2 3	PO3 2	PO4			1	1	1		P011	I		1
	3				PO4	PO5		1	1	1		P011	I		1
CO1	3		3	2	PO4	PO5		1	1	1		P011	I		1
CO1 CO2			3 3	2 2	PO4	PO5 3 3		1	1	1		PO11	I		1
CO1 CO2 CO3			3 3 3	2 2 2	PO4	PO5 3 3 3 3 3		1	1	1		P011	I		1
CO1 CO2 CO3 CO4 CO5			3 3 3 3 3	2 2 2 2 2 3		PO5 3 3 3 3 3 3	PO6	P07	P08	1		P011	I		1
CO1 CO2 CO3 CO4 CO5			3 3 3 3 3	2 2 2 2 2 3		PO5 3 3 3 3 3 1, BT- Bloc	PO6	PO7	РО8	PO9	P010	P011	I		1
CO1 CO2 CO3 CO4 CO5 1 – Slig		Mod	3 3 3 3 erate, 3	2 2 2 2 2 3	stantia	PO5 3 3 3 3 3 3 3 3 3 3	PO6 om's Ta	PO7	908 9 9 9 9 9	PO9	PO10	PO11	PO12		PSO2
CO1 CO2 CO3 CO4 CO5 1 – Slig Test Ca	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Mod	3 3 3 3 erate, 3	2 2 2 3 3 – Subs	stantia	PO5 3 3 3 3 3 1, BT- Bloc ASSESS Understa	PO6 om's Ta SMENT anding %	PO7 xonom PATTE Apply	908 9 9 ERN - ⁻ 9%	PO9 THEOR Analyz	PO10	valuating	PO12	PSO1	PSO2
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CO1 CO2 CO3 CO4 CO5 1 – Slig Test Ca	/ Bloon tegory*	Mod	3 3 3 3 erate, 3	2 2 2 3 3 – Subs member (K1) % 10	stantia	PO5 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 5 4 5 5 6 6 7 7 6 7 7 7 8 7 8 8 8 9	PO6 om's Ta SMENT anding %	PO7 xonom PATTE Apply (K3) 7(PO8 PO8 State Po	PO9 THEOR Analyz	PO10	valuating	PO12	PSO1	PSO2



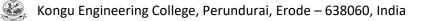
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	1	BS	3	0	0	3
				_	-		
Preamble	This course aims to equip the engineering students to realiz storage devices, organic electronic materials, insulating materials management.	e the impo rials, fuels	ortance of che & combustior	emist and	try in I the r	electi need f	rochemica or e-waste
Unit – I	ELECTROCHEMICAL STORAGE DEVICES						9
tests on battery - maintenance of ba Fuel Cells: Introd H ₂ -O ₂ fuel cell, alk Unit – II	ction- types of batteries - discharging and charging of battery - of - primary battery: silver button cell - secondary battery: Ni-Co tteries - choice of batteries for electric vehicle applications. Juction-Importance and classification of fuel cells - description, pri- aline fuel cell, molten carbonate fuel cell and direct methanol fue ORGANIC ELECTRONIC MATERIALS Inducting polymers – p-type and n-type organic semicondu	d battery inciple, cor el cell.	- modern bat	tery: I app	lithiu olicati	um-ioi ons o	f fuel cells
semiconducting n electrospinning, d	naterials – organic dielectric materials – processing and fabric organic dielectric materials – processing and fabric organic light emitting diodes – working -effect transistors and organic solar cells- working, types and ap	rication - , types and	spin coating, d applications	eva	apora	tion,	sputtering
Unit – III	INSULATING MATERIALS						9
constantan, molyl							olymers
constantan, molyl polarization of poly Unit – IV Introduction – clas theoretical calcula –proximate analys manufacture of sy	odenum disilicide and nichrome - polymers as electrical insu mers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C sis – significance – metallurgical coke - Otto-Hoffman byprodu metallurgical coke - bergius process - kn	calorific v Drsat's me loct method	on-polar poly alues – gross thod - solid fu - liquid fuel park ignition o	and els - rel	s - p I net o coal fining ne -	calorif and i of po	9 iic values ts varietie etroleum e number
constantan, molyt polarization of poly Unit – IV Introduction – class theoretical calcula –proximate analys manufacture of sy compression igniti Emission Standard	odenum disilicide and nichrome - polymers as electrical insu mers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C sis – significance – metallurgical coke - Otto-Hoffman byprodu metallurgical coke - Otto-Hoffman byprodu metallurgical coke - Detro - hydrogenation of coal - bergius process - kn on engine - cetane number - power alcohol and biodiesel - gased d (BSES) system.	calorific v Drsat's me loct method	on-polar poly alues – gross thod - solid fu - liquid fuel park ignition o	and els - rel	s - p I net o coal fining ne -	calorif and i of po	oolymers 9 fic values ts varietie etroleum e number arat Stag
constantan, molyt polarization of poly Unit – IV Introduction – class theoretical calcula –proximate analys manufacture of sy compression igniti Emission Standard Unit – V	odenum disilicide and nichrome - polymers as electrical insurvers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C sis - significance - metallurgical coke - Otto-Hoffman byprodu vnthetic petrol - hydrogenation of coal - bergius process - kn on engine - cetane number - power alcohol and biodiesel - gased d (BSES) system. E-WASTE AND ITS MANAGEMENT	calorific v Drsat's me loct method locking: sp bus fuel - v	on-polar poly alues – gross thod - solid fu - liquid fuel park ignition o vater gas - int	and els - - rel engii rodu	net o coal fining ne - ction	olar p calorit and i of po octan of Bh	9 iic values ts varietie etroleum e number arat Stage 9
constantan, molyt polarization of poly Unit – IV Introduction – class theoretical calcula –proximate analys manufacture of s compression igniti Emission Standard Unit – V Introduction-E- Wa human health- ne recycling of e-was	odenum disilicide and nichrome - polymers as electrical insu mers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C sis – significance – metallurgical coke - Otto-Hoffman byprodu metallurgical coke - Otto-Hoffman byprodu metallurgical coke - Detro - hydrogenation of coal - bergius process - kn on engine - cetane number - power alcohol and biodiesel - gased d (BSES) system.	calorific v Drsat's me loct method locking: sp bus fuel - v e-waste - minimizatio	on-polar poly alues – gross thod - solid fu - liquid fuel park ignition o vater gas - int effects of e-won techniques	and els - rel engli rodu vaste	net of coal fining ne - ction	calorit and i of po octan of Bh enviro aging	9 iic values ts varietie etroleum e numbe arat Stag 9 nment an e-waste
constantan, molyl polarization of poly Unit – IV Introduction – clas theoretical calcula –proximate analys manufacture of sy compression igniti Emission Standard Unit – V Introduction-E- Wa human health- ne recycling of e-was global scenario of	odenum disilicide and nichrome - polymers as electrical insurvers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C vis - significance - metallurgical coke - Otto-Hoffman byprodu vnthetic petrol - hydrogenation of coal - bergius process - kn on engine - cetane number - power alcohol and biodiesel - gased d (BSES) system. E-WASTE AND ITS MANAGEMENT aste - definition - sources of e-waste- hazardous substances in ed for e-waste management- e-waste handling rules - waste r te - disposal treatment methods of e- waste- mechanism of extr	calorific v Drsat's me loct method locking: sp bus fuel - v e-waste - minimizatio	on-polar poly alues – gross thod - solid fu - liquid fuel park ignition o vater gas - int effects of e-won techniques	and els - rel engli rodu vaste	net of coal fining ne - ction	calorit and i of po octan of Bh enviro aging	oolymers 9 iic values ts varietie etroleum e number arat Stag 9 nment and e-waste
constantan, molyl polarization of poly Unit – IV Introduction – clas theoretical calcula –proximate analys manufacture of sy compression igniti Emission Standard Unit – V Introduction-E- Wa human health- ne recycling of e-was global scenario of TEXT BOOK:	odenum disilicide and nichrome - polymers as electrical insurgers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by Class – significance – metallurgical coke - Otto-Hoffman byprodurenthetic petrol - hydrogenation of coal - bergius process - knon engine - cetane number - power alcohol and biodiesel - gased (BSES) system. E-WASTE AND ITS MANAGEMENT aste – definition - sources of e-waste – hazardous substances in ed for e-waste management – e-waste handling rules - waste rete - disposal treatment methods of e- waste – mechanism of extre E-waste – E-waste in India- case studies.	lators - n calorific v Drsat's me ict method ocking: sp ous fuel - v e-waste - ninimizatio action of p	on-polar poly alues – gross thod - solid fu - liquid fuel park ignition o vater gas - int effects of e-w on techniques precious meta	and els - - rel engii rodu vaste s for I froi	I net (coal fining ne - ction e on e mana m lea	calorit and i of po octan of Bh enviro aging iching	9 iic values ts varietie etroleum e numbe arat Stag 9 nment an e-waste solution Total:4
constantan, molyt polarization of poly Unit – IV Introduction – clas theoretical calcula –proximate analys manufacture of sy compression igniti Emission Standard Unit – V Introduction-E- Wa human health- ne recycling of e-was global scenario of TEXT BOOK: 1. Wiley Edit III, IV.	odenum disilicide and nichrome - polymers as electrical insurmers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C isis - significance - metallurgical coke - Otto-Hoffman byprodu inthetic petrol - hydrogenation of coal - bergius process - kn on engine - cetane number - power alcohol and biodiesel - gased d (BSES) system. E-WASTE AND ITS MANAGEMENT aste - definition - sources of e-waste- hazardous substances in ed for e-waste management- e-waste handling rules - waste r te - disposal treatment methods of e- waste- mechanism of extr E-waste - E-waste in India- case studies.	lators - n calorific v Drsat's me loct method locking: sp ous fuel - v e-waste - minimizatio action of p	on-polar poly alues – gross thod - solid fu - liquid fuel oark ignition o vater gas - int effects of e-w on techniques orecious meta	and els - rel engii rodu /aste for I froi	I net (coal fining ne - ction e on e mana m lea	calorit and i of po octan of Bh enviro aging iching	9 fic values ts varietie etroleum arat Stag 9 nment and e-waste solution Total:4
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constantan, molyt polarization of poly Unit – IV Introduction – clas theoretical calcula –proximate analys manufacture of sy compression igniti Emission Standard Unit – V Introduction-E- Wa human health- ne recycling of e-was global scenario of TEXT BOOK: 1. Wiley Edit III, IV. 2. Palanisan Edition, P	odenum disilicide and nichrome - polymers as electrical insurmers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C isis - significance - metallurgical coke - Otto-Hoffman byprodu inthetic petrol - hydrogenation of coal - bergius process - kn on engine - cetane number - power alcohol and biodiesel - gased d (BSES) system. E-WASTE AND ITS MANAGEMENT aste - definition - sources of e-waste- hazardous substances in ed for e-waste management- e-waste handling rules - waste r te - disposal treatment methods of e- waste- mechanism of extr E-waste - E-waste in India- case studies.	lators - n calorific v Drsat's me loct method locking: sp ous fuel - v e-waste - minimizatio action of p ndia Pvt. L	on-polar poly alues – gross thod - solid fu - liquid fuel oark ignition o vater gas - int effects of e-w on techniques orecious meta	and els - rel engii rodu /aste for I froi	I net (coal fining ne - ction e on e mana m lea	calorit and i of po octan of Bh enviro aging iching	9 ic values ts varietie etroleum e numbe arat Stag 9 nment an e-waste solution Total:4
constantan, molyt polarization of poly Unit – IV Introduction – class theoretical calcula –proximate analys manufacture of sy compression igniti Emission Standard Unit – V Introduction-E- Wa human health- ne recycling of e-was global scenario of TEXT BOOK: 1. Wiley Edit III, IV. 2. Palanisan Edition, P REFERENCES:	odenum disilicide and nichrome - polymers as electrical insurmers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C isis - significance - metallurgical coke - Otto-Hoffman byprodu inthetic petrol - hydrogenation of coal - bergius process - kn on engine - cetane number - power alcohol and biodiesel - gased d (BSES) system. E-WASTE AND ITS MANAGEMENT aste - definition - sources of e-waste- hazardous substances in ed for e-waste management- e-waste handling rules - waste r te - disposal treatment methods of e- waste- mechanism of extr E-waste - E-waste in India- case studies.	lators - n calorific v Drsat's me ict method ocking: sp bus fuel - v e-waste - minimizatio action of p ndia Pvt. L /a V.N., "E	on-polar poly alues – gross thod - solid fu - liquid fuel park ignition ov vater gas - int effects of e-won techniques precious meta	and els - relengii rodu vaste for I froi	s - p I net (coal fining ne - ction e on e mana m lea	caloriti and i of po octan of Bh enviro aging iching 2019 , Revi	9 fic values ts varietie etroleum e numbe arat Stag 9 nment an e-waste solution Total:4 for Unit-I, sed
constantan, molyt polarization of poly Unit – IV Introduction – class theoretical calcula –proximate analys manufacture of sy compression igniti Emission Standard Unit – V Introduction-E- Wa human health- ne recycling of e-was global scenario of TEXT BOOK: 1. Wiley Edit III, IV. 2. Palanisan Edition, P REFERENCES: 1. Palanisan	odenum disilicide and nichrome - polymers as electrical insurmers. FUELS AND COMBUSTION sification of fuels - characteristics of a good fuel - combustion - tion of calorific value by Dulong's formula - flue gas analysis by C sis - significance - metallurgical coke - Otto-Hoffman byprodu unthetic petrol - hydrogenation of coal - bergius process - kn on engine - cetane number - power alcohol and biodiesel - gased d (BSES) system. E-WASTE AND ITS MANAGEMENT aste - definition - sources of e-waste- hazardous substances in ed for e-waste management- e-waste handling rules - waste r te - disposal treatment methods of e- waste- mechanism of extr E-waste - E-waste in India- case studies. orial Board, "Wiley Engineering Chemistry", 2nd Edition, Wiley Ir my P.N., Manikandan P., Geetha A., Manjula Rani K. & Kowshaly earson Education, New Delhi, 2019, for Unit-I, II, V.	lators - n calorific v Drsat's me ict method ocking: sp ous fuel - v e-waste - minimizatio raction of p ndia Pvt. L /a V.N., "E	on-polar poly alues – gross thod - solid fu - liquid fuel oark ignition of vater gas - int effects of e-wo on techniques orecious meta td, New Delhi nvironmental	mers and els - rei engii rodu vaste s for l fron i, Re Scie	s - p I net (coal fining ne - ction e on e mana m lea	caloriti and i of po octan of Bh enviro aging iching 2019 , Revi	9 fic values ts varietie etroleum e numbe arat Stag 9 nment an e-waste solution Total:4 for Unit-I, sed

		UTCOM ion of t		se, the st	udents	s will be a	able to						(BT Mapp Highest L	
CO1	use	the con	cepts of	batteries,	fuel ce	ells and th	eir appl	ications	in vari	ious field	s.			Applying	(K3)
CO2	utiliz	ze the o	rganic e	ectronic m	naterial	s for vario	ous app	lications	6					Applying	(K3)
CO3	app	ly the kr	nowledge	e of insula	tors to	make diff	erent in	sulating	mater	ials for v	arious a	pplications		Applying	(K3)
CO4	app	ly the co	oncepts	of fuels an	d com	bustion fo	r engine	eering a	pplicat	ions				Applying	(K3)
CO5	utiliz	ze the ki	nowledg	e to handl	e the e	-waste ar	nd reduc	ce its im	pacts	on enviro	onment			Applying	(K3)
						Mapping	g of CO	s with	POs a	nd PSO:	5				
COs/I	Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1										
CO	2	3	2	1	1										
CO	3	3	1	1	1										
CO	4	3	1	1	1										
CO	5	3	2	1	1			3							
1 – Sli	ght, 2	– Mode	rate, 3 -	Substant	ial, BT·	- Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	RN –	THEOR	(
	st / Ble Catege	oom's ory*	Re	ememberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating (K6) %	Total %
	CAT	1		25		35		40)						100
	CAT	2		25		35		40)						100
	CAT	3		25		35		40)						100
	ESE	=		25		35		40)						100
* ±3%	may b	oe varied	d (CAT 1	,2,3 – 50	marks	& ESE –	100 ma	rks)			·				· ·



Programme& Branch	B.E & ELECTRONICS AND COMMUNICATION ENGINEERING	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	1	PC	3	0	0	3
Preamble	This course provides an insight on basic laws and networks and to expose them to the rudiments of the						
Unit – I	DC Circuits:						9
	ent Electricity and basic Kirchoff's Laws- Star-Delta T heorem-Thevenin Theorem, Norton Theorem-Maximum I			alysi	s-Noo	dal A	nalysis
Unit – II	AC Circuits:						9
	concepts-Mesh Analysis-Nodal Analysis – Star-Delta T n Theorem-Maximum Power Transfer Theorem	Fransformat	ion-Superpos	ition	Theo	rem-	Thevenir
Unit – III	Transient Analysis:						9
	ance and Phasor Diagram-Review-Basic Laplace Transf onse of RL, RC and RLC circuits	orms-DC re	sponse of RL	.,RC	and F	RLC (Circuits -
Unit – IV	Resonance:						9
Series Resonar	ce-Impedance and Phase Angle of a Series Resonant Ci						
Circuit-Bandwid	th of an RLC circuit-Quality Factor(Q) and its Effect on Bai iit- Q-Factor of Parallel Resonance.	ndwidth-Par	allel Resonan	ice-R	esona	ant Fi	requency
Circuit-Bandwid for a Tank Circu		ndwidth-Par	allel Resonan	ice-R	esona	ant Fi	equency
Circuit-Bandwid for a Tank Circu Unit – V Two-port Netwo	it- Q-Factor of Parallel Resonance.						9
Circuit-Bandwid for a Tank Circu Unit – V Two-port Netwo	http://www.sector.com/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/actio						9
Circuit-Bandwid for a Tank Circu Unit – V Two-port Netwo Parameters-Hyl	http://www.sector.com/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/actio						9 n (ABCD)
Circuit-Bandwid for a Tank Circu Unit – V Two-port Netwo Parameters-Hyl TEXT BOOK:	http://www.sector.com/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/action/actio	Admittance	(Y) Paramete	rs-Tra	ansm	issior	9 (ABCD) Total:4
Circuit-Bandwid for a Tank Circu Unit – V Two-port Netwo Parameters-Hyl TEXT BOOK: 1. Sudha Educa	atter A. and Shyammohan S. Palli, "Circuits and Networks atton, New Delhi, 2017.	Admittance	(Y) Paramete	rs-Tra	ansm	issior	9 (ABCD) Total:4
Circuit-Bandwid for a Tank Circu Unit – V Two-port Netwo Parameters-Hyl TEXT BOOK: 1. Sudha Educa REFERENCES	atter A. and Shyammohan S. Palli, "Circuits and Networks atton, New Delhi, 2017.	Admittance Analysis an	(Y) Paramete d Synthesis",	rs-Tra 5th E	ansm	issior , Mc ⁱ	9 (ABCD) Total:45

	E OUTC		ourse,	the stu	Idents V	vill be a	able to						BT Map (Highest	
CO1	make u	se of va	arious th	neorem	s and o	btain re	duced	DC Ciro	cuits.				Applying	g (K3)
CO2	apply v	arious r	network	theore	ms and	reduce	the cor	nplicate	d AC ci	rcuits.			Applying	g (K3)
CO3	analyze	e circuit	transie	nts for I	RL, RC	and RL	C circu	its.					Applying	(K3)
CO4	apply c	ondition	for res	onance	in serie	es and p	barallel	circuits	to find	the variou	us parame	eters.	Applying	g (K3)
CO5	determi	ine the v	various	paramo	eters of	a two p	ort netv	vork.					Applying	g (K3)
					Мар	oing of	COs w	ith POs	and P	SOs				
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1								2	3	2
CO2	3	2	1	1								2	3	2
CO3	3	3	2	1								2	3	2
CO4	3	2	1	1								2	3	2
CO5	3	2	1	1								2	3	2
1 – Sligh	nt, 2 – Mo	oderate,	3 – Su	bstantia	al, BT- E	Bloom's	Taxon	omy						
					ASS	ESSME		TTERN	- THE	ORY				
	Bloom's gory*		ember (K1) %	ing l	Jnderst (K2			plying (3) %		yzing 4) %	Evaluat (K5) S		Creating (K6) %	Total %
CA	\T1		13		1	2		75		-	-		-	100
CA	T2		13		2	5		62		-	-		-	100
CA	T 3		5		1	5		80		-	-		-	100
E	SE		5		1	0		85		-	-		-	100
* ±3% m	ay be va	ried (CA	AT 1,2,3	3 – 50 n	narks &	ESE –	100 ma	arks)						

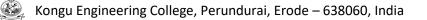


	(Co	mmon to All Engineering and Technology branches except	CSE, IT	, CSD, AIDS	& Al	ML)		
Prog Bran	ramme & ch	All BE/BTech Engineering & Technology branches , except CSE, IT, CSD, AIDS & AIML	Sem.	Category	L	Т	Р	Credit
Prere	equisites	Nil	1	BS	3	0	2	4
Prear	nble	The course aims to provide exposure to problem-solving fundamental concepts of C Programming. This course provide C						
Unit -	-1	Introduction to C and Operators:						9
		program – Compiling and executing C program – C Tokens – C les – constants – Input / Output statements – Operators	Character	set in C – Key	/wor	ds – i	dentif	iers- Basi
Unit -		Control Statements and Arrays:						9
		nd looping statements, Arrays: Declaring, initializing and acc and their operations.	cessing a	rrays – oper	atior	ns on	arra	ys — Two
Unit -		Functions:						9
		ion- Using functions, function declaration and definition – functi ata types and arrays – storage classes – recursive functions	on call –	return statem	ent -	- pas	sing p	arameter
Unit -		Strings and Pointers:						9
		 n – operations on strings: finding length, concatenation, cc ns, Arrays of strings. Pointers : declaring pointer variables – po 						
			inter expr	ession and a	TUTIT	ielic,	pointe	ers and Ti
	s, pointers and		inter expr	ession and a			pointe	9
Unit - User- enum positi	s, pointers and V defined data herated data ty on indicator : f	strings	structure	e – structure	and	func	tions	9 -unions
Unit - User- enum positi	s, pointers and - V defined data herated data ty on indicator : f OF EXPERIM	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re seek(), ftell() and rewind() ENTS / EXERCISES:	structure	e – structure	and	func	tions	9 -unions
arrays Unit - User- enum positi LIST 1.	s, pointers and V defined data herated data ty on indicator : f OF EXPERIM Programs f	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers	structure eading and	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
Unit - User- enum positi	s, pointers and V defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re seek(), ftell() and rewind() ENTS / EXERCISES:	structure eading and	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
arrays Unit - User- enum positi LIST 1. 2.	s, pointers and - V - v - v - v - v - v - v - v - v	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith	structure eading and	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
arrays Unit - User- enum positi LIST 1. 2. 3. 4.	s, pointers and - V defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re- seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith- or demonstrating the use of using decision making statements	structure eading and	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
unit - User- enum positi LIST 1. 2. 3. 4. 5.	s, pointers and - V - V - defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f Programs f	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures	structure eading and	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
arrays Unit - User- enum positi LIST 1. 2. 3. 4. 5. 6.	s, pointers and - V - V - defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f Programs f Programs f	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re- seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating one-dimensional arrays	structure eading and	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
array: Unit - User- enum positi LIST 1. 2. 3. 4. 5. 6. 7.	s, pointers and - V defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f Programs f Programs f Programs f	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re- seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating one-dimensional arrays or demonstrating two-dimensional arrays	structure eading and	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
arrays Unit - User- enum positi LIST 1. 2. 3. 4. 5. 6. 7. 8.	s, pointers and V defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f Programs f Programs f Programs f Programs f Programs f	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re- seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating one-dimensional arrays or demonstrating two-dimensional arrays o demonstrate modular programming concepts using function	structure eading and nmetic, log	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
arrays Unit - User- enum positi LIST 1. 2. 3. 4. 5. 6. 7. 8. 9.	s, pointers and - V defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f Programs f Programs f Programs f Programs f Programs f	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re- seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating one-dimensional arrays or demonstrate modular programming concepts using function o demonstrate recursive functions.	structure eading and nmetic, log	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
arrays Unit - User- enum positi 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	s, pointers and V defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f Programs f Programs f Programs f Programs t Programs t Programs t	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re- seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating one-dimensional arrays or demonstrate modular programming concepts using function o demonstrate recursive functions. o demonstrate strings (Using built-in and user-definedfunction	structure eading and nmetic, log	e – structure d writing data	and to fi	func les -l	tions Manip	9 -unions ulating fil
arrays Unit - User- enum positi LIST 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	s, pointers and - V defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f Programs f Programs f Programs f Programs t Programs t Programs t Programs t	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re- seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating two-dimensional arrays or demonstrate modular programming concepts using function o demonstrate strings (Using built-in and user-definedfunction o illustrate the use of pointers	structure eading and nmetic, log	e – structure d writing data gical, relationa	and to fi	func les -I	nary c	9 -unions oulating fil
arrays Unit - User- enum positi LIST 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.	s, pointers and - V defined data herated data ty on indicator : f OF EXPERIM Programs f Programs f Programs f Programs f Programs f Programs f Programs f Programs t Programs t Programs t Programs t	strings User-defined Data Types and File Handling: types: Structure: Introduction – nested structures– arrays of pe. File Handling : Introduction - opening and closing files – re- seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like arith- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating one-dimensional arrays or demonstrate modular programming concepts using function o demonstrate recursive functions. o demonstrate strings (Using built-in and user-definedfunction o illustrate the use of structures and unions	structure eading and nmetic, log	e – structure d writing data	and to fi	func les -I	nary c	9 -unions oulating fil





	1			SOFTWA			DDD -								
1.	Yas	havant I	Kanetkar	, "Let us (C", 161	th Edition,	BPB Pu	Iblicatio	ns, 20′	18.					
2.	Sun	nitabha	Das, "Co	mputer F	undam	nentals an	d C Proo	grammii	ng", 1s	t Edition	, McGra	w Hill, 2018			
3.		-	-			ANSI C",									
4.		rouz A. gage,20		n & Richa	rd F.G	Silberg, "C	omputer	Scienc	e A Sti	ructured	Program	nming Appro	oach Usi	ng C", 3 rd	Edition,
5.	http	s://www	.cprogra	mming.co	m/tuto	orial/c-tuto	rial.html								
		UTCOM												ВТ Мар	
				-		s will be a								Highest L Applying	
CO1		-			• .	it/output s								Precision	(S3)
CO2		itify the se stater		ate loopii	ng and	d control s	statemer	nts in C	and c	levelop a	applicat	ons using		Applying Precision	
CO3	dev	elop sim	ple C pr	ograms u	sing th	e concept	s of arra	ays and	modul	ar progra	amming			Applying Precision	(K3),
CO4	app	lv the co	oncepts o	of pointers	and c	levelop C	program	ns usinc	ı strina	s and po	ointers			Applying	(K3),
CO5		-	•	•		s and file o		-						Precision Applying Precision	(K3),
							-			nd PSOs					
COs/I	POs	PO1	PO2	PO3	PO4	1 PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO	1	3	2	2	2	1				1	1		1		
CO	2	3	2	2	2	1				1	1		1		
CO	3	3	2	2	2	1				1	1		1		
CO	4	3	2	2	2	1				1	1		1		
CO	5	3	2	2	2	1				1	1		1		
1 – Sli	ght, 2	– Mode	rate, 3 –	Substant	ial, BT	- Bloom's	Taxono	my							
						ASSES	SMENT	ΡΑΤΤΕ	RN - 1	THEORY	,				
	st / Bl Catego	oom's	Re	memberi (K1) %	ng	Understa (K2)	anding	Apply (K3)	/ing	Analyzi (K4) %	ing	Evaluating (K5) %		reating (K6) %	Tota %
	CAT	-		10		30		60				(10) /0		(10) /0	100
	CAT			10		30		60							100
	CAT			10		30	1	60)						100
	ESE			10		30		60)						100
				,2,3 – 50											

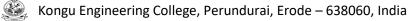


Programme & Branch		B.E & ELECTRO ENGINEERING	NICS AND COMMUN	NICATION	Sem.	Category	L	Т	Ρ	Credi
Prerequisites		Nil			1	ES	3	0	0	3
Preamble			about the constructi vices like diode, FET					ctrica	l m	achines
Unit – I		Electrical Machi	nes:							9
applications.	AC Ma		tion and working prin tion and working prir cations.							
Unit – II	-	Transformers:								9
			ing principle of single - losses and efficienc						ition	- testing
Unit – III		Semiconductor	Theory and Devices	•						9
		unction diodes	- VI characteristics	- Transition a	and diffusi	on capacitan	ces -	– Ze	ner	diode -
Unit – IV	s of Zen	er diode- LDR. P BJT, FET, MOSF		Simulation of ch	naracteristi	cs of PN junc	tion d	iode.		9
Unit – IV BJT-Construct Construction –	s of Zen I tion and Charac	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF	ractical component: S	Simulation of ch eristics of BJT i epletion and en	naracteristi in CE, CB hancemen	cs of PN junc and CC conf t mode – Cha	tion d igurat racter	iode. ions. istics	FE1	9 1: JFET 10SFE
Unit – IV BJT-Construct Construction –	s of Zen lion and Charac uction a	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF nd principle of op	ractical component: { ET and UJT: ration – I/O characte ET: Construction – De	Simulation of ch eristics of BJT i epletion and en s. Practical con	naracteristi in CE, CB hancemen	cs of PN junc and CC conf t mode – Cha	tion d igurat racter	iode. ions. istics	FE1	9 1: JFET 10SFE
Unit – IV BJT-Construct Construction – – UJT: Constru Unit – V SCR-TRIAC-H	s of Zen lion and Charac uction a lalf wave	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF nd principle of op Thyristors and F e and Full wave B	ractical component: { ET and UJT: ration – I/O characte ET: Construction – De eration-characteristic	Simulation of ch eristics of BJT i epletion and en s. Practical con ts: esistive load usi	naracteristi in CE, CB hancemen nponent: S ing diodes	cs of PN junc and CC conf t mode – Cha imulation of c – Analysis for	tion d igurat racter harac	iode. ions. ristics terist and r	FEI of M ics c	9 T: JFET 4OSFE of BJT. 9 9
Unit – IV BJT-Construct Construction – – UJT: Constru Unit – V SCR-TRIAC-H with C, L, LC a load regulation	s of Zen lion and Charac uction a lalf wave	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF nd principle of op Thyristors and F e and Full wave B	ractical component: S ET and UJT: ration – I/O character ET: Construction – De eration-characteristic ower Supply Circuit ridge rectifiers with re	Simulation of ch eristics of BJT i epletion and en s. Practical con ts: esistive load usi	naracteristi in CE, CB hancemen nponent: S ing diodes	cs of PN junc and CC conf t mode – Cha imulation of c – Analysis for	tion d igurat racter harac	iode. ions. ristics terist and r	FEI of M ics c	9 I: JFET IOSFE of BJT. 9 e voltage tion and
Unit – IV BJT-Construct Construction – – UJT: Constru Unit – V SCR-TRIAC-H with C, L, LC a load regulation TEXT BOOK: 1. BL The 2020,	s of Zen lion and Charac uction a lalf wave and CLC n. eraja, A for Unit	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF nd principle of op Thyristors and F e and Full wave B c filters. Zener dic K Theraja, "A text s I & II.	ractical component: S ET and UJT: ration – I/O character ET: Construction – De eration-characteristic: ower Supply Circuit ridge rectifiers with re de regulator –Transis book of Electrical Tec	Simulation of ch eristics of BJT i epletion and en s. Practical con ts: esistive load usi stor voltage reg	naracteristi in CE, CB hancemen nponent: S ing diodes iulators: Se ne II", 23 rd	cs of PN junc and CC conf t mode – Cha imulation of c – Analysis for eries and shur	tion d igurat racter harac · Vdc nt – Li	iode. ions. istics terist and r ine re	FET of M ics c ipple gula	9 F: JFET IOSFE of BJT. 9 e voltage tion and Total:4
Unit – IV BJT-Construct Construction – – UJT: Constru Unit – V SCR-TRIAC-H with C, L, LC a load regulation TEXT BOOK: 1. BL The 2020, Salival	s of Zen lion and Charac uction a lalf wave and CLC n. eraja, A for Unit	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF and principle of op Thyristors and F and Full wave E filters. Zener dic filters. Zener dic K Theraja, "A text s I & II. S. and Sureshkun	ractical component: S ET and UJT: ration – I/O characte ET: Construction – De eration-characteristic: ower Supply Circuit ridge rectifiers with re de regulator –Transis	Simulation of ch eristics of BJT i epletion and en s. Practical con ts: esistive load usi stor voltage reg	naracteristi in CE, CB hancemen nponent: S ing diodes iulators: Se ne II", 23 rd	cs of PN junc and CC conf t mode – Cha imulation of c – Analysis for eries and shur	tion d igurat racter harac · Vdc nt – Li	iode. ions. istics terist and r ine re	FET of M ics c ipple gula	9 F: JFET IOSFE of BJT. 9 e voltage tion and Total:4
Unit – IV BJT-Construct Construction – – UJT: Construct Unit – V SCR-TRIAC-H with C, L, LC a load regulation TEXT BOOK: 1. BL The 2. Salival for Unit	eraja, A for Unit hanan S its III, IV	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF and principle of op Thyristors and F and Full wave E filters. Zener dic filters. Zener dic K Theraja, "A text s I & II. S. and Sureshkun	ractical component: S ET and UJT: ration – I/O characte ET: Construction – De eration-characteristic: ower Supply Circuit ridge rectifiers with re de regulator –Transis book of Electrical Tec har N., "Electronic De	Simulation of ch eristics of BJT i epletion and en s. Practical con ts: esistive load usi stor voltage reg	naracteristi in CE, CB hancemen nponent: S ing diodes iulators: Se ne II", 23 rd	cs of PN junc and CC conf t mode – Cha imulation of c – Analysis for eries and shur	tion d igurat racter harac · Vdc nt – Li	iode. ions. istics terist and r ine re	FET of M ics c ipple gula	9 F: JFET IOSFE of BJT. 9 e voltage tion and Total:4
Unit – IV BJT-Construct Construction – – UJT: Construct Unit – V SCR-TRIAC-H with C, L, LC a load regulation TEXT BOOK: 1. BL The 2020, 1 Salival for Uni REFERENCES	eraja, A for Units Ihanan S its III, IV S/ MAN	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF nd principle of op Thyristors and F e and Full wave E filters. Zener dic filters. Zener dic K Theraja, "A text s I & II. S. and Sureshkun (& V. UAL / SOFTWAF	ractical component: S ET and UJT: ration – I/O characte ET: Construction – De eration-characteristic: ower Supply Circuit ridge rectifiers with re de regulator –Transis book of Electrical Tec har N., "Electronic De	Simulation of ch eristics of BJT i epletion and en s. Practical con ts: esistive load usi stor voltage reg	naracteristi in CE, CB hancemen nponent: S ing diodes ulators: Se ne II", 23 rd its", 4th Ec	cs of PN junc and CC conf t mode – Cha imulation of c – Analysis for eries and shur edition, S.Cha	tion d igurat racter harac · Vdc nt – Li	iode. ions. istics terist and r ine re	FET of M ics c ipple gula	9 F: JFET IOSFE of BJT. 9 e voltage tion and Total:4
Unit – IV BJT-Construct Construction – – UJT: Construct Unit – V SCR-TRIAC-H with C, L, LC a load regulation TEXT BOOK: 1. BL The 2. Salival for Uni REFERENCES 1. DP Ko 2 Adel S	s of Zen tion and Charac uction and Charac uction and lalf wave and CLC n. eraja, A for Units hanan S hanan S hits III, IV S/ MAN othari, IJ S.Sedra,	er diode- LDR. F BJT, FET, MOSF Principle of Ope teristics – MOSF and principle of op Thyristors and F and Full wave E filters. Zener dic filters. Zener dic S. and Sureshkun & V. UAL / SOFTWAF Nagrath, "Electri	ractical component: S ET and UJT: ration – I/O characte ET: Construction – De eration-characteristic: ower Supply Circuit ridge rectifiers with re de regulator –Transis book of Electrical Tec har N., "Electronic De	Simulation of ch eristics of BJT i epletion and en s. Practical con ts: esistive load usi stor voltage reg chnology, Volun vices and Circu	naracteristi in CE, CB hancemen nponent: S ing diodes julators: Se ne II", 23 rd its", 4th Ec	cs of PN junc and CC conf t mode – Cha imulation of c – Analysis for eries and shur edition, S.Cha lition, McGrav	tion d igurat racter harac Vdc nt – L and P v-Hill,	iode. ions. ristics terist and r ine re Publis	FE1 of M ics c ipple gula	9 I: JFET IOSFE of BJT. 9 e voltag tion an Total:4

	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Understand the construction and working principles of various electrical machines	Understanding (K2)
CO2	Understand the working of transformers and its testing procedures.	Understanding (K2)
CO3	comprehend the construction, characteristics and applications of various electronic devices	Understanding (K2)
CO4	demonstrate the configurations of BJT, FET and its applications.	Understanding (K2)
CO5	design various power supply circuits.	Applying (K3)

					Mappin	g of CO	s with I	POs ar	nd PSOs	5				
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1		2	1	1	2	2		2	1	1
CO2	2	1	1	1		2	1	1	2	2		2	1	1
CO3	2	2	1	2	3	2	2		2	2		2	3	2
CO4	3	2	2	3	3	2	2		2	2		2	2	3
CO5	3	3	2	3		3	3	3	2	2		3	3	3
1 – Sligh	nt, 2 – N	lodera	ite, 3 – Sub	stantial	BT- Bloc	om's Ta	konomy							
					ASSES	SMENT	PATTE	RN - T	HEORY					
	Bloom	's	Remembe		Understa	•	Apply	-	Analyzir	•	aluating		ating	Total
Cat	egory*		(K1) %)	(K2)		(K3)	%	(K4) %	(K5) %	(N)	6) %	%
C	AT1		40		60		-		-		-		-	100
C	AT2		40		60		-		-		-		-	100
C	AT3		20		40		40		-		-		-	100
E	ESE		20		60		20		-		-		-	100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



Program	_	B.E 8		TRON	-	-	ND ELE			ENGINE	ERING LAE		TOF	RY P	Credit
Branch	icitoc	ENGI Nil	NEERI	NG						1	BS	0	0	3	1
Prerequ	ISILES	INII								•	63	U	U	3	I
Preambl	e		course eering.	is desi	gned to	o provid	de a ha	Inds-or	ı experi	ience in	basics of e	electri	cal a	and ele	ctronics
LIST OF	EXPERI	MENTS	/ EXE	RCISES	S:										
1.	Load test	on DC	shunt	motor.											
2.	Load test	on sing	gle pha	se indu	ction m	notor.									
3.	Load test	on sing	gle pha	se tran	sforme	r									
4.	Open ciro	cuit and	short of	circuit te	est on t	ransfor	mer.								
5.	Light ON	/OFF co	ontrol u	sing Liq	ght Dep	endent	Resist	or (LDF	R).						
6.	Applicatio	on of B.	JT as C	N/OFF	switch										
7.	Controllir	ng of DC	C FAN	using N	IOSFE ⁻	Г.									
8.	Controllir	ng of DC	C motoi	using	SCR.										
9.	Design o	f power	supply	unit fo	r electro	onic ga	dgets.								
	Simulatio		-	•		-	•								
10.		Charact Charac			•	ion emi	tter con	figurati	on)						
DEEED					_										Total:45
	Laborato			IWAR	=:										
1.		·		Softwar	aro 16 (2									
2.	Orcad Ca	auence	r Spice	SUILWA)									
	E OUTCO		ourse, t	he stu	dents v	will be	able to							T Map ghest	oped Level)
CO1	test basic	c electri	cal ma	chines I	ike trar	nsforme	er and D	C moto	ors				•	plying	. ,
CO2														plying	ion(S2) (K3).
002	demonst												•		ion(S2)
CO3	perform s design to		on of th	e chara	acteristi	ics of c	levices	using e	electron	ic syster	ns		•	plying ecisior	. ,
					Manni	na of C	COs wit	h POe	and P	30s					
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	PO9	PO10	P011	PO1	2	PSO1	PSO2
CO1	3	2	2	2		2	2	2	3	2		2		2	2
CO2	3	3	2	2		2	2	2	2	2		3		2	2
CO3	2	2	2	2	3	2	2	2	2	2		2		2	2



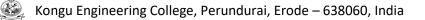
1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy



					((Commo	n to EC	E, EEE	and El	E Branc	ches)				
Progra Branci	amme h	&	B.E -	ECE, E							Sem.	Category	L	ТР	Credit
Prereq	quisite	s	Nil								1/2	BS	0	0 3	1
Pream			specti impro Cr ⁶⁺ ir	rophoto ve the a n electri	metric a inalytica cal syste	and pH al skills.	metry	experin	nents fo	or the e	stimatio	ctometric, po n of given s gnificance o	sample	s and th	ereby, to
LIST C				EXER											
1.	lodo	metric	analys	is of cop	oper cor	ntent fro	om disca	arded P	CBs.						
2.	Volu	metric	analys	is of chr	omium	prepare	ed from	electrop	plating s	sludge.					
3.	Find	the a	mount c	f minera	al acids	presen	t in the	given so	olution b	by cond	uctomet	ric based se	nsor el	ectrode.	
4.	Dete	rmina	tion of c	concenti	ration of	[∙] H⁺ ion	in a sol	lution us	sing H+	sensing	electroo	le.			
5.	Pote	ntiom	etric ap	oroach	using a	Pt elect	rode fo	r the es	timation	of iron	in the gi	ven sample			
6.	Dete	rmina	tion of r	nolecula	ar weigł	nt of a p	olymer	/ liquid	by Ostw	ald viso	cometer.				
7.	Spec	ctroph	otometr	ic meth	od for th	ne deter	minatio	on of Iroi	n in stee	el.					
8.				e given otal harc					y of dri	nking /	industria	l purpose b	y estim	ating the	calcium
9.	Estin	nation	of alka	linity of	river an	d borew	vell wat	er colleo	cted from	m differ	ent place	es.			
10.	Dete	rmina	tion of c	lissolve	d oxyge	n in the	given	wastewa	ater san	nple.					
11.	Elect	troplat	ing pro	cess (D	emonsti	ration).									
12.			analysi onstrati		al- deter	mine m	oisture	, volatile	e matter	and as	h conter	it of a given	sample	e of	
	oour	(Boin	onotrati	011).											Total:3
REFE	RENCE	ES/ M	ANUAL	/SOFT	WARE:										
1.				Manika ublisher:				and Ma	njula R	ani K.,	"Chemis	stry Laborat	ory Ma	nual", 1 ^s	^t Edition
	SE OU													BT Ma	
				urse, th										Highest Applying	
CO1	estin	nate th	ne amou	unt of ha	ardness	, alkalin	ity, DO	, Cu and	d Cr pre	sent in	the give	n sample.		Precisio	n (S3)
CO2	analy	yze th	e amou	nt of ac	ids pres	ent in th	ne givei	n sampl	e using	condu	ctivity an	d pH meter.		Applying Precisio	
CO3								tometric lar weig				ion of Fe		Applying Precisio	(K3),
						Маррі	ng of C	Cos witl	n POs a	and PS	Os				
COs/P	Os I	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO1	1	3	2	1	3			3							
	2	3	2	1	3			3							
CO2															



	(Common to All Engineering and Technology	Branche	s)				
Programme & Branch	All B.E./B.Tech. Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Communication Skills I	2	HS	3	0	0	3
Preamble	This course is designed to equip students with the necessary develop their linguistic and communicative competencies.	skills to li	sten, read, w	rite a	and s	peak s	o as to
Unit – I	Grammar, Vocabulary, Listening, Speaking, Reading & W	riting					9
substitution - List	ence Patterns - Simple, Compound & Complex sentences - Vening: Speeches from company CEOs - TV debates Speaking: - Writing: Job application letter with resume – Transcoding						
Unit – II	Grammar, Vocabulary, Listening, Speaking, Reading & W	riting					9
about celebrities	ord - Vocabulary: Phrasal verbs - Idioms & Phrases - Listening - Practicing Pronunciation through web tools - Reading: Con achine - Writing: Description: Person, Place, Process, Product a	mpany co	rrespondenc				
Unit – III	Grammar, Vocabulary, Listening, Speaking, Reading & W	/riting					9
11	Cremmer Vessbulen, Listening, Cresking, Desding 8.W			-			0
Listening: Liste commentaries - I	Grammar, Vocabulary, Listening, Speaking, Reading & W ees of Comparison - Punctuations – Fragments & run-ons - Voca ning to global accents - listening to motivational speeches - Sp Movie Enactment - Reading: Narrative passages - Writing: E r	abulary: I eaking: I	Narrating pers	sona	al mile	estones	s - Sports
Grammar: Degre Listening: Liste	ees of Comparison - Punctuations – Fragments & run-ons - Voca ning to global accents - listening to motivational speeches - Sp Movie Enactment - Reading: Narrative passages - Writing: E r	abulary: I eaking: I mail - Age	Narrating pers	sona	al mile	estones	& words
Grammar: Degre Listening: Liste commentaries - I Technical reports Unit - V Grammar: Purpe Listening to sam speeches/conver	ees of Comparison - Punctuations – Fragments & run-ons - Voca ning to global accents - listening to motivational speeches - Sp Movie Enactment - Reading: Narrative passages - Writing: E r	abulary: I eaking: I nail - Age riting oding & I ess, rhyth ches - Ne	Varrating persenda & Minut Pecoding - Al m & Intonati wspaper repo	sona es o Iphal on -	f Mee f Mee bet te	estones eting - est - L ded &	& words & s - Sports Special & 9 istening unguided hical texts
Grammar: Degra Listening: Liste commentaries - Technical reports Unit – V Grammar: Purpo Listening to sam speeches/conver from journals Wr	ees of Comparison - Punctuations – Fragments & run-ons - Voca ning to global accents - listening to motivational speeches - Sp Movie Enactment - Reading: Narrative passages - Writing: E r Grammar, Vocabulary, Listening, Speaking, Reading & W ose and Function - If clause - Error detection - Vocabulary: C ple HR Interviews - Speaking: Introduction to phonetics - Stre sations - Giving feedback – Debate - Reading: Key Note speece	abulary: I eaking: I nail - Age riting oding & I ess, rhyth ches - Ne	Varrating persenda & Minut Pecoding - Al m & Intonati wspaper repo	sona es o Iphal on -	f Mee f Mee bet te	estones eting - est - L ded &	& words s - Sports Special & 9 istening unguided
Grammar: Degre Listening: Liste commentaries - Technical reports Unit – V Grammar: Purpo Listening to sam speeches/conver from journals Wr	ees of Comparison - Punctuations – Fragments & run-ons - Voca ning to global accents - listening to motivational speeches - Sp Movie Enactment - Reading: Narrative passages - Writing: E r Grammar, Vocabulary, Listening, Speaking, Reading & W ose and Function - If clause - Error detection - Vocabulary: C ple HR Interviews - Speaking: Introduction to phonetics - Stre sations - Giving feedback – Debate - Reading: Key Note speec iting: Circulars - Critical Appreciation of a non-detailed text - Tec	abulary: I eaking: I mail - Age riting oding & I ess, rhyth ches - Ne hnical pro	Varrating persenda & Minut Decoding - Al m & Intonati wspaper repo posals	sona es o lphal on - orts ·	al mile f Mee bet te - Guie - shor	estones eting - est - L ded & rt techr	& words s - Sports Special & 9 istening unguided nical texts
Grammar: Degre Listening: Liste commentaries - Technical reports Unit – V Grammar: Purpo Listening to sam speeches/conver from journals Wr	ees of Comparison - Punctuations – Fragments & run-ons - Voca ning to global accents - listening to motivational speeches - Sp Movie Enactment - Reading: Narrative passages - Writing: E r Grammar, Vocabulary, Listening, Speaking, Reading & W ose and Function - If clause - Error detection - Vocabulary: C ple HR Interviews - Speaking: Introduction to phonetics - Stre sations - Giving feedback – Debate - Reading: Key Note speece	abulary: I eaking: I mail - Age riting oding & I ess, rhyth ches - Ne hnical pro	Varrating persenda & Minut Decoding - Al m & Intonati wspaper repo posals	sona es o lphal on - orts ·	al mile f Mee bet te - Guie - shor	estones eting - est - L ded & rt techr	& words s - Sports Special & 9 istening unguided nical texts
Grammar: Degre Listening: Liste commentaries - I Technical reports Unit – V Grammar: Purpo Listening to sam speeches/conver from journals Wr TEXT BOOK: 1. Sanjay P REFERENCES: 1. Meena	ees of Comparison - Punctuations – Fragments & run-ons - Voca ning to global accents - listening to motivational speeches - Sp Movie Enactment - Reading: Narrative passages - Writing: E r Grammar, Vocabulary, Listening, Speaking, Reading & W ose and Function - If clause - Error detection - Vocabulary: C ple HR Interviews - Speaking: Introduction to phonetics - Stre sations - Giving feedback – Debate - Reading: Key Note speec iting: Circulars - Critical Appreciation of a non-detailed text - Tec	abulary: I eaking: I nail - Age riting oding & I ess, rhyth ches - Ne hnical pro	Varrating persenda & Minut Decoding - Al m & Intonati wspaper repo posals	sona es o Iphal on - orts ·	al mile f Mee bet te - Guid - shor	estones etting - est - L ded & rt techr 18.	& words s - Sports Special & istening unguided nical texts Total:4
Grammar: Degre Listening: Liste commentaries - I Technical reports Unit - V Grammar: Purpor Listening to same speeches/conver from journals Wr TEXT BOOK: 1. Sanjay H REFERENCES: 1. Meena Universe	ees of Comparison - Punctuations – Fragments & run-ons - Voca ning to global accents - listening to motivational speeches - Sp Movie Enactment - Reading: Narrative passages - Writing: E r Grammar, Vocabulary, Listening, Speaking, Reading & W ose and Function - If clause - Error detection - Vocabulary: C ple HR Interviews - Speaking: Introduction to phonetics - Stre sations - Giving feedback – Debate - Reading: Key Note speec iting: Circulars - Critical Appreciation of a non-detailed text - Tec Kumar & Pushp Lata, "Communication Skills", 2 nd Edition, Oxford	abulary: I eaking: I mail - Age riting oding & I ess, rhyth ches - Ne hnical pro	Varrating persenda & Minut Decoding - Al m & Intonati wspaper repo posals / Press, New es and Practic	sona es o Iphal on - orts · Dell	al milé f Mee bet te - Guid - shor hi, 20	estones eting - est - L ded & rt techr 18.	& words s - Sports Special & istening unguided nical texts Total:4



	E OUTCO pletion o		, the stu	dents will be	able to						lapped st Leve	I)
CO1	use fund	ctional gramm	nar for im	proving comr	nunicatio	n skills				Apply	ing (K3)	
CO2	listen ar	nd comprehe	nd differe	nt accents ar	nd infer ir	nplied me	eanings			Apply	ing (K3)	
CO3	•	clearly, initia		sustain a di	scussion	and ne	gotiate usir	ng app	ropriate	Creat	ing (K6)	
CO4	read diff them	ferent genres	of texts,	infer implied	meanings	and criti	cally analyz	e and e	valuate	Understa	anding (k	(2)
CO5	•	e different type analytical and		ative, descrip ve writing	tive expos	sitory text	s and under	rstand c	reative,	Creat	ing (K6)	
				Mappir	ng of COs	s with PC	Ds and PSC)s				
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2			1	3	1	1
CO2									2	3		1
CO3									2	3		2
CO4						1				3	1	1
CO5										3		2
1 – Sligh	it, 2 – Mo	derate, 3 – S	ubstantia	l, BT- Bloom'	s Taxono	my						
				ASSES	SMENT	PATTER	N - THEOR	Y				
Test / B Categ		Remember (K1) %	ing Ur	nderstanding (K2) %		olying 3) %	Analyzing (K4) %		aluating (K5) %	Creating (K6) %	То	otal %
CA	Γ1			37	3	30				33		100
CA	Г2			7	Ę	50				43		100
CA	ГЗ			17	Ę	50				33		100
ES	E			15	4	45				40		100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

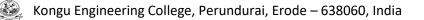


		22MAC21 - MULTIVARIABLE CALCULUS AND CO (Common to CIVIL, MECH, MTS, ECE, EEE, EIE						
Progra Branc	amme & h	B.E & Civil, Mech, MTS, ECE, EEE, EIE & FT branches	Sem.	Category	L	т	Ρ	Credit
	quisites	Nil	2	BS	3	1*	2 *	4
					1		1	
Pream	ıble	To impart the knowledge of partial derivatives, evaluation of and analytic functions to the students for solving the disciplines.						
Unit –		Functions of Several Variables:						9
		or more variables – Partial derivatives – Total differential – axima and minima – Constrained maxima and minima – Lag					f two	variables
Unit –		Multiple Integrals:						9
		n in cartesian coordinates – Change of order of integratior in cartesian coordinates – Volume as triple integrals.	n – Appl	ication: Area	bet	weer	ר two	curves -
Unit –		Vector Calculus:						9
Solend	bidal and Iri	tive – Gradient of a scalar point function – Divergence of otational vectors – Vector Integration: Introduction – Green /erification of the above theorems and evaluation of integra	n's, Stoke	e's and Gaus				
Unit –		Analytic Functions:	ŭ					9
Riema of ana	inn equatior lytic functio	mplex variable – Analytic functions – Necessary and suffic ns (Statement only) – Properties of analytic function (Statem n – Applications: Fluid flow – Conformal mapping: $w = z + a$	ent only)) – Harmonic	fund	ction	– Co	nstruction
Unit –		Complex Integration:	T				0.	9
 Class 	sification -	uchy's theorem (without proof) – Cauchy's integral formula Cauchy's residue theorem (without proof) – Applications: E ons over the circular contour.						
LIST (OF EXPERI	MENTS / EXERCISES:						
1.	Finding or	dinary and partial derivatives						
2.	Computin	g extreme values of function of two variables						
3.	Evaluating	g double and triple integrals						
4.	Finding th	e area between two curves						
5.	Computin	g gradient, divergence and curl of point functions						
6.	Applying I	Milne-Thomson method for constructing analytic function						
7.	Determina	ation of Mobius transformation for the given set of points						
8.	Finding po	bles and residues of an analytic function						
		Lectu	re:45, T	utorials and	Pra	ctica	al:15,	Total:60
TEXT	BOOK:							
1.	Ramana E Delhi, 201	3 V, "Higher Engineering Mathematics", 1 st Edition, Tata Mc 8.	Graw-Hi	ll Publishing	Con	npan	y Lim	ited, New
REFE	RENCES/ N	IANUAL / SOFTWARE:						
1.	Kreyszig E	E, "Advanced Engineering Mathematics ", 10 th Edition, John	Wiley, N	New Delhi, In	dia,	2016	5.	



2.	Edit	tion 201	4, S.Ch	and and	Co., No	ew Delh	i	· · ·		•		For First \			•
3.				ngataasa cation, N				K. and	Sure	sh M., "I	Engine	ering Matl	nematics	- I", 2 nd	Edition,
4.	Gre	wal B.S	S, "Highe	er Engine	eering N	/lathema	atics" 44	thEditio	on, Kh	anna Pu	blishe	s, New De	elhi, 2018	8.	
5.	Mul	tivariab	le Calcu	llus and	Comple	ex Analy	sis Labo	oratory	Manua	al.					
		OUTCO etion of		urse, the	e stude	nts will	be able	e to						BT Mapp lighest L	
CO1	co	ompute	the tota	l derivati	ves and	d extrem	ie value	s of mu	ıltivaria	able func	ctions.			Applying (Anipulatio	
CO2		valuate gions.	multiple	e integra	ls and	apply t	hem to	compu	ite the	e area a	nd vol	ume of th			
CO3		oply the oblems		ots of de	erivative	es and I	ine integ	grals of	f vecto	or functio	ons in o	engineerin			
CO4	gi	ven reg	jion und	er the giv	ven con	oformal r	napping					e image c	Ma	Applying (Anipulatio	
CO5			techniq closed c		omplex	integrat	ion to e	valuate	real a	and comp	olex int	egrals ove		Applying (Anipulatio	
						Mapping	g of CO	s with	POs a	nd PSO	S				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO1) PO11	PO12	PSO1	PSO2
CO	1	3	3	2		3									
CO	2	3	3	2		3									
CO	3	3	3			3									
CO	4	3	3			2									
CO	5	3	3	3		2									
1 – Sli	ight, 2	2 – Moo	derate, 3	– Subst	antial, I	BT- Bloc	om's Ta	xonomy	/						
						ASSES	SMENT	PATTE	ERN -	THEOR	Y				
		oom's	Rer	nemberi (K1) %	ing U	ndersta (K2)		Apply (K3)		Analyzi (K4) 9		Evaluating (K5) %		eating (6) %	Tota %
	t / Bl ateg	ory*		(11) /0				1						-	
				10		30		60)						100
	ateg	1		、 /		30 30		60 60							100 100
	ateg CAT	1 2		10)						

*Alternate week



Programme & Branch	BE- Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	2	BS	3	0	0	3
Preamble	This course aims to impart the knowledge on oscillations & theory of solids, dielectric materials and smart materials. It topics in electronics and communication engineering.						
Unit – I	Oscillations and Waves:						9
Damped oscillation – Equation of pl (qualitative) – En	- Oscillations – Simple harmonic motion – Differential equation ons – Application of simple harmonic motion in torsional pendulu ane progressive wave – Types of progressive waves – Refl ergy transport of progressive waves.	um, cantileve	er and LC circ	uit –	Reso	onanco	e – Wave boundar
Unit – II	Waveguides and Fiber optics:		_				9
waveguides (qua	netic waves – Transverse electric waves – Transverse electric waves – Transverse electric waves – Transverse electrication – Fiber optics – Numerical aperture and acceptance nodes and materials – Fiber optics communication system (qua	angle – Cl	assification o	f op	tical	fibers	based o
Unit – III							
Classical free ele Quantum free ele	Free electron theory and Band theory of solids: ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect	of temperate	ure on Fermi	Fund	ction	– Ele	ctrons in a
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic,	ectron theory of metals - Electrical conductivity - Success a	of temperating bands in susceptibilities depender	ure on Fermi solids – Clas y – Types of	Fund ssific polar	ction ation	– Elec of so on me	theory ctrons in a lids base 9 chanisms
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic, relation – Dielect	ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect – Bloch theorem – Brillouin zones (E-K curve) – Origin of ene (conductors, semiconductors and insulators). Dielectric materials: ectric constant – Polarization – Displacement vector – Electric orientational and space-charge – Frequency and temperatur ric loss – Dielectric breakdown – Uses of dielectric materials in	of temperating bands in susceptibilities depender	ure on Fermi solids – Clas y – Types of	Fund ssific polar	ction ation	– Elec of so on me	theory ctrons in a lids base 9 chanisms
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic, relation – Dielect Unit – V Metallic glasses: – Surface-to-volu	ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect – Bloch theorem – Brillouin zones (E-K curve) – Origin of ene (conductors, semiconductors and insulators). Dielectric materials: ectric constant – Polarization – Displacement vector – Electric orientational and space-charge – Frequency and temperatur	of temperatu rgy bands in susceptibilit re depender capacitors. s: Character Top-down	ure on Fermi solids – Clas y – Types of nce – Interna ristics and app and bottom-u	Fund ssific polar l fiel plicat	tion ation izatio d – (tions proa	– Elec of so on me Clausi – Nan ches	h theory ctrons in a lids base 9 chanisms us-Mosot 9 oostructur – Electro method
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic, relation – Dielect Unit – V Metallic glasses: – Surface-to-volu beam lithography Applications.	ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect – Bloch theorem – Brillouin zones (E-K curve) – Origin of ene (conductors, semiconductors and insulators). Dielectric materials: ectric constant – Polarization – Displacement vector – Electric orientational and space-charge – Frequency and temperatur ric loss – Dielectric breakdown – Uses of dielectric materials in Smart Materials: Properties, preparation and applications – Shape memory alloys ume ratio – Quantum confinement – Nanomaterials synthesis:	of temperatu rgy bands in susceptibilit re depender capacitors. s: Character Top-down	ure on Fermi solids – Clas y – Types of nce – Interna ristics and app and bottom-u	Fund ssific polar l fiel plicat	tion ation izatio d – (tions proa	– Elec of so on me Clausi – Nan ches	h theory ctrons in lids base 9 chanisms us-Mosot 9 ostructur – Electro
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic, relation – Dielect Unit – V Metallic glasses: – Surface-to-volu beam lithography Applications.	ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect – Bloch theorem – Brillouin zones (E-K curve) – Origin of ene (conductors, semiconductors and insulators). Dielectric materials: ectric constant – Polarization – Displacement vector – Electric orientational and space-charge – Frequency and temperatur ric loss – Dielectric breakdown – Uses of dielectric materials in Smart Materials: Properties, preparation and applications – Shape memory alloys me ratio – Quantum confinement – Nanomaterials synthesis: v – Physical vapour deposition – Carbon nanotubes: Structures	of temperatu rgy bands in susceptibilit e depender capacitors. s: Character Top-down s, properties	ure on Fermi solids – Clas y – Types of nce – Interna ristics and app and bottom-u , synthesis by	Fund ssific polar I fiel plicat plicat y las	ction ation rizatio d – (iions proa er ab	– Elec of so on me Clausi – Nan ches – lation	h theory ctrons in lids base 9 chanisms us-Mosot 9 oostructur – Electro method
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic, relation – Dielect Unit – V Metallic glasses: – Surface-to-volu beam lithography Applications.	ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect – Bloch theorem – Brillouin zones (E-K curve) – Origin of ene (conductors, semiconductors and insulators). Dielectric materials: ectric constant – Polarization – Displacement vector – Electric orientational and space-charge – Frequency and temperatur ric loss – Dielectric breakdown – Uses of dielectric materials in Smart Materials: Properties, preparation and applications – Shape memory alloys ume ratio – Quantum confinement – Nanomaterials synthesis:	of temperatu rgy bands in susceptibilit e depender capacitors. s: Character Top-down s, properties	ure on Fermi solids – Clas y – Types of nce – Interna ristics and app and bottom-u , synthesis by	Fund ssific polar I fiel plicat plicat y las	ction ation rizatio d – (iions proa er ab	– Elec of so on me Clausi – Nan ches – lation	h theory ctrons in lids base 9 chanisms us-Mosof 9 oostructur – Electro method
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic, relation – Dielect Unit – V Metallic glasses: – Surface-to-volu beam lithography Applications.	ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect – Bloch theorem – Brillouin zones (E-K curve) – Origin of ene (conductors, semiconductors and insulators). Dielectric materials: ectric constant – Polarization – Displacement vector – Electric orientational and space-charge – Frequency and temperatur ric loss – Dielectric breakdown – Uses of dielectric materials in Smart Materials: Properties, preparation and applications – Shape memory alloys me ratio – Quantum confinement – Nanomaterials synthesis: v – Physical vapour deposition – Carbon nanotubes: Structures	of temperatu rgy bands in susceptibilit e depender capacitors. s: Character Top-down s, properties	ure on Fermi solids – Clas y – Types of nce – Interna ristics and app and bottom-u , synthesis by	Fund ssific polar I fiel plicat plicat y las	ction ation rizatio d – (iions proa er ab	– Elec of so on me Clausi – Nan ches – lation	h theory ctrons in lids base 9 chanisms us-Mosof 9 oostructur – Electro method
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic, relation – Dielect Unit – V Metallic glasses: – Surface-to-volu beam lithography Applications. TEXT BOOK: 1. Hitendra REFERENCES:	ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect – Bloch theorem – Brillouin zones (E-K curve) – Origin of ene (conductors, semiconductors and insulators). Dielectric materials: ectric constant – Polarization – Displacement vector – Electric orientational and space-charge – Frequency and temperatur ric loss – Dielectric breakdown – Uses of dielectric materials in Smart Materials: Properties, preparation and applications – Shape memory alloys me ratio – Quantum confinement – Nanomaterials synthesis: v – Physical vapour deposition – Carbon nanotubes: Structures	of temperatu rgy bands in susceptibilit re depender capacitors. s: Character Top-down s, properties	ure on Fermi solids – Clas y – Types of nce – Interna ristics and app and bottom-u , synthesis by	Fund ssific polar I fiel plicat plicat y las	ction ation rizatio d – (iions proa er ab	– Elec of so on me Clausi – Nan ches – lation	h theory ctrons in lids base 9 chanisms us-Mosot 9 oostructur – Electro method
Classical free ele Quantum free ele periodic potential on energy bands Unit – IV Dielectrics – Diel Electronic, ionic, relation – Dielect Unit – V Metallic glasses: – Surface-to-volu beam lithography Applications. TEXT BOOK: 1. Hitendra REFERENCES: 1. Pandey I	ectron theory of metals – Electrical conductivity – Success a ectron theory (qualitative) – Fermi distribution function – Effect – Bloch theorem – Brillouin zones (E-K curve) – Origin of ene (conductors, semiconductors and insulators). Dielectric materials: ectric constant – Polarization – Displacement vector – Electric orientational and space-charge – Frequency and temperatur ric loss – Dielectric breakdown – Uses of dielectric materials in Smart Materials: Properties, preparation and applications – Shape memory alloys ume ratio – Quantum confinement – Nanomaterials synthesis: v – Physical vapour deposition – Carbon nanotubes: Structures K. Malik and A.K. Singh, "Engineering Physics", 2 nd Edition M	of temperatu rgy bands in susceptibilit re depender capacitors. s: Character Top-down s, properties cGraw-Hill E	ure on Fermi solids – Clas y – Types of nce – Interna ristics and app and bottom-u , synthesis by	Fund ssific polai polai l fiel plicat plicat p ap y las	ction ation rizatic d – (iions proa er ab	– Elec of so on me Clausi – Nan ches – lation	h theory ctrons in lids base 9 chanisms us-Mosol 9 oostructur – Electro method

		UTCON	-	se, the st	udents	will be a	able to						(BT Mapp Highest L	
CO1	mał	ke use c	of the con	,	oscillato			otion to	compre	hend th	e phenor	nena relate	, be	Applying	
CO2	prop	bagatior	of electr		c waves							concepts of fiber opt		Applying	(K3)
CO3				f free ele ergy gap a					of solids	to com	prehend t	he formatio	on	Applying	(K3)
CO4	pola	rization	mechai		dielect	rics, Cl	ausius-l					the differe s, dielectr		Applying	(K3)
CO5	utiliz	ze appro	opriate m		prepare	metalli	c glasse					naterials ar	nd	Applying	(K3)
						Mappin	g of CO)s with	POs an	d PSO:	6				
Cos/I	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	01	3	2	2						2	2		2		
CO)2	3	2	2						2	2		2		2
CO)3	3	2	2						2	2		2		
CO)4	3	2	2						2	2		2		2

ASSESSMENT PATTERN – THEORY

Applying

(K3) %

40

40

40

40

Understanding

(K2) %

40

40

40

2

Analyzing

(K4) %

2

Evaluating

(K5) %

2

2

Creating

(K6) %

Total

%

100

100

100

100

 ESE
 20
 40

 * ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

2

1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy

Remembering

(K1) %

20

20

20

2

3

Test / Bloom's

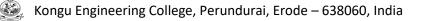
Category*

CAT1

CAT2

CAT3

CO5



		22ECT21 – ELECTROMAGNETIC	FIELDS					
Program Branch		B.E & ELECTRONICS AND COMMUNICATION ENGINEERING	Sem.	Category	L	т	Р	Credi
Prerequi	sites	Nil	1	BS	3	1	0	4
Preamble		To impart the knowledge on the behaviour of electric environment.	field and ma	agnetic field in	stati	c and	time	e varyinę
Jnit – I		Static electric Fields:						9+3
Definition ine charg Potential	of Electric F ge and surfa – Relationsh	inate System – Rectangular – Cylindrical and Spheric ield Intensity- Calculation of electric field intensity due ce charge-Electric Flux Density – Gauss Law – Pro ip between potential and electric field - Potential due nulation of Electric field	to different of of Gauss	: charge confi s Law – Appli	gurati catior	ons: I ns. E	Point lectri	t charge c Scala
Jnit – II		Conductors and Dielectrics:						9+3
Boundary	conditions f	ent density – point form of Ohm's law – continuity equor electric fields- Definition of Capacitance-Several C of parallel plate using Laplace's equation.						
Jnit – III		Static Magnetic Field and Magnetic Materials:						9+3
		ctor form – Magnetic Field Intensity due to a finite and	i infinite wire	e carrying a ci	urrent	t I — N	/lagn	etic field
ntensity of Magnetic conditions	on the axis o flux density s-Definition o	ctor form – Magnetic Field intensity due to a finite and f a circular and rectangular loop carrying a current I - - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varving Fields and Electromagnetic Wayes :	 Ampere's ture of maged efinition of r 	circuital law a netic materia	ınd si ıls -N	mple lagne	appl tic b	lications oundar xample
ntensity o Magnetic conditions Jnit – IV Faraday's	on the axis o flux density s-Definition o s law –Displa	f a circular and rectangular loop carrying a current I - - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varying Fields and Electromagnetic Waves cement current –Maxwell's four equations in integral	- Ampere's ture of mag efinition of r : form and di	circuital law a gnetic materia nutual inducta fferential form	ind si ils -M ance - n- Ma:	mple lagne – sim xwell'	appl tic b ple e s eq	lications ooundary xamples 9+3
ntensity o Magnetic conditions Jnit – IV Faraday's Phasor fo	on the axis o flux density s-Definition o law –Displa orm -Derivatio	f a circular and rectangular loop carrying a current I - - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varying Fields and Electromagnetic Waves cement current –Maxwell's four equations in integral on of Wave Equation- Wave equation in Phasor form	- Ampere's ture of mag efinition of r : form and di	circuital law a gnetic materia nutual inducta fferential form	ind si ils -M ance - n- Ma:	mple lagne – sim xwell'	appl tic b ple e s eq	lications ooundary xamples 9+3 uation ir
ntensity of Magnetic conditions Jnit – IV Faraday's Phasor fo Jnit – V Plane wa	on the axis o flux density s-Definition o a law –Displa orm -Derivatio ves in lossle	f a circular and rectangular loop carrying a current I - - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varying Fields and Electromagnetic Waves cement current –Maxwell's four equations in integral	- Ampere's ture of mag efinition of r : form and di -Poynting V agation in g	circuital law a gnetic materia nutual inducta fferential form ector and the ood conducto	ind si ils -M ance - a- Ma flow (rs - F	mple lagne – sim xwell' of pov	appl tic b ole e s eq ver.	lications ooundar xample: 9+3 uation in 9+3
ntensity of Magnetic conditions Jnit – IV Faraday's Phasor fo Jnit – V Plane wa	on the axis o flux density s-Definition o a law –Displa orm -Derivatio ves in lossle	f a circular and rectangular loop carrying a current I - - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varying Fields and Electromagnetic Waves cement current –Maxwell's four equations in integral on of Wave Equation- Wave equation in Phasor form Uniform Plane Waves : ss dielectric– Plane waves in lossy dielectrics – Prop	- Ampere's ture of mag efinition of r : form and di -Poynting V agation in g	circuital law a gnetic materia nutual inducta fferential form ector and the ood conducto	ind si ils -M ance - a- Ma flow o rs - F ave.	mple lagne - sim xwell' of pov Reflec	appl tic b ple e s eq ver.	lications ooundar <u>9+3</u> uation in <u>9+3</u> of Plane
ntensity of Magnetic conditions Jnit – IV Faraday's Phasor fo Jnit – V Plane wa	on the axis o flux density s-Definition o s law –Displa orm -Derivatio ves in lossles ormal and ob	f a circular and rectangular loop carrying a current I - - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varying Fields and Electromagnetic Waves cement current –Maxwell's four equations in integral on of Wave Equation- Wave equation in Phasor form Uniform Plane Waves : ss dielectric– Plane waves in lossy dielectrics – Prop	- Ampere's ture of mag efinition of r : form and di -Poynting V agation in g	circuital law a gnetic materia nutual inducta fferential form ector and the ood conducto iform plane w	ind si ils -M ance - a- Ma flow o rs - F ave.	mple lagne - sim xwell' of pov Reflec	appl tic b ple e s eq ver.	lications ooundar xample 9+3 uation in 9+3 of Plane
ntensity of Magnetic conditions Jnit – IV Faraday's Phasor fo Jnit – V Plane wa Vave– no	on the axis o flux density s-Definition o a law –Displa orm -Derivatio ves in lossle ormal and ob	f a circular and rectangular loop carrying a current I - - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varying Fields and Electromagnetic Waves cement current –Maxwell's four equations in integral on of Wave Equation- Wave equation in Phasor form Uniform Plane Waves : ss dielectric– Plane waves in lossy dielectrics – Prop	- Ampere's ture of mag efinition of r form and di -Poynting V agation in g neters of un	circuital law a gnetic materia nutual inducta fferential form ector and the ood conducto iform plane w Lecture:45,	ind si ance - h- Ma flow o rrs - F ave. Tuto	mple lagne - sim xwell' of pov Reflec rial:1	appl tic b ole e s eq ver. tion 5, T	lications ooundar xample 9+3 uation i 9+3 of Plan of Plan
ntensity of Magnetic conditions Jnit – IV Faraday's Phasor fo Jnit – V Plane wa Vave– no	on the axis o flux density s-Definition o a law –Displa orm -Derivatio ves in lossle ormal and ob OK: William H. H Publishing (f a circular and rectangular loop carrying a current I - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varying Fields and Electromagnetic Waves cement current –Maxwell's four equations in integral on of Wave Equation- Wave equation in Phasor form Uniform Plane Waves: ss dielectric– Plane waves in lossy dielectrics – Prop- lique incidence-Polarization - Simulation to find paran	- Ampere's ture of mag efinition of r form and di -Poynting V agation in g neters of un	circuital law a gnetic materia nutual inducta fferential form ector and the ood conducto iform plane w Lecture:45,	ind si ance - h- Ma flow o rrs - F ave. Tuto	mple lagne - sim xwell' of pov Reflec rial:1	appl tic b ole e s eq ver. tion 5, T	ications ooundar example 9+3 uation in 9+3 of Pland otal:60
ntensity of Magnetic conditions Jnit – IV Faraday's Phasor fo Jnit – V Plane wa Vave– no TEXT BO	on the axis o flux density s-Definition o a law –Displa orm -Derivatio ves in lossles ormal and ob POK: William H. H Publishing (NCES:	f a circular and rectangular loop carrying a current I - Magnetic Vector Potential– Magnetic moment-Nat f Inductance – Inductance of loops and solenoids – D Time Varying Fields and Electromagnetic Waves cement current –Maxwell's four equations in integral on of Wave Equation- Wave equation in Phasor form Uniform Plane Waves: ss dielectric– Plane waves in lossy dielectrics – Prop- lique incidence-Polarization - Simulation to find paran dayt, Jr ,John A. Buck, and Jaleel M Akhtar, "Engineer Company, NewDelhi,2020 (Unit I to V)	- Ampere's ture of mag efinition of r form and di Poynting V agation in g neters of un	circuital law a gnetic materia nutual inducta fferential form ector and the ood conducto iform plane w Lecture:45, magnetics",9 th	nd si ils -M ance - h- Ma flow o brs - F ave. Tuto	mple lagne - sim xwell' of pov Reflec rial:1	appl tic b ple e s eq ver. tion 5, T (ications ooundar yxample 9+3 uation i 9+3 of Plan otal:60

COURSE On comp		-	ourse, the s	studer	nts will b	e able t	0					(BT Map Highest	
CO1	determi	ne the	electric field	intens	sity and p	otential	for poin	t and	line char	ge distrib	outions.		Applying	(K3)
CO2	apply bo	oundar	y conditions	and d	erive the	capacit	ance of	parall	el plate c	apacitors	6.		Applying	(K3)
CO3	calculat	e the m	nagnetic fiel	d inten	isity and f	lux den	sity for c	curren	nt carrying	conduc	tor		Applying	(K3)
CO4	apply M	laxwell'	s equation a	and ob	tain the \	Nave p	aramete	rs.					Applying	(K3)
CO5	compute dielectri		naracteristic a	s of ur	niform pla	ne wav	es in coi	nduct	or, lossle	ss and lo	ssy		Applying	(K3)
					Mapping	of COs	with P	Os ar	nd PSOs					
COs/POs	6 PO1	PO2	PO3	PO4		PO6	P07	PO		PO10	P011	PO12	PSO1	PSO2
CO1	3	2	1	1	3				2	2			1	
CO2	3	2	1	1									2	
CO3	3	2	1	1									2	
CO4	3	2	1	1									2	
CO5	3	2	1	1	3				2	2			2	
1 – Slight	, 2 – Mo	derate,	3 – Substa	ntial, B	BT- Bloom	's Taxo	nomy		i					
					ASSESS									
	Bloom's egory*	5	Remember (K1) %	ing	Understa (K2)		Apply (K3)	-	Analyzir (K4) %	-	valuating (K5) %	-	eating K6) %	Total %
	AT1		05		50	/0	45		(14) /		(110) /0	(.		100
	AT2		05		50		45							100
C	AT3		05		50		45							100
E	ESE		05		55		40							100
* ±3% ma	ay be var	ied (CA	T 1,2,3 – 5) mark	s & ESE	– 100 r	narks)			I		I		

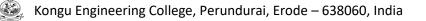
	(Common to ECE, EEE, EIE and	d MTS Branches)	1				I
Programme & Branch	BE – ECE, EEE, EIE and MTS Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Programming in C	2	PC	3	0	2	4
Preamble	This course is indented to introduce the concept of novice learner from cross disciplines in Engineering		uctures and r	notio	n of a	lgorith	nms to
	List: 5 – Abstract Data Types (ADT) – List ADT and Array Imp pplication : Polynomial Addition	lementation – Link	ed List – Dou	ıbly l	_inke	d List	9 – Circula
Unit – II	Stack and Queues:						9
	rray and Linked List implementation of Stacks – Applicat ion Evaluation – Queue ADT – Array and Linked List imple				Postf	ix Co	nversion
Unit – III	Trees:						9
	aries – Binary Trees –Binary Tree Traversals – The Search tion: Expression Tree	Tree ADT – Binary	/ Search Tree	s–Pr	iority	Queu	ies (Binar
Unit – IV	Graphs:						9
Graphs - Defi	nitions – Elementary Graph Operations- Traversals – S						_
, ,	ithm – Minimum Spanning Tree: Prim"s Algorithm- Kruska	I``s Algorithm – App	lications: Bico	onne	ctivity	/.	
Unit – V	Sorting and Hashing:	ent blacking Or		1	F	- 4'	9
Chaining – Ope	ninaries – Insertion Sort – Quicksort – Merge sort – Heaps en addressing.	ort – Hashing – Ge	eneral Idea – I	lasn	Fun	ction -	- Separat
	RIMENTS / EXERCISES:						
1. Implem	nentation of C programs using pointers						
2. Implem	nentation of singly linked list and its operations						
3. Implem	nentation of doubly linked list and its operations						
4. Implem	nentation of Stack and its operations						
5. Implem	nentation of Queue and its operations						
6. Implem	nentation of Stack and Queue using Singly Linked List						
7. Conve	rt a given In-fix Expression into Post-fix Expression using \$	Stack ADT					
8. Evalua	te the Post-fix Expression using Stack ADT						
9. Implem	nentation of Binary Search Tree traversals						
10. Implem	nentation of sorting algorithms: Insertion and Quick sort						
I			Lecture:4	15, P	racti	cal:30), Total:7
TEXT BOOK:							
1. Weiss	M. A., "Data Structures and Algorithm Analysis in C", 2 nd E	dition, Pearson Ed	ucation Asia,	New	Delh	ni, 201	6.
REFERENCES	/ MANUAL / SOFTWARE:						
1. Horowi 2011.	tz Sahni, Andreson Freed, "Fundamentals of Data Structu	res in C", 2 nd Editio	n, Universitie	s Pre	ess, H	Hydera	abad,
∠UII.							



Langsam Y.M., Augenstein J. and Tenenbaum A. M., "Data Structures using C and C++", 2 nd Edition, Pearson Education, 2015.

Kongu Engineering College, Perundurai, Erode – 638060, India

		UTCOM on of the		e, the stude	ents w	ill be able	to						(BT Map Highest L	
CO1	app	ly List A	DT for	solving the	given	problems								Applying	(K3)
CO2	mak	ke use o	f arrays	and linked	d lists t	o create S	Stack an	d Queu	e ADT	S.				Applying	(K3)
CO3	utiliz	ze Tree	ADT to	develop si	mple a	application	l							Applying	(K3)
CO4	mak	ke use o	f Graph	ADT for s	tandar	d problem	S							Applying	(K3)
CO5	illus	ustrate the use of standard sorting and Hashing Techniques Applying (K3)													
						Mappin	g of Co	s with	POs ai	nd PSOs	6				
Cos/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1										
CO	2	3	2	1	1										
CO	3	3	2	1	1										
CO	4	3	2	1	1										
CO	5	3	2	1	1										
1 – Sli	ght, 2	– Mode	rate, 3	 Substant 	ial, BT	- Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	RN –	THEOR	(
	st / Bl Catego	oom's ory*	R	ememberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9	-	Evaluating (K5) %		reating (K6) %	Total %
	CAT	1		10		40		50)						100
	CAT	2		5		35		60)						100
	CAT	3		5		35		60)						100
	ESE	=		5		35		60)						100
* ±3%	may b	oe varied	d (CAT	1,2,3 – 50	marks	& ESE –	100 ma	rks)			·				



	22WEITI - ENGIN	EERING DRAWING					
	(Common to All Engineer	ing and Technology	Branches)		T	r	
Programme & Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	1/2	ES	2	1	0	3
Preamble	To impart knowledge on orthographic, isome different application oriented problems.	tric projections, sections	onal views and d	levelopm	ent of su	Irfaces I	by solving
Unit – I	General Principles of Orthographic Proje	ction:					6+3
Projection - First Quadrant - Deter	awing Sheets - Lettering and Dimensioning - Pro Angle Projection - Layout of Views - Projection of mination of True Lengths and True Inclinations o both Reference Planes. Projections of Solid:	of Points Located in a	II Quadrant and	Straight I	Lines Lo	cated in	n the Firs
	imple Solids Like Prisms, Pyramids, Cylinder	and Cone when th	e Axis is inclir	ned to O	ne Refe	erence	
Unit – III	Sectioning of Solids:						6+3
	ids - Prisms, Pyramids, Cylinder and Cone in ndicular to the other - Obtaining True Shape of		ion by Cutting I	Planes in	clined to	o One F	Reference
Unit – IV	Development of Surfaces:						6+3
			and Conce F)ovolopm	ant of C	Simple .	Truncated
	Lateral Surfaces of Simple Solids Like Prisms Prisms, Pyramids, Cylinders and Cones.	Pyramids, Cylinders	s and Cones -L	evelopin	entora	mpic	
			s and Cones -L				6+3
Solids Involving F Unit – V Principles of Ison	Prisms, Pyramids, Cylinders and Cones.	AutoCAD: Projections of Simp	le and Truncation	ed Solids	Like P		6+3
Solids Involving F Unit – V Principles of Ison	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to Ametric Projection - Isometric Scale - Isometric	AutoCAD: Projections of Simp	le and Truncate	ed Solids	: Like P D.	risms,	6+3
Solids Involving F Unit – V Principles of Ison	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to Ametric Projection - Isometric Scale - Isometric	AutoCAD: Projections of Simp	le and Truncate	ed Solids	: Like P D.	risms,	6+3 Pyramids
Solids Involving F Unit – V Principles of Isor Cylinders and Cor TEXT BOOK:	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to Ametric Projection - Isometric Scale - Isometric	AutoCAD: Projections of Simp hographic Projection	le and Truncate - Introduction to	ed Solids AutoCA Lecture: 3	: Like P D. 30, Tutc	risms, prial:15	6+3 Pyramids
Solids Involving F Unit – V Principles of Isor Cylinders and Cor TEXT BOOK: 1. Natara	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to A metric Projection - Isometric Scale - Isometric nes - Conversion of Isometric Projection into Or	AutoCAD: Projections of Simp hographic Projection	le and Truncate - Introduction to	ed Solids AutoCA Lecture: 3	: Like P D. 30, Tutc	risms, prial:15	6+3 Pyramids
Solids Involving F Unit – V Principles of Isor Cylinders and Cor TEXT BOOK: 1. Natara REFERENCES:	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to A metric Projection - Isometric Scale - Isometric nes - Conversion of Isometric Projection into Or	AutoCAD: Projections of Simp hographic Projection 35 th Edition, Dhanala	le and Truncate - Introduction to L kshmi Publisher	ed Solids AutoCA Lecture:	: Like P D. 30, Tutc ai, 2022	risms, prial:15	6+3 Pyramids , Total:4
Solids Involving F Unit – V Principles of Isor Cylinders and Cor TEXT BOOK: 1. Natara REFERENCES: 1. Venue	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to Ametric Projection - Isometric Scale - Isometric nes - Conversion of Isometric Projection into Or ajan.K.V. "A Textbook of Engineering Graphics",	AutoCAD: Projections of Simp hographic Projection 35 th Edition, Dhanala hics", 16 th Edition, Ne	le and Truncate - Introduction to I kshmi Publisher	ed Solids AutoCA _ecture: rs, Chenr onal Publ	: Like P D. 30, Tutc ai, 2022	risms, prial:15	6+3 Pyramids , Total:4

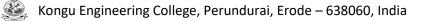
COURSE On comp			: course, th	e studer	nts will I	be able	to							Mapped est Leve	
CO1	interp plane		rnational s	tandards	s of draw	ings an	d sketch	the pro	jections	of points	s, lines an	d	Арр	lying (K3)
CO2	draw	the pro	jections of	3D primi	itive obje	ects like	prisms,	pyramic	ls, cylind	ders and	cones		Арр	lying (K3	i)
CO3	const	construct the various sectional views of solids like prisms, pyramids, cylinders and cones Applying (K3))
CO4	devel	evelop the lateral surfaces of simple and truncated solids													5)
CO5		sketch the isometric projections of simple and truncated solids and convert isometric drawing into orthographic projection												lying (K3)
					Ма	apping	of COs	with PC	s and F	SOs					
COs/P	os	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO
CO	1	3	2			2					3		2		
CO	2	3	2	1		2					3		2		
CO	3	3	2	1		2					3		2		
CO	4	3	2	1		2					3		2		
CO	5	3	2	1		2					3		2		
1 – Slight	t, 2 – M	oderate	e, 3 – Subs	tantial, E	BT- Bloor	n's Tax	onomy								
					AS	SESSI		ATTERI	N – THE	ORY					
Test / Bl Catego			embering K1) %		erstandi K2) %	ng	Applying (K3) %	9	Analyziı (K4) %		Evaluat (K5) %		Creatin (K6) %		otal %
CAT	1		6		9		85								100
CAT	2		6		9		85								100
CAT	3		6		9		85								100
ESE	=		10		10		80								100
* ±3% ma	ay be va	aried (C	AT 1,2,3 –	50 mark	s & ESE	E – 100	marks)			·					

	22TAM02 – தமிழரும் தொழில் (Common to All Engineering and Techno	• •					
Programme &	(Common to All Engineering and Techno						
Branch	All BE/BTech Branches	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	2/3	HS	1	0	0	1
முன்னுரை	தமிழ் கலாச்சாரத்தோடு ஒன்றிய தொழில் நுட	்பங்கன	ள பற்றிப் எ	டுத்	ക്വത	ரத்த	ல்
ച്ച രക്ര – 1	நெசவு மற்றும் பானை தொழில்நுட்பம்						3
சங்க காலத்தில் கீறல் குறியீடுக	் நெசவு தொழில் – பானைத் தொழில்நுட்பம் க ள்	கருப்பு க	ிவப்பு பான்	ரடம்	Jகள்	– L	௱ண்டகளில்
ച്ച രക്ര – 11	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்						3
விவரங்கள் – ம வழிபாட்டுத் தல அம்மன் ஆலய	தில் கட்டுமான பொருட்களும் நடுகல்லும் – சில மாமல்லபுரச்சிற்பங்களும், கோவில்களும் – சோழர லங்கள் – நாயக்கர் காலக் கோயில்கள் –மாதிரிகட்ட ம் மற்றும் திருமலை நாயக்கர் மஹால் – செட தா–சாரோசெனிக் கட்டிடக் கலை.	ர் காலத் _மைப்புல	து பெருங் ேகள் பற்றி அ	காய மித	ါလ် လ်, ၊	கள் மதுல	மற்றும் பிர ரை மீனாட்க
<u>ക്രങ്ങൾ മുട്ടാം</u> എക്രെ – 111							•
கப்பல் கட்டும்	உற்பத்தித் தொழில்நுட்பம் கலை – உலோகவியல் – இரும்புத் தொழிற் 1றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நால				-		-
கப்பல் கட்டும் வரலாற்றுச்சான் தொழிற்சாலைக எலும்புத்துண்டுல	கலை – உலோகவியல் – இரும்புத் தொழிற்க ாறுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நால ள் – கல்மணிகள் – கண்ணாடி மணிகள் – கள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில	னயங்கள சுடுமன் ல் மணி	ள் அச்சடித்த ர மணிகள்	ວல் - _	– டம சங்	ឃា ខ	ல், எஃகு உருவாக்குட மணிகள்
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கப்பல் கட்டும் வரலாற்றுச்சான் தொழிற்சாலைக எலும்புத்துண்டுச அலகு – IV அணை, ஏரி, கு கால்நடைகளுக் – கடல்சார் அறி அறிவுசார் சமூக அறிவுசார் சமூக அறிவியல் தமி மென்பொருட்கள்	கலை – உலோகவியல் – இரும்புத் தொழிற்க ாறுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நான கள் – கல்மணிகள் – கண்ணாடி மணிகள் – கள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட் ளங்கள், மதகு – சோழர்கால குமிழித் தூம்பின் காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை வு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் ம. அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் ழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி – தமி ர உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகப	னயங்கள சுடுமன் ல் மணி பம் முக்கிய மற்றும் ல – பெரு	ள் அச்சடித்த ர மணிகள் களின் வனை பத்துவம் – வேளாண்னை ,ங்கடல் குற் களை மின்	ல் - ககவ் காஎ றத்த பதிப்	– ம் சங் ர. ல்நன ார்ந்த பன்	ணி உ பகு நடை தசெ எடை	ல், எஃகு உருவாக்குட மணிகள் 3 பராமரிப்பு யல்பாடுகள் _ய அறிவு 3 தல் – தமிழ ணையத்தின்
கப்பல் கட்டும் வரலாற்றுச்சான தொழிற்சாலைக எலும்புத்துண்டு அலகு – IV அனை, ஏரி, கு கால்நடைகளுக் – கடல்சார் அறி அறிவுசார் சமூக அறிவியல் தமி மென்பொருட்கன தமிழ் அகராதிக TEXT BOOK: 1 தமிழக வர	கலை – உலோகவியல் – இரும்புத் தொழிற்க ாறுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நான கள் – கல்மணிகள் – கண்ணாடி மணிகள் – கள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட் ளங்கள், மதகு – சோழர்கால குமிழித் தூம்பின் காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை வு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் ம. அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் ழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி – தமி ர உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகப	னயங்கள சுடுமன் ல் மணி பம் முக்கிய மற்றும் ல – பெரு பிழ் நூல் ம் – தமி (வெளிய	ள் அச்சடித்த ர மணிகள் களின் வனை பத்துவம் – வேளாண்ன ,ங்கடல் குற களை மின் ந களை மின் ந பிழ் மின் நு பீடு தமிழ்நா	,ல் - ககவ் காஎ நித்த பதிப்	- ம சங் ா. ப்ரநன பன் பன் படி செ	ணி : பகு நசெய்த செய்த	ல், எஃகு ருவாக்குட புராமரிப்பு யல்பாடுக ய அறிவு தல் – தமிழ ணையத்தில Total:1
கப்பல் கட்டும் வரலாற்றுச்சான் தொழிற்சாலைக எலும்புத்துண்டுச் அலகு – IV அனை, ஏரி, கு காலநடைகளுக் – கடல்சார் அறி அறிவுசார் சமூக அறிவுசார் சமூக அறிவியல் தமி மென்பொருட்கள தமிழ் அகராதிக TEXT BOOK: 1. தமிழக வர கல்வியில்	கலை – உலோகவியல் – இரும்புத் தொழிற்க ாறுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நான ன் – கல்மணிகள் – கண்ணாடி மணிகள் – கள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட் ளங்கள், மதகு – சோழர்கால குமிழித் தூம்பின் காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை வு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் ம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் ழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி – தமி ள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகப ள் சொற்குவைத் திட்டம்.	னயங்கள சுடுமன் பம் முக்கிய மற்றும் ற – பெரு ந் – தம ந் – தம (வெளிய	ள் அச்சடித்த ர மணிகள் களின் வனை பத்துவம் – வேளாண்ன ,ங்கடல் குற களை மின் ந களை மின் ந பிழ் மின் நு பீடு தமிழ்நா	,ல் - ககவ் காஎ நித்த பதிப்	- ம சங் ா. ப்ரநன பன் பன் படி செ	ணி : பகு நசெய்த செய்த	ல், எஃகு ருவாக்குட ருவாக்குட பராமரிப்பு யல்பாடுக ய அறிவு தல் – தமிடி தல் – தமிடி தல் – தமிடி தல் – தமிடி தைல் – தமிடி கணயத்தில்
கப்பல் கட்டும் வரலாற்றுச்சான் தொழிற்சாலைக எலும்புத்துண்டுச் அலகு – IV அனை, ஏரி, கு காலநடைகளுக் – கடல்சார் அறி அறிவுசார் சமூக அறிவுசார் சமூக அறிவியல் தமி மென்பொருட்கள தமிழ் அகராதிக TEXT BOOK: 1. தமிழக வர கல்வியில்	கலை – உலோகவியல் – இரும்புத் தொழிற்க ாறுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நான ள் – கல்மணிகள் – கண்ணாடி மணிகள் – கள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட் ளங்கள், மதகு – சோழர்கால குமிழித் தூம்பின் காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை வு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் ம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் ழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி – தமி ள உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகட ள் சொற்குவைத் திட்டம்.	னயங்கள சுடுமன் பம் முக்கிய மற்றும் ற – பெரு ந் – தம ந் – தம (வெளிய	ள் அச்சடித்த ர மணிகள் களின் வனை பத்துவம் – வேளாண்ன ,ங்கடல் குற களை மின் ந களை மின் ந பிழ் மின் நு பீடு தமிழ்நா	,ல் - ககவ் காஎ நித்த பதிப்	- ம சங் ா. ப்ரநன பன் பன் படி செ	ணி : பகு நசெய்த செய்த	ல், எகு ருவாக்குட ருவாக்குட
கப்பல் கட்டும் வரலாற்றுச்சான் தொழிற்சாலைக எலும்புத்துண்டுச அலகு – 1V அனை, ஏரி, கு கால்நடைகளுக் – கடல்சார் அறி அறிவுசார் சமூக அறிவியல் தமி வென்பொருட்கள தமிழ் அகராதிக TEXT BOOK: 1. தமிழக வர கல்வியில் 2. கணினித்து REFERENCES:	கலை – உலோகவியல் – இரும்புத் தொழிற்க ாறுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நான ள் – கல்மணிகள் – கண்ணாடி மணிகள் – கள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட் ளங்கள், மதகு – சோழர்கால குமிழித் தூம்பின் காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை வு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் ம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் ழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி – தமி ள உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகட ள் சொற்குவைத் திட்டம்.	னயங்கள சுடுமன் பம் முக்கிய மற்றும் ற – பெரு ற – பெரு ற – தம ற – தம ப ப் – தம பெரைய ம – தம	ள் அச்சடித்த ர மணிகள் களின் வனை பத்துவம் – வேளாண்ன ,ங்கடல் குற ,ங்கடல் குற களை மின் நிழ் மின் நு பீடு தமிழ்நா னை, 2002	ுல் - ககவ் காஎ ம ச றித்த பதிப் பலக	- ഥം சங் п. ப்ரநன ார்ந்த பன ப	ணி : பகு நசெய்த செய்த	ல், எகு ருவாக்கு ருவாக்கு



3.	Social Life	of Tamil	s (Dr.K.K	.Pillay) A	joint Pu	blication	of TN	TB & ESC	C and I	RMRL –	(in print)				
4.	Social Life	of the Ta	amils – T	he Classi	cal Perio	od (Dr.S	.Sigara	velu) (Pu	blishe	d by: Inte	rnationa	al Institute	e of Tam	il Studie	s).
5.	Historical H Tamil Stud		of the Ta	mils (Dr.S	S.V.Suba	atamania	an, Dr.ł	K.D. Thiru	inavuk	arasu) (F	ublishe	d by : Inte	ernation	al Institu	te of
6.	The Contril	oution of	the Tam	il to India	n Cultur	e (Dr.M.	Valarm	athi) (Pu	plished	d by Inter	national	Institute	of Tamil	Studies).
7.	Keeladi – 'S Tamilnadu									lished by	: Depar	tment of	Archaec	ology &	
8.	Studies in t	he Histo	ry of Indi	a with Sp	ecial Re	eference	to Tarr	nilnadu (D	Dr.K.K.	Pillay) (P	ublishe	d by: The	Author)		
9.	Porunai Civ Corporation			Published	by: De	partment	t of Arc	haeology	& Tar	nilnadu T	extbool	k and Edu	icational	Service	S
10.	Journey of	Civilizati	on Indus	to Vaigai	(R.Bala	akrishnai	n) (Pub	lished by	: RMR	L) – Refe	erence E	Book.			
	RSE OUTC பை முடித்தஎ		ாணவர்க	ள்									(BT Map Highest	
CO1	_{தமிழ்} க தொழில்	லாச்சா நுட்பம்	,		-	சமூகத்	தினு	டைய	நெச	வு மர	ற்றும்	பானை	ហ Un	derstand	ling (K2)
CO2	தமிழர்கள்	ின் வடி	வமைப்	பு மற்ற	ரம் கட்	டிடத் (தொழி	ல்நுட்ப	ஆற்	றல் பற்	றி விளச்	க் முடியுட	b. Un	derstand	ling (K2)
CO3	தமிழர்கள்	ின் உற்	பத்தித்	தொழில்	நுட்பப	பற்றி க	ஈருக்கப	மாகக் கூற) լրեր	பும்.			Un	derstand	ling (K2)
CO4	தமிழர்கள்	ின் வே	ளாண்ன	ு மற்	றம் நீர்	ரப்பாச6	øத் ெ	தாழில்ந	رالن) பற்றி வ	ிளக்க மு	ுடியும்.	Un	derstand	ling (K2)
CO5	தமிழர்களி	ின் அற்)வியல்	தமிழ்	மற்றுப	் கணி	னித்த	ற்ப த்மெ	றி வ	ிளக்க பு	றடியும்	ז.	Un	derstand	ling (K2)
					Monn	ing of (200 1	vith POs	and	0000					
C	Os/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
	CO1						3		3	2	2		3		
	CO2						3		3	2	2		3		
	CO3						3		3	2	2		3		
	CO4						3		3	2	2		3		
	CO5						3		3	2	2		3		
1 – S	Slight, 2 – Mo	derate,	3 – Subs	tantial, B	Γ- Bloon	n's Taxo	nomy								
					A66	ESSME		TTERN -		עסר					
Toet	/ Bloom's (`atogon	, _* Ren	nemberin		derstan	ding				Eva	luating	Crea		Total %
1631		alegois		(K1) %		(K2) %)	(K3) %		(K4) %	(K	(5) %	(K6) %	
	CAT1			40		60									100
	CAT2			40		60									100
	CAT3 ESE			40		60			N	•					100





	22TAM02 - TAMILS	AND TECHNOLOGY												
	(Common to All Engineerin	g and Technology Brand	:hes)		1									
Programme & Branch	All BE/Blech Branches Sem. Category L I P													
Prerequisites	Nil 2/3 HS 1 0 0													
Preamble	This course aims to impart the essential knowled	ge on the tamil culture and	d related techno	oloav										
UNIT – I	WEAVING AND CERAMIC TECHNOLOGY			- 35			3							
Weaving Indus	stry during Sangam Age – Ceramic technology – Blac	k and Red Ware Potteries	s (BRW) – Graf	fiti on	Potte	eries.	I							
UNIT – II	DESIGN AND CONSTRUCTION TECHNOLOGY	/					3							
of Sangam ag Cholas and oth	Structural construction House & Designs in househol e – Details of Stage Constructions in Silappathikara her worship places – Temples of Nayaka Period – Ty Houses, Indo – Saracenic architecture at Madras due	m – Sculptures and Temp pe study (Madurai Meena	oles of Mamalla	apurar	n – (Great	Temples of							
UNIT – III	MANUFACTURING TECHNOLOGY						3							
of Coins - Bea	lding – Metallurgical studies – Iron industry – Iron sm ds making – industries Stone beads – Glass beads –⊺ ypes described in Silappathikaram.													
UNIT – IV	AGRICULTURE AND IRRIGATION TECHNOLO	GY					3							
	onds, Sluice, Significance of Kumizhi Thoompu of (d Agro Processing – Knowledge of Sea – Fisheries – ty.													
UNIT – V	SCIENTIFIC TAMIL & TAMIL COMPUTING						3							
	of Scientific Tamil – Tamil computing – Digitalizatio mil Digital Library – Online Tamil Dictionaries – Sork		lopment of Tan	nil So	ftwar	re – T	amil Virtua							
							Total:15							
TEXT BOOK:														
1. Social Li	ife of Tamils (Dr.K.K.Pillay) A joint Publication of TNT	B & ESC and RMRL – (in	print)											
2. Social Li	ife of the Tamils – The Classical Period (Dr.S.Sigara	velu) (Published by: Intern	ational Institute	of Ta	mil S	Studies	s).							
REFERENCES	S:													
	வரலாறு - மக்களும் பண்பாடும் - கே கே பி ள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவனப		ழ்நாடு பாடச	ரால் ப	றற்ற	றம் சு	ல்வியில்							
2. கணின	ரித்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பி	ரசுரம், 2016												
3. கீழடி எ	வகை நதிக்கரையில் சங்ககால நகர நாகர	ிகம்.(தொல்லியல் து	றை வெளியீ(9)										
4. பொருக	நை ஆற்றங்கரை நாகரிகம் (தொல்லியல் து	றை வெளியீடு												
5. Historica Studies)	al Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K	.D. Thirunavukarasu) (Pul	olished by : Inte	rnatio	nal l	nstitut	e of Tamil							
	tribution of the Tamils to Indian Culture (Dr.M.Valarm						-							
	 - 'Sangam City Civilzation on the banks of river Vaigation and Educational Services Corporation, Tamilnadu) 		Department of A	Archae	eolog	ју & Т	amilnadu							
TENIDUL														



9.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu)
10.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

		OUTCO tion of	MES: the cour	se, the s	tudents v	vill be abl	e to						(1	BT Map Highest I			
CO1	exp	olain we	aving and	l ceramic	technolog	gy in tamil	culture	and tamil	society.				Un	derstand	ing (K2)		
CO2	Illus	strate a	bout the c	lesign an	d construe	ction techi	nology.						Un	derstand	ing (K2)		
CO3	sun	nmarize	e about the	e manufa	cturing te	chnology.							Un	Understanding (K2			
CO4	exp	lain the	e agricultu	re and irr	gation teo	chnology.							Un	derstand	ing (K2)		
CO5	exp	lain the	e significa	nce of tan	nil in scier	ntific and o	computir	ng.					Un	derstand	ing (K2)		
						Mapping	g of CO	s with P0	Ds and P	SOs							
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	1						3		3	2	2		3				
CO2	2						3		3	2	2		3				
COS	3						3		3	2	2		3				
CO4	1						3		3	2	2		3				
CO5	5						3		3	2	2		3				
1 – Slig	ght, 2	2 – Moo	lerate, 3 –	Substan	tial, BT- B	lloom's Ta	axonomy	/									
						ASSES	SMENT	PATTER	N – THE	ORY							
Test / Cate	Bloc egor		Remem (K1)			standing 2) %		plying K3) %		alyzing (4) %		luating (5) %	Crea (K6		Total %		
С	AT1		40)	(60									100		
С	CAT2 40 60								100								
С	AT3		40)	(60									100		
E	ESE								NA					I			
* ± 3%	mav	be var	ied (CAT	1.2.3 - 5	0 marks)												



Progra Branc	amme & h	. Category	L	Т	Ρ	Credit	
Prerec	quisites	Nil 2	BS	0	0	2	1
Pream		This course aims to impart hands on training in the determination modulus, AC frequency, velocity of ultrasonic waves, compress numerical aperture of an optical fiber, Hall coefficient, wave resistance, thickness of a thin film and knowledge on the work also to impart skills on writing coding / developing project / produce MENTS / EXERCISES:	ibility of a liquic length of lase ng of LCR circ	l, aco , pa uit a	cepta rticle nd p-	nce a size, n june	ngle and specific ction and
1.		ation of the rigidity modulus of the given metallic wire using torsion	al pendulum.				
2.	Studying t	he variation of current and voltage in a series LCR circuit / Determing electrically vibrating tuning fork (Melde's apparatus).	-	eque	ency o	of alte	rnating
3.	Determina interferom	ation of the velocity of ultrasonic waves in a liquid and the compres	sibility of the lic	luid ι	ising	ultras	onic
4.	Determina	ation the acceptance angle and numerical aperture of the given op	ical fiber.				
5.	Observation arrangemo	on of the I-V characteristics of a p-n diode / Determination of Hall o ent.	coefficient of a r	nate	rial us	sing ⊢	all effec
6.	Determina	ation of the band gap of a given semiconducting material using pos	t-office box.				
7.		ination of the wavelength of the given semiconductor laser. nination of the particle size of the given powder using laser.					
8.	Determina	ation the specific resistance of the material of a given coil of wire us	sing Carey-Fos	ter's	bridg	e.	
9.	Determina	ation of the thickness of a thin film by air-wedge arrangement.					
10.	Writing co	ding for any one of the above experiments / developing a project /	a product.				
	I						Total:30
REFE	RENCES/ M	ANUAL /SOFTWARE:					
1.	Physics La	aboratory Manual / Record, Department of Physics, 1 st Edition, 20	20.				
	SE OUTCO	MES: the course, the students will be able to				Г Мар hest	oped Level)
CO1	determine	e the rigidity modulus of a wire, the variation of variation of current a R circuit or the frequency of an alternating current and the velocity					(K3), า (S3)
CO2	characteri	the acceptance angle and the numerical aperture of an optica istics of a p-n diode or the Hall coefficient of a material, the uctor materials.					(K3), n (S3)
CO3		e the wavelength of a laser, the particle size of a powder mater e of a given wire, the thickness of a thin film and develop a coding / p				olying	(K3),

	Mapping of Cos with POs and PSOs													
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3					2	2		2	2	
CO2	3	2	2	3					2	2		2	2	
CO3	3	2	2	3					2	2		2	2	
1 – Slight, 2	2 – Mod	lerate, 3	– Subs	tantial,	BT- Blo	om's Ta	axonom	у						





			2	22MEL1	1 - EN	GINEE	ring p	RACTI	CES LA	BORAT	ORY				
_	_			(Comm	ion to A	II Engin	eering	and Teo	chnolog	y Branch	ies)				
Programm Branch	е &	All B	E/BTec	h Brano	ches					Sem.	Category	/ L	т	Ρ	Credit
Prerequisi	tes	Nil								1/ 2	ES	0	0	2	1
Preamble				is desi practice		o provi	de a ha	ands-or	n exper	ience in	basic of	mecha	anical	and e	electrica
LIST OF E	XPERIN	IENTS	/ EXER	CISES:											
					PA	RT A –	MECH	ANICA	L ENGI	NEERIN	G				
1.	Тарр	oing, an	d Asser	mbling 7	Tasks fr	om the	given S	quare /	Rectan	gular M	rt for Matir S Plates us	ing Mc	dern l	Power	Tools.
2.		are T / er Tools		Joint fro	om give	n Wooc	len Wor	k Piece	and Ma	ake a Bo	x / Tray ou	it of Ply	/wood	using	Moderi
3.		orm the -Proof.		d Forma	ition on	a GI/P	VC Pipe	e and F	repare	a Water	Line from	the O	/erhea	ad Tar	ik that is
4.	Mak	Make a Butt / Lap / Tee Joint of MS Plate using Arc Welding Process and Welding Simulator.													
5.		Activity: Prepare an Innovative Model with the Knowledge from Fitting / Carpentry / Plumbing / Welding Involving Modern Power Tools.													
		Involving Modern Power Tools. PART B – ELECTRICAL AND ELECTRONICS ENGINEERING													
6.	Wirir	ng circu	it for flu	orescer	nt lamp	and Sta	ir case	wiring							
7.	Wirir	ng Circu	uit of Inc	andesc	ent lam	p using	Impuls	e Relay	,						
8.	Mea	sureme	nt of Ea	arth Res	istance										
9.	Sold	ering of	Simple	Circuit	s and tr	ouble s	hooting								
10.	Impl	ementa	tion of h	nalf wav	e and f	ull wave	Rectifi	er using	g diodes	6					
REFEREN	CES/ M	ANUAL	./SOFT	WARE											Total:30
1.	Engin	eering l	Practice	s Labor	atory N	lanual.									
COURSE (On comple			uree th	o ctud	onto wi	ll bo ok	la ta							Map	ped Level)
CO1	plan		quence					ompleti	on of tl	he planr	ned model	s /	Crea	ating (nipulat	(K6)
CO2		fy and		propriate	e mode	rn powe	er tools	and co	mplete	the exer	cises/mod	els		(S2) lying (nipulat (S2)	
CO3	perfor	m hous	e wiring	g and re	alize th	e impor	tance o	f earthir	ng				App Manii	olying	(K3), on (S2)
CO4	solder	ring with	n simple	electro	nics cir	cuits							Арр	olying	
CO5	trouble	e shoot	the ele	ctrical a	nd elec	tronic c	ircuits						App	olying	
	<u> </u>				Марр	ing of (COs wi	th POs	and PS	SOs		1	man	pulati	(02)
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO1	2 P	SO1	PSO2
CO1	3		3	1	3	1			3	3		3			

CO2	3		3	1	3				3	3	3		
CO3	3		3	2	1				2	2	3	3	2
CO4	3		2	1	1				2	3	3	3	2
CO5	3		3	2	1				2	2	3	3	2
1 – Slight, 2	2 – Mod	lerate, 3	3 – Subs	stantial.	BT- Blo	om's T	axonon	าง					

	22VEC11 - YOGA AND VALUES						
	(Common to All Engineering	and Technology Brand	ches)		_		
Programme & Branch	All B.E./B.Tech. Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	1/2	HS	1	0	1	1
Preamble	Yoga or yogasanas are considered as art and s harmony of body and mind for general wellbeir Indians for healthy living. Students in particular	ng. Yoga is considered	as one of the	nt guru greate	us. It i est gif	s met ts to	thod to bring the world by
Unit – I	Introduction:	r	~ ~ ~				2
Asanas – Classi	oga – Definitions - Concepts - Aims and objectives fications of Yogasanas – Patanjali's Ashtanga Yo ns of Yoga – Modern Trends in yoga.						
Unit – II	Yoga and Mind:						2
	nd - Five Elements and the Mind - Meditation and Disorders, Major Depressive Disorder, Cyclothymi		of the Mind - R	ole of	Yoga	a in P	sychologica
Unit – III	Yoga and Values, Diet:						2
	Social Values – Role of Yoga in Personality Integ Diet – Constructive Diet.	ration - Concepts of N	latural Diet - N	aturop	athy	Diet -	- Eliminative
Unit – IV	Asanas:						2
	& Closing - Preparatory practices – Loosening Prac nas. Asanas: Standing – Sitting – Prone – Supine		nitions and Obj	ectives	s of A	sanas	s - Principles
Unit – V	Pranayama and Meditation:						2
	es for awareness - Definitions and Objectives of P abathi – Sitali – Sitkari – Bhranari – Ujjayi – Relaxa			ranay	ama.	Prana	ayama: Nad
			Lecture	e: 10, l	Pract	ical:	10, Total:20
TEXT BOOK:							
	atyananda saraswathi, "Asana pranayama mudra	bandha", Bihar school	of yoga, 4 th Ec	dition,	1969.		
1. Swami s	atyananda saraswathi, "Asana pranayama mudra nukthi Bodhanandha, "Hatha yoga pradipika", Biha	-		dition,	1969.		
1.Swami s2.Swami r		-		lition,	1969.		
1. Swami s 2. Swami r REFERENCES:		ar school of yoga, 4 th E		dition,	1969.		

		TCOMES on of the	-	the stude	ents will	be able t	to						Mapped est Level)	
CO1	reali	ize the im	portance	e of yoga	in physic	al health.						Appl	ying (K3)	
CO2	reali	ize the im	portance	e of yoga	in menta	l health.						Applying (K3)		
CO3	reali		Applying (K3)											
CO4	do t	he looser		Apply	ying (K3)									
CO5	do t	he practio		Applying (K3)										
					Ма	pping of	COs with	POs and	PSOs					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	
CO)1						3		2	1				

CO1				3	2	1		
CO2				3	2			
CO3				3	3			
CO4				3	2	3		
CO5				3	3			
1 Olivitation	Ma danata	 						

1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy

		ASSESSME		- THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	-	-	-	-	-	-
CAT2	-	-	-	-	-	-	-
CAT3	20	30	50	-	-	-	100
ESE	-	-	-	-	-	-	-
* ±3% may be	varied (CAT3 – 100 ı	marks)			•		



	22TAM01 - தமிழ (Common to All Engineering and	• -	es)				
Programme & Branch	All BE / BTech Branches	Sem.	Category	L	т	Ρ	Credit
Branch Prerequisites	Nil	1/2	HS	1	0	0	1
Preamble	தமிழர்களின் மொழி, இலக்கியம், ஓவியா விளையாட்டுக்கள், திணைக் கோட்பா(பங்களிப்பைப் பற்றிய அறிவை வழங்குக	டுகள், இந்திய	பண்பாட்டி	ற்கு	த்	தமீ	லகள், வீ 1ழர்களில்
அலகு – I	பொழி மற்றும் இலக்கியம்		<u> </u>		0		3
– சங்க இலக் மேலாண்மைச் பக்தி இலக்கிய	க் குடும்பங்கள் – திராவிட மொழிகள் – தமீ கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க & கருத்துக்கள் – தமிழ் காப்பியங்கள், தமிழ பம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சி பிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்று	் இலக்கியத்தில் நகத்தில் சமண ற்றிலக்கியங்கள்	் பகிர்தல் பௌத்த ச 1 – தமிழில்	அற்ப மயா நவ	ഥ – പകണ് തെ (റ്റ	திரு 1ன் இலக்	க்குறளி தாக்கம் கியத்தில
തെക്കിതെബ് (மரபு – பாறை ஓவியங்கள் முதல் நவீன நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைச பொருட்கள், பொம்மைகள் – தேர் செய்யுட	ள் – பழங்குடியி ம் கலை – சுடு	னர் மற்றும் 6மண் சிற்ட	் அ பங்க	வர்க ள் -	நா	ட்டுப்புற
	குமரிமுனையில் திருவள்ளுவர் சிலை – பரம் – தமிழர்களின் சமூக பொருளாதார வ				نة, L	மற	, ഖ്ഞൽ
அலகு – பட	் நாட்டுப்புறக் கலைகள் மற்றும் வர விலை	ாயாட்டுக்கள்					3
அலகு – 111 தெருக்கூத்து, சிலம்பாட்டம்,	் நாட்டுப்புறக் கலைகள் மற்றும் வீர வினை கரகாட்டம், வில்லுப்பாட்டு, கணியான் வளரி, புலியாட்டம், தமிழர்களின் விளைய	கூத்து, ஒயில	ரட்டம், (தா	ប់បារ	തഖദ്	
தெருக்கூத்து, சிலம்பாட்டம்,	கரகாட்டம், வில்லுப்பாட்டு, கணியான்	கூத்து, ஒயில	ரட்டம், (தோ	់បាកឲ	തഖദ്	
தெருக்கூத்து, சிலம்பாட்டம், அலகு – IV தமிழகத்தின் த புறக் கோட்பா கல்வியும் – ச	கரகாட்டம், வில்லுப்பாட்டு, கணியான் வளரி, புலியாட்டம், தமிழர்களின் விளைய	கூத்து, ஒயில ாட்டுகள். பயம் மற்றும் சா டு– சங்க கால	ங்க இலக்கி மத்தில் தமி)யத்த முகத்	தில் நதில்	அகப் எழு	ைகூத்த 3 ம் மற்றுட த்தறிவு
தெருக்கூத்து, சிலம்பாட்டம், அலகு – IV தமிழகத்தின் த புறக் கோட்பா கல்வியும் – ச	கரகாட்டம், வில்லுப்பாட்டு, கணியான் வளரி, புலியாட்டம், தமிழர்களின் விளைய தமிழர்களின் திணைக் கோட்பாடுகள் எவரங்களும், விலங்குகளும் – தொல்காப்பி டுகள் – தமிழர்கள் போற்றிய அறக்கோட்பா ங்ககால நகரங்களும் துறை முகங்களும் – ாடுகளில் சோழர்களின் வெற்றி. இந்திய தேசிய இயக்கம் மற்றும் இந்திய	கூத்து, ஒயில ாட்டுகள். 1யம் மற்றும் சா 1டு– சங்க கால சங்ககாலத்தில்	ங்க இலக்கி லத்தில் தமி ஏற்றுமதி	பயத்த மற்	தில் நதில்	அகப் எழு	ைகூத்த 3 ம் மற்றுட த்தறிவு
தெருக்கூத்து, சிலம்பாட்டம், அலகு – IV தமிழகத்தின் த புறக் கோட்பா கல்வியும் – ச கடல்கடந்த நா அலகு – V இந்திய விடுத – சுயமரியான	கரகாட்டம், வில்லுப்பாட்டு, கணியான் வளரி, புலியாட்டம், தமிழர்களின் விளைய தமிழர்களின் திணைக் கோட்பாடுகள் ராவரங்களும், விலங்குகளும் – தொல்காப்பி டுகள் – தமிழர்கள் போற்றிய அறக்கோட்பா ங்ககால நகரங்களும் துறை முகங்களும் – ாடுகளில் சோழர்களின் வெற்றி.	கூத்து, ஒயில ாட்டுகள். பயம் மற்றும் சா டு– சங்க கால சங்ககாலத்தில் பண்பாட்டிற்குத் எவின் பிறபகுதில் சித்த மருத்துவ	ங்க இலக்கீ லத்தில் தமி ஏற்றுமதி தமிழர்கஎ களில் தமிழ	ியத்த மற் ரின் ஓ பல	தில் தில் றும் ன்பா	அகப் எழு இற	் கூத்த 3 ம் மற்றுட த்தறிவு க்குமதி 3 ர தாக்கட
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தெருக்கூத்து, சிலம்பாட்டம், அலகு – IV தமிழகத்தின் த பறக் கோட்பா கல்வியும் – ச கடல்கடந்த நா அலகு – V இந்திய விடுத – சுயமரியான கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப REFERENCES: ↓ தமிழக	கரகாட்டம், வில்லுப்பாட்டு, கணியான் வளரி, புலியாட்டம், தமிழர்களின் விளைய தமிழர்களின் திணைக் கோட்பாடுகள் ராவரங்களும், விலங்குகளும் – தொல்காப்பி டுகள் – தமிழர்கள் போற்றிய அறக்கோட்பா ங்ககால நகரங்களும் துறை முகங்களும் – ாடுகளில் சோழர்களின் வெற்றி. இந்திய தேசிய இயக்கம் மற்றும் இந்திய பங்களிப்பு லைப்போரில் தமிழர்களின் பங்கு – இந்தியா நத இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரல	கூத்து, ஒயில ாட்டுகள். பயம் மற்றும் சா ரடு– சங்க கால சங்ககாலத்தில் பண்பாட்டிற்குத் பண்பாட்டிற்குத் வின் பிறபகுதில சித்த மருத்துவ ாறு.	ங்க இலக்கி றத்தில் தமி ஏற்றுமதி தமிழர்க ை களில் தமிழ றத்தின் பா)யத்த மற் மற்	தில் நதில் றும் ன்பா – ச	அகப் எழு இற டடின் கல்ெ	் கூத்த 3 ம் மற்றுட த்தறிவு க்குமதி 3 ர தாக்கட வட்டுகள் Total: 1
தெருக்கூத்து, சிலம்பாட்டம், அலகு − IV தமிழகத்தின் த புறக் கோட்பா கல்வியும் − ச கடல்கடந்த நா அலகு − V இந்திய விடுத - சுயமரியான கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப REFERENCES: 1. தமிழக	கரகாட்டம், வில்லுப்பாட்டு, கணியான் வளரி, புலியாட்டம், தமிழர்களின் விளைய தமிழர்களின் திணைக் கோட்பாடுகள் எவரங்களும், விலங்குகளும் – தொல்காப்பி டுகள் – தமிழர்கள் போற்றிய அறக்கோட்பா ங்ககால நகரங்களும் துறை முகங்களும் – ாடுகளில் சோழர்களின் வெற்றி. இந்திய தேசிய இயக்கம் மற்றும் இந்திய பங்களிப்பு லைப்போரில் தமிழர்களின் பங்கு – இந்தியா நத இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரல	கூத்து, ஒயில ாட்டுகள். 1யம் மற்றும் சா டு– சங்க கால சங்ககாலத்தில் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் வன் பிறபகுதில சித்த மருத்துவ ாறு. 2.	ங்க இலக்கி றத்தில் தமி ஏற்றுமதி தமிழர்க ை களில் தமிழ றத்தின் பா)யத்த மற் மற்	தில் நதில் றும் ன்பா – ச	அகப் எழு இற டடின் கல்ெ	் கூத்த 3 6 மற்று த்தறிவு க்குமதி 3 1 தாக்கு வட்டுகள் Total: 1
தெருக்கூத்து, சிலம்பாட்டம், அலகு − IV தமிழகத்தின் த புறக் கோட்பா கல்வியும் – ச கடல்கடந்த நா அலகு − V இந்திய விடுத - சுயமரியான கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப REFERENCES: 1. தமிழக கல்விய 2. கணினி	கரகாட்டம், வில்லுப்பாட்டு, கணியான் வளரி, புலியாட்டம், தமிழர்களின் விளைய தமிழர்களின் திணைக் கோட்பாடுகள் ராவரங்களும், விலங்குகளும் – தொல்காப்பி டுகள் – தமிழர்கள் போற்றிய அறக்கோட்பா ங்ககால நகரங்களும் துறை முகங்களும் – ாடுகளில் சோழர்களின் வெற்றி. இந்திய தேசிய இயக்கம் மற்றும் இந்திய பங்களிப்பு லைப்போரில் தமிழர்களின் பங்கு – இந்தியா நத இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரல படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரல	கூத்து, ஒயில ாட்டுகள். பயம் மற்றும் சா டு– சங்க கால சங்ககாலத்தில் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பண்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பன்பாட்டிற்குத் பருத்து பிரசுரம்ப்	ங்க இலக்கீ லத்தில் தமி ஏற்றுமதி தமிழர்க களில் தமிழ பத்தின் பா பிழ்நாடு பாட	ியத்த மற் மற் ரின் டி பஎ டி பஎ டநூல	தில் நதில் றும் ன்பா – ச	அகப் எழு இற டடின் கல்ெ	் கூத்த 1 மற்று த்தறிவு க்குமதி 3 1 தாக்க வட்டுகள Total: 1



		UTCO மடித்த		ா, மாண	வர்கள்	т								BT Map Highest	•
CO1		ிழ் டெ டியும்.		ற்றும் (இலக்க	கியத்தில	் மதிட	்புமிக்	ቴ ቆቤ	த்துக்க	ണെ ഖ്	ிளக்க	Und	erstanding	j (K2)
CO2	தமீ	ிழர்க	ளின் சி	ற்பம் மற	றும் ,	அவர்கவ	ரின் ஒ	வியங்	கள் பு	ற்றி வி	ளக்க பு	்டியும்.	Und	erstanding	3 (K2)
CO3	~	ிழர்க ற முடி		ாட்டுப்புற) மற்ற	றம் தற்க	காப்புக்	கலை	ക്തണ	ப் பற்றி) சுருக்ச	மாகக்	Unde	erstanding	g (K2)
CO4	தமீ	ிழர்க		Und	Understanding (K2)										
CO5				இயக்கம்)) விளக்க			திய பல	ன்பாட்ட	۹ <u></u> ۵@	த் தமிழ	ர்களின்	[Unde	erstanding	յ (K2)
						Марр	ing of C	COs wit	h POs	and PS	Os				
COs/F	Pos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1						3		3	2	2		3		
CO	2						3		3	2	2		3		
CO	3						3		3	2	2		3		
CO	4						3		3	2	2		3		
CO	5						3		3	2	2		3		
1 – Sli	ght, 2	– Mod	erate, 3	8 – Substa	ntial, B	T- Bloom	's Taxoi	nomy							
						4665	COMEN			- THEO					
	st / Ble Catego	oom's ory*	R	emember (K1) %	ing	Understa (K2)	anding	Apply (K3)	/ing	Analyz (K4) 9	ing l	Evaluating (K5) %		eating (6) %	Total %
	CAT			40		60								•	100
	CAT	2		40		60								100	
	CAT	3		40		60									100
	ESE	Ξ			1				1	NA	1				
* ±3%	mav I	be varie	ed (CAT	1,2&3	– 50 m	arks)									



	22TAM01 - HERITAGE OF T	AMILS					
	(Common to All Engineering and Techn	ology Branch	es)				
Programme & Branch	All BE / BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	1/2	HS	1	0	0	1
Preamble	The objective of this course is to impart knowledge about arts, heroic games, doctrines, contribution of Tamils to In		ge, literature,	pain	tings,	sculp	otures, folk
UNIT I	Language and Literature						3
sangam literatu & jainism in tam	ies in india - dravidian languages – tamil as a classical lang e – distributive justice in sangam literature - management prine il land - bakthi literature azhwars and nayanmars - forms of m bharathiyar and bharathidhasan.	ciples in thiruk	ural - tamil ep	oics ai	nd im	pact o	of buddhism
UNIT II	Heritage - Rock Art Paintings to Modern Art – Sculptu	ure					3
in a alla a ai	and a statement of the second statement of the statement						
UNIT III	role of temples in social and economic life of tamils. Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather	r puppetry – si	lambattam –	valar	i - tig	er daı	3 nce - sports
UNIT III Therukoothu – I and games of ta	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather imils.	r puppetry – si	lambattam –	valar	i - tig	er daı	nce - sports
UNIT III Therukoothu – I and games of ta UNIT IV	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather imils. Thinai Concept of Tamils						nce - sports
UNIT III Therukoothu – I and games of ta UNIT IV Flora and fauna	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather imils.	sangam litera	ture - aram co	oncep	ot of t	amils	nce - sports 3 - education
UNIT III Therukoothu – and games of ta UNIT IV Flora and fauna and literacy duri of cholas.	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather imils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyam and	sangam litera ort and import	ture - aram co during sanga	oncep	ot of t	amils	nce - sports
UNIT III Therukoothu – and games of ta UNIT IV Flora and fauna and literacy duri of cholas. UNIT V Contribution of t	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather imils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyam and ng sangam age - ancient cities and ports of sangam age - experimental	sangam litera ort and import and Indian Cu Is over the oth	ture - aram co during sanga Ilture er parts of ind	oncer im ag	ot of t e - ov	amils /ersea	as conques
UNIT III Therukoothu – and games of ta UNIT IV Flora and fauna and literacy duri of cholas. UNIT V Contribution of t - role of siddha	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather mils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyam and ng sangam age - ancient cities and ports of sangam age - exponent cities and ports of sangam age - exponent and sangle to indian freedom struggle - the cultural influence of tamils to indian freedom struggle - the cultural influence of tamil	sangam litera ort and import and Indian Cu Is over the oth	ture - aram co during sanga Ilture er parts of ind	oncer im ag	ot of t e - ov	amils /ersea	ace - sports 3 - educatior as conques 3 t movemen
UNIT III Therukoothu – I and games of ta UNIT IV Flora and fauna and literacy duri of cholas. UNIT V Contribution of t - role of siddha TEXT BOOK:	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather umils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyam and ng sangam age - ancient cities and ports of sangam age - experimentation of Tamils to Indian National Movement at amils to indian freedom struggle - the cultural influence of tamil medicine in indigenous systems of medicine – inscriptions & r	sangam litera ort and import and Indian Cu ls over the oth manuscripts –	ture - aram co during sanga Ilture er parts of inc print history o	oncer im ag	ot of t e - ov	amils /ersea	as conques
UNIT III Therukoothu – I and games of ta UNIT IV Flora and fauna and literacy duri of cholas. UNIT V Contribution of t - role of siddha TEXT BOOK: 1. S.Muth	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather umils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyam and ng sangam age - ancient cities and ports of sangam age - experimental sector of Tamils to Indian National Movement at amils to indian freedom struggle - the cultural influence of tamil medicine in indigenous systems of medicine – inscriptions & r uramalingam, M.Saravanakumar, Heritage of Tamils, Yes Deet	sangam litera ort and import and Indian Cu ls over the oth manuscripts –	ture - aram co during sanga Ilture er parts of inc print history o	oncer im ag	ot of t e - ov	amils /ersea	ace - sports 3 - educatior as conques 3 t movemen
UNIT III Therukoothu – I and games of ta UNIT IV Flora and fauna and literacy duri of cholas. UNIT V Contribution of t - role of siddha TEXT BOOK: 1. S.Muth REFERENCES	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather imils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyam and ng sangam age - ancient cities and ports of sangam age - experimental sector of Tamils to Indian National Movement at amils to indian freedom struggle - the cultural influence of tamil medicine in indigenous systems of medicine – inscriptions & r uramalingam, M.Saravanakumar, Heritage of Tamils, Yes Deet	sangam litera ort and import and Indian Cu Is over the oth manuscripts – e Publishing F	ture - aram co during sanga Ilture er parts of inc print history o vt Ltd, 2023.	oncep im ag lia – s of tam	ot of t e - ov self-re	amils /ersea espec oks.	ace - sports 3 - educatior as conques 3 t movemen Total: 15
UNIT III Therukoothu – I and games of ta UNIT IV Flora and fauna and literacy duri of cholas. UNIT V Contribution of t - role of siddha TEXT BOOK: 1. S.Muth REFERENCES 1. Historic Tamil S	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather imils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyam and ng sangam age - ancient cities and ports of sangam age - experimental sto indian freedom struggle - the cultural influence of tamil medicine in indigenous systems of medicine – inscriptions & r uramalingam, M.Saravanakumar, Heritage of Tamils, Yes Deet al Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thir tudies).	sangam litera ort and import and Indian Cu Is over the oth manuscripts – e Publishing F runavukarasu)	ture - aram co during sanga alture er parts of inc print history o vt Ltd, 2023. (Published b	bincep im ag lia – s of tam	ot of t e - ov self-re nil boo	amils /ersea espec oks.	ace - sports 3 - education as conques 3 t movemen Total: 15
UNIT III Therukoothu – I and games of ta UNIT IV Flora and fauna and literacy duri of cholas. UNIT V Contribution of t - role of siddha TEXT BOOK: 1. S.Muth REFERENCES 1. Historic Tamil S	Folk and Martial Arts karagattam - villu pattu - kaniyan koothu – oyillattam - leather imils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyam and ng sangam age - ancient cities and ports of sangam age - experimental sector of Tamils to Indian National Movement at amils to indian freedom struggle - the cultural influence of tamil medicine in indigenous systems of medicine – inscriptions & r uramalingam, M.Saravanakumar, Heritage of Tamils, Yes Deet al Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thir tudies). ntribution of Tamil of the Tamils to Indian Culture(Dr.M.Val	sangam litera ort and import and Indian Cu Is over the oth manuscripts – e Publishing F runavukarasu)	ture - aram co during sanga alture er parts of inc print history o vt Ltd, 2023. (Published b	bincep im ag lia – s of tam	ot of t e - ov self-re nil boo	amils /ersea espec oks.	ace - sports 3 - education as conquest 3 t movement Total: 15

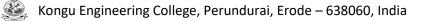
		UTCON		ourse, the	student	ts will be	able to)						BT Map (Highest	
CO1	expl	lain val	uable	concepts ir	langu	age and	literature	e of tam	ils.				Und	erstandin	g (K2)
CO2	illus	trate at	oout th	ie tamils sc	ulpture	and their	painting	gs.					Und	erstandin	g (K2)
CO3	sum	nmarize	abou	t the tamils	folk and	d martial	arts.						Und	erstandin	g (K2)
CO4	expl	lain the	thinai	concept of	tamils.								Und	erstanding	g (K2)
CO5	05 explain the contribution of Tamils to the Indian National Movement and Indian culture.														g (K2)
						Маррі	ng of C	Os with	n POs	and PS	Os				
COs/P	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1					3		3	2	2		3				
CO2	2						3		3	2	2		3		
COS	3						3		3	2	2		3		
CO4	1						3		3	2	2		3		
COS	5						3		3	2	2		3		
1 – Slig	ght, 2	– Mode	erate,	3 – Substa	ntial, B1	r- Bloom	s Taxor	nomy	1		1			1	·
						ASSE	SSMEN	Τ ΡΑΤΊ	ERN -	THEOF	۲Y				
	t / Blo atego	oom's ory*		Remember (K1) %	ring l	Jndersta (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		Creating (K6) %	
	CAT	1		40		60									100
	CAT	2		40		60									100
	CAT	3		40		60									100
	ESE	=						1		NA	I		1		1

	(Common to All Engineering and	தாழில்நுட்பமுப் Technology Brai					
Programme &	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Branch						_	
Prerequisites	Nil	2/3	HS	1	0	0	1
முன்னுரை	தமிழ் கலாச்சாரத்தோடு ஒன்றிய தொழ	ல் நுட்பங்கலை	ள பற்றிப் எ	டுத்	துவை	Ĵġġ	່າ
அலகு – I	நெசவு மற்றும் பானை தொழில்நுட்பம்						3
சங்க காலத்தில் கீறல் குறியீடுக	ல் நெசவு தொழில் – பானைத் தொழில்நுட் ள்	பம் கருப்பு சீ	ിഖப்பு பாൽ	πடங்	1கள்	– Uſ	ாண்டகளில
அலகு – 11	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்	துட்பம்					3
சென்னை இந்ே அலகு – 111 கப்பல் கட்டும் வரலாற்றுச்சான் தொழிற்சாலைக	பம் மற்றும் திருமலை நாயக்கா் மஹால் தா–சாரோசெனிக் கட்டிடக் கலை. உற்பத்தித் தொழில்நுட்பம் கலை – உலோகவியல் – இரும்புத் தெ ன்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் கள் – கல்மணிகள் – கண்ணாடி மணிக	தாழிற்சாலை 1 – நாணயங்கல ள் – சுடுமண்	– இரும்னை ப்பில் அச்சடித்த பிமணிகள்	_	_ருக் - மன சங்	குத குத னி உ	3 ல், எஃகு _ருவாக்கு।
0 0	கள் – தொல்லியல் சான்றுகள் – சிலப்பதிக		ടണിൽ ഖതം	୫୫ଗ	1.		
<mark>அலகு –</mark> IV ചെത്രങ്ങ എ ശ	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொ	சுலறிட்பா					2
	வங்கள், மககு – சோழர்கால குமிழிக் தூ	ம்பின் (மக்கிய	க்குவும் –	கால	்நன		3 ராமரிப்பு
– கடல்சார் அறி		ன்மை மற்றும் ளித்தல் – பெரு	வேளாண்னை	மச	ார்ந்த	செப	ராமரிப்பு பல்பாடுக
– கடல்சார் அறி அறிவுசார் சமூச அலகு – v	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளால 1வு – மீன்வளம் – முத்து மற்றும் முத்துக்குல 6ம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	ன்மை மற்றும் ளித்தல் – பெரு 2	வேளாண்ன ங்கடல் குற்	ம ச)த்த	ார்ந்த பன்	செப ாடை	ராமரிப்பு பல்பாடுகஞ ய அறிவு 3
– கடல்சார் அறி அறிவுசார் சமூச அலகு – v அறிவியல் தமி மென்பொருட்கள	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளால 1வு – மீன்வளம் – முத்து மற்றும் முத்துக்குல 6ம்.	ண்மை மற்றும் ளித்தல் – பெரு 2 – தமிழ் நூல்	வேளாண்ன ங்கடல் குற் களை மின்ப	ம ச றத்த பதிப்	ார்ந்த பண் பு ெ	, செப ாடை சய்த	ராமரிப்பு பல்பாடுகஞ ய அறிவு <u>3</u> ல் – தமி
– கடல்சார் அறி அறிவுசார் சமூச அலகு – v அறிவியல் தமி மென்பொருட்கள்	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளால வெ – மீன்வளம் – முத்து மற்றும் முத்துக்குல கம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் ிழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி ள் உருவாக்கம் – தமிழ் இணையக் கல்வி	ண்மை மற்றும் ளித்தல் – பெரு 2 – தமிழ் நூல்	வேளாண்ன ங்கடல் குற் களை மின்ப	ம ச றத்த பதிப்	ார்ந்த பண் பு ெ	, செப ாடை சய்த	ராமரிப்பு பல்பாடுகள ய அறிவு 3 ல் – தமி ணையத்தில்
– கடல்சார் அறி அறிவுசார் சமூச அலகு – v அறிவியல் தமி மென்பொருட்கஞ தமிழ் அகராதிக	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளால வெ – மீன்வளம் – முத்து மற்றும் முத்துக்குல கம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் ிழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி ள் உருவாக்கம் – தமிழ் இணையக் கல்வி	ண்மை மற்றும் ளித்தல் – பெரு 2 – தமிழ் நூல்	வேளாண்ன ங்கடல் குற் களை மின்ப	ம ச றத்த பதிப்	ார்ந்த பண் பு ெ	, செப ாடை சய்த	ராமரிப்பு பல்பாடுகஞ ய அறிவு <u>3</u> ல் – தமி
– கடல்சார் அறி அறிவுசார் சமூச அலகு – v அறிவியல் தமி மென்பொருட்கள தமிழ் அகராதிக TEXT BOOK:	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளால வெ – மீன்வளம் – முத்து மற்றும் முத்துக்குல கம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் ிழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி ள் உருவாக்கம் – தமிழ் இணையக் கல்வி	ன்மை மற்றும் (ளித்தல் – பெரு – தமிழ் நூல் க்கழகம் – தமி ள்ளை (வெளிய	வேளாண்ன ங்கடல் குற் களை மின் நிழ் மின் நூ பீடு தமிழ்நா	ம ச ற்த்த பதிப் லக	பண் பண் பு ெ	, செப ாடை சய்த இல	ராமரிப்பு பல்பாடுகள ய அறிவு 3 ல் – தமி நணயத்தில Total:1
– கடல்சார் அறி அறிவுசார் சமூச அலகு – V அறிவியல் தமி மென்பொருட்கள தமிழ் அகராதிக TEXT BOOK: 1. தமிழக வர கல்வியில்	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளான வெ – மீன்வளம் – முத்து மற்றும் முத்துக்குள கம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி ஸ் உருவாக்கம் – தமிழ் இணையக் கல்வி ஸ் சொற்குவைத் திட்டம். ரலாறு – மக்களும் பண்பாடும் – கே கே பில	ன்மை மற்றும் (ளித்தல் – பெரு – தமிழ் நூல் க்கழகம் – தமி ள்ளை (வெளிய றுவனம், சென்	வேளாண்ன ங்கடல் குற் களை மின் நிழ் மின் நூ பீடு தமிழ்நா	ம ச ற்த்த பதிப் லக	பண் பண் பு ெ	, செப ாடை சய்த இல	ராமரிப்பு பல்பாடுகள ய அறிவு 3 ல் – தமி நணயத்தில Total:1
– கடல்சார் அறி அறிவுசார் சமூச அலகு – V அறிவியல் தமி மென்பொருட்கள தமிழ் அகராதிக TEXT BOOK: 1. தமிழக வர கல்வியில்	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளான வு – மீன்வளம் – முத்து மற்றும் முத்துக்குள ம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் இன் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி ஸ் உருவாக்கம் – தமிழ் இணையக் கல்வி ஸ் சொற்குவைத் திட்டம். ரலாறு – மக்களும் பண்பாடும் – கே கே பிஞ பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நி	ன்மை மற்றும் (ளித்தல் – பெரு – தமிழ் நூல் க்கழகம் – தமி ள்ளை (வெளிய றுவனம், சென்	வேளாண்ன ங்கடல் குற் களை மின் நிழ் மின் நூ பீடு தமிழ்நா	ம ச ற்த்த பதிப் லக	பண் பண் பு ெ	, செப ாடை சய்த இல	ராமரிப்பு பல்பாடுகள ய அறிவு 3 ல் – தமி நணயத்தில் Total:1
– கடல்சார் அறி அறிவுசார் சமூச அலகு – V அறிவியல் தமி மென்பொருட்கள தமிழ் அகராதிக TEXT BOOK: 1. தமிழக வர 5. தமிழக வர 2. கணினித்த REFERENCES:	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளான வு – மீன்வளம் – முத்து மற்றும் முத்துக்குள ம். அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் இன் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி ஸ் உருவாக்கம் – தமிழ் இணையக் கல்வி ஸ் சொற்குவைத் திட்டம். ரலாறு – மக்களும் பண்பாடும் – கே கே பிஞ பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நி	ன்மை மற்றும் (ளித்தல் – பெரு – தமிழ் நூல் க்கழகம் – தமி ள்ளை (வெளிய றுவனம், சென் சுரம், 2016	வேளாண்ன ங்கடல் குற் களை மின் நு பிழ் மின் நூ வேன் து	ம ச ற்த்த பதிப் லக டுட	பண் பண் பு ெ படந	, செப ாடை சய்த இல	ராமரிப்பு பல்பாடுக ய அறிவு 3 ல் – தமி நணயத்தி Total:



2.	பொருழை	ந-ஆற்ற	൹഻൴൏	ர நாகரில	கம் (ஷெ	தால்லி	ியல் ந	துறை 🤇	പെണി	ாடு)					
3.	Social Life	of Tamils	(Dr.K.K	(Pillay) A	joint Pu	blicatior	n of TN	TB & ESO	C and	RMRL –	(in print)				
4.	Social Life	of the Ta	mils – T	he Classi	cal Perio	od (Dr.S	.Sigara	ivelu) (Pu	ıblishe	d by: Inte	rnationa	al Institut	e of Tam	il Studie	s).
5.	Historical H Tamil Stud		f the Ta	mils (Dr.S	S.V.Suba	atamania	an, Dr.ł	K.D. Thiru	unavuk	(F	Publishe	d by : Int	ernation	al Institu	te of
6.	The Contri	bution of	the Tam	il to India	n Cultur	e (Dr.M.	Valarm	athi) (Pu	plished	d by Inter	national	Institute	of Tamil	Studies).
7.	Keeladi – ' Tamilnadu	Sangam (Text Boo	City Civi k and E	Ization on ducationa	the ban I Service	iks of riv es Corp	/er Vaio oration	gai; (Joint , Tamilna	ly Pub du)	lished by	: Depart	ment of	Archaed	ology &	
8.	Studies in	the Histor	y of Indi	ia with Sp	ecial Re	ference	to Tan	nilnadu (E	Dr.K.K.	Pillay) (P	ublished	d by: The	e Author)		
9.	Porunai Ci Corporatio			Published	by: Dep	partmen	t of Arc	haeology	[,] & Tar	milnadu T	extbook	and Ed	ucational	Service	S
10.	Journey of	Civilizatio	on Indus	to Vaigai	(R.Bala	krishna	n) (Pub	lished by	: RMR	L) – Refe	erence E	Book.			
	RSE OUTC பை முடித்த		ணவர்க	ள்									(BT Map Highest	
CO1	_{தமிழ்} ச தொழில்	லாச்சா நுட்பம்			-	ទលេខទ្	ந்தினு	டைய	நெச	வு மர	ற்றும்	பாலை	ឆា Un	derstand	ling (K2)
CO2	தமிழர்கள	ரின் வடி	வமைட்	பு மற்ற	յம் கட்	டிடத் (தொழி	ல்நுட்ப	ஆற்	றல் பற்	றி விளச்	க முடியு	ம். Un	derstand	ling (K2)
CO3	தமிழர்கள	ரின் உற் ட	ıத்தித்	தொழில்	நுட்பப்	பற்றி க	சுருக்கப	மாகக் கூற	յ ւներ	பும்.			Un	derstand	ling (K2)
CO4	தமிழர்கள	ரின் வே	ாண்ன	ும் மற்ற	றம் நீர்	ப்பாசஎ	ரத் ெ	தாழில்ந	ரட்பம்	பற்றி வ	ிளக்க மு	ஷயும்.	Un	derstand	ling (K2
CO5	தமிழர்கள	^{ின்} அறி	ഖിലல்	தமிழ்	மற்றுப்	் கணி	ினித்த	ஹ் பு	ற்றி வீ	ிளக்க பு	ற்டியும்).	Un	derstand	ling (K2
					Маррі	ing of (COs w	vith POs	and	PSOs				1	1
С	Os/POs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO
	<u>CO1</u>						3		3	2	2		3		
	CO2 CO3						3		3	2	2		3		
	CO3						3		3	2	2		3		
	CO5						3		3	2	2		3		
1 – S	light, 2 – Mo	oderate, 3	- Subs	tantial, B⊺	Γ- Bloon	n's Taxo	_						U U		
					ASS	ESSME	NT PA	TTERN -	- THEC	ORY					
Test	/ Bloom's (Category		nemberin (K1) %		derstan (K2) %	ding	Applyin (K3) %	g A	nalyzing (K4) %		luating (5) %	Crea (K6		Total %
	CAT1			40		60									100
	CAT2			40		60									100
	CAT3			40		60									100
	ESE								N	A					





	22TAM02 - TAMILS	AND TECHNOLOGY					
	(Common to All Engineering	g and Technology Brand	ches)				1
Programme 8 Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	2/3	HS	1	0	0	1
Preamble	This course aims to impart the essential knowledge	te on the tamil culture and	d related techno	oloav			
UNIT – I	WEAVING AND CERAMIC TECHNOLOGY	,		- 37			3
Weaving Indus	stry during Sangam Age – Ceramic technology – Blac	k and Red Ware Potteries	s (BRW) – Graf	fiti on	Potte	eries.	I
UNIT – II	DESIGN AND CONSTRUCTION TECHNOLOGY	,					3
of Sangam ag Cholas and ot	Structural construction House & Designs in househole – Details of Stage Constructions in Silappathikara her worship places – Temples of Nayaka Period – Ty Houses, Indo – Saracenic architecture at Madras dur	m – Sculptures and Temp pe study (Madurai Meena	ples of Mamalla	apurar	n – (Great	Temples of
UNIT – III	MANUFACTURING TECHNOLOGY						3
of Coins - Bea	ilding – Metallurgical studies – Iron industry – Iron sme ads making – industries Stone beads – Glass beads –T ypes described in Silappathikaram.						
UNIT – IV	AGRICULTURE AND IRRIGATION TECHNOLO	GY					3
	onds, Sluice, Significance of Kumizhi Thoompu of C d Agro Processing – Knowledge of Sea – Fisheries – ty.						
UNIT – V	SCIENTIFIC TAMIL & TAMIL COMPUTING						3
	of Scientific Tamil – Tamil computing – Digitalization amil Digital Library – Online Tamil Dictionaries – Sorku		lopment of Tar	nil So	ftwar	re – T	amil Virtua
							Total:15
TEXT BOOK:							
1. Social L	ife of Tamils (Dr.K.K.Pillay) A joint Publication of TNT	B & ESC and RMRL – (in	print)				
2. Social L	ife of the Tamils – The Classical Period (Dr.S.Sigarav	elu) (Published by: Intern	ational Institute	of Ta	mil S	tudies	s).
REFERENCE	S:						
	5 வரலாறு - மக்களும் பண்பாடும் - கே கே பில ள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவனம்		ழ்நாடு பாட	தால் ட	ற்ற	றம் க	ல்வியில்
2. கணின	ரித்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பி	ரசுரம், 2016					
3. கீழடி எ	வைகை நதிக்கரையில் சங்ககால நகர நாகர	ிகம்.(தொல்லியல் து	றை வெளியீ(B)			
4. பொரு	நை ஆற்றங்கரை நாகரிகம் (தொல்லியல் து	றை வெளியீடு					
5. Historica Studies)	al Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.	.D. Thirunavukarasu) (Pul	blished by : Inte	ernatio	nal I	nstitut	e of Tamil
6. The Cor	ntribution of the Tamils to Indian Culture (Dr.M.Valarm	athi)(Puplished by Interna	ational Institute	of Tar	mil S	tudies).
- Keeladi	- 'Sangam City Civilzation on the banks of river Vaiga	ai; (Jointly Published by: [Department of A	Archa	eolog	ју & Т	amilnadu
	ok and Educational Services Corporation, Tamilnadu)						

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9.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu)
10.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

		OUTCO tion of	MES: the cours	se, the s	tudents v	vill be abl	e to						(1	BT Map Highest I	
CO1	exp	lain we	aving and	ceramic	technolog	gy in tamil	culture	and tamil	society.				Un	derstand	ing (K2)
CO2	Illus	strate a	bout the d	esign an	d construe	ction techi	nology.						Un	derstand	ing (K2)
CO3	sun	nmarize	e about the	e manufa	cturing te	chnology.							Un	derstand	ing (K2)
CO4	exp	lain the	agricultur	e and irr	gation teo	chnology.							Un	derstand	ing (K2)
CO5	exp	lain the	e significan	ice of tan	nil in scier	ntific and o	computir	ng.					Un	derstand	ing (K2)
						Mapping	g of CO	s with P0	Ds and P	SOs					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3		3	2	2		3		
CO2	2						3		3	2	2		3		
CO3	3						3		3	2	2		3		
CO4	ł						3		3	2	2		3		
CO5	5						3		3	2	2		3		
1 – Slię	ght, 2	2 – Mod	erate, 3 –	Substan	tial, BT- B		-								
							-	PATTER		-			-1		
Test / Cate	Bloc egor		Rememb (K1)			standing 2) %		plying K3) %		alyzing (4) %		uating (5) %	Crea (K6		Total %
С	AT1		40		(60									100
С	AT2		40		(60									100
С	AT3		40		(60									100
E	SE								NA					<u>.</u>	
* ± 3%	mav	be var	ied (CAT [·]	1.2.3 – 5	0 marks)										

	22MAT33 - TRANSFORMS AND PROBABILITY 1	HE	ORY				
Programme Branch	BE & Electronics and Communication Engineering Se	m.	Category	L	т	Р	Credit
Prerequisite	s Nil 3		BS	3	1	0	4
Preamble	To provide the foundations for understanding the various type types of signals and impart knowledge in random variables process.						
Unit – I	Fourier Series and Fourier Transform:						9+3
	orm of Fourier series analysis – Gibbs phenomenon –Fourier Trans tems – Inverse Fourier Transform for CT Signals.	for	m: CTFT – F	Prope	erties	s – R	esponse
Unit – II	Laplace Transform:						9+3
Transform –	 Relation between CTFT and LT- Region of Convergence – LT of inding Laplace Transform – Inverse Laplace Transform: Partial Fra esponse of Linear time invariant Continuous time system using Lap 	ctio	n Expansion				
Unit – III	Z transform:						9+3
	Relation between DTFT and ZT – Region of Convergence – Z T	ans	sform of DT	signa	als –	Pro	perties -
	nsform and Inverse Z-transform: Partial fraction – Residue method.						
Unit – IV	Random Variables and Probability distributions:						
Random Var	ables - Discrete and Continuous random variables – Probability ma	ass	and density	func	tions	5 – M	9+3 lean and
Variance – S Continuous [dis	stribution –	Pois	son	distri	lean and bution -
Variance – S Continuous I probability dis	ables - Discrete and Continuous random variables – Probability material and a continuous random variables – Probability material distributions: Discrete Distributions: Binomia istributions: Exponential distribution – Normal distribution – Two	dis	stribution –	Pois	son	distri	lean and bution -
Variance – S Continuous I probability dis Unit – V	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomial istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition	dis Dim	stribution – ensional Ra	Pois: ndor	son n Va	distri Iriabl	lean and bution - es: Join 9+3
Variance – S Continuous I probability dis Unit – V Introduction -	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomial istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition	dis Dim	stribution – ensional Ra	Pois: ndor _imit	son n Va ing c	distri triable listrik	lean and bution - es: Join 9+3 putions -
Variance – S Continuous I probability dis Unit – V Introduction - Poisson proc	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomia istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition ess.	dis Dim	stribution – ensional Ra babilities – I	Pois: ndor _imit	son n Va ing c	distri triable listrik	lean and bution - es: Join 9+3 putions -
Variance – S Continuous I probability dis Unit – V Introduction - Poisson proc	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomia istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition ess.	dis Dim pro	stribution – ensional Ra babilities – I Lecture:45,	Poisandor _imit Tut	son n Va ing c orial	distri Iriabl listrik :15,	ean and bution - es: Join 9+3 butions - Total:60
Variance – S Continuous I probability dis Unit – V Introduction – Poisson proc TEXT BOOK 1. Nago	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomial istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition ess.	dis Dim pro	stribution – ensional Ra babilities – I Lecture:45 , , Chennai, 20	Poisendor	son n Va ing c orial (Uni	distri iriabl listrib :15, ⁻ ts I –	ean and bution – es: Join 9+3 butions – Total:60 III)
Variance – S Continuous I probability dis Unit – V Introduction - Poisson proc TEXT BOOK <u>1.</u> Nago	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomial istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition ess. For Kani A., "Signals and Systems", 20 th Reprint, McGraw Hill Educa rajan, T, "Probability and Statistics, Random Processes and Queution, Chennai, 2019. (Units IV, V)	dis Dim pro	stribution – ensional Ra babilities – I Lecture:45 , , Chennai, 20	Poisendor	son n Va ing c orial (Uni	distri iriabl listrib :15, ⁻ ts I –	ean and bution - es: Join 9+3 putions - Total:60
Variance – S Continuous I probability dis Unit – V Introduction - Poisson proc TEXT BOOK 1. Nago 2. Veera Educa REFERENCI 1. Oppe	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomial istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition ess. For Kani A., "Signals and Systems", 20 th Reprint, McGraw Hill Educa rajan, T, "Probability and Statistics, Random Processes and Queution, Chennai, 2019. (Units IV, V)	dis Dim pro ion	stribution – ensional Ra babilities – I Lecture:45, , Chennai, 2 Theory", 1 st	Poisandor _imit Tut 018. Ed	son n Va ing c orial (Uni ition,	distri listrik : 15 , ts I – McC	ean and bution - es: Join 9+3 butions - Total:60 III) Graw Hil
Variance – S Continuous I probability dis Unit – V Introduction - Poisson proc TEXT BOOK 1. Nago 2. Veera Educa REFERENCI 1. Oppe Delhi, 2. Robe	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomial istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition ess. or Kani A., "Signals and Systems", 20th Reprint, McGraw Hill Education, Chennai, 2019. (Units IV, V) S: heim Alanv, Willsky Alan S., Hamid Nawab S., "Signals & Systems"	dis Dim pro ion ing	stribution – ensional Ra babilities – I Lecture:45, , Chennai, 20 Theory", 1 st	Poiss ndor Limit Tut 018. Ed	son n Va ing c orial (Uni ition, n Ed	distri Iriabl listrib :15, KcC	ean and bution - es: Join 9+3 butions - Total:60 III) Graw Hil
Variance – S Continuous I probability dis Unit – V Introduction – Poisson proc TEXT BOOK 1. Nago 2. Veera Educa REFERENCI 1. Oppe Delhi, 2. Robe Hill Ed	ables - Discrete and Continuous random variables – Probability matandard Probability Distributions: Discrete Distributions: Binomial istributions: Exponential distribution – Normal distribution – Two tributions – Marginal and conditional distributions. Random Process: Classification – Stationary process – Markov chains – Transition ess. For Kani A., "Signals and Systems", 20 th Reprint, McGraw Hill Educator rajan, T, "Probability and Statistics, Random Processes and Queution, Chennai, 2019. (Units IV, V) S: The Manual Manual Statistics, Manual S., "Signals & Systems 2015. Its M.J., "Signals And Systems Analysis Using Transform Method at the formation of the second statement of the s	dis Dim pro ion ing ', 2 ^r	stribution – ensional Ra babilities – I Lecture:45, , Chennai, 20 Theory", 1 st	Pois ndor Limit Tut 018. Ed	son n Va ing c orial (Uni ition, n Ed	distri riabl listrib :15, ts I – McC	ean and bution - es: Join 9+3 butions - Total:60 III) Graw Hil ion, Nev McGrav



COURSE		-											BT Ma	
On compl													(Highest	Level)
CO1					Fourier traited of the ph						ovide th	e ability	Applying	g (K3)
CO2	utilize	Laplace	transfor	m and	d solve co	ntinuous	s time s	system	respons	se.			Applying	g (K3)
CO3	apply 2	Z-transfo	orm on d	liscret	te time sys	stems ar	nd solve	e the sy	vstem re	esponse.			Applying	g (K3)
CO4					al concepta problems.	s of ran	idom va	ariables	and a	pply suit	able pro	obability	Applying	g (K3)
CO5		tand the		ts of	Random F	Process	and de	termine	e the ter	mporal c	haracter	istics of	Applying	g (K3)
					Mappir	ng of CC	Os with	POs a	nd PSC	Ds				
COs/POs	PO1	PO2	PO3	PO4		PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1		3	3							3	
CO2	3	2	2		2	2							2	
CO3	3	3	2		2	2							2	
CO4	3	2	1										1	
CO5	3	3	3										3	
1 – Slight,	2 – Mo	derate, 3	3 – Subs	stantia	al, BT- Blo	om's Ta	ixonom	у						
					ASSES	SMEN	ΓΡΑΤΤ	ERN -	THEOR	Υ (Y				
Test / B		Rei	nember	ing	Understa			lying		alyzing		luating	Creating	Total
Categ			(K1) %		(K2)			8) %	()	(4) %	()	(5) %	(K6) %	%
CA			10		25		-	5						100
CA			10		25			5						100
CA			10		25			5						100
ES			10		25		-	5						100
* ±3% may	/ be var	ied (CA	1,2&	3 – 5	0 marks &	ESE –	100 ma	arks)						

	(Common to ECE,EEE,EI	/A PROGRAMMING	Brand	ches)				
Programme & Branch	ECE, EEE, EIE, MTS		Sem.	Category	L	т	Р	Credit
Prerequisites	Problem Solving and Programming in C		3	ES	3	0	2	4
			-		_			
Preamble	This course provides the fundamental object exception handling, multithreading, Generic		of Java	a programmin	g inclu	ding inł	neritano	ce,
Unit – I	Classes and Objects							9
	ution of Java – An Overview of Java–Data Typ tals-objects – Assigning Object Reference Vari k Class.							
Unit – II	Inheritance, Packages, and Interfaces							9
and Inner Class Hierarchy-Metho	hods – Objects as Parameters –Argument Pas- es–Command–Line Arguments – Variable Le d Overriding–Dynamic Method Dispatch –Abstra ess- Importing Packages – Interfaces.	ength Arguments. Inf	neritar	ice - Basics-	- Supe	r keyw	ord -	Multileve
Unit – III	Exception Handling and Multithreading							9
Multithreaded Pr	ing basics – Multiple catch Clauses – Nested t ogramming: Java Thread Model - Creating a Th Suspending – Resuming, and Stopping Thread	read and Multiple Thr	a's Bu eads -	ult-in Exceptic – Priorities – S	ons – L Synchro	lser-de onizatio	fined E n – Inte	xception er Thread
Unit – IV	I/O and Generics							9
	Nrappers – Auto boxing – Annotation Basics. I/ ntroduction – Generic Classes & Methods - Exa) and W	/riting
Unit – V	String Handling and Collections							9
String Handling: Strings – String	String constructors – operations – Character Ex Buffer. Collection Framework: Overview – Collec	traction – String Con ction Interfaces – Col	npariso lection	on – Searchin I Classes.	g String	gs – Mo	odifying	
LIST OF EXPER	MENTS / EXERCISES:							
1. Write Jay	a programs using operators, arrays, and contro	l statements						
2. Develop	a stack and queue data structures using classes	s and objects						
3. Program	to demonstrate inheritance & polymorphism							
4. Develop	an application using interfaces by accessing su	perclass constructors	and r	nethods				
5. Develop	applications using packages and exception han	dling						
6. Program	to demonstrate thread concepts							
7. Write Jay	a program to illustrate file and string manipulati	ons						
8. Impleme	nt Java program to illustrate collection framewor	rks						
I				Lecti	ure:45,	Practi	cal:30,	Total:7
TEXT BOOK:								
1. Herbert S	Schildt, "Java: The Complete Reference", 11 th E	Edition, McGraw Hill E	Educa	tion, New Dell	ni, 2019	9. (Unit	s I - V)	
REFERENCES/	IANUAL / SOFTWARE:							
1. Cay S. H	orstmann, "Core Java Fundamentals", Eleventh	Edition, Prentice Ha	II, 201	8.				
Electronics and	Communication Engineering, Regulation, C	Curriculum and SvII	abus	– R2022		Page	e 127	

		UTCON		se, the st	udents	will be a	able to						(BT Mapped Highest Lev	
CO1	appl	ly the co	oncepts o	of classes	and ob	jects to s	olve sin	nple pro	blems					Applying (K	3)
CO2	deve	elop pro	ograms u	sing inhei	itance,	package	s, and ir	nterface	s					Applying (K3	3)
CO3		e use c olems	of excepti	on-handli	ng mec	hanisms	and mu	ltithreac	led mo	dels to s	solve re	al-world		Applying (K	3)
CO4	deve	elop Jav	/a applic	ations wit	h I/O pa	ackages a	and gen	erics co	ncepts					Applying (K	3)
CO5	appl	ly string	handling	g function	s and c	ollection	classes	and inte	erfaces					Applying (K	3)
						Марр	ing of C	COs wit	h POs	and PS	Os				
COs/I	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3	2	1	1										
CO	2	3	2	1	1										
СО	3	3	2	1	1										
CO	4	3	2	1	1										
CO	5	3	2	1	1										
1 – Sli	ght, 2	– Mode	erate, 3 –	Substant	ial, BT-	Bloom's	Taxono	my							
						ASSE	ESSMEN		TERN	- THEOI	RY				
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %	Creat	ing (K6) %	Tota %
	CAT	1		20		40		40)						100
	CAT	2		10		20		70)						100
	CAT	3		10		20		70)						100
	ESE	=		10		20		70)						100

	22ECT31 - DIGITAL ELECTR						
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	3	PC	3	0	0	3
Preamble	To gain knowledge about the number systems and to design	gn combinati	onal and seque	ential lo	ogic cir	cuits.	
Unit – I	Binary Numbers and Minimization Techniques:						9
Boolean expression	ned binary numbers- Binary arithmetic- Boolean postulates a n- Minimization of Boolean expressions- Minterm, Maxterm, Su -Implementations of logic functions using universal gates.						
Unit – II	Combinational Circuits Design:						9
	 Half adder and subtractor – Full adder and subtractor -Paralle plexer- Demultiplexer – Decoder - Encoder – Parity checker an 						
Unit – III	Hardware Description Language						9
	Hardware Description Language:						
Verilog Basics - C	verview of Verliog HDL-Modules and ports-Gate level modeling	ng- design c	of combinationa	al circu	iits usir	ng Ver	ilog HDL
Verilog Basics - C		ng- design c	of combinationa	al circu	iits usir	ng Ver	ilog HDL
Verilog Basics - C Comparison of TT Unit – IV	Diverview of Verliog HDL-Modules and ports-Gate level modelin L and CMOS characteristics. Sequential Circuits:					-	9
Verilog Basics - C Comparison of TT Unit – IV Introduction, Flipfle	Overview of Verliog HDL-Modules and ports-Gate level modelin L and CMOS characteristics.	f one flipflop	using other flip	flops-	Design	of syn	9
Verilog Basics - C Comparison of TT Unit – IV Introduction, Flipfl counters-up count Unit – V	Dverview of Verliog HDL-Modules and ports-Gate level modelin L and CMOS characteristics. Sequential Circuits: ops: SR, JK, D and T –Level and Edge triggering - Realization or er, down counter, up-down counter, Ripple counters – Register Design and analysis of Sequential Circuits:	f one flipflop s: Shift regis	using other flip ters, Universal	flops- shift r	Design egister.	of syn	9 Ichronous
Verilog Basics - C Comparison of TT Unit – IV Introduction, Flipfl counters-up count Unit – V Design and analys minimization and S	Overview of Verliog HDL-Modules and ports-Gate level modelin L and CMOS characteristics. Sequential Circuits: ops: SR, JK, D and T –Level and Edge triggering - Realization of er, down counter, up-down counter, Ripple counters – Register	f one flipflop s: Shift regis tables and o nous circuits	using other flip ters, Universal equations, Stat	flops- shift re e diag es –Ha	Design egister. ram, S	of syn	9 hchronous 9 ble, State
Verilog Basics - C Comparison of TT Unit – IV Introduction, Flipfl counters-up count Unit – V Design and analys minimization and S Essential, Hazards	Deverview of Verliog HDL-Modules and ports-Gate level modelin L and CMOS characteristics. Sequential Circuits: ops: SR, JK, D and T –Level and Edge triggering - Realization or er, down counter, up-down counter, Ripple counters – Register Design and analysis of Sequential Circuits: sis of synchronous sequential circuits: Characteristic, excitation State assignment - Sequence detector - Introduction to asynchro	f one flipflop s: Shift regis tables and o nous circuits	using other flip ters, Universal equations, Stat	flops- shift re e diag es –Ha	Design egister. ram, S	of syn	9 achronou 9 ble, State Dynamic
Verilog Basics - C Comparison of TT Unit – IV Introduction, Flipfl counters-up count Unit – V Design and analys minimization and S Essential, Hazards	Deverview of Verliog HDL-Modules and ports-Gate level modelin L and CMOS characteristics. Sequential Circuits: ops: SR, JK, D and T –Level and Edge triggering - Realization or er, down counter, up-down counter, Ripple counters – Register Design and analysis of Sequential Circuits: sis of synchronous sequential circuits: Characteristic, excitation State assignment - Sequence detector - Introduction to asynchro	f one flipflop s: Shift regis tables and o nous circuits PLDs: PROM	using other flip ters, Universal equations, Stat -Cycles – Raco I, PLA and PAL	flops- shift r e diag es –Ha -	Design egister. ram, S azards:	of syn	9 achronou 9 ble, State Dynamic
Verilog Basics - C Comparison of TT Unit – IV Introduction, Flipfl counters-up count Unit – V Design and analys minimization and S Essential, Hazards TEXT BOOK: 1. Morris Ma	Overview of Verliog HDL-Modules and ports-Gate level modeling L and CMOS characteristics. Sequential Circuits: ops: SR, JK, D and T –Level and Edge triggering - Realization or er, down counter, up-down counter, Ripple counters – Register Design and analysis of Sequential Circuits: sis of synchronous sequential circuits: Characteristic, excitation State assignment - Sequence detector - Introduction to asynchro selimination - Realization of combinational logic circuits using F	f one flipflop s: Shift regis tables and o nous circuits PLDs: PROM	using other flip ters, Universal equations, Stat - Cycles – Rac I, PLA and PAL	flops- shift r e diag es –Ha ts I,II,I	Design egister. ram, S azards: V,V.	of syn tate ta Static	9 ochronou 9 ble, Stat Dynamic Total:4
Verilog Basics - C Comparison of TT Unit – IV Introduction, Flipfl counters-up count Unit – V Design and analys minimization and S Essential, Hazards TEXT BOOK: 1. Morris Ma	Overview of Verliog HDL-Modules and ports-Gate level modeling L and CMOS characteristics. Sequential Circuits: ops: SR, JK, D and T –Level and Edge triggering - Realization or er, down counter, up-down counter, Ripple counters – Register Design and analysis of Sequential Circuits: sis of synchronous sequential circuits: Characteristic, excitation State assignment - Sequence detector - Introduction to asynchro selimination - Realization of combinational logic circuits using F ano M., "Digital Design", 6 th Edition, Pearson Education Pvt. Ltd	f one flipflop s: Shift regis tables and o nous circuits PLDs: PROM	using other flip ters, Universal equations, Stat - Cycles – Rac I, PLA and PAL	flops- shift r e diag es –Ha ts I,II,I	Design egister. ram, S azards: V,V.	of syn tate ta Static	9 ochronou 9 ble, Stat Dynamic Total:4
Verilog Basics - C Comparison of TT Unit – IV Introduction, Flipfl counters-up count Unit – V Design and analys minimization and S Essential, Hazards TEXT BOOK: 1. Morris Ma 2. Palnitkar III REFERENCES:	Overview of Verliog HDL-Modules and ports-Gate level modeling L and CMOS characteristics. Sequential Circuits: ops: SR, JK, D and T –Level and Edge triggering - Realization or er, down counter, up-down counter, Ripple counters – Register Design and analysis of Sequential Circuits: sis of synchronous sequential circuits: Characteristic, excitation State assignment - Sequence detector - Introduction to asynchro selimination - Realization of combinational logic circuits using F ano M., "Digital Design", 6 th Edition, Pearson Education Pvt. Ltd	f one flipflop s: Shift regis tables and o nous circuits PLDs: PROM	using other flip ters, Universal equations, Stat - Cycles – Rac I, PLA and PAL	flops- shift r e diag es –Ha ts I,II,I	Design egister. ram, S azards: V,V.	of syn tate ta Static	9 ochronou ble, Stat Dynamic Total:4

COURS														BT Mapp	
CO1	-					will be al map for		imization						Highest L	
	-					map ioi		IIIIZation						Applying	
CO2		U		onal circui										Applying	
CO3				ational cir	cuits usi	ng HDL								Applying	(K3)
CO4	de	sign se	quential	circuits										Applying	(K3)
CO5	re	alize Bo	olean fu	inctions u	sing PLD	Ds								Applying	(K3)
						Марр	oing of C	Os with	POs and	d PSOs					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1		3	2	2	2								2	2	2
CO2	2	3	2	2	2	2				2			2	3	2
CO3	3	3	2	2	2	3				3			2	3	2
CO4	ŀ	3	2	2	2								2	3	2
CO5	5	3	2	2	2								2	3	2
1 – Sligi	ht, 2	– Mode	erate, 3 -	- Substan	tial, BT-	Bloom's T	axonom	у							
						ASS	ESSMEN		ERN - TH	HEORY					
		loom's jory*		Rememb (K1) %		Underst (K2)		Applyin (K3) %	•	Analyzing (K4) %		/aluating (K5) %		eating K6) %	Total %
	CA	T1		10		40)	50							100
	CA	T2		10		40)	50							100
	CA	ТЗ		10		40)	50							100
	ES	E		5		25	5	70							100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Physics for Electronics and Communication Engineering	3	PC	3	0	0	3
Preamble	To understand the biasing circuits and analyze feedback amp	lifiers, large sig	nal amplifiers a	nd os	cillato	ors.	
Unit – I	Diode and Thyristors:						9
	N junction diodes – VI characteristics – Zener diode – Characteris ner diode regulator- Line Regulation and load regulation – SCR -		de -Half wave a	ind Fu	ıll wa	ve bri	dge rectifie
Unit – II	BJT and Biasing Circuits:						9
	on and Principle of Operation CE,CB and CC configurations - Tra elf bias, voltage divider bias – Stability factors – Method of stabili						
Unit – III	BJT Amplifier Analysis:						9
Midband analysis frequencies - Hyt	s of BJT single stage amplifiers using h-parameters – Approxima orid- π common emitter transistor model- CE short-circuit Current	te and Exact Ar Gain	nalysis - Miller's	s theo	rem-	Trans	sistor at hig
Unit – IV	Feedback Amplifiers:						9
	ers - Block diagram - Loop gain - Gain and Cut off frequencies v ies - Input and output resistances with feedback - Method of iden						
reeuback topolog			topology / line.	,			
Unit – V	Oscillators and Power Amplifiers:			-			9
Unit – V Oscillators: RC o oscillators, UJT r Power Amplifiers		ors: Hartley and	l Colpitts oscilla	itor us	ing E	BJT, C	9 wartz cryst
Unit – V Oscillators: RC o oscillators, UJT re Power Amplifiers efficiency-Distorti	Oscillators and Power Amplifiers: scillators: RC phase shift and Wien Bridge oscillators - LC oscillat elaxation oscillator : Classification of amplifiers (Class A, B, AB, and C)-Direct couple	ors: Hartley and	l Colpitts oscilla	itor us	ing E	BJT, C	9 wartz cryst lifiers and i rs-operatio
Unit – V Oscillators: RC o oscillators, UJT r Power Amplifiers efficiency-Distorti applications.	Oscillators and Power Amplifiers: scillators: RC phase shift and Wien Bridge oscillators - LC oscillat elaxation oscillator : Classification of amplifiers (Class A, B, AB, and C)-Direct couple	ors: Hartley and ed and transform ush-pull power	l Colpitts oscilla ner-coupled cla amplifiers. Cl	tor us ss A p ass (ing B bowe C an	BJT, C r amp nplifie	9 wartz cryst lifiers and i rs-operation Total:4
Unit – V Oscillators: RC o oscillators, UJT re Power Amplifiers efficiency-Distorti applications.	Oscillators and Power Amplifiers: scillators: RC phase shift and Wien Bridge oscillators - LC oscillat elaxation oscillator : Classification of amplifiers (Class A, B, AB, and C)-Direct couple on in power Amplifiers-Class B complementary-symmetry, p	ors: Hartley and ed and transforn ush-pull power ion, McGraw-Hi	I Colpitts oscilla ner-coupled cla amplifiers. Cl	tor us ss A p ass (022. f	ing E bowe C an	BJT, C r amp nplifie	9 wartz cryst lifiers and i rs-operatio Total: 4
Unit – V Oscillators: RC o oscillators, UJT re Power Amplifiers efficiency-Distorti applications.	Oscillators and Power Amplifiers: scillators: RC phase shift and Wien Bridge oscillators - LC oscillat elaxation oscillator : Classification of amplifiers (Class A, B, AB, and C)-Direct couple on in power Amplifiers-Class B complementary-symmetry, p	ors: Hartley and ed and transforn ush-pull power ion, McGraw-Hi	I Colpitts oscilla ner-coupled cla amplifiers. Cl	tor us ss A p ass (022. f	ing E bowe C an	BJT, C r amp nplifie	9 wartz cryst lifiers and i rs-operatio Total: 4
Unit – V Oscillators: RC o oscillators, UJT representations, UJT representations Power Amplifiers efficiency-Distortiapplications. TEXT BOOK: 1. S Salivaha 2. Millman J. REFERENCES:	Oscillators and Power Amplifiers: scillators: RC phase shift and Wien Bridge oscillators - LC oscillat elaxation oscillator : Classification of amplifiers (Class A, B, AB, and C)-Direct couple on in power Amplifiers-Class B complementary-symmetry, p	ors: Hartley and and transform ush-pull power ion, McGraw-Hi n, McGraw Hill,	I Colpitts oscilla ner-coupled cla amplifiers. Cl II, New Delhi, 2 New York, 200	tor us ss A p ass (022. f	ing E bowe C an	BJT, C r amp nplifie	9 wartz cryst lifiers and i rs-operatio Total: 4



COURSE	OUTCOM	IES:											ВТ Мар	
On comp	letion of t	he cour	se, the studer	nts will b	be able to)							(Highest	Level)
CO1	understar	nd the co	onstruction and	applicat	tions of di	odes						L	Inderstand	ling (K2)
CO2	design va	rious bi	asing circuits of	f BJT									Applying	J (K3)
CO3	examine	the BJT	amplifiers at lo	w and h	gh freque	encies							Applying	j (K3)
CO4	Interpret	the perfo	ormance of amp	olifiers u	sing feed	back cor	ncepts						Applying	j (K3)
CO5	construct	oscillate	or and power a	mplifier o	circuits								Applying	ı (K3)
					Mapping	l of COs	with PC)s and I	PSOs					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	2	3	2									2	1
CO2	3	2	3	2									2	1
CO3	3	3	2	2	3	2	2		2	2		2	2	1
CO4	3	3	2	1	3	2	2		2	2		3	2	1
CO5	3	3	3	1		2	2		2	2		2	3	1
1 – Slight,	2 – Mode	rate, 3 -	- Substantial, B	T- Bloor	n's Taxor	nomy								
					ASSESS		PATTER	N - THE	ORY					
	/ Bloom's tegory*	;	Rememberi (K1) %	ng	Understa (K2)	anding	Apply (K3)	ing /	Analyzin (K4) %	-	valuating (K5) %		reating K6) %	Total %
			5		45		50							100

CAT1	5	45	50		100
CAT2	5	45	50		100
CAT3	5	50	45		100
ESE	5	45	50		100
* ±3% may be varied (CAT	1,2,3 – 50 marks & E	SE – 100 marks)			

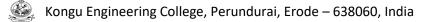
_	22ECC31 - LINEAR INTEGRATED CI						
Progra Branch	amme & B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prereq	uisites Basics of Electronics and Electrical Engineering	3	PC	3	0	2	4
Pream	ble To understand and construct analog integrated circuits using	op-amp, IC 55	5 and special f	unctio	n IC	's.	
Unit –	I Operational Amplifiers:						9
Interna repeate	al block diagram of OP-AMP- Circuits for improving CMRR: Constant currenters. ers. DC Characteristics of OP-AMP: Input bias current-Input offset current-Input Frequency response- Frequency compensation methods –slew rate.						s, Currer
Unit –	II Applications of Operational Amplifier:						9
of Com oscillat							'ien bridg
	IIIRectifiers, Active Filters and Regulators:and Second order low pass and high pass filters. Rectifiers- Half wave rectifier- Fup regulator (78XX), General Purpose regulator (IC 723)- Switching regulator.	Ill wave rectifie	r. Regulators- \	/oltage	e reç	gulator	9 IC: Serie
Unit –	IV A/D Converter and D/A Converter:						9
	V Special IC's: (IC 555)- Functional block diagram –Astable and Monostable operation –Applic e and lock range –Phase detector: Analog phase detector and Digital phase det						9 erivation
			controlled Uso	cillator	-App	licatio	
LIST O	DF EXPERIMENTS / EXERCISES:		controlled Usc	cillator	-App	olicatic	
LIST O 1.	DF EXPERIMENTS / EXERCISES: Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I						
1.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I	Differentiator a					
1. 2.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741	Differentiator a					
1. 2. 3.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741 Frequency response of 2 nd order low pass and high pass filters using IC74	Differentiator a	nd Integrator us	sing IC	2741		
1. 2. 3. 4.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741 Frequency response of 2 nd order low pass and high pass filters using IC74 Construction of voltage regulator using IC 78xx series	Differentiator a	nd Integrator us	sing IC	2741		
1. 2. 3. 4. 5.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741 Frequency response of 2 nd order low pass and high pass filters using IC74 Construction of voltage regulator using IC 78xx series Design and construct R-2R ladder type Digital to Analog Converter and Flag	Differentiator a	nd Integrator us	sing IC	2741		
1. 2. 3. 4. 5. 6.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741 Frequency response of 2 nd order low pass and high pass filters using IC74 Construction of voltage regulator using IC 78xx series Design and construct R-2R ladder type Digital to Analog Converter and Flat Design of pulse width modulator using IC555	Differentiator a	nd Integrator us	sing IC			
1. 2. 3. 4. 5. 6. 7.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741 Frequency response of 2 nd order low pass and high pass filters using IC74 Construction of voltage regulator using IC 78xx series Design and construct R-2R ladder type Digital to Analog Converter and Flat Design of pulse width modulator using IC555	Differentiator a	nd Integrator us	sing IC			ns.
1. 2. 3. 4. 5. 6. 7.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741 Frequency response of 2 nd order low pass and high pass filters using IC74 Construction of voltage regulator using IC 78xx series Design and construct R-2R ladder type Digital to Analog Converter and Flat Design of pulse width modulator using IC555 MiniProject	Differentiator a 1 Ish type Analo	nd Integrator us g to Digital Con	sing IC	c741		ns.
1. 2. 3. 4. 5. 6. 7. TEXT I 1.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741 Frequency response of 2 nd order low pass and high pass filters using IC74 Construction of voltage regulator using IC 78xx series Design and construct R-2R ladder type Digital to Analog Converter and Fla Design of pulse width modulator using IC555 MiniProject	Differentiator a 1 Ish type Analo	nd Integrator us g to Digital Con	sing IC	c741		ns.
1. 2. 3. 4. 5. 6. 7. TEXT I 1.	Construction of - Inverting and non-inverting amplifiers, Voltage Follower, I Construction of Schmitt trigger using IC741 Frequency response of 2 nd order low pass and high pass filters using IC74 Construction of voltage regulator using IC 78xx series Design and construct R-2R ladder type Digital to Analog Converter and Fla Design of pulse width modulator using IC555 MiniProject BOOK: Roy Choudhry D & Shail B. Jain, "Linear Integrated Circuits", 5 th Edition, Ne	Differentiator a 1 Ish type Analo w Age Internat	nd Integrator us g to Digital Con Lecture: ional, New Dell	sing IC	c741		ns.



3. I	aboratory	Manual												
COURSE On compl			, the studer	nts will	be able to								BT Map (Highest	
	elaborate characteris		of various -amp.	current	sources fo	or impro	iving CN	IRR ai	nd unders	tand the	dc and	ac U	nderstandi Precision	0 ()
CO2	levelop dif	ferent ap	olications of	operatio	onal amplifie	rs for the	e given s	pecifica	ation.				Applying Precision	
CO3	construct fi	rst and se	econd order l	ow pas	s and high p	ass filte	rs, rectifi	ers and	d regulator	s using a	nalog IC's	s	Applying Precision	(K3),
CO4	lemonstra			Applying Precision	i (S3)									
CO5	llustrate th			Applying Precision										
					Mapping	of COs v	with POs	s and F	PSOs					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO1	3	3	2	3		2							3	3
CO2	3	3	3	2	3	2		2	2			2	2	2
CO3	3	2	3	3	3	2		2	2			2	2	2
CO4	3	3	3	2	3	2		2	2			2	2	2
CO5	3	3	3	3	3	2	2	2	2			2	2	2
1 – Slight,	2 – Moder	ate, 3 – S	Substantial, E	T- Bloc	m's Taxono	my								
					ASSESSN		ATTERN	– THE	ORY					
	/ Bloom's tegory*		Remember (K1) %	ing	Understa (K2) 9		Apply (K3)		Analyzin (K4) %	g Eva	luating (ł %		reating (K6) %	Tota %
(CAT1		5		50		45							100
(CAT2		5		40		55							100
(CAT3		5		70		25							100
	ESE		5		65		30							100

	(Common to All Engineering an	d Technology Branches	5)				
Programme & Branch	All BE/BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	3	BS	2	0	0	2
Preamble	To make the student to know what they 'really w of happiness and prosperity for a human being all the levels of human living, and live according	. Also to facilitate the st					
Unit – I	Introduction:						6
Exploration – Con Aspirations – Con	Suidelines of Value Education – Content and Proc tent and Process of Self exploration – Natural A tinuous Happiness and Prosperity – Exploring Hap is – Relationships – Physical Facilities – Right Un	Acceptance – Realizatio ppiness and Prosperity	n and Under	stan	ding	– Bas	sic Huma
Unit – II	Harmony in the Self and Body:						6
Self and Body, Se	Body – Understanding Myself as Co–existence of S If ('I') as the Conscious Entity, the Body as the Ma erstanding Myself – Harmony with Body.	, <i>,</i>			-		
Unit – III	Harmony in the Family and Society:						6
Harmony in the Fa	amily – Justice – Feelings (Values) in Human Relat	tionships – Relationship	from Family	to S	ociety	/ – Ide	entificatio
of Human Goal – F	Five dimensions of Human Endeavour.						
11.14	Harmony in Nature and Existence:						6
Unit – IV					tic –	Racio	
	 Interconnectedness – Understanding the Four o troduction to Space – Co–existence of units of Space 						
Order of Nature – Conformance – Int is Co–existence.		ce – Limited and unlimite	ed – Active ar	nd No	o–act		
Order of Nature – Conformance – Int is Co–existence. Unit – V Values in different Identification of C	Implications of the above Holistic Understar dimensions of Human Living – Definitiveness of E omprehensive Human Goal – Humanistic Educat	ce – Limited and unlimite nding of Harmony on F Ethical Human Conduct	ed – Active ar Professional –Implications	nd No Ethi s of '	o–act cs: Value	ivity – e base	Existence 6 ed Living
Order of Nature – Conformance – Int is Co–existence. Unit – V Values in different Identification of Co Professional Ethics	Implications of the above Holistic Understar dimensions of Human Living – Definitiveness of E omprehensive Human Goal – Humanistic Educat	ce – Limited and unlimite nding of Harmony on F Ethical Human Conduct	ed – Active ar Professional –Implications	nd No Ethi s of '	o–act cs: Value	ivity – e base	Existence
Order of Nature – Conformance – Int is Co–existence. Unit – V Values in different Identification of C Professional Ethics TEXT BOOK:	troduction to Space – Co–existence of units of Space Implications of the above Holistic Understar dimensions of Human Living – Definitiveness of F omprehensive Human Goal – Humanistic Educat s.	ce – Limited and unlimite n ding of Harmony on F Ethical Human Conduct tion – Universal Humar	ed – Active ar Professional –Implications n Order – Co	nd No Ethi s of ' ompe	o–act cs: Value etenc	ivity – e base e and	Existence 6 ed Living Issues Total:3
Order of Nature – Conformance – Intis Co–existence. Unit – V Values in different Identification of Co Professional Ethics TEXT BOOK: 1. Gaur R.R. Books Pvt	Implications of the above Holistic Understar dimensions of Human Living – Definitiveness of E omprehensive Human Goal – Humanistic Educat	ce – Limited and unlimite n ding of Harmony on F Ethical Human Conduct tion – Universal Humar	ed – Active ar Professional –Implications n Order – Co	nd No Ethi s of ' ompe	o–act cs: Value etenc	ivity – e base e and	Existence 6 ed Living Issues Total:3
Order of Nature – Conformance – Int is Co–existence. Unit – V Values in different Identification of C Professional Ethics TEXT BOOK: 1. Gaur R.R. Books Pvt REFERENCES:	Implications of the above Holistic Understar dimensions of Human Living – Definitiveness of E omprehensive Human Goal – Humanistic Educat s.	ce – Limited and unlimite n ding of Harmony on F Ethical Human Conduct tion – Universal Humar	ed – Active ar Professional –Implications n Order – Co	nd No Ethi s of ' ompe	o–act cs: Value etenc	ivity – e base e and	Existence 6 ed Living Issues Total:3
Order of Nature – Conformance – Intis Co–existence. Unit – V Values in differenti Identification of Co Professional Ethics TEXT BOOK: 1. Gaur R.R. Books Pvt REFERENCES: 1. Ivan Illich,	troduction to Space – Co–existence of units of Space Implications of the above Holistic Understar dimensions of Human Living – Definitiveness of B omprehensive Human Goal – Humanistic Educat s. , Sangal R., Bagaria G.P., "A Foundation Course in	ce – Limited and unlimite nding of Harmony on F Ethical Human Conduct tion – Universal Humar n Human Values and Pr	ed – Active ar Professional –Implications n Order – Co rofessional Et	nd No Ethi s of ' ompe	o–act cs: Value etenc	ivity – e base e and	Existence 6 ed Living Issues Total:3

		JTCOM												BT Mapp	
On cor	_					s will be a								Highest L	
CO1		ate the r e societ	•	of happin	ess an	id prosper	ity and c	lo a cor	rect ap	praisal c	f the cur	rent scenar	io	Applying	(K3)
CO2				the Self		e Body, u	nderstar	nd the r	neanin	ig of Har	mony in	the Self, th	ne	Applying	(K3)
CO3	infer	the val	lue of ha	armonious	relatio							y acceptab us society	le	Applying	(K3)
CO4	trans natu		nemselve	es to co-e	ess and	four order	of	Applying	(K3)						
CO5		distinguish between ethical and unethical practices, and extend ethical and moral practices better living												Applying	(K3)
						Mappin	g of CO	s with	POs a	nd PSOs	5				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1	1										
CO2	2	3	2	1	1										
CO3	3	3	2	1	1										
CO4	4	3	2	1	1										
CO5	5	3	2	1	1										
1 – Slig	ght, 2	– Mode	rate, 3 -	Substant	ial, BT	- Bloom's	Taxono	my					P		
						ASSES	SMENT	PATTE	RN - 1	THEORY	,				
	Test / Bloom's Rememberin Category* (K1) %					Understa (K2)		Apply (K3)	•	Analyzi (K4) %	•	Evaluating (K5) %		reating (K6) %	Tota %
	CAT	1		25		75									100
	CAT	2		25		75									100
	ESE			NA											100



	22TAM01 - தமிழ						
	(Common to All Engineering and	Technology Branch	nes)	1	1	1	1
Programme & Branch	All BE / BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	3	HS	1	0	0	1
Preamble	தமிழா்களின் மொழி, இலக்கியம், ஓவியா விளையாட்டுக்கள், திணைக் கோட்பா(பங்களிப்பைப் பற்றிய அறிவை வழங்குக	டுகள், இந்திய	பண்பாட்டி	௺ௐ	த்	தமீ	லகள், வீ 1ழாகளின்
<u> </u>	மொழி மற்றும் இலக்கியம்						3
மேலாண்மைக் பக்தி இலக்கிய	யெத்தின் சமயச் சார்பற்ற தன்மை – சங்க கருத்துக்கள் – தமிழ் காப்பியங்கள், தமிழ ம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சி ழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்று	ஓகத்தில் சம்ண)ற்றிலக்கியங்கள்	பௌத்த ச 1 – தமிழில்	மயா > நவ	ស់ភទ លៃ (ரின் இலக்	தாக்கம் கியத்தில்
ച്ചുളെ – 11	மரபு – பாறை ஓவியங்கள் முதல் நவீன	வியங்கள் வ	ரை – சிற்ப	<u></u> 5 ла	ຑຨາ		3
தெய்வங்கள் – யாழ், நாதஸ்வ	பாருட்கள், பொம்மைகள் – தேர் செய்யு குமரிமுனையில் திருவள்ளுவர் சிலை – ரம் – தமிழர்களின் சமூக பொருளாதார வ	இசைக் கருவி ாழ்வில் கோவில	கள் – மிரு	தங்க			, ഖീത്ഞ്
அலகு – 111 தெருக்கூத்து, சிலம்பாட்டம்,	நாட்டுப்புறக் கலைகள் மற்றும் வீர வினை கரகாட்டம், வில்லுப்பாட்டு, கணியான் வளரி, புலியாட்டம், தமிழாகளின் விளைய	கூத்து, ஒயில	லாட்டம், (தோ	ல்பா	ബെദ്	3 க கூத்து
ച രെക്ര – IV	தமிழா்களின் திணைக் கோட்பாடுகள்						3
புறக் கோட்பா(கல்வியும் – சா	ாவரங்களும், விலங்குகளும் – தொல்காப்பி தெள் – தமிழர்கள் போற்றிய அறக்கோட்பா ங்ககால நகரங்களும் துறை முகங்களும் - டுகளில் சோழர்களின் வெற்றி.	ாடு– சங்க கால	லத்தில் தமி	ម្រិនទ្	தில்	រ តម្រ	<u>த்தற</u> ிவுப்
அல கு – v	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பங்களிப்பு	பண்பாட்டிற்குத்	தமிழர்க	វាា់ថា			3
– சுயமரியான	லைப்போரில் தமிழர்களின் பங்கு – இந்திய த இயக்கம் – இந்திய மருத்துவத்தில் 1டிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரல	சித்த மருத்துல	களில் தமிழ பத்தின் பா	த் ⊓உ ப	ன்பா – ,	ாட்டிவ கல்ெ	ள் தாக்கப் வட்டுகள்
		0					Total: 1
TEXT BOOK:		2					
	லன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 202	Ζ.					
1. ஆ. பூபா	லன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 202.	Ζ.					
1. ஆ. பூபா REFERENCES: ₁ தமிழக எ	பரலாறு- மக்களும் பண்பாடும்- கே கே பிள்ன		மிழ்நாடு பாட	_நூ	ல் ம	ற்றும்)
REFERENCES: 1. தமிழக எ கல்வியி		ள (வெளியீடு தட	<u>விழ்நாடு</u> பாட	_நூ	ல் ம	ற்றும்)
1. ஆ. பூபா REFERENCES: 1. தமிழக எ கல்வியி 2. கணினித்	பரலாறு- மக்களும் பண்பாடும்- கே கே பிள்ன 1யல் பணிகள் கழகம்)	ள (வெளியீடு தட 11ரசுரம்)		0		ற்றும்)

		UTCOI மடித்த		ர, மாண	பர்கள்									BT Map Highest	•
CO1	~	ிழ் பெ டியும்.	•	ற்றும் (இலக்சி	யெத்தில்	் மதிட	ப்புமிக்க	ቴ ቆጤ	த்துக்க	ണെ ഖ്	ிளக்க	Und	erstanding	g (K2)
CO2	தம	ிழர்க	றின் சி	ற்பம் மற்	றும் ச	அவர்கவ	ரின் ஓ	ബിലங്	கள் ப	ற்றி வி	ளக்க மு	வுயும்.	Und	erstanding	g (K2)
CO3		ிழர்க ற முடி		ாட்டுப்புற) மற்ற	றம் தற்ச	காப்புக்	ക്തരം	ക്തണ	ப் பற்றி) சுருக்க	மாகக்	Und	erstanding	g (K2)
CO4	தம	ிழர்க	றின் தி	ணைக்	கோட்ட	பாடுகன	ளப் பர	ற்றி வி	ளக்க	முடியு	ضا.		Und	erstanding	g (K2)
CO5			தேசிய பு பற்றீ		Und	erstandinç	g (K2)								
						Марр	ing of C	Os wit	h POs	and PS	Os				
COs/F	os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1						3		3	2	2		3		
CO2	2						3		3	2	2		3		
CO	3						3		3	2	2		3		
CO4	4						3		3	2	2		3		
CO	5						3		3	2	2		3		
1 – Sli	ght, 2	2 – Mod	erate, 3	 Substa 	ntial, B	T- Bloom	's Taxor	nomy							
						ASSE	SSMEN		FERN -	- THEOI	RY				
	t / Bl ateg	oom's ory*	R	emember (K1) %	ing l	Jndersta (K2)		Apply (K3)		Analyzi (K4) %		Evaluating (K5) %		eating K6) %	Total %
	CAT	1		40		60									100
	CAT	2		40		60									100
	CAT	3		40		60									100
	ESI	E								NA					

	22TAM01 - HERITAGE						
	(Common to All Engineering and	Technology Branch	es)		T		
Programme & Branch	All BE / BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	3	HS	1	0	0	1
Preamble	The objective of this course is to impart knowledge arts, heroic games, doctrines, contribution of Tami		ge, literature,	pain	tings,	sculp	otures, folk
UNIT I	Language and Literature						3
sangam literature & jainism in tamil - contribution of k	es in india - dravidian languages – tamil as a classica – distributive justice in sangam literature - manageme land - bakthi literature azhwars and nayanmars - form pharathiyar and bharathidhasan.	nt principles in thiruk is of minor poetry - c	ural - tamil ep	oics a	nd im	pact c	of buddhisn ture in tam
UNIT II	Heritage - Rock Art Paintings to Modern Art – S	culpture					3
nadhaswaram - r	e deities, thiruvalluvar statue at kanyakumari, making o ole of temples in social and economic life of tamils.	of musical instrumen	ts - mridhang	am, p	iarai,	VEEN	
nadhaswaram - r UNIT III Therukoothu – ka and games of tar	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - I						3
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - I nils. Thinai Concept of Tamils	eather puppetry – si	lambattam –	valar	i - tig	er dar	3 nce - sport 3
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV Flora and fauna o	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - l nils.	eather puppetry – si m and sangam litera	lambattam – ture - aram c	valar	i - tig	er dar amils	3 nce - sport 3 - education
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV Flora and fauna o and literacy durin	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - l nils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiya	eather puppetry – si m and sangam litera e - export and import	lambattam – ture - aram c during sanga	valar	i - tig	er dar amils	3 nce - sports 3 - education
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV Flora and fauna of and literacy durin of cholas. UNIT V Contribution of ta	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - I nils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyat g sangam age - ancient cities and ports of sangam age	eather puppetry – si m and sangam litera e - export and import ment and Indian Cu of tamils over the oth	lambattam – ture - aram co during sanga ulture er parts of inc	valar oncer im ag	i - tig ot of t e - ov	er dar amils versea	3 nce - sport 3 - education as conques 3
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV Flora and fauna of and literacy durin of cholas. UNIT V Contribution of ta - role of siddha m	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - I nils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyat g sangam age - ancient cities and ports of sangam age Contribution of Tamils to Indian National Move mils to indian freedom struggle - the cultural influence of the struggle - the struggle - the cultural influence of the struggle - t	eather puppetry – si m and sangam litera e - export and import ment and Indian Cu of tamils over the oth	lambattam – ture - aram co during sanga ulture er parts of inc	valar oncer im ag	i - tig ot of t e - ov	er dar amils versea	3 nce - sport 3 - education as conques 3
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV Flora and fauna o and literacy durin of cholas. UNIT V Contribution of ta - role of siddha m TEXT BOOK:	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - I nils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyal g sangam age - ancient cities and ports of sangam age Contribution of Tamils to Indian National Move mils to indian freedom struggle - the cultural influence of nedicine in indigenous systems of medicine – inscription	eather puppetry – si m and sangam litera e - export and import ment and Indian Cu of tamils over the oth ons & manuscripts –	lambattam – ture - aram c during sanga Ilture er parts of inc print history o	valar oncep am ag dia – s of tan	i - tig ot of t e - ov	er dar amils versea	3 nce - sport 3 - educatio as conques 3 t movemer
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV Flora and fauna of and literacy durin of cholas. UNIT V Contribution of ta - role of siddha m TEXT BOOK: 1. S.Muthu	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - I nils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyat g sangam age - ancient cities and ports of sangam age Contribution of Tamils to Indian National Move mils to indian freedom struggle - the cultural influence of the struggle - the struggle - the cultural influence of the struggle - t	eather puppetry – si m and sangam litera e - export and import ment and Indian Cu of tamils over the oth ons & manuscripts –	lambattam – ture - aram c during sanga Ilture er parts of inc print history o	valar oncep am ag dia – s of tan	i - tig ot of t e - ov	er dar amils versea	3 nce - sport 3 - educatio as conques 3 t movemer
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV Flora and fauna of and literacy durin of cholas. UNIT V Contribution of ta - role of siddha m TEXT BOOK: 1. S.Muthu REFERENCES:	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - I nils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyar g sangam age - ancient cities and ports of sangam age Contribution of Tamils to Indian National Move mils to indian freedom struggle - the cultural influence of nedicine in indigenous systems of medicine – inscription ramalingam, M.Saravanakumar, Heritage of Tamils, Y I Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.	eather puppetry – si m and sangam litera e - export and import ment and Indian Cu of tamils over the oth ons & manuscripts – es Dee Publishing F	lambattam – ture - aram co during sanga liture er parts of inc print history o	valar oncep im ag dia – s	i - tig ot of t e - ov self-re	er dar amils versea espect oks.	3 nce - sport 3 - educatio as conques 3 movemer Total: 1
nadhaswaram - r UNIT III Therukoothu – ka and games of tar UNIT IV Flora and fauna of and literacy durin of cholas. UNIT V Contribution of ta - role of siddha m TEXT BOOK: 1. S.Muthu REFERENCES: 1. Historica Tamil Str	ole of temples in social and economic life of tamils. Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - I nils. Thinai Concept of Tamils of tamils & aham and puram concept from tholkappiyar g sangam age - ancient cities and ports of sangam age Contribution of Tamils to Indian National Move mils to indian freedom struggle - the cultural influence of nedicine in indigenous systems of medicine – inscription ramalingam, M.Saravanakumar, Heritage of Tamils, Y I Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K. udies). ntribution of Tamil of the Tamils to Indian Culture(Dr	eather puppetry – si m and sangam litera e - export and import ment and Indian Cu of tamils over the oth ons & manuscripts – es Dee Publishing F D. Thirunavukarasu)	lambattam – ture - aram co during sanga ilture er parts of inc print history o Pvt Ltd, 2023.	valar oncep m ag dia – s of tan	i - tig bt of t e - ov self-re nil boo	er dar amils versea espect oks.	3 nce - sport - educatio as conques 3 : movemer Total: 1 Institute c

		UTCON tion of		ourse, the	student	ts will be	e able to)						BT Map (Highest	
CO1	exp	lain val	uable	concepts ir	langua	age and I	literature	e of tam	ils.				Und	erstandin	g (K2)
CO2	illus	strate at	oout th	e tamils sc	ulpture	and their	painting	gs.					Und	erstandin	g (K2)
CO3	sum	nmarize	abou	t the tamils	folk and	d martial	arts.						Und	erstanding	g (K2)
CO4	exp	lain the	thina	concept of	tamils.								Und	erstanding	g (K2)
CO5	exp	lain the	contr	ibution of T	amils to	the India	an Natio	nal Mov	/ement	and Inc	lian cultu	re.	Und	erstanding	g (K2)
						Маррі	ing of C	Os with	n POs	and PS	Os				
COs/P	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1						3		3	2	2		3		
CO2	2						3		3	2	2		3		
COS	3						3		3	2	2		3		
CO4	4						3		3	2	2		3		
COS	5						3		3	2	2		3		
1 – Slig	ght, 2	– Mode	erate,	3 – Substa	ntial, B1	r- Bloom	's Taxor	nomy	J	4				1	1
						ASSE	SSMEN	Τ ΡΑΤΊ	ERN -	- THEOF	۲Y				
	st / Ble Catego	oom's ory*		Remember (K1) %	ing l	Jndersta (K2)		Apply (K3)		Analyz (K4)		Evaluating (K5) %		eating K6) %	Total %
	CAT	1		40		60				-					100
	CAT	2		40		60									100
	CAT	3		40		60									100
	ESE	=						1		NA	I		1		



Progra Branch	amme & h	B.E &	Electro	onics and	d Communica	tion Enginee	ing	Sem.	Category	L	т	Ρ	Credit			
Prereq	uisites	Nil						3	PC	0	0	2	1			
Pream	ble	To de	sign and	l implem	ent combinatio	nal and seque	ntial logic	circuits.								
LIST O	F EXPERIM	ENTS / E	EXERCI	SES:												
1.	Verificatio	n of digit	al logic	gates												
2.	Design an	d Impler	nentatio	n of Com	binational Circ	uits using logi	c gates									
3.	Design an	d Impler	nentatio	n of 4-bit	adder/subtrac	tor using MSI	device.									
4.	Design an	Design and Implementation of 4-bit adder/subtractor using MSI device. Design and simulate 4- bit ripple carry adder using Modelsim														
5.	Design an	Design and simulate 4- bit ripple carry adder using Modelsim Design and simulate 4- bit BCD adder using Modelsim														
6.	Design an	Design and simulate 4- bit BCD adder using Modelsim Design and implementation of flip flops using basic gates.														
7.	Design an	d implen	nent a N	10D-4 cc	ounter using JK	Flip Flop.										
8.	MiniProje	ct														
													Total:3			
DEEEB			SOETW										Total:3			
	RENCES/ MA			ARE:									Total:3			
1.	Laborator			ARE:									Total:30			
1.				ARE:									Total:30			
1. 2. COUR	Laborator Modelsim	y Manua	 		s will be able t	0						Т Мар	ped			
1. 2. COURS	Laborator Modelsim SE OUTCOM mpletion of t	y Manua IES: he cour	se, the	students	s will be able t						(Hig Ap	T Map ghest I	ped _evel) (K3),			
1. 2. COUR: On cor CO1	Laborator Modelsim SE OUTCON mpletion of t design an	y Manua IES: .he cour d verify c	I se, the combina	students	cuits using logi	c gates					(Hig Ap Pro Ap	T Map ghest I plying ecision plying	ped _evel) (K3), (S3) (K3),			
1. 2. COURS On cor CO1 CO2	Laborator Modelsim SE OUTCON mpletion of t design an design an	y Manua IES: .he cour d verify c d simula	se, the scombina	students tional circ	cuits using logi	c gates Ising Verilog F	IDL				(Hig Ap Pr Ap Pr	T Map ghest I plying ecision plying ecision	ped _evel) (K3), (S3) (K3), (S3)			
1. 2. COURS On cor CO1 CO2	Laborator Modelsim SE OUTCON mpletion of t design an design an	y Manua IES: .he cour d verify c d simula	se, the scombina	students tional circ	cuits using logi	c gates Ising Verilog F	IDL				(Hig Ap Pro Ap Pro Ap	T Map ghest I plying ecision plying	ped _evel) (K3), (S3) (K3), (S3) (K3),			
1. 2. COURS On cor CO1 CO2	Laborator Modelsim SE OUTCON mpletion of t design an design an	y Manua IES: .he cour d verify c d simula	se, the scombina	students tional circ	cuits using logi Logic circuits t circuits using le	c gates Ising Verilog F)s			(Hig Ap Pro Ap Pro Ap	T Map ghest I plying ecision plying ecision plying	ped _evel) (K3), (S3) (K3), (S3) (K3),			
1. 2. COUR: On cor CO1 CO2 CO3	Laborator Modelsim SE OUTCON mpletion of t design an design an design an	y Manua IES: the cour d verify c d simula d verify \$ PO2	I se, the combina te comb Sequent PO3	students tional circ inational ial Logic PO4	cuits using logi Logic circuits u circuits using logi Mapping of PO5 PO6	c gates Ising Verilog H ogic gates	and PSC	PO10	P011	P012	(Hig Pro Ap Pro Ap Pro	T Map ghest I plying ecision plying ecision plying ecision	ped _evel) (K3), (S3) (K3), (S3) (K3), (S3)			
1. 2. COURS On cor CO1 CO2 CO3 COs/P CO1	Laborator Modelsim SE OUTCOM mpletion of t design an design an design an POS PO1 1 3	y Manua IES: the cour d verify o d simula d verify \$ PO2 2	se, the combinate combinat	students tional circ inational ial Logic PO4 2	cuits using logi	c gates using Verilog H ogic gates Cos with PO s	and PS0 PO9 2	PO10 2	P011	2	(Hig Pro Ap Pro Ap Pro	T Map ghest I plying ecision plying ecision plying ecision PSO1 3	ped _evel) (K3), (S3) (K3), (S3) (K3), (S3) PSO2 2			
1. 2. COUR: On cor CO1 CO2 CO3 COs/P	Laborator Modelsim SE OUTCOM mpletion of t design an design an design an design an 20 PO1 1 3 2 3	y Manua IES: the cour d verify c d simula d verify \$ PO2	I se, the combina te comb Sequent PO3	students tional circ inational ial Logic PO4	cuits using logi Logic circuits u circuits using logi Mapping of PO5 PO6	c gates using Verilog H ogic gates Cos with PO s	and PSC	PO10	P011		(Hig Pro Ap Pro Ap Pro	T Map ghest I plying ecision plying ecision plying ecision	ped _evel) (K3), (S3) (K3), (S3) (K3), (S3)			

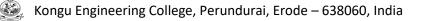


 Apple Characteristic Characteristic Free Description Claracteristic Claracteristic Claracteristic Claracteristic Sin 	PERIME esign of p pplication naracteri equency esign of a	To des INTS / E power su n of BJT stics of I	sign sim E XERCI upply ur as ON/	ple syst SES: hit for ele	ems ba	sed on a				Sem. 3	Category PC	L 0		2	Credit 1			
LIST OF EXF 1. Desite 2. App 3. Chain 4. Free 5. Desite 6. Clain 7. Desite 8. Sin	esign of p pplicatior naracteri equency esign of a	Dower su n of BJT stics of I	as ON/	SES:			amplifier	s, oscilla	requisites 3 PC									
1. Des 2. App 3. Cha 4. Free 5. Des 6. Cla 7. Des 8. Sin	esign of p pplicatior naracteri equency esign of a	oower so of BJT stics of I	upply ur as ON/	nit for ele	ectronic													
 Apple Characteristic Characteristic Free Description Claracteristic Claracteristic Claracteristic Claracteristic Sin 	oplication naracteri equency esign of a	n of BJT stics of I	as ON/		ectronic													
3. Characterization 4. Free 5. Desiterization 6. Claracterization 7. Desiterization 8. Simplement	naracteri equency esign of a	stics of I		OFF swi		gadgets	6											
4. Free 5. Des 6. Cla 7. Des 8. Sin	equency esign of a		JJT	Application of BJT as ON/OFF switch. Characteristics of UJT														
5. Des 6. Cla 7. Des 8. Sin	esign of a	respon																
6. Cla 7. Des 8. Sin	-	Frequency response of fixed bias/voltage divider bias/collector to base bias of BJT Design of audio and radio frequency oscillator(RC Phase Shift Oscillator & Hartley oscillator)																
7. Des 8. Sin	ass -B C	audio ar	nd radio	frequen	cy oscill	ator(RC	Phase	Shift Os	scillator	& Hartley	oscillator)							
8. Sin		omplem	entary s	symmeti	y Powe	r amplifi	ier-with a	and with	out cros	sover dis	ortion							
	esign of	current s	series fe	edback	amplifie	r												
9. Mir	mulation	of the fo	ollowing	experin	nents us	ing PSF	PICE i) V	Vien Bri	dge Osc	illator ii)	Colpitts Osci	llator						
I	ni Projec	ct to gei	nerate a	wavefo	rm and	improve	e its sign	al level										
															Total:30			
REFERENCE	ES/ MA	NUAL /S	OFTW	ARE:														
	boratory		_															
	cad Cac			Software	16.6													
COURSE OU On completi		-	se, the :	student	s will b	e able t	o						BT N Highe)					
CO1 der	monstra	te the a	oplicatio	on of var	ious ele	ctronic (devices						Applyi Precis					
CO2 des	sign of c	scillator	s and la	arge sigr	nal ampl	ifiers							Applyi Precis	ng (l	K3),			
	sign and stems de			rmance	of bias	ing circ	uits, am	plifiers a	and osc	illators us	ing electron	ic	Applyi Precis	ng (l	K3),			
					Man	oing of	Cos wit	h POs a	and PSC)s								
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PS	D1	PSO2			
CO1	3	3	2	2	1	1		2	2	1		1	2		1			
CO2	3	3	2	2	1	1		2	2	1		1	2		1			
CO3 1 – Slight, 2 -	3	3	2	2	3	1		2	2	1		1	2					



	22ITC41 - PROGRAMMING IN	-	1 ac				
Programme &	(Common to ECE, EEE, EIE, MTS E	ngineering branch	ies)				
Branch	ECE, EEE, EIE, MTS	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Problem Solving and Programming in C	4	ES	3	0	2	4
Preamble	This course introduces the core Python programming. It e functions, classes, objects, and NumPy	mphasizes develop	bing Python p	rogran	ns wit	h allda	ita types,
Unit – I	Introduction:						9
identifiers – da	ng strategies – program design tools – Types of errors – T ata types - input operation – comments – reserved words ments: Introduction – conditional statement – iterative sta else in loops.	- indentation - C	Operators and	d Exp	ressio	ons –	Decision
Unit – II	Lists, Tuples and Dictionary:						9
operations, assig delete, sort, loop Unit – III Strings: Concat	pdate, nested, cloning, operations, methods, comprehension ments, returning multiple values, nested tuples, index, and ing, nested, built-in methods — list vs tuple vs dictionary. Strings and Regular Expressions: tenation, append, multiply on strings – Immutable – formatting	d count method - I	Dictionary: Cr	eate, a ods ar	acces	s, add	and modi
	nctions – operators – comparing – iterating – string module ns – flag options.	 Regular Expres 	sions – matc	h, sea	irch, s	sub, fir	ndall and
Unit – IV	Functions and Modules:						9
	oduction - definition – call – variable scope and lifetime – re strings – programming practices recursive function- Modu ition.						
Unit – V	Object Orientation: ts: Class and objects – class methods and self – constructo						9
	IMENTS / EXERCISES:						
	entation of list and tuple operations						
· ·	entation of dictionary operations						
•	various string operations						
5. Use regi	ular expressions for validating inputs						
6. Demons	tration of different types of functions and parameter passing						
7. Develop	programs using classes and objects						
8. Perform	computation on NumPy arrays						
9. Draw dif	ferent types of plots using Matplotlib						
			Lect	ure:4	5, Pra	ctical	:30, Total:
TEXT BOOK:							
1. Reema 2017.	Thareja., "Python Programming using problem solving appro	ach", 3 rd impressio	on, Oxford Ur	iversit	y Pre	ss., No	ew Delhi,
REFERENCES/	MANUAL / SOFTWARE:						
1. Nages	wara Rao, "Core Python Programming", 2 nd Edition, DreamT	ech Press, New De	lhi, 2018.				
2. Jake V	ander Plas," Python Data Science Handbook Essential Tools	for Working with Da	ata", O'Reilly	publisl	ners,1	st Editi	ion, 2016.
– Electronics a	nd Communication Engineering. Regulation. Curriculur	n and Syllahus – I	R2022		Page	e 143	

		OUTCO		se, the stu	idents w	/ill be ab	le to							BT Map (Highest	
CO1	u	se basio	Python o	constructs	to build s	imple pro	ograms							Applying Precision	
000			4	-1 -1' - 4'										Applying	
CO2	a	ppiy list	, tupie, an	d dictionar	y to nan	die a vari	ety of da	ita.						Precision	(S3)
CO3	a	oply stri	ngs and r	egular exp	ressions	for searc	hing and	d retrieva	al					Applying Precision	
CO4	s	olve the	problems	s using fun	ctions ar	d module	es.							Applyin	g (K3),
				•										Precision Applying	
CO5	a	oply obj	ect-orient	ed concep	ts and pe	erform ba	sic data	science	operatio	ons using	g Pythor	1		Precision	
						Manr	ning of (COs with	POs a	nd PSO	6				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	2	1	1										
CO2	2	3	2	1	1										
CO3	3	3	2	1	1										
CO4	ł	3	2	1	1										
CO5	5	3	2	1	1										
1 – Slię	ght, 2	2 – Mod	erate, 3 -	Substantia	al, BT- B	loom's Ta	axonomy	/							
						ASS	FSSMF		FRN - 1		(
	t / Bl ateg	oom's ory*	Rem	nembering %	(K1)	Understa (K2)		Apply (K3)		Analyz (K4)		Evaluating (K5) %		eating (6) %	Total %
	CAT			10		15		75						-	100
	CAT	Γ2		10		15		75	5						100
	CAT	ГЗ		10		15		75	5						100
	ES	-		10		15		75	5						100



Programme& Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Transforms and Probability Theory	4	PC	3	1	0	4
Preamble	This course provides foundation for understanding the variou analyze digital signal processing systems.	us types of sig	nals and syste	ms a	nd als	so to de	sign and
Unit – I	Signals (CT and DT):						9 + 3
Standard CT ar Classification or	nd DT Signals – Classification of CTS and DTS –Mathematical of f continuous time and discrete time systems	operations on (CTS and DTS.	Syste	ems:	CT and	DT systems
Unit – II	Analysis of Systems(CT and DT)						9 + 3
CT systems.	systems using Laplace transforms: Impulse response-Step response using Z-Transform: Impulse response-Step response				•		
Unit – III	DFT and FFT:						9 + 3
Linear convolut signals	 Properties of DFT. Radix2-FFT (8-point) : Decimation in Tili ion- Overlap add and Overlap Save method. Applications: Anal 						
Unit – IV	FIR and IIR Filter Design:						9 + 3
FIR Filter Desig –Hanning- Blac IIR Filter Desig	gn : Response of FIR Filter-Group delay & phase delay (Concep kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters	,	Ū.			Ū.	ar –Hammin
FIR Filter Desig –Hanning- Blac IIR Filter Desig Bilinear transfor	gn : Response of FIR Filter-Group delay & phase delay (Concer kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters rmation	,	Ū.			Ū.	ar –Hammin e technique
FIR Filter Desig -Hanning- Blac IIR Filter Desig Bilinear transfor Unit – V Quantization no	gn : Response of FIR Filter-Group delay & phase delay (Concep kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters	s - Digital Tra	nsformation : I	mpul	se inv	variance	ar –Hammir e technique 9 + 3
FIR Filter Desig -Hanning- Blac IIR Filter Desig Bilinear transfor Unit – V Quantization no	gn : Response of FIR Filter-Group delay & phase delay (Concer kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters rmation Finite Word Length Effect: oise – Derivation for quantization noise power –Truncation	s - Digital Tra	nsformation : I error – Input scaling	mpul	se inv	variance	ar –Hammin e technique 9 + 3 pr-Coefficier
FIR Filter Desig -Hanning- Blac IIR Filter Desig Bilinear transfor Unit – V Quantization no	gn : Response of FIR Filter-Group delay & phase delay (Concer kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters rmation Finite Word Length Effect: oise – Derivation for quantization noise power –Truncation	s - Digital Tra	nsformation : I error – Input scaling	mpul	se inv	variance	ar –Hammir e technique 9 + 3 pr-Coefficie
FIR Filter Desig -Hanning- Blac IIR Filter Desig Bilinear transfor Unit – V Quantization no quantization err TEXT BOOK:	gn : Response of FIR Filter-Group delay & phase delay (Concer kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters rmation Finite Word Length Effect: oise – Derivation for quantization noise power –Truncation	s - Digital Tra and rounding w error-Signa	nsformation : I error – Input scaling	mpul	se inv	variance	ar –Hammin e technique 9 + 3
FIR Filter Desig -Hanning- Blac IIR Filter Desig Bilinear transfor Unit – V Quantization no quantization err TEXT BOOK:	gn : Response of FIR Filter-Group delay & phase delay (Concer kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters rmation Finite Word Length Effect: oise – Derivation for quantization noise power –Truncation ror-Product quantization error – Limit cycle oscillations- Overflow	s - Digital Tra and rounding w error-Signa	nsformation : I error – Input scaling	mpul	se inv	variance	ar –Hammir e technique 9 + 3 pr-Coefficie
FIR Filter Desig -Hanning- Blac IIR Filter Desig Bilinear transfor Unit – V Quantization no quantization err TEXT BOOK: 1. Nagoor Ka REFERENCES	gn : Response of FIR Filter-Group delay & phase delay (Concer kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters rmation Finite Word Length Effect: oise – Derivation for quantization noise power –Truncation ror-Product quantization error – Limit cycle oscillations- Overflow	s - Digital Tra and rounding w error-Signa Delhi, 2017.	nsformation : I error – Input scaling Leo	mpul qua	se inv ntizat	variance ion erro	ar –Hammir e technique 9 + 3 pr-Coefficie :15, Total:6
FIR Filter Desig -Hanning- Blac IIR Filter Desig Bilinear transfor Unit – V Quantization no quantization err TEXT BOOK: 1. Nagoor Ka REFERENCES 1. Oppenheir Roberts M	gn : Response of FIR Filter-Group delay & phase delay (Concept kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters rmation Finite Word Length Effect: oise – Derivation for quantization noise power –Truncation ror-Product quantization error – Limit cycle oscillations- Overflow ani, "Digital Signal Processing", 2 nd Edition, McGraw-Hill, New D :: n Alanv, Willsky Alan S., Hamid Nawab S., "Signals & Systems .J., "Signals And Systems Analysis Using Transform Method ar	s - Digital Tra and rounding w error-Signal Delhi, 2017.	nsformation : I error – Input scaling Lec Pearson Educ	mpul qua	se inv ntizat : 45, T , New	variance ion erro	ar –Hammir e technique 9 + 3 or-Coefficie :15, Total:6
FIR Filter Desig -Hanning- Blac IIR Filter Desig Bilinear transfor Unit – V Quantization no quantization err TEXT BOOK: 1. Nagoor Ka REFERENCES 1. Oppenheir 2. Roberts M. Hill, New D	gn : Response of FIR Filter-Group delay & phase delay (Concept kmann Window. gn : Analog filter design: Butterworth filter and Chebyshev filters rmation Finite Word Length Effect: oise – Derivation for quantization noise power –Truncation ror-Product quantization error – Limit cycle oscillations- Overflow ani, "Digital Signal Processing", 2 nd Edition, McGraw-Hill, New D :: n Alanv, Willsky Alan S., Hamid Nawab S., "Signals & Systems .J., "Signals And Systems Analysis Using Transform Method ar	s - Digital Tra and rounding w error-Signal Delhi, 2017.	error – Input scaling Leo Pearson Educ	mpul qua cture	se inv ntizat :45, 1 , New ;aw-	variance ion erro Tutorial	ar –Hammir e technique 9 + 3 or-Coefficie :15, Total:6 2015.

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COURSE O													BT Map	
On complet			e, the stud ous time ar				nd eveto	me					(Highest Applying	
001	•					0								
			orm, Z-trai					discre	e time sy	/stem res	sponse		Applying	
CO3 apr	bly DFT a	and FFT t	o find freq	uency co	omponen	ts in a si	gnal.						Applying	(K3)
CO4 des	sign digit	al FIR an	d IIR filter	for the g	iven spec	cification	•						Applying	(K3)
CO5 det	ermine t	he effect	of finite wo	ord lengt	h of infini	te respor	nse.						Applying	(K3)
					Мар	ping of (COs wit	h POs	and PSC)s				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2				2	2		2	3	
CO2	3	2	2	1	2				2	2		2	3	
CO3	3	2	2	2								2	3	
CO4	3	2	2	2					2			2	3	
CO5	3	2	2	2								2	3	
1 – Slight, 2	– Mode	rate, 3 – S	Substantia	l, BT- Blo	oom's Ta	xonomy							I	I
							1		THEOR	-				
Test / B Categ		Re	memberii (K1) %	ng	Understa (K2)		Apply (K3)		Analyzi (K4) 9		Evaluating (K5) %		reating (K6) %	Total %
CA	Г1		10		20		70)	-		-		-	100
CA	Г2		5		25		70)	-		-		-	100
CA	Г3		5		25		70)	-		-		-	
ES	E		5		25		70)	-		-		-	100
* ±3% may l	ne varied	I (CAT 1 2	2 3 – 50 m	arks & F	SF - 100) marks)	1			1		1		1

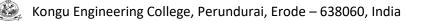


			1	1			
Programme& Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	4	PC	3	0	0	3
Preamble	To understand the concepts of microprocessor and microcont applications.	rollers techniqu	ues and do pro	gram	ming	for rea	l time
Unit – I	8086 Microprocessor:						9
modes of 8086 - I	tion of 8086 – Architecture –Memory Segmentation- Physical men nstruction set of 8086: Data transfer instructions - String instruction ctions - Processor control instructions.						
Unit – II	8086 Microprocessor ALP Programming:						9
Simple Assembly	Language Programming - Introduction to stack - Interrupt and inter	errupt service ro	outines-Time de	elays	using	count	er.
Unit – III	89C51 Microcontroller:						9
	SC and CISC machines – 89C51 Microcontroller hardware block of pins - Ports and circuits - Interfacing to external memory- Instructi			memo	ory ma	apping	- Registe
organization - I/O				memo	ory ma	apping	- Registe
organization - I/O Unit – IV Assembly langua	pins - Ports and circuits - Interfacing to external memory- Instruction	on sets - Addre	essing modes.				9
organization - I/O Unit – IV Assembly langua programming.	pins - Ports and circuits - Interfacing to external memory- Instructi 89C51 Programming: ge programming -Timer and counter programming – Serial Da	on sets - Addre	essing modes.				9
organization - I/O Unit – IV Assembly langua programming. Unit – V Traffic light Contri	pins - Ports and circuits - Interfacing to external memory- Instructi 89C51 Programming:	on sets - Addre ta Communica	tion using MA	X232	conv	verter -	9 – Interrup
organization - I/O Unit – IV Assembly langua programming. Unit – V Traffic light Conti	pins - Ports and circuits - Interfacing to external memory- Instructi 89C51 Programming: ge programming -Timer and counter programming – Serial Da 89C51 Case study: rol: LED, 7 segment display-Digital locker: LCD, Matrix Keypad-F	on sets - Addre ta Communica	tion using MA	X232	conv	verter -	9 – Interrup
organization - I/O Unit – IV Assembly langua programming. Unit – V Traffic light Contr Conveyor Belt: D	pins - Ports and circuits - Interfacing to external memory- Instructi 89C51 Programming: ge programming -Timer and counter programming – Serial Da 89C51 Case study: rol: LED, 7 segment display-Digital locker: LCD, Matrix Keypad-F	on sets - Addre ta Communica	tion using MA	X232	conv	verter -	9 – Interrup 9 control o
organization - I/O Unit – IV Assembly langua programming. Unit – V Traffic light Contr Conveyor Belt: Du TEXT BOOK: 1. Ray K., a Tata Mc	pins - Ports and circuits - Interfacing to external memory- Instructi	on sets - Addre ta Communica Fire alarm Syst s: Architecture, II.	essing modes. tion using MA em: ADC, LM: Programming	X232 35 se and	ensor-	verter - Speed	9 - Interru 9 control o Total:4
organization - I/O Unit – IV Assembly langua programming. Unit – V Traffic light Contr Conveyor Belt: Du TEXT BOOK: 1. Ray K., a Tata Mc 2. Muhamr	pins - Ports and circuits - Interfacing to external memory- Instructi 89C51 Programming: ge programming -Timer and counter programming – Serial Da 89C51 Case study: rol: LED, 7 segment display-Digital locker: LCD, Matrix Keypad-F C motor, Stepper motor –Smart shoe for Physically Challenged. and Bhurchandi K. M., "Advanced Microprocessors and Peripheral	on sets - Addre ta Communica Fire alarm Syst s: Architecture, II. Microcontroller	essing modes. tion using MA em: ADC, LM: Programming	X232 35 se and	ensor-	verter - Speed	9 - Interru 9 control o Total:4
organization - I/O Unit – IV Assembly langua programming. Unit – V Traffic light Contr Conveyor Belt: Di TEXT BOOK: 1. Ray K., a Tata Mcd 2. Muhamr and C", 2	pins - Ports and circuits - Interfacing to external memory- Instructi 89C51 Programming: ge programming -Timer and counter programming – Serial Da 89C51 Case study: rol: LED, 7 segment display-Digital locker: LCD, Matrix Keypad-F C motor, Stepper motor –Smart shoe for Physically Challenged. and Bhurchandi K. M., "Advanced Microprocessors and Peripheral Graw Hill, New Delhi, 2012, ISBN: 9780070140622 for Units I and had Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051	on sets - Addre ta Communica Fire alarm Syst s: Architecture, II. Microcontroller	essing modes. tion using MA em: ADC, LM: Programming	X232 35 se and	ensor-	verter - Speed	9 Interrup control o Total:4
organization - I/O Unit – IV Assembly langua programming. Unit – V Traffic light Contr Conveyor Belt: Dr TEXT BOOK: 1. Ray K., a Tata Mc 2. Muhamr and C", s REFERENCES: 1. Muhamr Pearson	pins - Ports and circuits - Interfacing to external memory- Instructi 89C51 Programming: ge programming -Timer and counter programming – Serial Da 89C51 Case study: rol: LED, 7 segment display-Digital locker: LCD, Matrix Keypad-F C motor, Stepper motor –Smart shoe for Physically Challenged. and Bhurchandi K. M., "Advanced Microprocessors and Peripheral Graw Hill, New Delhi, 2012, ISBN: 9780070140622 for Units I and had Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051	on sets - Addre ta Communica Fire alarm Syst s: Architecture, II. Microcontroller s III, IV and V. s, "Microproces	essing modes. tion using MA em: ADC, LM: Programming and Embedde sors and Micro	X232 35 se and d Sys	conv ensor-	verter - Speed ace", 3 using	9 Interru 9 control Total:4 rd Edition Assembly dition,

	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	describe the internal blocks and register organisation of 8086 microprocessor architecture	Understanding (K2)
CO2	use assembly language programming skill for arithmetic and logic operations using 8086 processor	Applying (K3)
CO3	describe the internal blocks of 89C51 microcontroller Architecture and interfacing external memory	Understanding (K2)
CO4	develop assembly language programming for internal modules of 89C51 controller	Applying (K3)
CO5	apply programming skills to interface external peripherals	Applying (K3)

					Mappi	ng of CO	Os with	POs an	d PSOs					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1										3	1	
CO2	3	2	1	1						2			3	
CO3	2	1										3	1	
CO4	3	2	1	1						2		2	3	1
CO5	3	2	1	1		2			1	2	1	2	3	2
1 – Slight, 2	– Modei	rate, 3 – S	Substantial	, BT- Blo	om's Ta	xonomy	1	1	1	r I		4		·

		ASSESSMENT	PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	55	25	-	-	-	100
CAT2	10	35	55	-	-	-	100
CAT3	10	35	55	-	-	-	100
ESE	4	44	52	-	-	-	100
* ±3% may be varied (C	AT 1,2,3 – 50 marks	& ESE – 100 marks)		·			

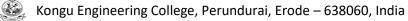


22ECT43 - TRANSMISSION LINES AND WAVEGUIDES

Programme & Branch	B.E - Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Electromagnetic Fields	4	PC	3	0	0	3
Preamble	To acquire the concepts of transmission line parameter	ers and wave propag	ation in guidec	and	wave	guide	structures
Unit – I	Transmission Line Parameters:						9
Wavelength -Vel	led T sections - Transmission lines - General solution ocity —propagation - Distortionless line -The telephone on and short circuited lines - Insertion loss.						
Unit – II	The Line at Radio Frequency:						9
line -Standing wa	en wire line and Coaxial cable at RF - Line constants for z ves -Nodes and antinodes- Standing wave ratio - Input imp d lines -Power and impedance measurement on lines - Th	pedance of the dissi	pationless line	-Inpu	ıt imp	edano	ce of oper
Unit – III	Stub Matching and Smith Chart:						9
impedance- Admi	erivations of single stub impedance matching on a line-Sm ttance for given impedance- Input impedance of a TL terr	minated in a short of	r open - Input	impe	dance	e of a	
impedance- Admi distance from a lo Unit – IV Waves between p	Ittance for given impedance- Input impedance of a TL terr ad- Locating first maximum and minimum from any load- M Guided Waves: parallel planes of perfect conductors- Field Equations: TE	minated in a short of Matching a TL to a lo	r open - Input ad with a paral	impe lel tu	dance ning s	e of a stub.	TL at any
impedance- Admi distance from a lo Unit – IV Waves between p Attenuation of TE	ittance for given impedance- Input impedance of a TL terr ad- Locating first maximum and minimum from any load- N Guided Waves: barallel planes of perfect conductors- Field Equations: TE and TM waves in parallel plane guides - TEM Waves.	minated in a short of Matching a TL to a lo	r open - Input ad with a paral	impe lel tu	dance ning s	e of a stub.	TL at any 9
impedance- Admi distance from a lo Unit – IV Waves between p Attenuation of TE Unit – V Rectangular Wav Dominant mode -	Ittance for given impedance- Input impedance of a TL terr ad- Locating first maximum and minimum from any load- M Guided Waves: parallel planes of perfect conductors- Field Equations: TE	minated in a short o Matching a TL to a lo E waves, TM waves cteristic of TE and T	r open - Input ad with a paral - Characteristi M Waves - Im	impe lel tu cs of	dance ning s TE a	e of a stub. Ind TI	TL at any 9 M waves 9
impedance- Admi distance from a lo Unit – IV Waves between p Attenuation of TE Unit – V Rectangular Wa v Dominant mode -	ittance for given impedance - Input impedance of a TL terr ad- Locating first maximum and minimum from any load- N Guided Waves: barallel planes of perfect conductors- Field Equations: TE and TM waves in parallel plane guides - TEM Waves. Waveguides and Resonators: veguides: Field equations: TM waves, TE waves - Charac Characteristic impedance - Excitation of modes.	minated in a short o Matching a TL to a lo E waves, TM waves cteristic of TE and T	r open - Input ad with a paral - Characteristi M Waves - Im	impe lel tu cs of	dance ning s TE a	e of a stub. Ind TI	TL at any 9 M waves 9 M waves
impedance- Admi distance from a lo Unit – IV Waves between p Attenuation of TE Unit – V Rectangular Wav Dominant mode -	ittance for given impedance - Input impedance of a TL terr ad- Locating first maximum and minimum from any load- N Guided Waves: barallel planes of perfect conductors- Field Equations: TE and TM waves in parallel plane guides - TEM Waves. Waveguides and Resonators: veguides: Field equations: TM waves, TE waves - Charac Characteristic impedance - Excitation of modes.	minated in a short o Matching a TL to a lo E waves, TM waves cteristic of TE and T	r open - Input ad with a paral - Characteristi M Waves - Im	impe lel tu cs of	dance ning s TE a	e of a stub. Ind TI	TL at any 9 M waves 9 M waves
impedance- Admi distance from a lo Unit – IV Waves between p Attenuation of TE Unit – V Rectangular Wav Dominant mode - Resonators: Micr TEXT BOOK:	ittance for given impedance - Input impedance of a TL terr ad- Locating first maximum and minimum from any load- N Guided Waves: barallel planes of perfect conductors- Field Equations: TE and TM waves in parallel plane guides - TEM Waves. Waveguides and Resonators: veguides: Field equations: TM waves, TE waves - Charac Characteristic impedance - Excitation of modes.	minated in a short of Matching a TL to a lo E waves, TM waves cteristic of TE and T Q factor of a cavity re	r open - Input ad with a paral - Characteristi M Waves - Im esonator for TE	impe lel tu cs of possi	dance ning s TE a bility mode	e of a stub. Ind TI	TL at any 9 M waves 9
impedance- Admi distance from a lo Unit – IV Waves between p Attenuation of TE Unit – V Rectangular Wav Dominant mode - Resonators: Micr TEXT BOOK: 1. Ryder J.	Ittance for given impedance - Input impedance of a TL terr ad- Locating first maximum and minimum from any load- M Guided Waves: barallel planes of perfect conductors- Field Equations: TE and TM waves in parallel plane guides - TEM Waves. Waveguides and Resonators: veguides: Field equations: TM waves, TE waves - Charac Characteristic impedance - Excitation of modes. rowave cavity resonator - Rectangular cavity resonators - O	minated in a short of Matching a TL to a lo E waves, TM waves cteristic of TE and T Q factor of a cavity re cation, New Delhi, 20	r open - Input ad with a paral - Characteristi M Waves - Im esonator for TE	impe lel tu cs of possi 101 II, &	dance ning s TE a bility mode	e of a stub. Ind TI	TL at any 9 M waves 9 M waves
impedance- Admi distance from a lo Unit – IV Waves between p Attenuation of TE Unit – V Rectangular Way Dominant mode - Resonators: Micr TEXT BOOK: 1. Ryder J. 2. Dr.P.Dar	Ittance for given impedance - Input impedance of a TL terr ad- Locating first maximum and minimum from any load- N Guided Waves: barallel planes of perfect conductors- Field Equations: TE and TM waves in parallel plane guides - TEM Waves. Waveguides and Resonators: veguides: Field equations: TM waves, TE waves - Charac Characteristic impedance - Excitation of modes. rowave cavity resonator - Rectangular cavity resonators - O D, "Networks Lines and Fields", 2 nd Edition, Pearson Eductor	minated in a short of Matching a TL to a lo E waves, TM waves cteristic of TE and T Q factor of a cavity re cation, New Delhi, 20	r open - Input ad with a paral - Characteristi M Waves - Im esonator for TE	impe lel tu cs of possi 101 II, &	dance ning s TE a bility mode	e of a stub. Ind TI	TL at any 9 M waves 9 M waves
impedance- Admi distance from a lo Unit – IV Waves between p Attenuation of TE Unit – V Rectangular Wav Dominant mode - Resonators: Micr TEXT BOOK: 1. Ryder J. 2. Dr.P.Dar REFERENCES:	Ittance for given impedance - Input impedance of a TL terr ad- Locating first maximum and minimum from any load- N Guided Waves: barallel planes of perfect conductors- Field Equations: TE and TM waves in parallel plane guides - TEM Waves. Waveguides and Resonators: veguides: Field equations: TM waves, TE waves - Charac Characteristic impedance - Excitation of modes. rowave cavity resonator - Rectangular cavity resonators - O D, "Networks Lines and Fields", 2 nd Edition, Pearson Eductor	minated in a short of Matching a TL to a lo E waves, TM waves cteristic of TE and T Q factor of a cavity re cation, New Delhi, 20 Publications,2014, f	r open - Input ad with a paral - Characteristi M Waves - Im esonator for TE 15, for Units I, or Units IV & V	impe lel tu cs of possi 101	dance ning s TE a bility mode	e of a stub. Ind TI	TL at an 9 M waves 9 M waves Total:4

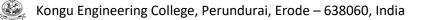
		UTCOM ion of t		se, the st	udents	will be al	ble to						(BT Map Highest L	
CO1	cor	npute th	ie param	eters of t	ransmiss	sion lines.							Ur	iderstandi	ng (K2)
CO2			the para		f transm	ission lin	e at rac	lio frequ	iency a	and the	impedano	cevalue for	Ur	derstandi	ng (K2)
CO3	Ma	ke use o	of Smitho	chart for c	lesign of	transmis	sion line	s and St	ub mat	ching				Applying	(K2)
CO4	cor	npute th	ne field e	quations,	charact	eristics ar	nd perfor	mance p	barame	ters for g	Juidedwa	ves	Ur	iderstandi	ng (K2)
CO5				equation ctangular				formanc	e para	meters fo	orrectang	ular	Ur	iderstandi	ng (K2)
						Марр	ing of C	Os with	POs a	nd PSOs	6				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	2	2				2					3	2
CO	2	3	2	2	2				2					3	2
CO	3	3	2	2	2				2					3	2
CO	4	3	2	2	2				2					3	2
CO	5	3	2	2	2				2					3	2
1 – Slig	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's 1	Faxonom	iy			l			L	·
						ASSE	SSMEN	T PATT	ERN - 1	THEORY	,				
	st / Bl Catego	oom's ory*	Re	member (K1) %	ing	Understa (K2)	•	Apply (K3)		Analyz (K4) 9	•	Evaluating (K5) %		eating K6) %	Total %
	CAT	1		10		90		-		-		-		-	100
	CAT	2		10		55		35	5	-		-		-	100
	CAT	3		10		90		-		-		-		-	100
	ESE	E		10		70		20)	-		-		-	100
* ±3%	may b	e varied	d (CAT 1	,2,3 – 50	marks 8	ESE – 1	00 mark	s)			I		I		1





Programme& Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Transforms and Probability Theory	4	PC	3	1	0	4
Preamble	To understand the concepts of mathematical modeling of variou and stability in both time and frequency domain.	us systems and	also to exami	ne th	e syst	em re	sponse
Unit – I	System Representation:						9 + 3
Systems-Mode	s in control systems – Open and closed loop systems – Modelin ling of Electrical Networks- Electrical analogy of mechanical syste trains-Block Diagram Reduction-Signal Flow Graph.						
Unit – II	Time Domain Analysis:						9 + 3
	ignals- Time response of First and Second order system response- neralized error series –Introduction to P, PI, PID controllers - Effect						s – Steady
Unit – III	Stability Analysis in time Domain:						9 + 3
Characteristics	Equation - Location of Roots in S plane for stability - Routh Hurv	witz Criterion -	Poot Locus co	nstru	ction -	_ Effe	ct of noles
and zeros on s				notra	011011	LIIC	
						LIIG	9+3
and zeros on s Unit – IV Frequency resp	ystem stability.						9 + 3
and zeros on s Unit – IV Frequency resp	ystem stability. Frequency Response Analysis: Donse – Correlation between frequency domain and time domain						9 + 3
and zeros on s Unit – IV Frequency resp in Frequency D Unit – V Introduction to	ystem stability. Frequency Response Analysis: ponse – Correlation between frequency domain and time domain pomain-Nyquist Stability Criteria-Introduction to Compensators. State Space Representation: state space analysis - Phase variable and canonical forms - State	specifications - te transition ma	Bode plot – P	olar p	lot –S	Stabilit	9 + 3 y Analysis 9 + 3
and zeros on s Unit – IV Frequency resp in Frequency D Unit – V Introduction to	ystem stability. Frequency Response Analysis: ponse – Correlation between frequency domain and time domain pomain-Nyquist Stability Criteria-Introduction to Compensators. State Space Representation:	specifications - te transition ma	Bode plot – Pe trix - Solutions	olar p s to s	lot –S	Stabilit	9 + 3 y Analysis 9 + 3 equation
and zeros on s Unit – IV Frequency resp in Frequency D Unit – V Introduction to	ystem stability. Frequency Response Analysis: ponse – Correlation between frequency domain and time domain pomain-Nyquist Stability Criteria-Introduction to Compensators. State Space Representation: state space analysis - Phase variable and canonical forms - State	specifications - te transition ma	Bode plot – Pe trix - Solutions	olar p s to s	lot –S	Stabilit	9 + 3 y Analysis 9 + 3
and zeros on s Unit – IV Frequency resp in Frequency D Unit – V Introduction to Controllability a	ystem stability. Frequency Response Analysis: ponse – Correlation between frequency domain and time domain pomain-Nyquist Stability Criteria-Introduction to Compensators. State Space Representation: state space analysis - Phase variable and canonical forms - State	specifications - te transition ma	Bode plot – Pe trix - Solutions	olar p s to s	lot –S	Stabilit	9 + 3 y Analysis 9 + 3 equation
and zeros on s Unit – IV Frequency resp in Frequency D Unit – V Introduction to Controllability a TEXT BOOK:	ystem stability. Frequency Response Analysis: ponse – Correlation between frequency domain and time domain pomain-Nyquist Stability Criteria-Introduction to Compensators. State Space Representation: state space analysis - Phase variable and canonical forms - State	specifications - te transition ma pservability.	Bode plot – Po trix - Solution: Lecture	olar p s to s e:45,	lot –S tate s Tuto i	Stabilit	9 + 3 y Analysis 9 + 3 equation
and zeros on sUnit – IVFrequency respin Frequency DUnit – VIntroduction to Controllability aTEXT BOOK:1.	ystem stability. Frequency Response Analysis: ponse – Correlation between frequency domain and time domain lomain-Nyquist Stability Criteria-Introduction to Compensators. State Space Representation: state space analysis - Phase variable and canonical forms - State and Observability of systems-Kalman test for Controllability and Observability of systems-Kalman test for Controllability and Observability and Observability of systems Engineering", 5 th Edition, New	specifications - te transition ma pservability.	Bode plot – Po trix - Solution: Lecture	olar p s to s e:45,	lot –S tate s Tuto i	Stabilit	9 + 3 y Analysis 9 + 3 equation
and zeros on s Unit – IV Frequency resp in Frequency D Unit – V Introduction to Controllability a TEXT BOOK: 1. Nagra REFERENCES	ystem stability. Frequency Response Analysis: ponse – Correlation between frequency domain and time domain lomain-Nyquist Stability Criteria-Introduction to Compensators. State Space Representation: state space analysis - Phase variable and canonical forms - State and Observability of systems-Kalman test for Controllability and Observability of systems-Kalman test for Controllability and Observability and Observability of systems Engineering", 5 th Edition, New	specifications - te transition ma oservability. Age Internation	Bode plot – Pe trix - Solutions Lectur e al , New Delhi	olar p s to s e:45, i, 201	lot –S tate s Tuto i	Stabilit	9 + 3 y Analysis 9 + 3 equation

		UTCOM		e, the stu	dents v	will be abl	e to						(BT Map Highest L	
CO1	dev	velop ma	athematic	al models	for var	ious types	of contro	ol syster	ns.					Applying	(K3)
CO2	det	termine t	he time r	esponse o	of first a	and second	l order c	ontroller	s.					Applying	(K3)
CO3	ver	rify the s	tability of	the system	ms in tii	me domair	۱.							Applying	
CO4		•	-	-		oility of sys		frequen	cv dom	ain				Applying	(K3)
CO5						lability and					IS.			Applying	(K3)
						Mappin	g of CO	s with F	POs and	d PSOs					
COs/F	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3	2	1	1								2	3	
CO	2	3	3	2	2	2								3	
CO	3	3	3	2	2	2				2	2		2	3	
CO	4	3	3	2	2	2				2	2		2	3	
CO	5	3	2	1	1									3	
	jin, 2				, DT- L	Bloom's Ta	SMENT		RN - TH	IEORY					
	st / B Categ	loom's jory*	R	emember (K1) %	ing	Understa (K2)	•	Apply (K3)		Analyz (K4)	-	Evaluating (K5) %		reating K6) %	Tota %
	CA			05		35		60	-	-		-		-	100
	CA			05		25		70		-		-		-	100
	CA			05		25		70	-	-		-		-	100
	ES	SE		05		25		70)	-		-		-	100



Programm Branch	ne&	B.E &	Electro	onics and (Communication E	Engineerir	ng	Sem.	Category	L	т	Р	Credit
Prerequisi	ites	Nil						4	PC	0	0	2	1
Deservable		T : -			4h - 6m			-1 -1:-:4-1	City and the				
Preamble LIST OF E	XPERIMI				the frequency con	nponents d	of a signa	ai, digitai	tiliters and its	Imple	mentat	ion	
₁ Ge	eneration	of Variou	us Signa	Is and Seq	uences (Periodic a		dic), suc	h as Unit	Impulse, Uni	it Step	, Squa	re, Sa	w tooth
₂ Op	erations	on Signa	Is and S		g MATLAB and Si such as Addition, I pulink		on, Scali	ng, Shifti	ng, Folding, C	Compu	Itation	of Ene	ergy an
, Pe	rform way	veform s	ynthesis	s using Lap	lace transform an or a given transfer		orm of a	given sig	gnal. Also loc	ate ze	eros, po	oles. A	Also plo
4. Pe	rform line	ar convo	olution a	nd Circular	convolution using	MATLAB							
	nsider an ATLAB	audio s	ignal and	d convert th	is into discrete tim	ne signal. A	Also com	pute the	Discrete Fou	rier Tr	ansforr	m and	IDFT i
6. FIF	R Filter de	esign and	d its ana	lysis with th	e Windowing met	hod using	MATLAE	3					
7. Dig	gital IIR Fi	ilter desi	gn and i	ts analysis	using impulse inva	ariant meth	nod and I	bilinear tı	ransformation	techr	nique u	sing N	IATLA
8. FIF	R and IIR	Filter de	sign usi	ng Simulink									
9. Au	dio loopb	ack usin	g interru	pt and polli	ng method with TI	MS320C67	7XX proc	essor.					
10. Mir	niproject												
													Total:
REFEREN	CES/MA		SOETW	ADE.									
	boratory N		501 TW										
1.	ATLAB												
<u> </u>	de Comp	oser Stu	idio.										
<u>კ.</u> ს ან	18320067	XX DSF	proces	cor datach	1								
<u>.</u> тм				SUI Ualasin	eet								
J. ТМ			•		961								
4 TM	OUTCOM		·									Mapp	
4 TM	OUTCOM etion of t	he cour	se, the	students w	vill be able to						(High	est L	evel)
4 TM COURSE (On comple CO1 sim	OUTCOM etion of t nulate vari	he cour ious con	se, the stinuous	students w and discret	rill be able to e time signals						(High App Prec	lying(l ision	evel) K3), (S3)
COURSE (On comple	OUTCOM etion of t nulate vari	he cour ious con	se, the stinuous	students w and discret	vill be able to	ecification					(High App Prec App	lying(l ision lying(l	evel) K3), (S3) K3),
4 TM COURSE (On comple CO1 sim CO2 des	OUTCOM etion of t nulate vari	he cour ious con ligital filt	se, the stinuous er and II	students w and discret R digital filt	rill be able to e time signals						(High App Prec App Prec App	lying(l ision lying(l ision lying(l	evel) K3), (S3) K3), (S3) K3),
4 TM COURSE (On comple CO1 sim CO2 des	OUTCOM etion of t nulate vari	he cour ious con ligital filt	se, the stinuous er and II	students w and discret R digital filt	vill be able to e time signals er for the given sp						(High App Prec App Prec App	lying(l ision lying(l ision	evel) K3), (S3) K3), (S3) K3),
GOURSE (On comple CO1 sim	OUTCOM etion of t nulate vari	he cour ious con ligital filt	se, the stinuous er and II	students w and discret R digital filt uisition and	vill be able to e time signals er for the given sp	^D processo	or)s			(High App Prec App Prec App	lying(l ision lying(l ision lying(l	evel) K3), (S3) K3), (S3) K3),
4 TM COURSE (On comple CO1 sim CO2 des CO3 per	OUTCOM etion of t nulate vari sign FIR c form real	he cour ious con ligital filt	se, the stinuous er and II	students w and discret R digital filt uisition and	rill be able to e time signals er for the given sp processing in DSF	processo	or	Ds PO10	P011	P012	(High App Prec App Prec App Prec	lying(l ision lying(l ision lying(l	evel) K3), (S3) K3), (S3) K3), (S3)
4 TM COURSE (On comple CO1 sim CO2 des CO3 per CO5/POs	OUTCOM etion of t nulate vari sign FIR c form real	he cour ious con ligital filt time sig	se, the stinuous er and II nal acqu	students w and discret R digital filt uisition and PO4 P	fill be able to e time signals er for the given sp processing in DSF Mapping of Cos v	processo	or and PSO		PO11 2	PO12	(High App Prec App Prec App Prec 2 Pt	lying(l ision lying(l ision lying(l ision	evel) K3), (S3) K3), (S3) K3),
4 TM 4 TM COURSE (On completion CO1 sim CO2 des CO3 per	OUTCOM etion of t nulate vari sign FIR c form real	he cour ious con ligital filt time sig PO2	se, the stinuous er and II nal acqu	students w and discret R digital filt uisition and PO4 P 3	vill be able toe time signalser for the given spprocessing in DSFMapping of Cos vO5PO6PO6	processo	and PSO			P01:	(High App Prec App Prec App Prec 2 P:	lying(l ision lying(l ision lying(l ision SO1	evel) (3), (53) (3), (53) (3), (53) PSC

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

Progra Branci	amme& h	B.E & Ele	ctronics ar	nd Communica	tion Engineerir	ng	Sem.	Category	L	т	Р	Credit
	quisites	Nil					4	PC	0	0	2	1
Pream	ble	To do pro	gramming u	ising 8086 and 8	39C51							
		ENTS / EXE	RCISES:									
1.	Arithmetic op	erations usi	ng 8086 mic	croprocessor								
2.	Sorting and s	searching ma	anipulation u	using 8086 MICI	ROPROCESSO	R						
3.	Arithmetic op	erations usi	ng 89C51 m	nicrocontroller								
4.	Object count	er with 7-seg	ment displa	ay and digital se	nsor using 89C5	51 micro	controller					
5.	Digital locker	with LCD ar	nd Keypad u	using 89C51 mic	crocontroller.							
6.	Conveyer be	lt movement	using Step	per motor with 8	9C51 microcont	roller						
7.	Fire alarm sy	etom using (00054 mian									
	r no alaini oy	stern using a		ocontroller								
	The diam by	stern using a		ocontroller								Total:3
				DCONTROller								Total:3
	RENCES/ MA	NUAL /SOF		controller								Total:3
REFE		NUAL /SOF	TWARE:	controller								Total:30
REFE 1. 2.	RENCES/ MA Laboratory N Keil and Pro	NUAL /SOF /anual teus software	TWARE:	controller								
REFEF 1. 2.	RENCES/ MA Laboratory M Keil and Pro SE OUTCOM	NUAL /SOF /anual teus software	TWARE:	ts will be able t	0						BT Map ghest l	ped
REFEF 1. 2. COUR	RENCES/ MA Laboratory M Keil and Pro SE OUTCOM mpletion of t apply 808	NUAL /SOF /anual teus software IES: he course, t 6 and 8051 i	TWARE:	ts will be able t ets and address	sing modes for a	given a	ddition / S	Subtraction /		(Hi A	BT Map ghest l	ped Level) (K3),
REFEF 1. 2. COUR On col	RENCES/ MA Laboratory M Keil and Prot SE OUTCOM mpletion of t apply 808 Multiplicat	NUAL /SOF /anual teus softward IES: he course, 1 6 and 8051 i ion / Divisior), Switch ,	TWARE:	ts will be able t ets and address g and sorting pro	sing modes for a	•		Subtraction /		(Hi A P A	ST Map ghest I oplying recisior oplying	ped Level) (K3), 1 (S3) (K3),
REFEF 1. 2. COUR On col CO1 CO2	RENCES/ MA Laboratory M Keil and Pro SE OUTCOM mpletion of t apply 808 Multiplicat build LEE Microcont	NUAL /SOF Ianual teus software IES: he course, f 6 and 8051 i ion / Divisior) , Switch , roller	TWARE:	ts will be able t ets and address g and sorting pro C, Stepper mot	sing modes for a ograms	tor interf				(Hi A P A P A	ST Map ghest I oplying recisior	ped Level) (K3), 1 (S3) (K3), 1 (S3) (K3),
REFEF 1. 2. COUR On col CO1 CO2	RENCES/ MA Laboratory M Keil and Pro SE OUTCOM mpletion of t apply 808 Multiplicat build LEE Microcont	NUAL /SOF Ianual teus software IES: he course, f 6 and 8051 i ion / Divisior) , Switch , roller	TWARE:	ts will be able t ets and address g and sorting pro C, Stepper mot roject using 805	sing modes for a ograms tor and DC Mo 1 Microcontrolle	tor interf	aces v			(Hi A P A P A	BT Map ghest I oplying recisior oplying recisior oplying	ped Level) (K3), 1 (S3) (K3), 1 (S3) (K3),
REFEF 1. 2. COUR On col CO1 CO2	RENCES/ MA Laboratory M Keil and Prot SE OUTCOM mpletion of t apply 808 Multiplicat build LEE Microcont demonstra	NUAL /SOF Ianual teus software IES: he course, f 6 and 8051 i ion / Divisior) , Switch , roller	TWARE:	ts will be able t ets and address g and sorting pro C, Stepper mot roject using 805	sing modes for a ograms tor and DC Mo	tor interf	aces v		P01	(Hi P A P A P	BT Map ghest I oplying recisior oplying recisior oplying	ped Level) (K3), 1 (S3) (K3), 1 (S3) (K3), 1 (S3)
REFE 1. 2. COUR COUR CO1 CO2 CO3	RENCES/ MA Laboratory M Keil and Pro SE OUTCOM mpletion of t apply 808 Multiplicat build LEE Microcont demonstra	NUAL /SOF Ianual teus softward IES: he course, 1 6 and 8051 i ion / Divisior 0 , Switch , roller ate the worki	TWARE:	ts will be able t ets and address g and sorting pro C, Stepper mot roject using 805 Mapping of	sing modes for a ograms tor and DC Mo 1 Microcontrolle Cos with POs a	tor interf	aces v	vith 8051	P01.	(Hi P A P A P	BT Map ghest I oplying recisior oplying recisior oplying recisior	ped Level) (K3), (S3) (K3), (K3), (K3), (K3),
REFEF 1. 2. COUR On col CO1 CO2 CO3	RENCES/ MA Laboratory M Keil and Prot SE OUTCOM mpletion of t apply 808 Multiplicat build LEE Microcont demonstrat POs 1 3	NUAL /SOF Ianual teus softward IES: he course, 1 6 and 8051 i ion / Divisior 0 , Switch , roller ate the worki	TWARE: the student nstruction s a / searching ADC, DAC ng model/pr D3 PO4	ts will be able t ets and address g and sorting pro C, Stepper mot roject using 805 Mapping of	sing modes for a ograms tor and DC Mo 1 Microcontrolle Cos with POs a	tor interf r and PSC PO9	aces v Ps PO10	vith 8051		(Hi P A P A P	BT Map ghest I oplying recisior oplying recisior oplying recisior	ped Level) (K3), 1 (S3) (K3), 1 (S3) (K3),

			(C	ommon to	All Engin	eering and	Technolog	v Branch	es)				
Progran Branch	nme &	All B.E.	/B.Tech Bra		<u> </u>	<u>-</u>		em.	Category	L	т	Р	Credit
Prerequ	isites	Nil						4	HS	0	0	2	1
Preambl	e		urse is desig ional comm			ssary skills	to listen, s	peak, rea	d and write	in orde	r to ob	tain be	tter
LIST OF	EXPERIM	ENTS / E	XERCISES:										
1.	Self I	ntroductio	n & Mock In	terview									
2.	Job	Applicatio	n letter with	Resume									
3.	Prese	entation: A	Technical t	opic / Proj	ect report	& a Case	study						
4.			ogues / Tele	phonic Co	onversatio	ns							
5.	Grou	p Discuss	ion										
6.		ling Aloud											
7.			prehension										
8.		0 1	ny Profiles										
9.	Prepa	aring revi	ews of a boo	k/product/	movie								
													Total: 、
REFERE		ANUAL /S	OFTWARE:										
	Lab	oratory Ma	-)								
1. 2. COURS	Lab Ore	oratory Ma II Digital L MES:	anual anguage La	b Software								apped st Leve	
1. 2. COURS	Lab Ore E OUTCOI pletion of	oratory Ma Il Digital L MES: the cours	anual	b Software ents will b	e able to					(F Unc	lighes derstar Imitatio	st Leve nding (I on (S1)	: I) <2),
1. 2. COURS On com	E OUTCOI pletion of enha	oratory Ma Il Digital L MES: the cours nce effect	anual anguage La se, the stude	b Software ents will b and readir	be able to ng skills		education			(F Unc A Na	lighes derstar Imitatio Applyir turaliz	st Levending (I on (S1) ng (K3) ation (S	!) <2),) , S5)
1. 2. COURS On com CO1	E OUTCOI pletion of acqu	oratory Ma II Digital L MES: the cours nce effect	anual anguage La se, the stud e ive listening	b Software ents will b and readir equired fo	be able to ng skills r workpla	ce/higher e				(F Unc / Na	Highes derstar Imitatio Applyir turaliz Applyir	st Levending (I on (S1) ng (K3)	I) (2), (55)
1. 2. COURS On com CO1 CO2	E OUTCOI pletion of acqu	oratory Ma II Digital L MES: the cours nce effect	anual anguage La se, the stud ive listening sional skills r	b Software ents will b and readir equired fo effectively	be able to ng skills r workplac / in variou	ce/higher e				(F Unc / Na	Highes derstar Imitatio Applyir turaliz Applyir	at Leve nding (I on (S1) ng (K3) ation (S ng (K3)	I) (2), (55)
1. 2. COURS On com CO1 CO2	E OUTCOI pletion of acqu	oratory Ma II Digital L MES: the cours nce effect	anual anguage La se, the stud ive listening sional skills r	b Software ents will b and readir equired fo effectively	be able to ng skills r workplac / in variou	ce/higher e	S	SOs PO8	PO9	Unc Unc / Na	tighes derstar Imitatio Applyir turaliz Applyir rticula	at Leve nding (I on (S1) ng (K3) ation (S ng (K3)	I) (2), (55)
1. 2. COURS On com CO1 CO2 CO3 CO3	Lab Ore E OUTCOI pletion of enha acqu use E	oratory Ma II Digital L MES: the cours nce effect ire profess English lan	anual anguage La se, the stude ive listening sional skills r iguage skills	b Software ents will b and readir equired fo effectively Map	pe able to ng skills r workplaa / in variou	ce/higher e is situation COs with F	s POs and P		PO9 2	(H Unc A Na A	tighes derstar Imitatio Applyir turaliz Applyir rticula	st Leve nding (I on (S1) ng (K3) ation (S ng (K3) tion (S	il) (2), (55) (4)
1. 2. On com CO1 CO2 CO3 CO3 COs/ POs	Lab Ore E OUTCOI pletion of enha acqu use E	oratory Ma II Digital L MES: the cours nce effect ire profess English lan	anual anguage La se, the stude ive listening sional skills r iguage skills	b Software ents will b and readir equired fo effectively Map	pe able to ng skills r workplac / in variou	ce/higher e is situation COs with F	s POs and P			(H Uno / Na A PO10	tighes derstar Imitatio Applyir turaliz Applyir rticula	st Leve nding (I on (S1) ng (K3) ation (S ng (K3) tion (S	(2), (2), (55) (4) PO1

	(Common to All BE/ BTech Engineering and Tech		ranches)				
Programme &		0,	,				
Branch	All BE/ BTech Engineering and Technology branches	Sem.	Category	L	Т	Р	Credi
Prerequisites	Nil	4	EC	0	0	80	2
Preamble	This subject is to enhance the employability skills and to dev	elop care	er competen	CV			
Unit – I	Soft Skills – I :	0.00	<u></u>	-)			20
	confidence. Professional grooming and practices: Basics of cor of etiquette-Introductions and greetings-Rules of the handshak anguage. Quantitative Aptitude and Logical Reasoning – I:						elephon
	evel I: Number System-LCM &HCF-Divisibility test-Surds and inc		anums= rali	U-DIC	າມບາແປ	nis and	variatiol
connectives-Binar	speed and distance-Data interpretation-data representation. Lo y logic Linear arrangements- Circular and complex arrangemen Written Communication & Verbal Aptitude	t		ily tre	ee- De	eductior	ns-Logica
connectives-Bina Unit – III Writing Skills: Wr Professional e-ma (Transcoding) W Phrases Paired v Spotting Errors S	y logic Linear arrangements- Circular and complex arrangemen	Cover le al Repor s Homon orms usir Transforn	tter -Respond writing Inter yms One wo ng appropriate nation : Active	ding preta ord s e arti e-Pas	to Jok tion c ubstitu icles a ssive a	o Adver of Techr ution Idi and pre & Direct	as-Logica 30 tisement nical Dat ioms an positions -Indirect
connectives-Bina Unit – III Writing Skills: Wr Professional e-ma (Transcoding) Wi Phrases Paired v Spotting Errors So Rearranging Jum	y logic Linear arrangements- Circular and complex arrangement Written Communication & Verbal Aptitude iting strategies and formats Importance of Résumés Writing a ail Writing Responding to e-mails and business letters Technic iting One-page Essays. Verbal Aptitude Synonyms Antonyms vords Analogies Spelling test Cloze test using suitable verb for entence Correction and Formation Grammar Based questions (Cover le al Repor s Homon orms usir Transforn	tter -Respond writing Inter yms One wo ng appropriate nation : Active	ding preta ord s e arti e-Pas	to Jok tion c ubstitu icles a ssive a	o Adver of Techr ution Idi and pre & Direct	tisement nical Dat nical san positions
connectives-Bina Unit – III Writing Skills: Wr Professional e-ma (Transcoding) Wr Phrases Paired v Spotting Errors S Rearranging Jum TEXT BOOK: 1 Edgar Th	y logic Linear arrangements- Circular and complex arrangement Written Communication & Verbal Aptitude iting strategies and formats Importance of Résumés Writing a ail Writing Responding to e-mails and business letters Technic iting One-page Essays. Verbal Aptitude Synonyms Antonyms vords Analogies Spelling test Cloze test using suitable verb for entence Correction and Formation Grammar Based questions (t Cover le al Repor s Homon orms usir Transforn nces and	tter -Respond writing Inter yms One wo ng appropriat nation : Active Judgements	ding preta ord s e arti e-Pas state	to Jok tion c ubstitu icles a ssive a ement	o Adver of Techr ution Idi and pre & Direct s	as-Logica 30 tisement nical Dat ioms an positions -Indirect Total:4
connectives-Bina Unit – III Writing Skills: Wr Professional e-ma (Transcoding) Wi Phrases Paired v Spotting Errors Sa Rearranging Jum TEXT BOOK: 1. Edgar Th Services	y logic Linear arrangements- Circular and complex arrangemen Written Communication & Verbal Aptitude iting strategies and formats Importance of Résumés Writing a ail Writing Responding to e-mails and business letters Technic iting One-page Essays. Verbal Aptitude Synonyms Antonyms vords Analogies Spelling test Cloze test using suitable verb for entence Correction and Formation Grammar Based questions (bled Sentences & Jumbled paragraphs, Identifying Facts, Infere orpe and Showick Thorpe, "Objective English for Competitive Ex-	t Cover le al Repor s Homon orms usir Transforn nces and	tter -Respond writing Inter yms One wo ng appropriat nation : Active Judgements	ding preta ord s e arti e-Pas state	to Jok tion c ubstitu icles a ssive a ement	o Adver of Techr ution Idi and pre & Direct s	as-Logica 30 tisement nical Dat ioms an positions -Indirect Total:4
connectives-Bina Unit – III Writing Skills: Wr Professional e-ma (Transcoding) Wr Phrases Paired v Spotting Errors Sa Rearranging Jum TEXT BOOK: 1. Edgar Th Services REFERENCES:	y logic Linear arrangements- Circular and complex arrangemen Written Communication & Verbal Aptitude iting strategies and formats Importance of Résumés Writing a ail Writing Responding to e-mails and business letters Technic iting One-page Essays. Verbal Aptitude Synonyms Antonyms vords Analogies Spelling test Cloze test using suitable verb for entence Correction and Formation Grammar Based questions (bled Sentences & Jumbled paragraphs, Identifying Facts, Infere orpe and Showick Thorpe, "Objective English for Competitive Ex-	t Cover le al Repor s Homon orms usir Transforn nces and kaminatic	tter -Respond writing Inter yms One wo ng appropriat nation : Active Judgements	ding preta ord s e arti ∋-Pas state	to Jok tion c ubstitu icles a ssive a ement	o Adver of Techr ution Idi and pre & Direct s	as-Logic 30 tisement ical Dat ioms an positions -Indirect Total:4

		UTCOI tion of		rse, the	studen	ts will be	e able to	D					()	BT Mapped lighest Lev						
CO1			e soft sk nd as a		arners t	o suppoi	rt them v	work ef	ficiently	/ in an c	organiza	tion as an		Applying (K3 Precision (S3						
CO2	solv	/e real t	ime prot	olems usi	ng num	erical ab	ility and	logical	reasor	ing				Applying (K3 Precision (S3						
CO3				on skills grammat				l and de	eliver ir	formatio	on in var	ious		Applying (K3 Precision (S3						
						Марр	ing of C	Os wit	h POs	and PS	Os									
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2					
CO	1	3	2				3	3		3		3	2							
CO	2	3	2				3	3		3		3	2							
CO	3		2				3	3		3	3	3	2							
1 – Sli	ght, 2	2 – Mod	erate, 3	 Substa 	ntial, B	T- Bloom	's Taxor	nomy												
						ASSE	SSMEN		TERN	THEOF	RY									
Tos		oom's ory*	Re	member (K1) %	ing l	Jndersta (K2)	•	Apply (K3)		Analyz (K4)	•	valuating (K5) %	Creat	ing (K6) %	Total %					
	aley			_	<u> </u>	50		30							100					
	CAT			2	0	50		30												
	•	1		2	0										100					
	CAT	1 2		2	0										100 100					

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		1			r.		1
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Digital Electronics	5	PC	3	0	0	3
Preamble	To impart global understanding of Verilog Hard characteristics, fabrication and testing of ICs.	lware Des	cription Langu	iage a	nd MC	DS t	ransistor
Unit – I	Verilog HDL:						9
Data flow modelin Conditional staten	g –Behavioral modeling - Structured procedures- Procedural assi nents- Multiway branching – Loops- Switch level modeling.	gnments- T	ming controls –	Delay co	ontrol- Ev	/ent co	ontrol -
Unit – II	Logic Synthesis and RTL Design:						9
	Impact of logic synthesis- Verilog HDL synthesis- Synthesis desi TL design : 4-bit full adder subtractor- ALU design – Booth multip		erification of gate	e level n	etlist- Mo	odeling	g tips for
Unit – III	MOS Transistor:						9
	MOS transistor theory- Long channel I-V character s - Noise margin - Power dissipation - Switching characteristics.	stics- C-\	characteristic	s- No	n-ideal	I-V	effects-
Unit – IV	MOS Fabrication:						9
An overview o	of silicon semiconductor technology - Basic CMOS	technology	· N-well P-v	vell T	win tu	h ar	nd SOI
process- Latch Introduction to sta	up and prevention- Layout Design rules- Stick of tic CMOS- Pseudo nMOS logic -dynamic CMOS-Cascade Voltag	liagram- L	ayout diagran		win tu basic	logic	gates-
process- Latch Introduction to sta Unit – V	up and prevention- Layout Design rules- Stick of tic CMOS- Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing:	liagram- L e Switch Lo	.ayout diagran gic.	n for	basic	logic	gates-
process- Latch Introduction to sta Unit – V Introduction to	up and prevention- Layout Design rules- Stick of tic CMOS- Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing: testing- Logic verification principles- Test vectors pontrollability - Fault coverage – DFT- Ad-Hoc testing	liagram- L e Switch Lo -Manufactu	ayout diagran. gic. ring test pri	n for	basic	logic	gates- 9 models-
process- Latch Introduction to sta Unit – V Introduction to Observability, Co	up and prevention- Layout Design rules- Stick of tic CMOS- Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing: testing- Logic verification principles- Test vectors pontrollability - Fault coverage – DFT- Ad-Hoc testing	liagram- L e Switch Lo -Manufactu	ayout diagran. gic. ring test pri	n for	basic	logic ault and	gates- 9 models- Boolean
process- Latch Introduction to sta Unit – V Introduction to Observability, Co difference method	up and prevention- Layout Design rules- Stick of tic CMOS- Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing: testing- Logic verification principles- Test vectors pontrollability - Fault coverage – DFT- Ad-Hoc testing	liagram- L e Switch Lo -Manufactu	ayout diagran. gic. ring test pri	n for	basic	logic ault and	gates-
process- Latch Introduction to sta Unit – V Introduction to Observability, Co difference method TEXT BOOKS:	up and prevention- Layout Design rules- Stick of tic CMOS- Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing: testing- Logic verification principles- Test vectors pontrollability - Fault coverage – DFT- Ad-Hoc testing Samir, "Verilog HDL: A Guide to Digital Design and 17, for Units I, II.	liagram- L e Switch Lo -Manufactu - Scan d d synthesis	ayout diagran gic. ring test pri esign – BIST s", 2 nd Edition	n for	basic - Fa orithm	ault and	gates- 9 models- Boolean Total:45
process- Latch Introduction to sta Unit – V Introduction to Observability, Co difference method TEXT BOOKS: 1. Palnitkar Delhi, 20 2. Neil We	up and prevention- Layout Design rules- Stick of tic CMOS- Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing: testing- Logic verification principles- Test vectors pontrollability - Fault coverage – DFT- Ad-Hoc testing Samir, "Verilog HDL: A Guide to Digital Design and	liagram- L e Switch Lo -Manufactu - Scan d d synthesis	ayout diagran gic. ring test pri esign – BIST s", 2 nd Edition	n for nciples - D-alg	basic - Fa orithm	ault and ucatio	gates- 9 models- Boolean Total:45
process- Latch Introduction to sta Unit – V Introduction to Observability, Co difference method TEXT BOOKS: 1. Palnitkar Delhi, 20° 2. Neil We education	up and prevention- Layout Design rules- Stick of tic CMOS-Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing: testing- Logic verification principles- Test vectors pontrollability - Fault coverage – DFT- Ad-Hoc testing Samir, "Verilog HDL: A Guide to Digital Design and 7, for Units I, II. este & David Harris, "CMOS VLSI Design-A circuit	liagram- L e Switch Lo -Manufactu - Scan d d synthesis	ayout diagran gic. ring test pri esign – BIST s", 2 nd Edition	n for nciples - D-alg	basic - Fa orithm	ault and ucatio	gates- 9 models- Boolean Total:45
process- Latch Introduction to sta Unit – V Introduction to Observability, Co difference method TEXT BOOKS: 1. Palnitkar Delhi, 20 ⁻ 2. Neil We education REFERENCES:	up and prevention- Layout Design rules- Stick of tic CMOS-Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing: testing- Logic verification principles- Test vectors pontrollability - Fault coverage – DFT- Ad-Hoc testing Samir, "Verilog HDL: A Guide to Digital Design and 7, for Units I, II. este & David Harris, "CMOS VLSI Design-A circuit	diagram- L e Switch Lo -Manufactu - Scan d d synthesis	ayout diagran gic. ring test pri esign – BIST s", 2 nd Edition	n for nciples - D-alg	basic - Fa orithm	ault and ucatio	gates- 9 models- Boolean Total:45
process- Latch Introduction to sta Unit – V Introduction to Observability, Cd difference method TEXT BOOKS: 1. Palnitkar Delhi, 20 2. Neil We education REFERENCES: 1. Pucknell, 2. Rabaey	up and prevention- Layout Design rules- Stick of tic CMOS-Pseudo nMOS logic -dynamic CMOS-Cascade Voltag CMOS Testing: testing- Logic verification principles- Test vectors pontrollability - Fault coverage – DFT- Ad-Hoc testing Samir, "Verilog HDL: A Guide to Digital Design and 17, for Units I, II. este & David Harris, "CMOS VLSI Design-A circuit , New Delhi, 2019, for Units III, IV, V.	diagram- L e Switch Lo -Manufactu - Scan d synthesis s & Sys -earning, Ne	ayout diagran gic. ring test pri esign – BIST s", 2 nd Edition stem Perspecti	n for nciples - D-alg , Pears ive", 4	basic - Fa orithm	ault and ucatio on,	gates- 9 models- Boolean Total:45



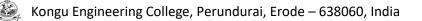
CO4

CO5

	SE OUT mpletio		ES: e course	e, the stu	idents w	ill be ab	le to							BT Mappe ighest Le ^v	
CO1	develo Langu		gital log ogrammi		iits and	VLSI	system	s using	Verilo	g Hardw	are Desc	cription	A	pplying (K	(3)
CO2	illustra	ate the	compone	ents in the	e logic sy	nthesis-l	based de	sign flow.					A	pplying (K	(3)
CO3	elaboi	rate the	characte	eristics of	MOS tr	ansistor.							Und	erstanding	g (K2)
CO4			technique ts using v				t design r	ules to d	raw layou	It of logic f	unctions a	ind to	Δ	pplying (K	(3)
CO5	interp	ret the	testing te	chniques	algorith	ms to tes	t the circ	uits					Und	erstanding	j (K2)
						Мар	ping of C	COs with	POs an	l PSOs					
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	3	3		3				2			2	3	3
CO	2	3	3	3		3				2			2	3	3
CO	3	3	3	2		2				2			2	3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

		ASSESSME	NT PATTERN	- THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	15	35	50	-	-	-	100
CAT2	15	70	15	-	-	-	100
CAT3	15	50	35	-	-	-	100
ESE	10	55	35	-	-	-	100



22ECT52 - ANALOG	AND DIGITAL	COMMUNICATION
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Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Digital Signal Processing, Electronic Circuits	5	PC	3	0	0	3
Preamble	To endow the fundamentals and analytical perspectives of co	mmunication	systems.				
Unit – I	Amplitude Modulation:						9
	ulation and its need– Linear modulation schemes: DSBSC, SS n multiplexing – Superheterodyne receivers – Noise in AM receive						
Unit – II	Angle Modulation:						9
	ation, Narrowband FM, Wideband FM – Generation of FM: Indirect					cy dis	criminato
Unit – III	Pulse Modulation and Baseband Pulse Transmission:	•					9
Manchester – Ma	S – PAM – Quantization process –PCM – TDM – Delta modulation tched filter as optimum receiver – Intersymbol interference – Eye p	battern – Nyq	uist criterion fo	r dist	ortior	i∠, on i less	baseban
binary transmissio	on – Pulse shaping with raised cosine filter –Adaptive equalization	: LMS algorit	thm (concept c	only)			
Unit – IV	Pass band Digital Transmission and Spread Spectrum Co	ommunicatio	on:	• ·			9
Unit – IV Introduction – Co Minimum Shift Ke		ommunicatio QPSK – QAN	on: M- BER analys	sis of	BPS		QPSK ·
Unit – IV Introduction – Co Minimum Shift Ke spectrum Unit – V	Pass band Digital Transmission and Spread Spectrum Co herent Phase Shift Keying: BPSK, QPSK, OQPSK, π/4 shifted ying – Spread spectrum: PN sequence and its properties- Direct se Information Theory and Coding:	ommunicatic QPSK – QAN equence spre	n: M- BER analys ad spectrum-F	sis of requ	BPS ency	hoppi	l QPSK ng sprea 9
Unit – IV Introduction – Co Minimum Shift Ke spectrum Unit – V Entropy and its p	Pass band Digital Transmission and Spread Spectrum Coherent Phase Shift Keying: BPSK, QPSK, OQPSK, $\pi/4$ shifted ying – Spread spectrum: PN sequence and its properties- Direct set	QPSK – QAN equence spre	n: M- BER analys ad spectrum-F emoryless cha	sis of requ	BPS ency – Mu	hoppi tual ir	I QPSK ng sprea 9 Iformation diagram
Unit – IV Introduction – Co Minimum Shift Ke spectrum Unit – V Entropy and its p and its properties Viterbi algorithm	Pass band Digital Transmission and Spread Spectrum Content herent Phase Shift Keying: BPSK, QPSK, OQPSK, π/4 shifted ying – Spread spectrum: PN sequence and its properties- Direct sequence Information Theory and Coding: roperties – Source coding theorem : Huffman coding, LZ coding	QPSK – QAN equence spre	n: M- BER analys ad spectrum-F emoryless cha	sis of requ	BPS ency – Mu	hoppi tual ir	I QPSK ng sprea 9 Iformatio diagram
Unit – IV Introduction – Co Minimum Shift Ke spectrum Unit – V Entropy and its p and its properties Viterbi algorithm TEXT BOOK:	Pass band Digital Transmission and Spread Spectrum Content herent Phase Shift Keying: BPSK, QPSK, OQPSK, π/4 shifted ying – Spread spectrum: PN sequence and its properties- Direct sequence Information Theory and Coding: roperties – Source coding theorem : Huffman coding, LZ coding	Demmunicatio QPSK – QAN equence spre – Discrete me ming codes –	n: M- BER analysis ad spectrum-F emoryless cha Convolutiona	sis of requ	BPS ency – Mu	hoppi tual ir	I QPSK ng sprea 9 Iformation diagram
Unit – IV Introduction – Co Minimum Shift Ke spectrum Unit – V Entropy and its p and its properties Viterbi algorithm TEXT BOOK: 1. Simon Ha	Pass band Digital Transmission and Spread Spectrum Content herent Phase Shift Keying: BPSK, QPSK, OQPSK, π/4 shifted ying – Spread spectrum: PN sequence and its properties- Direct sequence Information Theory and Coding: roperties – Source coding theorem : Huffman coding, LZ coding – Channel coding theorem – information capacity theorem; Hamiltonian Coding theorem	Demmunicatio QPSK – QAN equence spre – Discrete me ming codes –	n: M- BER analysis ad spectrum-F emoryless cha Convolutiona	sis of requ	BPS ency – Mu	hoppi tual ir	I QPSK ng sprea 9 Iformatio diagram
Unit – IV Introduction – Co Minimum Shift Ke spectrum Unit – V Entropy and its p and its properties Viterbi algorithm TEXT BOOK: 1. Simon Ha REFERENCES:	Pass band Digital Transmission and Spread Spectrum Content herent Phase Shift Keying: BPSK, QPSK, OQPSK, π/4 shifted ying – Spread spectrum: PN sequence and its properties- Direct sequence Information Theory and Coding: roperties – Source coding theorem : Huffman coding, LZ coding – Channel coding theorem – information capacity theorem; Hamiltonian Coding theorem	Demmunicatic QPSK – QAN equence spre – Discrete me ming codes – New Delhi, 20	9n: M- BER analys ad spectrum-F emoryless cha Convolutiona	nnel	BPS ency – Mu es –	hoppi tual ir Trellis	d QPSK - ng spread 9 iformation diagram-
Unit – IV Introduction – Co Minimum Shift Ke spectrum Unit – V Entropy and its p and its properties Viterbi algorithm TEXT BOOK: 1. Simon Ha REFERENCES: 1. GautamS	Pass band Digital Transmission and Spread Spectrum Content herent Phase Shift Keying: BPSK, QPSK, OQPSK, π/4 shifted ying – Spread spectrum: PN sequence and its properties- Direct sector Information Theory and Coding: roperties – Source coding theorem : Huffman coding, LZ coding – Channel coding theorem – information capacity theorem; Hamilan aykin, "Communication Systems", 4 th Edition, John Wiley & Sons,	Demmunicatio QPSK – QAN equence spre – Discrete me ming codes – New Delhi, 20	M- BER analys ad spectrum-F emoryless cha Convolutiona 017. Graw-Hill, 2019	nnel l code	BPS ency – Mu es – [–]	hoppi tual ir Trellis hi	I QPSK - ng spread iformation diagram- Total:4



		JTCOM on of t		se, the st	udents	will be a	ble to							BT Mapp lighest Lo	
CO1	apply	y the co	oncept of	amplitud	e modula	ation and	l infer the	e effect o	of noise	in AM re	ceivers			Applying (K3)
CO2	infer	the cor	ncept of	narrowba	nd and v	vide ban	d FM and	d interpre	et the eff	ect of no	oise in FN	/ receivers	Und	lerstandin	g (K2)
CO3	ident meth	•	notion of	baseban	d pulse t	transmis	sion, inte	er-symbo	l interfe	rence an	id its com	pensation		Applying (K3)
CO4	illust	rate the	scheme	e of passt	and digi	tal transı	mission f	or bandl	imited a	nd widel	band sigr	als	Unc	lerstandin	g (K2)
CO5		•	characte nication	ristics of	discrete	memoryl	ess char	nnel and	provide	the solu	ition for lo	ossless, erroi		Applying (K3)
						Марр	ing of C	Os with	POs an	d PSOs					
COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	2	2					2	2	2		2	
CO	2	3	2	2	2					2	2	2		2	

CO4	3	3	2	2	2		3	3	3	2	2	2	
CO5	3	3	3	3	2		2 2	3	3		2	2	
1 – Slight, 2	2 – Mode	rate, 3 –	Substant	ial, BT	- Bloom's Ta	axonomy							
					ASSES	SMENT P	PATTERN	- THEOF	RY				
Test / B Categ		Re	memberi (K1) %	ing	Understar (K2) %		Applying (K3) %		yzing 4) %	Evaluating (K5) %		reating K6) %	Total %
CA	T1		10		55		35		-	-		-	100
CA	T2		15		55		30		-	-		-	100
CA	T3		10		55		35		-	-		-	100
ES	E		10		55		35		-	-		-	100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

CO3

	22ECC51 -EMBEDDED SYSTEMS	AND IOT					
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Microprocessor and Microcontroller	5	PC	3	0	2	4
Preamble	Interpret the concepts of microcontroller, display devices and se	ensors to make a	n automated e	mbec	lded p	oroduc	
Unit – I	Introduction to 8 bit Microcontroller:						9
	C 16F877A- Register file structure -CPU Register- Status Register- In d reset circuits-Program memory -Data memory.	nstruction sets- A	ddressing mod	les -S	Simple	e prog	rams usin
Unit – II	On-Chip Peripherals:						9
On-chip Periphera	Is: Timers-Compare-Capture and PWM Modules- Interrupts - Watch	ndog timer– ADC-	-USART - ALP	for T	imers	;	
Unit – III	PIC Programming in C:						9
	pgramming-LED-7 segment , Multiplexed 7 segment – switch-Timer	programming – A	ADC-USART				
Unit – IV Automation in boil	Case Studies on Boiler conveyer and clock: ers - Temperature, Pressure, Water level-display in LCD-Automatic	on in conveyor ba	ased LPG cylin	der f	illina	- cylin	9 der count
	splay in 7 segment- digital Alarm clock through I2C protocol.				g	e y iii i	
Unit – V	Case Studies on Development of IoT Applications : using PIC microcontroller, GSM and ThingSpeak. Development of	Moothor monitor	ing avatamy air	tom	orati	uro hu	9
	ad and control with cloud application.	weather monitor	ing system. an	temp	Jerall	ire, nu	innuity an
	g of 7-segment and switch with PIC 16F877A microcontroller.						
	ensor interfacing with PIC16F877A microcontroller.						
	n: PWM based speed control of DC motor using PIC16F877A micro						
	e: PWM based speed control of DC motor using PIC16F877A microc	controller					
	f clock using Real Time Clock with PIC 16F877A microcontroller.						
8. Design of	Weather monitoring system.		Lecture	:45,	Pract	ical:3	0, Total:7
TEXT BOOKS:							
	et: https://ww1.microchip.com/downloads/en/devicedoc/39582b.pdf	f					
	& John B, "Design with PIC Microcontrollers", 1 st Edition, Pearson I	-	Delhi. 2009.				
	, , , , , , , , , , , , , , , , , , , 		,				
REFERENCES/ M	ANUAL /SOFTWARE:						
1. Laborato	ry Manual						
2. Proteus/	CCS compiler						
B.F Electron	ics and Communication Engineering, Regulation, Curriculum	and Svllabus –	R2022		Pag	ge 162)



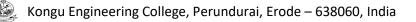
		JTCOM on of tl		se, the s	tudents	will be al	ble to							BT Mapp Highest L	
CO1	con	npreher	d the are	chitecture	e and co	ncepts of	PIC micro	controller						Applying (Precision	
CO2	illus	strate th	e workin	g princip	le of inte	rnal perip	herals in F	PIC micro	controller	and its ap	plications	5		Applying (Precision	
CO3				program PIC micro			chip periph	nerals ,Ex	kternal inp	out output	devices ir	n real		Applying (Precision	
CO4		elop en tal cloci		C progra	am for au	utomation	process ir	n boilers,	conveyor	based LP	G cylinde	r filling and		Applying (Precision	
CO5	Des	sign and	l build ha	ardware a	and soft	vare for lo	oT applicat	ions						Applying (Precision	
						Ма	apping of	COs witł	n POs an	d PSOs					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3				2							1		
CO2	2	3											1		
COS	3	3		2	1	3							2	3	2
CO4	1	3	1	2	2	3	1		2	3		2	3	3	2
CO5	5	3	2	2	3	3				3		2	3	3	2
1 – Slig	ht, 2 -	– Modei	ate, 3 –	Substan	tial, BT-	Bloom's 1	Faxonomy								·
						A	SSESSME		FERN - T	HEORY					
	/ Blo atego			nemberi (K1) %	ng	Underst (K2)			lying 8) %	Analyzi (K4) %		Evaluating (K5) %		reating (K6) %	Tota %
	CAT1			20		80)		-	-		-		-	100
	CAT2	2		10		50)	4	0	-		-		-	100
	CAT3	8		10		45	5	4	5	-		-		-	100
	ESE			10		50)	4	0	-		-		-	100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



22ECC52 - ANTENNAS AND WAVE PROPAGATION

Branch	mme & N	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prereq	uisites	Nil	5	PC	2	0	2	3
Preamb		To design and analyze the state of the art in antenna based of	n fundan			lund	orotor	ad ita
Fleam	Jie	parameter measurements.	Infundan			unu	ersiar	10 115
Unit – I		Fundamentals of Antenna:						6
Definitio	ons: Radiation	rtzian- Power radiated and radiation resistance, Half-wave di on pattern –Radiation intensity – Gain –Directive gain – Power g area – Relation between maximum aperture and gain –Folded Antenna Arrays:	ain –Dire					
		near array with n-isotropic point sources of equal amplitude and ation –Binomial array- Yagi Uda antenna - Log periodic dipole at						ase - Metho
Unit – I	11	Special and Aperture Antennas:						6
		ormal mode and axial mode of radiation - Horn antenna - Ante tenna: Rectangular patch: transmission line model design proce			ector	s and	d feed	ling system
Unit – I		Propagation of Radio Waves:						6
troposp	heric wave	 Dagation - Tropospheric wave propagation- Line of sight dis Sky wave propagation – Effective dielectric constant and um usable frequency – Skip distance 	stance- E conducti	ffective earth vity of ionosp	's ra here	dius, -Virtu	Fielc ual he	l strength o eight- Critica
Unit – V		Antenna Measurements:						6
		ce measurement- Radiation pattern measurements-Measurem	nent of di	rectivity, Mea	surer	nent	of an	tenna gain
vieasur	ement of rad	diation resistance – Antenna efficiency – Polarization						
LIST O	F EXPERIM	IENTS / EXERCISES:						
1.	Demonstra	ate and plot the radiation pattern of dipole antenna						
2.	Demonstra	ate and plot the radiation pattern of Yagi-Uda antenna						
3.	Demonstra	ate and plot the radiation pattern of Helical antenna						
4.	Design and	d simulate a rectangular microstrip patch antenna						
5.	Design and	d simulate a circular microstrip patch antenna						
6.	Simulate a	Phased array antenna and observe its radiation characteristics						
7.	Observe th	ne S-parameters of antenna using Vector Network analyzer						
8.	Design and	d Simulate a Slot antenna						
9.	Miniproject	t						
				Lectur	e:30	, Prae	ctical	:30, Total:6
TEXT E								
1.		D, "Antennas and Wave Propagation", 4 th Edition, Satya Prakash	han Publi	cations, New I	Delhi	, 201	9.	
REFER		ANUAL /SOFTWARE:						
1.	Kraus Johr Delhi, 2018	n D& Marhefka Ronald J& Ahmad S. Khan, "Antennas and Wav 3.	e Propag	ation", 5 th Edit	ion, l	McGr	aw Hi	ll, New
2.	Balanis Co	nstantine A, "Antenna Theory", 4 th Edition, John Wiley & Sons,	New York	k, 2016.				
	Laboratory							



		UTCOM	IES: he cours	e. the st	udents v	vill be al	ble to						(BT Mapp Highest L	
CO1			ncept of a	,				ologies u	sing me	asurem	ents			derstandir anipulatio	
CO2	iden	ntify the	performa	nce of an	tenna ar	ray with	its radiat	ion patte	ern with	measure	ement			Applying (anipulatio	
CO3	sho	w the ch	aracteris	tics of sp	ecial ant	ennas wi	ith meas	urement	s and si	mulatior	tool			Applying (Precision	
CO4	dese	cribe the	e differen	t types of	wave pr	opagatio	on effects	on the a	atmosph	eric lay	ers			derstandir Precision	
CO5	sum	marize	the impo	tance of	antenna	paramet	ter meas	urement	S					derstandir anipulatio	
						Mappir	ng of Co	s with F	os and	PSOs					
Cos/	Pos	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
~~~		0	0			0				•					•

			. •-									 		
(	CO1	3	2			3				3				3
(	CO2	3	3	2	2	3				3	2		2	3
(	CO3	3	2	2	2	3				3	2	2	2	3
(	CO4	3	3					2			2			
(	CO5	3	2						2		2	3		
4		Mada		Cubatant			<b>T</b> av/a <b>m</b> a ma							

		ASSESSMENT	PATTERN - 1	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	15	75	10	-	-	-	100
CAT2	15	65	20	-	-	-	100
CAT3	25	75	-	-	-	-	100
ESE	15	65	20	-	-	-	100



Programn	10 &														
Branch		B.E	& Electr	onics a	nd Com	munica	tion Eng	gineering	g Se	em.	Category	L	Т	Ρ	Credit
Prerequis	ites	Digi	tal Elect	ronics						5	PC	0	0	2	1
Preamble		To d	lesign ar	nd impler	ment dig	ital circu	uits using	Verilog	Hardwai	e Descri	ption Lang	uage			
LIST OF E	XPERIME	NTS/E	XERCIS	ES:											
1.	Modeling	of comb	oinationa	l circuits	and its	verificati	ion using	test ben	ch						
2.	Modeling	of sequ	ential dig	jital syst	ems and	d its verif	fication u	sing test	bench						
3.	Design a	nd simul	ate vend	ling mac	hine cor	ntroller u	sing FSN	Л							
4.	Design a	nd imple	mentatic	on of ALl	J in FPG	<b>B</b> A									
5.	Design a	nd imple	mentatic	on of 4X4	1 array n	nultiplier	and Wa	llace tree	in FPG	A					
6.	Design a	nd simul	ate Boot	h multip	lier										
7.	Design a	nd simul	ate a 8 x	8 FIFC	) memor	У									
8.	Design a	nd Imple	ment a r	eal time	clock us	sing FPC	GA								
9.	Design a	nd simul	ation of I	basic ga	tes using	g CMOS	transist	ors							
10.	Design a	nd simul	ation of I	D-Flipflo	p using	CMOS ti	ransistor	S							
11.	Miniproje	ct													
															Total:3
REFEREN	CES/ MAI	NUAL / S	SOFTW	ARE:											
1.	Laborato	ry Manua	al												
2.	ModelSin	n, Xilinx	ISE and	any SPI	CE Pacl	kage									
COURCE		-0.											DT		
COURSE On compl		-	se, the s	tudents	will be	able to								' Map hest L	pea _evel)
CO1	design ar	nd verify	the func	tions of o	digital sy	/stems u	ising Ver	ilog						lying ( cision	
CO2	implemer	nt digital	systems	in FPG	Ą								Арр	lying (	(K3),
002	design di	nital circ	uits at tr	ansistor	امريوا									cision lying (	
CO3		gitar ene												cision	
					Марр	oing of (	Cos with	Pos an	d PSOs						
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	2 F	PSO1	PSO2
CO1	3	2	3	2	3				3			3		3	3
	3	2	3	2	3				3			3		3	3
CO2					3										

1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy



Dresse	100.000				22ECL52	- ANALC	og ane	DIGIT	AL CC	OMMUN		N LABOF	RATO	JRY	<u>г г</u>	
Progra &Bran			B.E & I	Electroni	cs and C	ommuni	cation	Engine	ering	Se	m. C	ategory	L	т	Р	Credit
Prereq	uisites		Digital	Signal P	rocessin	g, Electr	onic C	rcuits			5	PC	0	0	2	1
Pream	hle		To built	d a firm fo	oundation	on analo	a and c	ligital co	ommur	nication	system	\$				
						on analo	gunu	igital of	omman	lioution	oyotom	0.				
	FEXPER															
1.	Verificatio			-												
Z.			• •		lulation us	•		nponen	ts							
3.	Verificatio	on of	Pulse co	ode modu	lation and	l demodu	lation									
4.	Verificatio	on of	Delta Mo	odulation	and demo	odulation										
	Verificatio	on of	Time div	ision mul	tiplexing a	and demu	ultiplexi	ng								
	Simulatio	n of l	ine codir	ng and ve	rification of	of eye pa	ttern									
	Simulatio	n of l	binary m	odulation	(BASK,BF	SK,BPS	K)and d	bserva	tion th	rough S	SDR					
	Simulatio	n of l	Minimum	Shift Ke	ving and C	Observati	on thro	ugh SD	R							
	Simulatio	n of l	M-ary mo	odulation(	QPSK, 16	6QAM)ar	d imple	mentat	ion usi	ng SDF	2					
	Generatio	on of	Huffman	coding a	nd decod	ing				•						
10.	Simulatio			-		5										
11.																
-	RENCES/			FTWARE	:											
2.	MATLAB															
3.	SDR mar	nuals														
	SEOUTC														BT Mapp	
	-				idents wi									-	ghest L alyzing (I	
CO1	examine	the a	nalog mo	odulation,	analog to	o digital p	ulse co	nversio	n and	transmi	ssion.				ecision(	
CO2	analvze tl	he pa	assband	digital co	mmunicat	ion.									alyzing (I	
	•	•		0											ecision( alyzing (l	
CO3 i	infer the p	perfo	rmance o	of source	coding ar	nd channe	el codin	g							recision(	
						Mapping	j of Co	s with I	Pos ar	d PSO	S					
Cos/P	os P	01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	P	012	PSC	01 PSO2
CO	1	3	3	3	3	3				2	3	2		2	2	
	2	3	3	3	3	3				2	3	2		2	2	
CO2						1	ł					1	-			
CO2	3	3	3	3	3	3				2	3	2		3	2	



	(Common to All BE/ Btech Engineering and Tech	nnology bra	inches)	1	,		
Programme & Branch	All BE/ Btech Engineering and Technology branches	Sem.	Category	L	Т	Ρ	Credi
Prerequisites	Nil	5	EC	0	0	80	2
Preamble	This subject is to enhance the employability skills and to dev	elop caree	r competency	,			
Unit – I	Soft Skills – II :						20
an interview: For	n-Elements of leadership, disadvantages of a team, stages of tea undation in core subject- industry orientation / knowledge about kills-Activities before Interview, upon entering interview room, du Quantitative Aptitude and Logical Reasoning – II:	ut the com	pany- profess	siona	l per	sonality	y-
polynomial equat Statistics-Data su Conditionality and	evel II: Money related problems-Mixtures-Symbol base problem- ions-Special, equations-Inequalities-Sequence and series-Set th ufficiency- Geometry-Trigonometry-Heights and distances-Co-o d grouping-Sequencing and scheduling- Selections-Networks:-(	neory-Perm ordinate ge	utations and ometry-Mens	com urati	binati on. L	ons- P ogical r	robability
	soning-Flaw detection- Puzzles-Cryptarithms.		bes-venn dia	gram	n in Io	ogical r	
Unit – III Reading: Readin	soning-Flaw detection- Puzzles-Cryptarithms.	Inferential	, & Argumen	tative	e read	ding pa	30 assages
Unit – III Reading: Readin Identifying and comprehension / of an argument – notices and book Real Time Expe Various Topics – Discussion – Gro	soning-Flaw detection- Puzzles-Cryptarithms. Reading & Speaking Skills	Inferential skimming f atensive rea cles in busir g: Mock Inf ED Talks tion – Orate	, & Argumen or general u ading – under ness magazin rerviews –Sel –Extempore; ory and Effec	tative Inder rstan es, n f-Intr Givi	e read stand ding ewsp oduc ng a Publio	ding pa ding – the dev apers - tion – S Preser c Spea	30 assages selectiv velopmer – Readin Sharing o ntation o iking; Pa
Unit – III Reading: Readin Identifying and comprehension / of an argument – notices and book Real Time Expe Various Topics – Discussion – Gro	Soning-Flaw detection- Puzzles-Cryptarithms.           Reading & Speaking Skills           g comprehension- Effective Reading strategies - Descriptive, locating factual information within a text - global reading/s scanning for specific information - detailed comprehension / in identifying the writer's attitude and opinions - Reading news articts reviews -Interpreting graphic data & Advertisements. Speaking rience; Conversational Practices -Role Play - Short Talks / Technical / Non-Technical Topics - Project Review Presentation Discussion - The process of Group Discussion - Strategies	Inferential skimming f atensive rea cles in busir g: Mock Inf ED Talks tion – Orate	, & Argumen or general u ading – under ness magazin rerviews –Sel –Extempore; ory and Effec	tative Inder rstan es, n f-Intr Givi	e read stand ding ewsp oduc ng a Publio	ding pa ding – the dev apers - tion – S Preser c Spea	30 assages selectiv velopmer – Readin Sharing o ntation o iking; Pa
Unit – III Reading: Readin Identifying and comprehension / of an argument – notices and book Real Time Expe Various Topics – Discussion – Gro Conversations &	Soning-Flaw detection- Puzzles-Cryptarithms.           Reading & Speaking Skills           g comprehension- Effective Reading strategies - Descriptive, locating factual information within a text - global reading/s scanning for specific information - detailed comprehension / in identifying the writer's attitude and opinions - Reading news articts reviews -Interpreting graphic data & Advertisements. Speaking rience; Conversational Practices -Role Play - Short Talks / Technical / Non-Technical Topics - Project Review Presentation Discussion - The process of Group Discussion - Strategies	Inferential skimming f atensive rea cles in busir g: Mock Inf ED Talks tion – Orate	, & Argumen or general u ading – under ness magazin rerviews –Sel –Extempore; ory and Effec	tative Inder rstan es, n f-Intr Givi	e read stand ding ewsp oduc ng a Publio	ding pa ding – the dev apers - tion – S Preser c Spea	30 selectiv velopmer – Readin Sharing o ntation o iking; Pa elephoni
Unit – III Reading: Readin Identifying and comprehension / of an argument – notices and book Real Time Expe Various Topics – Discussion – Gra Conversations & TEXT BOOK:	Soning-Flaw detection- Puzzles-Cryptarithms.           Reading & Speaking Skills           g comprehension- Effective Reading strategies - Descriptive, locating factual information within a text - global reading/s scanning for specific information - detailed comprehension / in identifying the writer's attitude and opinions - Reading news articts reviews -Interpreting graphic data & Advertisements. Speaking rience; Conversational Practices -Role Play - Short Talks / Technical / Non-Technical Topics - Project Review Presentation Discussion - The process of Group Discussion - Strategies	Inferential skimming f itensive rea cles in busir g: Mock Inf 'ED Talks tion – Orate es to be ac	, & Argumen or general u ading – under ness magazin erviews –Sel –Extempore; ory and Effec dopted – Skil	tative Inder rstan es, n f-Intr Givi tive Is As	e read stand ding ewsp oduc ng a Public ssess	ding pa ding – the dev apers - tion – S Preser c Spea ed – T	30 assages selectiv velopmer – Readin Sharing o ntation o iking; Pa elephon Total:4
Unit – III         Reading: Reading         Identifying and         comprehension /         of an argument –         notices and book         Real Time Expe         Various Topics –         Discussion – Gra         Conversations &         TEXT BOOK:         1.         Edgar Th         Services	Soning-Flaw detection- Puzzles-Cryptarithms.         Reading & Speaking Skills         g comprehension- Effective Reading strategies - Descriptive, locating factual information within a text - global reading/s scanning for specific information - detailed comprehension / in identifying the writer's attitude and opinions - Reading news artice reviews -Interpreting graphic data & Advertisements. Speaking rience; Conversational Practices -Role Play - Short Talks / To Technical / Non-Technical Topics - Project Review Presentate Dup Discussion - The process of Group Discussion - Strategies Skills - Negotiating Skills.	Inferential skimming f itensive rea cles in busir g: Mock Inf 'ED Talks tion – Orate es to be ac	, & Argumen or general u ading – under ness magazin erviews –Sel –Extempore; ory and Effec dopted – Skil	tative Inder rstan es, n f-Intr Givi tive Is As	e read stand ding ewsp oduc ng a Public ssess	ding pa ding – the dev apers - tion – S Preser c Spea ed – T	30 assages selectiv velopmer – Readin Sharing o ntation o iking; Pa elephoni Total:4
Unit – III         Reading: Reading         Identifying and         comprehension /         of an argument –         notices and book         Real Time Expe         Various Topics –         Discussion – Gro         Conversations &         TEXT BOOK:         1.         Edgar Th         Services         REFERENCES:	Soning-Flaw detection- Puzzles-Cryptarithms.         Reading & Speaking Skills         g comprehension- Effective Reading strategies - Descriptive, locating factual information within a text - global reading/s scanning for specific information - detailed comprehension / in identifying the writer's attitude and opinions - Reading news artice reviews -Interpreting graphic data & Advertisements. Speaking rience; Conversational Practices -Role Play - Short Talks / To Technical / Non-Technical Topics - Project Review Presentate Dup Discussion - The process of Group Discussion - Strategies Skills - Negotiating Skills.	Inferential skimming f itensive reac cles in busin g: Mock Inf ED Talks tion – Orate es to be ac	, & Argumen or general u ading – undei ness magazin rerviews –Sel –Extempore; ory and Effec dopted – Skil	tative Inder rstan es, n f-Intr Givi tive Is As	e read stand ding ewsp oduc ng a Public ssess	ding pa ding – the dev apers - tion – S Preser c Spea ed – T	30 assages selectiv velopmer – Readin Sharing o ntation o iking; Pa elephon Total:4
Unit – III         Reading: Reading         Identifying and         comprehension /         of an argument –         notices and book         Real Time Expe         Various Topics –         Discussion – Gro         Conversations &         TEXT BOOK:         1.       Edgar Th         Services         REFERENCES:         1.       Aruna Ko	Soning-Flaw detection- Puzzles-Cryptarithms.         Reading & Speaking Skills         g comprehension- Effective Reading strategies - Descriptive, locating factual information within a text - global reading/s scanning for specific information - detailed comprehension / in identifying the writer's attitude and opinions - Reading news artic a reviews -Interpreting graphic data & Advertisements. Speaking rience; Conversational Practices -Role Play - Short Talks / To Technical / Non-Technical Topics - Project Review Presentate bup Discussion - The process of Group Discussion - Strategies Skills - Negotiating Skills.         Proper and Showick Thorpe, "Objective English for Competitive Eight 2017.	Inferential skimming f itensive reactles in busir g: Mock Inf ED Talks tion – Orate es to be act xamination	, & Argumen or general u ading – undei ness magazin erviews –Sel –Extempore; ory and Effec dopted – Skil ", 6 th Edition,	tative inder rstan es, n f-Intr Givi ls As Pea	e read ding f ewsp oduc ng a Public ssess	ding pa ding – the dev apers - tion – S Preser c Spea ed – T	30 assages selectiv velopmer – Readin Sharing o ntation o king; Pa elephon Total:4



		OUTCOI tion of		rse, the s	tuden	ts will be	able to						(	BT Mappe Highest Le	
CO1			e soft sk and as a		ners to	support t	hem wo	rk efficie	ently in	an orga	nization	as an		Applying (K Precision (S	
CO2	sol	ve real	time prol	olems usir	ng num	erical abil	ity and l	ogical r	easoni	ng				Applying (K Precision (S	
CO3	app	oly read	ing and s	speaking s	skills ef	fectively f	or variou	us acad	emic a	nd profe	ssional p	ourposes		Applying (K Precision (S	
						Маррії	ng of Co	os with	Pos a	nd PSO:	S				
Cos/P	os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3	2				3	3		3		3	2		
CO2	2	3	2				3	3		3		3	2		
COS	3		2				3	3		3	3	3	3		
1 – Sli	ght, 2	2 – Mod	erate, 3 -	- Substar	itial, B	Γ- Bloom's	Taxono	omy			1	1	1		
						ASSES	SMENT	PATTE	ERN –	THEOR	Y				
	t / Blo atego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4)		Evaluating (K5) %	Cre	ating (K6) %	Total %
	CAT	1		20		40	)	40	)						100
	CAT	2				50		50	)						100
	CAT	3				50		50	)						100
	ESE	=								NA	I				1
* ±3%	may	be varie	ed (CAT	1,2 & 3 –	50 mai	rks)									



Programme &Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Transmission Lines and Waveguides, Electronic Circuits	6	PC	3	0	0	3
Preamble	To understand the characteristics of passive microwave measurement of microwave signal parameters. To acqui working of different optical sources and receivers for signal	re the kno	wledge in optic				
Unit– I	Microwave Networks and Circuit Representation:						9
•	ncy-S parameter representation of N ports–Properties–Advar r–Slotted section– Waveguide corners-Bends-Twists-Matcheo	•		tional c	couplei	-Wave	guide tees
Unit– II	Microwave Semiconductor Devices and Vacuum Tube	es:					9
	n effect- RWH theory–Avalanche transit time devices-Read on-Power output-Efficiency and electronic admittance-Magnet				rt dio	de-Ref	lex klystror
Unit– III	Microstrip lines and Microwave Measurements:						9
	osses in microstrip lines–Quality factor Q of microstrip lines – ers: LPF- Microwave radar equation	Measuren	nents: Impedan	ce–Fre	equenc	:y–Pow	ver –VSWF
Unit-IV	Optical Fiber Structures and Digital Transmission Sys	stems:					•
•••••							9
Elements of an op	tical fiber transmission link- Total internal reflection – Accepta inearly polarized modes–Single mode fiber-Graded index fibe	ance angle			-Optic	al fiber	•
Elements of an op	tical fiber transmission link- Total internal reflection – Accepta	ance angle			–Optic	al fiber	-
Elements of an op configurations – L <b>Unit– V</b> Direct and indirec	tical fiber transmission link- Total internal reflection – Accepta inearly polarized modes–Single mode fiber-Graded index fibe	ance angle r structure ept of lase	-Fiber fabricat	ion. eration	of PIN	and A	PD diodes an
Elements of an op configurations – L <b>Unit– V</b> Direct and indirect Fundamental rece rise time budget.	tical fiber transmission link- Total internal reflection – Accepta inearly polarized modes–Single mode fiber-Graded index fibe Optic Sources and Optical Receivers: t band gap materials- LED structures: SLED, ELED – Conc	ance angle r structure ept of lase	-Fiber fabricat	ion. eration	of PIN	and A	modes an 9 PD diodes
Elements of an op configurations – L Unit– V Direct and indirec Fundamental rece rise time budget.	tical fiber transmission link- Total internal reflection – Accepta inearly polarized modes–Single mode fiber-Graded index fibe Optic Sources and Optical Receivers: t band gap materials- LED structures: SLED, ELED – Conc	ance angle r structure ept of lase point link s	-Fiber fabricat	ion. ration rations	of PIN S- Link	and A power	PD diodes and budget and
Elements of an op configurations – L Unit– V Direct and indirect Fundamental rece rise time budget. TEXTBOOKS: 1. Samuel Y.	<ul> <li>Acceptation of the internal reflection - Acceptation in the internal reflection - Acceptation in the internal reflection - Acceptation and polarized modes - Single mode fiber-Graded index fiber</li> <li>Optic Sources and Optical Receivers:</li> <li>Acceptation and the internal reflection - Acceptation - Acceptation</li></ul>	ance angle r structure ept of lase point link s	-Fiber fabricat	ion. eration erations	of PIN S- Link	and A power	PD diodes and budget and
Elements of an op configurations – L Unit– V Direct and indirect Fundamental rece rise time budget. TEXTBOOKS: 1. Samuel Y. 2. Gerd Keise REFERENCES:	tical fiber transmission link- Total internal reflection – Accepta inearly polarized modes–Single mode fiber-Graded index fiber <b>Optic Sources and Optical Receivers:</b> t band gap materials- LED structures: SLED, ELED – Conc eiver operation – Error sources- Probability of error – Point to Liao, "Microwave Devices & Circuits", 3 rd Edition, Pearson Ed er, "Optical FiberCommunication",5 th Edition, McGraw Hill, Ner	ept of lase point link s ucation, Ne w Delhi,20	-Fiber fabricat rs diodes- Ope system conside ew Delhi, 2015, 20, for Units IV,	ion. eration erations for Un ,V.	of PIN S- Link	and A power	modes ar 9 NPD diodes budget ar
Elements of an op configurations – L Unit– V Direct and indirect Fundamental rece rise time budget. TEXTBOOKS: 1. Samuel Y. 2. Gerd Keise REFERENCES:	Liao, "Microwave Devices & Circuits", 3 rd Edition, Pearson Ed	ept of lase point link s ucation, Ne w Delhi,20	-Fiber fabricat rs diodes- Ope system conside ew Delhi, 2015, 20, for Units IV,	ion. eration erations for Un ,V.	of PIN S- Link	and A power	modes ar 9 NPD diodes budget ar



COURSEC On compl			se, the st	udents v	vill be ab	le to						BT I Lev	Mapped ( el)	(Highes
CO1 inte	erpret the	features	and chara	acteristics	s of micro	wave co	mponent	s.				Und	erstandin	ig(K2)
CO2 sun	nmarize t	he princij	oles of var	ious mic	rowave si	gnal ger	nerators.					Und	erstandin	ig(K2)
CO3 des	cribe the	principle	s involved	I in micro	strip lines	and me	easure th	e micro	wave sig	nal paran	neters.	Und	erstandin	ig(K2)
	er the diffe	erent mod	des of wav	e propa	gation and	d configu	ration of	optical	fibre.			Und	erstandin	g(K2)
	cribe the	characte	eristics of v	/arious o	ptical sou	irces and	d receive	rs				Und	erstandin	ig(K2)
					Mappir	ng of Co								
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										2	2	
CO2	3	2	2			2		2				2	2	
CO3	3	2	2		2	2					2		1	1
CO4	3	2											2	2
CO5	3	2						2				3		
1–Slight,2-	-Moderat	e,3–Sub	stantial, B	T-Bloom		<u>,</u>	ENTPAT	TERN	– THEOF	<u>.</u>				
	loom's gory*	Re	memberii K1)%	ng(U	nderstan (K2)%		Applyin (K3)%	•	nalyzing (K4)%		luating (5)%	Crea (K6		Tota %
C	AT1		25		75		-		-		-		-	100
C	AT2		20		80		-		-		-		-	100
C	AT3		25		75		-		-		-		-	100
	SE		20		80		-		-		-		-	100



Program Branch	nme &	B.E & El	ectronics a	and Com	municati	ion Eng	jineering	J	Sem.	Category	L	т	Ρ	Credi
Prerequ	isites	Nil							6	PC	3	0	0	3
Preamb	le	To acquir applicatio	•	e knowled	dge on the	e functio	on of vari	ous interr	etworking	devices, algo	ithms	s, pro	tocols	s and its
Unit– I		Network	Architectu	ire :										9
and infra		uit switching			•			•	•	ded media: Rannecting devic				
Unit– II		Link Lay	ər											9
to Point Gigabit I	protocol–Ra Ethernet-IE	andom Acc EEE802.11	ess: CSM/ ·: Architect	A-Persist	tent meth	nods-CS	SMA/CD-	Minimum	frame siz	Receive winde e-Energy leve AN frame for	el-CS			
Unit– III		Network	lavor											9
Address Equatior Link stat	mapping: / n – Distance e advertiser	ce – Class ARP and I e vector – L ment –BGF	ess addres ARP–ICM SR: Databa : eBGP- iB	PV4- Me ase – Dijl	essage fo	ormat –	Error re	porting m	essages-	nat-IPV6 Addr Routing proto - OSPF: Metric	cols:	DVR	: Bell	ne forma Iman Fo ble-Area
Address Equatior Link stat <b>Unit– IV</b> UDP dat	mapping: / n – Distance e advertiser agram, UDF	ce – Class ARP and I e vector – L ment –BGF Transpo	ess addres ARP–ICM SR: Databa : eBGP- iB t Layer: and applica	PV4- Me ase – Dijl GP. itions-TC	essage fo kstra algo	ormat – orithm-R	Error re IP messa eatures-S	age- RIP a	essages- algorithm -	Routing proto - OSPF: Metric ection-Flow co	cols: c-For	DVR wardi	: Bell ng tal	ne forma Iman Fo ble-Area <b>9</b>
Address Equation Link stat <b>Unit– IV</b> UDP dat QOS-De	mapping: A – Distance e advertiser	ce – Class ARP and I e vector – L ment –BGF Transpo P services ensitivity of	ess addres ARP–ICM SR: Databa : eBGP- iB t Layer: and applica application	PV4- Me ase – Dijl GP. itions-TC	essage fo kstra algo	ormat – orithm-R	Error re IP messa eatures-S	age- RIP a	essages- algorithm -	Routing proto - OSPF: Metric ection-Flow co	cols: c-For	DVR wardi	: Bell ng tal	ne forma Iman Fo ble-Area <b>9</b> n control
Address Equation Link stat <b>Unit– IV</b> UDP dat QOS-De <b>Unit– V</b>	mapping: / n – Distance le advertiser dagram, UDF finitions, Se	ce – Class ARP and I e vector – L ment –BGF Transpo P services ensitivity of Applicat	ARP-ICM CARP-ICM SR: Databa : eBGP- iB t Layer: and applica application on Layer:	PV4- Me ase – Dijl GP. tions-TC s, Flow c	essage fo kstra algo P service lasses-So	ormat – orithm-R es and fe	Error rej IP messa eatures-S ng-Token	Begment, a bucket a	essages- algorithm - TCP conne and leaky l	Routing proto - OSPF: Metric ection-Flow co oucket.	cols: c-For ntrol-	DVR wardi Cong	: Bell ng tal jestion	ne forma Iman Fo ble-Area 9 n control 9
Address Equation Link stat <b>Unit– IV</b> UDP dat QOS-De <b>Unit– V</b> E-Mail: <i>A</i> FTP: Co	mapping: / n – Distance e advertiser agram, UDF finitions, Se	ce – Class ARP and I e vector – L ment –BGF Transpo P services ensitivity of Applicat e, User ager ction- Data	ess address ARP–ICM SR: Databa : eBGP- iB <b>t Layer:</b> and application <b>on Layer:</b> t, SMTP, P connection	PV4- Me ase – Dijl GP. tions-TC s, Flow c	essage fo kstra algo P service lasses-So AP4 and I	ormat – prithm-R es and fe cchedulir HTTP: N	Error re IP messa eatures-S ng-Token Nonpersis	Begment, Beg	essages- algorithm - TCP conne Ind leaky l	Routing proto - OSPF: Metric ection-Flow co	cols: c-For ntrol- ectio	DVR wardi Cong	: Bell ng tal jestion	ne forma man Fo ble-Area 9 n control 9 ge forma
Address Equation Link stat <b>Unit– IV</b> UDP dat QOS-De <b>Unit– V</b> E-Mail: <i>A</i> FTP: Co	mapping: / n – Distance e advertiser tagram, UDF finitions, Se Architecture, ntrol connect	ce – Class ARP and I e vector – L ment –BGF Transpo P services ensitivity of Applicat e, User ager ction- Data	ess address ARP–ICM SR: Databa : eBGP- iB <b>t Layer:</b> and application <b>on Layer:</b> t, SMTP, P connection	PV4- Me ase – Dijl GP. tions-TC s, Flow c	essage fo kstra algo P service lasses-So AP4 and I	ormat – prithm-R es and fe cchedulir HTTP: N	Error re IP messa eatures-S ng-Token Nonpersis	Begment, Beg	essages- algorithm - TCP conne Ind leaky l	Routing proto - OSPF: Metric ection-Flow co oucket. ersistent conn	cols: c-For ntrol- ectio	DVR wardi Cong	: Bell ng tal jestion	ne forma man Fo ble-Area 9 n control 9 ge forma
Address Equation Link stat <b>Unit– IV</b> UDP dat QOS-De <b>Unit– V</b> E-Mail: A FTP: Col space-zo	mapping: / n – Distance e advertiser agram, UDF afinitions, Se Architecture, ntrol connectone one-DNS in	ce – Class ARP and I e vector – L ment –BGF Transpo P services ensitivity of Applicat a, User ager oction- Data	ess address ARP–ICM SR: Databa : eBGP- iB <b>t Layer:</b> and application <b>on Layer:</b> t, SMTP, F connection t.	PV4- Me ase – Dijl GP. titions-TC s, Flow c POP3, IM/ – VoIP-E	Pessage fo kstra algo P service classes-So AP4 and I Domain Na	ormat – orithm-R es and fe ichedulir HTTP: N lame Sys	Error re IP messa eatures-S ng-Token Nonpersis stem (DN	Segment, bucket a stent conr IS): Name	essages- algorithm - TCP conne and leaky l nections- P s Space-Do	Routing proto - OSPF: Metric ection-Flow co bucket. ersistent connormain Name S	cols: c-For ntrol- ectio pace	DVR wardi Cong ns- N -Distr	: Bell ng tal jestion	ne forma Iman Fo ble-Area 9 n control 9 ge forma
Address Equation Link stat <b>Unit– IV</b> UDP dat QOS-De <b>Unit– V</b> E-Mail: A FTP: Col space-zo	mapping: / n – Distance e advertiser agram, UDF afinitions, Se Architecture, ntrol connectone one-DNS in	ce – Class ARP and I e vector – L ment –BGF Transpo P services ensitivity of Applicat a, User ager oction- Data	ess address ARP–ICM SR: Databa : eBGP- iB <b>t Layer:</b> and application <b>on Layer:</b> t, SMTP, F connection t.	PV4- Me ase – Dijl GP. titions-TC s, Flow c POP3, IM/ – VoIP-E	Pessage fo kstra algo P service classes-So AP4 and I Domain Na	ormat – orithm-R es and fe ichedulir HTTP: N lame Sys	Error re IP messa eatures-S ng-Token Nonpersis stem (DN	Segment, bucket a stent conr IS): Name	essages- algorithm - TCP conne and leaky l nections- P s Space-Do	Routing proto - OSPF: Metric ection-Flow co oucket. ersistent conn	cols: c-For ntrol- ectio pace	DVR wardi Cong ns- N -Distr	: Bell ng tal jestion	ne forma Iman Fo ble-Area 9 n control 9 ge forma
Address Equation Link stat Unit- IV UDP dat QOS-De Unit- V E-Mail: A FTP: Col space-zc TEXTBC	mapping: / – Distance e advertiser tagram, UDF finitions, Se Architecture, ntrol connec one-DNS in DOK: Behrouz A. F	ce – Class ARP and I e vector – L ment –BGF Transpo P services ensitivity of Applicat a, User ager oction- Data	ess address ARP–ICM SR: Databa : eBGP- iB <b>t Layer:</b> and application <b>on Layer:</b> t, SMTP, F connection t.	PV4- Me ase – Dijl GP. titions-TC s, Flow c POP3, IM/ – VoIP-E	Pessage fo kstra algo P service classes-So AP4 and I Domain Na	ormat – orithm-R es and fe ichedulir HTTP: N lame Sys	Error re IP messa eatures-S ng-Token Nonpersis stem (DN	Segment, bucket a stent conr IS): Name	essages- algorithm - TCP conne and leaky l nections- P s Space-Do	Routing proto - OSPF: Metric ection-Flow co bucket. ersistent connormain Name S	cols: c-For ntrol- ectio pace	DVR wardi Cong ns- N -Distr	: Bell ng tal jestion	ne forma Iman Fo ble-Area 9 n control 9 ge forma
Address Equation Link stat UDP dat QOS-De Unit- V E-Mail: A FTP: Col space-zc TEXTBC	mapping: / n – Distance e advertiser agram, UDF finitions, Se Architecture, ntrol connec one-DNS in DOK: Behrouz A. F	ce – Class ARP and I e vector – L ment –BGF Transpo P services ensitivity of Applicat e, User ager oction- Data the interne Forouzan,	ess address AARP–ICM SR: Databa : eBGP- iB <b>t Layer:</b> and application <b>on Layer:</b> t, SMTP, F connection t. Data comr	PV4- Me ase – Dijl GP. Itions-TC s, Flow c POP3, IM/ – VoIP-E	P service P service AP4 and I Domain Na	brmat – brithm-R es and fe schedulir HTTP: N lame Sys etworking	Error re IP messa eatures-S ng-Token Nonpersis stem (DN	Begment, bucket a stent conr IS): Name	essages- algorithm - TCP conne and leaky l nections- P space-Do	Routing proto - OSPF: Metric ection-Flow co bucket. ersistent connormain Name S	cols: c-For ntrol- ectio pace	DVR wardi Cong ns- M -Distr 9.	: Bell ng tal jestion lessag	ne forma Iman Fo ble-Area 9 n control 9 ge forma n of nam Total:4
Address Equation Link stat UDP dat QOS-De Unit- V E-Mail: A FTP: Col space-zc TEXTBC	mapping: / n – Distance e advertiser dagram, UDF afinitions, Se Architecture, ntrol connector one-DNS in DOK: Behrouz A. F ENCES: James F. Ku Education, N	ce – Class ARP and F e vector – L ment –BGF Transpo P services ensitivity of Applicat a, User ager oction- Data the interne Forouzan, Forouzan,	ess address AARP–ICM SR: Databa : eBGP- iB <b>t Layer:</b> and application <b>on Layer:</b> t, SMTP, F connection t. Data comr Bas Keith W, 2012.	PV4- Me ase – Dijl GP. titions-TC s, Flow c POP3, IM/ – VoIP-E	Pessage fo kstra algo Pervice classes-So AP4 and I Domain Na n and Ne	ormat – prithm-R es and fe schedulir HTTP: N lame Sys etworking orking: A	Error rep IP messa eatures-S ng-Token Nonpersis stem (DN g", 5 th Ed	Segment, a bucket a stent conr IS): Name	essages- algorithm - TCP conne and leaky l nections- P Space-Do Space-Do	Routing proto - OSPF: Metric ection-Flow co bucket. ersistent conno omain Name S	cols: c-For ntrol- ectio pace i, 201	DVR wardi Cong ns- M -Distr 9.	: Bell ng tal jestion lessag	ne forma Iman Fo ble-Area 9 n control 9 ge forma n of nam Total:4



		UTCOM tion of t		e, the stud	ents will	be able	to							T Mappeo ghest Lev	
CO1	com	nprehend	d different	network mo	odels and	l architec	ture.						Unc	derstandin	g (K2)
CO2	app	ly suitab	le flow, er	ror and acc	ess conti	ol techni	ques foi	r node-	to node	deliver	ry.		A	Applying(K	(3)
CO3	ana	lyze the	routing m	echanisms	and IP a	ddress m	anagem	nent.					A	pplying(K	3)
CO4	арр	ly suitab	le protoco	ols for conne	ection ori	ented and	d conne	ctionles	ss servi	ces in i	nternet.		A	Applying(K	(3)
CO5	inte	rpret the	functiona	alities of ap	plication	protocols							Und	erstandin	g(K2)
						Mappin	ng of Co	os with	Pos a	nd PSC	)s				
Cos/P	os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	)1	3	2			2		2	2	2	2		2	2	
CO	2	3	2		1			2	2		2		2	3	2
CO	3	3	3	2	2	2		2	2	2	2		2	3	2
CO	4	3	2	1	1	1			2		2		2	3	2
CO	95	2	1			1			1					3	
1–Slig	ht,2–	Moderat	e,3–Subs	tantial, BT-	Bloom's	Taxonom	у								
						ASSE	SSME	NTPAT	TERN -	- THEC	RY				
	st/ Ble egory	oom's ′*		embering K1)%	U	nderstan (K2)	•	Apply (K3)		Analy (K4	, ,	Evaluatin g (K5)%		eating (6)%	Tota %
	C	AT1		20		60		2	20		-	-		-	100
	C	AT2		20		60			10	1	0	-		-	100
	C	AT3		10		60		3	30		-	-		-	100
			1	20		50		1	20	I 4	0	-	1	-	100



Progr &Brai	amme	B.E &	Electroni	cs and	Commu	nicatior	n Engin	eering		Sem.	Category	' L	Т	Р	Credit
	uisites	NIL								6	PC	0	0	2	1
-															
Pream	nble	To mea	asure and	analyze	the mic	rowave	and opt	tical par	ameters	S					
ISTO	OF EXPERI	MENTS/EX	ERCISES	6:											
	Demons	rate the mo	de chara	cteristics	of Refle	ex Klystr	ron								
2.	Observe	the radiation	on charact	eristics	of Horn a	antenna									
3.	Verificati	on of load i	mpedance	e using \	/SWR										
I.	Observe	the VI char	acteristics	s and Po	wer mea	asureme	ent of G	unn Dio	de osci	llator					
5.	Design a	nd simulate	e the Mag	ic Tee											
5.	Design a	nd simulate	the micro	ostrip Ll	PF using	ı transm	ission li	ne step	impeda	ance met	hod				
	Measure	ment of nui	merical ap	erture a	nd Digita	al signal	transm	ission u	ising fib	re-optic					
8.	Observe	the VI&PI	characteri	stics of L	ED and	Laser d	liode								
Э.	Observe	the VI&PI	characteri	stics of A	PD/PD										
10.	Observe	the effectiv	e refractiv	/e index	of the o	ptical fib	er using	g MATL	AB						
															Tatala
															Total:
				_											
	RENCES/N		JEIWAR	E:											
1.		S,MATLAB													
2.	TIF 35,AD	S,IVIAT LAD													
OUR	SEOUTCO	MES:												BT	Mapped
	npletion of t	-	the stude	nts will b	e able to	D									est Level)
CO1							l its sign	al para	meters	using a r	nicrowave s	et-up.			lying(K3),
				<u> </u>										-	ulation(S2)
	interpret t	ne characte	ristics of I	VagicTe	e and m	icrostrip	transm	ission li	ines, rei	fractive i	ndex of opti	ical			lying(K3), ision(S3)
CO2	lible		ristics of c	optical so	ource. fit	ore and	detecto	r.							lying(K3),
	observe th	ie characte													ision(S3)
CO2 CO3	observe th	le characte													
	observe tł				Mapr	oina of (	Cos wit	h Pos a	and PS	Os					
003			PO3	PO4	Mapp PO5	oing of ( PO6	Cos wit PO7	h Pos a PO8	and PS PO9	Os PO10	PO11	PO12	!	PSO1	PSO2
	Pos PO		<b>PO3</b> 3	PO4		-	1	1			P011	P012	2	PSO1	PSO2
CO3 Cos/	Pos PO 01 3	1 PO2		PO4		-	1	1	PO9		<b>PO11</b> 2	<b>PO12</b>	2	<b>PSO1</b>	<b>PSO2</b>
CO3 Cos/	Pos PO 01 3 02 3	1 <b>PO2</b>	3	PO4	PO5	-	1	1	<b>PO9</b> 3						



Programn Branch	ne &	B.E & E	Electroni	cs and (	Commu	nicatio	n Enginee	ring		Sem.	Category	L	Т	P	Credit
rerequisit	es	NIL								6	PC	0	0	2	1
Preamble											as creating g standard r			netwo	rk topologie
	XPERIME	ENTS/EXI	ERCISES	:											
1.	Simulati	on of vario	ous LAN 1	topologie	es										
2.	Realizat	ion of flov	v control a	algorithm	าร										
3.	Realizat	ion of AR	P and Sul	bnetting	using IP	V4 in c	ampus are	a networ	k.						
4.	Analyze	the functi	ioning of I	Distance	vector r	routing	& Link state	e routing	in in	ntra dom	ain routers.				
5.	Analyze	the netwo	ork load p	erforma	nce usin	ig Leaky	y bucket al	gorithm							
6.	Demons	trate data	exchang	e using	point to	point: S	Server-Clier	nt Model							
7.	Creation	of three	node for 7	CP traff	fic										
8.	Analyzin	ig TCP tra	affic with (	CSMA											
9.	Simulati	on of 802	.11 wirele	ss LAN											
10.	Packet	capture a	nd analys	is using	network	c protoc	ol analyzer	٢							Tota
REFEREN	ICES/MA	NUAL/SC	DFTWAR		network	x protoc	ol analyzer	r							Tota
REFEREN	ICES/MA	NUAL/SC	DFTWARI		network	<pre>c protoc</pre>	ol analyzer	r							Tota
10. <b>REFEREN</b> 1. 2.	ICES/MA	NUAL/SC	DFTWARI		network	¢ protoc	ol analyzer	r 							Tota
REFEREN 1. 2. OURSEO	ICES/MA Laborato Netsim,1 UTCOME ion of the	NUAL/SC bry Manua NS-3,Wire S: course, t	DFTWARI al eshark he studer	E:	e able to		ol analyzer	r						(High	Mapped est Level)
REFEREN 1. 2. OURSEO	ICES/MA Laborato Netsim,1 UTCOME ion of the	NUAL/SC bry Manua NS-3,Wire S: course, t	DFTWARI al eshark	E:	e able to		ol analyzer	r 						(High Apply	Mapped
REFEREN 1. 2. OURSEOI n completi CO1	ICES/MA Laborato Netsim,I UTCOME ion of the apply dif	NUAL/SC ory Manua NS-3,Wire S: course, t iferent net	DFTWARI al eshark he studer twork laye	E: <u> hts will b</u> er topolo	e able to gies.	)	ol analyzer							<b>(High</b> Appl Manip Analy	Mapped est Level) ving (K3), ilation (S2) zing (K4),
REFEREN 1. 2. OURSEO n completi CO1 CO2	ICES/MA Laborato Netsim,I UTCOME ion of the apply dif analyse	NUAL/SC bry Manua NS-3,Wire course, t ferent net L2, L3 an	DFTWARI al eshark he studer twork laye	E:	e able to gies. der diffe	o Prent tra	ffic conditio							(High Apply Manipu Analy Prec Analy	Mapped est Level) <i>i</i> ing (K3), ilation (S2)
REFEREN 1. 2. OURSEO On completi CO1 CO2	ICES/MA Laborato Netsim,I UTCOME ion of the apply dif analyse	NUAL/SC bry Manua NS-3,Wire course, t ferent net L2, L3 an	DFTWARI al eshark he studer twork laye	E:	e able to gies. der diffe g packet	erent tra	ffic conditione tools.	DNS.						(High Apply Manipu Analy Prec Analy	Mapped est Level) /ing (K3), ilation (S2) zing (K4), sion (S3) zing (K4),
REFEREN 1. 2. OURSEOU n completi CO1 CO2 CO3	ICES/MA Laborato Netsim,I UTCOME ion of the apply dif analyse	NUAL/SC bry Manua NS-3,Wire course, t ferent net L2, L3 an	DFTWARI al eshark he studer twork laye	E:	e able to gies. der diffe g packet	erent tra	ffic conditione tools.	DNS.	-	0s PO10	P011	P012	1	(High Apply Manipu Analy Prec Analy	Mapped est Level) /ing (K3), ilation (S2) zing (K4), sion (S3) zing (K4), ilation (S2)
REFEREN 1. 2. OURSEO n completi CO1 CO2 CO3	ICES/MA Laborato Netsim,I UTCOME ion of the apply dif analyse analyse	NUAL/SC bry Manua NS-3,Wire course, t ferent net L2, L3 an different o	DFTWARI al eshark he studer twork laye id L4 prote data pack	E: hts will b er topolo ocols un ets using	e able to gies. der diffe g packet Mapp	erent tra	ffic conditione tools.	ons.	-		P011	P012	1	(High Appl Manipu Analy Prec Analy Manipu	Mapped est Level) /ing (K3), ilation (S2) zing (K4), sion (S3) zing (K4), ilation (S2)
REFEREN 1. 2. OURSEO Dn completi CO1 CO2 CO3 CO3 Cos/Pos	ICES/MA Laborato Netsim,I UTCOME ion of the apply dif analyse analyse PO1	NUAL/SC Dry Manua NS-3,Wire S: course, t ferent net L2, L3 an different of PO2	DFTWARI al eshark he studer twork laye d L4 prote data pack data pack	E: hts will b er topolo ocols un ets using PO4	e able to gies. der diffe g packet Mapp	erent tra t capture ing of ( PO6	ffic conditione tools.	ons.	9		PO11	P012	1	(High Appl Manipu Analy Prec Analy Manipu Manipu	Mapped est Level) /ing (K3), ilation (S2) zing (K4), sion (S3) zing (K4), ilation (S2)



requisites       NIL       6       EC       0       0       8       4         Total : 12         URSEOUTCOMES:         BT Mapped (Highest Level)         201       identify, analyze, interpret and formulate the real world problem and conceptualize the methodology of the project       Applying (K3)         202       design the electronics based system using mathematical analysis       Applying (K3)         203       develop the model using modern tools and demonstrate the working of the model       Analyzing (K4)         204       articulate the project report and presentations       Evaluating (K5)         205       plan and execute the project as a team       Evaluating (K5)         Mapping of Cos with Pos and PSOs         Mapping of Cos with Pos and PSOs         OS         Mapping of Cos with Pos and PSOs								22E	CP61 -	PROJ	ECT W	ORKI					
Total : 12         Total : 12         Total : 12         URSEOUTCOMES:         BT Mapped (Highest Level)         dentify, analyze, interpret and formulate the real world problem and conceptualize the methodology of the project       Applying (K3)         Of design the electronics based system using mathematical analysis       Applying (K3)         Applying (K4)         Analyzing (K4)         Analyzing (K5)         Of an and execute the project as a team       Evaluating (K5)         Mapping of Cos with Pos and PSOs         Mapping of Cos with Pos and PSOs         Of PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02         CO1       3       3       3         Mapping of Cos with Pos and PSOs	Progra Branch		8	B.E & I	Electroni	cs and	Commu	nicatio	n Engin	eering		Sem.	Category	L	Т	Р	Credit
BT Mapped (Highest Level)         Completion of the course, the students will be able to dentify, analyze, interpret and formulate the real world problem and conceptualize the methodology of the project       Applying (K3)         01       design the electronics based system using mathematical analysis       Applying (K3)         02       develop the model using modern tools and demonstrate the working of the model       Analyzing (K4)         03       develop the project report and presentations       Evaluating (K5)         04       articulate the project as a team       Evaluating (K5)         05       plan and execute the project as a team       Evaluating (K5)         Mapping of Cos with Pos and PSOs         Sos/Pos       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       3       3       2       2       2       3       3       3       2       3       3	Prerequ	lisites	S	NIL								6	EC	0	0	8	4
completion of the course, the students will be able to       (Highest Level)         D1       Identify, analyze, interpret and formulate the real world problem and conceptualize the methodology of the project       Applying (K3)         D2       design the electronics based system using mathematical analysis       Applying (K3)         D2       develop the model using modern tools and demonstrate the working of the model       Analyzing (K4)         D3       develop the project report and presentations       Evaluating (K5)         D4       articulate the project as a team       Evaluating (K5)         D5       plan and execute the project as a team       Mapping of Cos with Pos and PSOs         Mapping of Cos with Pos and PSOs         Mapping of PO1       PO1       PO12       PS01       PS02         CO1       3       3       2       2       2       2       3       3       3       2       3       3				1													Total: 120
Identify, analyze, interpret and formulate the real world problem and conceptualize the methodology of the project       Applying (K3)         01       design the electronics based system using mathematical analysis       Applying (K3)         02       design the electronics based system using mathematical analysis       Applying (K3)         03       develop the model using modern tools and demonstrate the working of the model       Analyzing (K4)         04       articulate the project report and presentations       Evaluating (K5)         05       plan and execute the project as a team       Evaluating (K5)         Mapping of Cos with Pos and PSOs         Mapping of Cos with Pos and PSOs         OS/Pos       P01       P02       P03       P04       P05       P06       P07       P08       P09       P010       P011       P012       PS01       PS02         CO1       3       3       3       2       2       2       3       3       3       2       3       3	COURS	EOU	ТСОМЕ	S:												BT	Mapped
21       methodology of the project       11.9.9 (K3)         22       design the electronics based system using mathematical analysis       Applying (K3)         23       develop the model using modern tools and demonstrate the working of the model       Analyzing (K4)         24       articulate the project report and presentations       Evaluating (K5)         25       plan and execute the project as a team       Evaluating (K5)         Mapping of Cos with Pos and PSOs         Mapping of Cos with Pos and PSOs         OS PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PSO1 PSO2         CO1       3       3       2       2       2       3       3       3       2       3       3	On comp														(	Highe	st Level)
02       02       03       04       04       04       04       Analyzing (K4)         04       articulate the project report and presentations       Evaluating (K5)       Evaluating (K5)         05       plan and execute the project as a team       Evaluating (K5)         Mapping of Cos with Pos and PSOs         05       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       3       3       2       2       2       2       3       3       3       2       3       3	CO1					d formul	ate the	real wor	ld probl	em and	concep	otualize th	ne			Apply	ing (K3)
J3       Image: Constraint of the project report and presentations       Evaluating (K5)         D4       articulate the project report and presentations       Evaluating (K5)         D5       plan and execute the project as a team       Evaluating (K5)         Mapping of Cos with Pos and PSOs         Solution (K5)         OS         Mapping of Cos with Pos and PSOs         Cos PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       3       3       2       2       2       3       3       3       2       3       3	CO2	des	sign the	electroni	cs based	system	using m	athema	tical ana	alysis						Apply	ing (K3)
D4     D4     D5     D4     D5     D5     Evaluating (K5)       Mapping of Cos with Pos and PSOs       S/Pos     P01     P02     P03     P04     P05     P06     P07     P08     P09     P010     P011     P012     PS01     PS02       CO1     3     3     2     2     2     2     3     3     2     3     3	CO3	dev	velop th	ie model	using mo	dern too	ols and d	lemonst	rate the	working	g of the	model				Analyz	zing (K4)
Mapping of Cos with Pos and PSOs         Mapping of Cos with Pos and PSOs         ps/Pos       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         CO1       3       3       2       2       2       2       3       3       2       3       3	CO4	arti	iculate t	he projec	t report a	nd prese	entations	6								Evalua	ating (K5)
pos/Pos         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS02           CO1         3         3         3         2         2         2         2         3         3         3         2         3         3	CO5	pla	n and e	xecute th	e project	as a tea	m								l	Evalua	ating (K5)
CO1         3         3         2         2         2         2         2         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         2         3         3         3         3         2         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3							Марр	oing of (	Cos wit	h Pos a	and PS	Os					
	Cos/P	os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	2	PSO1	PSO2
	CO1	1	3	3	3	2	2	2	2	2	3	3	3	2		3	3
	CO2	2	3	3	3	3	3	2	2	2	3	3	3	2	3		3
CO3       3       3       3       3       2       2       2       3       3       2       3       3	CO3	3	3	3	3	3	3	2	2	2	3	3	3	2		3	
CO4     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3     3<	CO4	4	3	3	3	3	3	3	3	3	3	3	3	3		3	3
CO5         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3	CO5	5	3	3	3	3	3	3	3	3	3	3	3	3		3	3
Slight,2–Moderate,3–Substantial, BT-Bloom's Taxonomy	1—Sliah	nt.2–N	Noderat	e,3–Subs	stantial, B	T-Bloom	n's Taxo	nomy	1	I	1	1 1					1



	(Common to All BE/Bte	ech branches)	1	1		1	
Programme & Branch	All B.E/B.Tech Branches	Sem.	Category	L	Т	Р	Credit
Prerequisites	Nil	3/6	MC	2	0	0	0
Preamble	This course provides an approach to understa pollution control & monitoring methods for sus awareness for engineering students on biologica	stainable life and also al sciences.					
Unit – I	Environmental Studies and Natural Resource						5
Introduction to E resources-case	nvironmental Science – uses, over-exploitation and o studies	conservation of forest,	water, miner	al, fo	od, e	energ	y and land
Unit – II	Ecosystem and Biodiversity						5
Food web only). and Conservatio	ncept and components of an ecosystem –structural ar Biodiversity: Introduction – Classification – Bio geogra n of biodiversity – case studies.						v – Threat
Unit – III	Environmental Pollution						5
Environmontal F	And the set of the set					alaha	I serve mene in a
acid rain, ozone	Pollution: Definition – causes, effects and control mea layer depletion (b)Water pollution (c) Soil pollution – F						e studies.
acid rain, ozone <b>Unit – IV</b>	layer depletion (b)Water pollution (c) Soil pollution – F Environmental Monitoring	Role of an individual in	prevention of	pollu	ution	– cas	e studies. 5
acid rain, ozone <b>Unit – IV</b> Sustainability –tl – Introduction to	layer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         pree pillars of sustainability- factors affecting environm         EIA – objectives of EIA – environment protection act –	Role of an individual in	prevention of	pollu sust	ution ainat	– cas	e studies. 5 velopmen
acid rain, ozone Unit – IV Sustainability –tl – Introduction to and control of po	layer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         pree pillars of sustainability- factors affecting environm         EIA – objectives of EIA – environment protection act –	Role of an individual in	prevention of	pollu sust	ution ainat	– cas	e studies. 5 velopmen
acid rain, ozone Unit – IV Sustainability –tl – Introduction to and control of po Unit – V Functions of Ca nucleus- Heredit	layer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         nree pillars of sustainability- factors affecting environn         EIA – objectives of EIA – environment protection act –         ollution) act.	Role of an individual in mental sustainability-ap air (prevention and cor ls and its organelles –	prevention of proaches for trol of pollutio plasma mem	pollu sust on) ad	ainat ainat ct – w	- cas ole de vater (	e studies. 5 velopmen prevention 5 ondria and
acid rain, ozone Unit – IV Sustainability –tl – Introduction to and control of po Unit – V Functions of Ca nucleus- Heredit	Iayer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         bree pillars of sustainability- factors affecting environm         EIA – objectives of EIA – environment protection act –         ollution) act.         Introduction to Biological Science         rbohydrates, lipids, proteins and nucleic acids – Cell         y and DNA – organization of DNA in cells – Genes and	Role of an individual in mental sustainability-ap air (prevention and cor ls and its organelles –	prevention of proaches for trol of pollutio plasma mem	pollu sust on) ad	ainat ainat ct – w	- cas ole de vater (	e studies. 5 velopmer prevention 5 ondria and on- mitosi
acid rain, ozone <b>Unit – IV</b> Sustainability –tl – Introduction to and control of po <b>Unit – V</b> Functions of Ca nucleus- Heredit & meiosis – Cell	Iayer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         bree pillars of sustainability- factors affecting environm         EIA – objectives of EIA – environment protection act –         ollution) act.         Introduction to Biological Science         rbohydrates, lipids, proteins and nucleic acids – Cell         y and DNA – organization of DNA in cells – Genes and	Role of an individual in mental sustainability-ap air (prevention and cor ls and its organelles –	prevention of proaches for trol of pollutio plasma mem	pollu sust on) ad	ainat ainat ct – w	- cas ole de vater (	e studies. 5 velopmer preventio 5 ondria and on- mitosi
acid rain, ozone Unit – IV Sustainability –tl – Introduction to and control of po Unit – V Functions of Ca nucleus- Heredit & meiosis – Cell TEXT BOOKS: 1. Anubha Pvt. Ltd	Iayer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         nree pillars of sustainability- factors affecting environm         EIA – objectives of EIA – environment protection act –         oblution) act.         Introduction to Biological Science         rbohydrates, lipids, proteins and nucleic acids – Cell         y and DNA – organization of DNA in cells – Genes an         cycle and molecules that control cell cycle.         Kaushik, and Kaushik C.P., "Environmental Science and         , New Delhi, 2018, for Unit-I, II, III, IV.	Role of an individual in mental sustainability-ap air (prevention and cor ls and its organelles – nd chromosomes- Cell and Engineering", 6 th Mu	prevention of pproaches for itrol of pollutio plasma mem division –Typ	pollu sust n) ac	ainat ainat ct – w f cell	- cas ole de vater ( iitocho divisio	e studies. 5 velopmer preventio 5 ondria an on- mitosi Total:2
acid rain, ozone Unit – IV Sustainability –tl – Introduction to and control of po Unit – V Functions of Ca nucleus- Heredit & meiosis – Cell TEXT BOOKS: 1. Anubha Pvt. Ltd 2 Rastogi	Iayer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         nree pillars of sustainability- factors affecting environn         EIA – objectives of EIA – environment protection act –         ollution) act.         Introduction to Biological Science         rbohydrates, lipids, proteins and nucleic acids – Cell         y and DNA – organization of DNA in cells – Genes an         cycle and molecules that control cell cycle.         Kaushik, and Kaushik C.P., "Environmental Science and	Role of an individual in mental sustainability-ap air (prevention and cor ls and its organelles – nd chromosomes- Cell and Engineering", 6 th Mu	prevention of pproaches for itrol of pollutio plasma mem division –Typ	pollu sust n) ac	ainat ainat ct – w f cell	- cas ole de vater ( iitocho divisio	e studies. 5 velopmer preventio 5 ondria an on- mitosi Total:2
acid rain, ozone Unit – IV Sustainability –tl – Introduction to and control of po Unit – V Functions of Ca nucleus- Heredit & meiosis – Cell TEXT BOOKS: 1. Anubha Pvt. Ltd 2 Rastogi	Iayer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         nree pillars of sustainability- factors affecting environm         EIA – objectives of EIA – environment protection act –         Introduction to Biological Science         rbohydrates, lipids, proteins and nucleic acids – Cell         y and DNA – organization of DNA in cells – Genes an         cycle and molecules that control cell cycle.         Kaushik, and Kaushik C.P., "Environmental Science at         , New Delhi, 2018, for Unit-I, II, III, IV.         SC, "Cells and Molecular Biology", 2 nd Edition, reprir	Role of an individual in mental sustainability-ap air (prevention and cor ls and its organelles – nd chromosomes- Cell and Engineering", 6 th Mu	prevention of pproaches for itrol of pollutio plasma mem division –Typ	pollu sust n) ac	ainat ainat ct – w f cell	- cas ole de vater ( iitocho divisio	e studies. 5 velopmen prevention 5 ondria and on- mitosis Total:23 ternationa
acid rain, ozone Unit – IV Sustainability –tl – Introduction to and control of po Unit – V Functions of Ca nucleus- Heredit & meiosis – Cell TEXT BOOKS: 1. Anubha Pvt. Ltd 2. Rastogi 2008, fo REFERENCES: 1 Palanisa	Iayer depletion (b)Water pollution (c) Soil pollution – F         Environmental Monitoring         nree pillars of sustainability- factors affecting environm         EIA – objectives of EIA – environment protection act –         Introduction to Biological Science         rbohydrates, lipids, proteins and nucleic acids – Cell         y and DNA – organization of DNA in cells – Genes an         cycle and molecules that control cell cycle.         Kaushik, and Kaushik C.P., "Environmental Science at         , New Delhi, 2018, for Unit-I, II, III, IV.         SC, "Cells and Molecular Biology", 2 nd Edition, reprir	Role of an individual in mental sustainability-ap air (prevention and cor ls and its organelles – nd chromosomes- Cell and Engineering", 6 th Mu	prevention of pproaches for itrol of pollutio plasma mem division –Typ ulticolour Edition	pollu sust n) ac hbrar es of on, N	ainat ainat ct – w ne, m f cell	- cas ole de vater ( divisional age In ers, N	e studies. 5 velopmer preventio 5 ondria an on- mitosi Total:2: ternationa

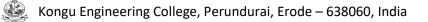
	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	illustrate the various natural resources and role of individual for its conservation	Understanding (K2)
CO2	elaborate the features of ecosystem and biodiversity to find the need for conservation.	Understanding (K2)
CO3	manipulate the sources, effects and control methods of various environmental pollution.	Applying (K3)
CO4	make use of the knowledge of EIA and environmental legislation laws towards sustainability.	Applying (K3)
CO5	explain the functions of carbohydrates, lipids, proteins, nucleic acids, Cells and its organelles	Understanding (K2)

					Mappin	g of CO	s with	POs an	d PSO	5				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1					3							
CO2	2	1					3							
CO3	3	2	1				3							
CO4	3	2	1				3							
CO5	3	1												
1 – Slight, 2	– Mode	erate, 3 –	Substant	ial, BT-	Bloom's	Taxono	my							
					ASSES	SMENT	PATTE	RN – T	HEOR	(				

		ASSESSIVIENT	FAILERN-	INCORT			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	25	35	40				100
CAT2	25	35	40				100
CAT3	NA						
ESE	NA						
* ±3% may be varied (0	CAT 1, 2 – 50 marks	)					



	(Common to All BE/B	tech branches)					
Programme & Branch	All BE/Btech branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	7	HS	3	0	0	3
Preamble	The aim of the course is to create fundamental known economics, national income, marketing, operations					epts lil	ke
Unit – I	Micro Economics						9
	asics Concepts and Principles – Demand and Supply ircular Flow of Economic Activities and Income.	- Law of demand and S	Supply – Dete	rmin	ants	– Mai	rket
Unit – II	Macro Economics, Business Ownership and M	anagement concepts					9
of Business – C	e and its Measurement Techniques. Inflation – Cause wnership Types. Management concepts: Taylor and I of Management – Roles of Manager.						
Unit – III	Marketing Management						9
	re Concepts of Marketing – Four P's of Marketing – N cle – Pricing Strategies and Decisions.	ew Product Developme	nt – Intellectu	ial Pi	roper	ty Rig	hts (IPR)
Unit – IV	Operations Management						9
Operations Mar and Control – Ir	nagement – Resources – Types of Production System nventory – EOQ Determination.	– Site Selection, Plant	Layout, Step	s in I	Produ	uction	Planning
Unit – V	Financial Management						9
	ciples – Financial Statements and its Uses – Depreci - Capital Budgeting – Significance –Traditional and Di			Bala	ance	Meth	od – Brea
							Total:4
TEXT BOOK:		ginggring College "Egg	onomics and I	Mana	agem	ent fo	or
1 Compil	ed by Department of Management Studies, Kongu En ers", 1 st Edition, McGraw Hill Education, Noida, 2013.						
1. Compil Engine	ers", 1 st Edition, McGraw Hill Education, Noida, 2013.						
1. Compil Engine	ers", 1 st Edition, McGraw Hill Education, Noida, 2013.		on, McGraw-I	Hill, I	New	Delhi,	2018.
Compil       1.     Compil       Engine       REFERENCES       1.     Geetika	ers", 1 st Edition, McGraw Hill Education, Noida, 2013. :	al Economics", 3 rd Editi		Hill, I	New	Delhi,	2018.



		UTCON on of th		se, the stud	lents w	vill be able	e to							Mapped ghest Lev	/el)
CO1	iden	ntify mai	rket ec	uilibrium aı	nd inte	rpret natio	onal inco	me calc	ulation	s and inf	lation iss	sues		Applying	(K3)
CO2	cho	ose a si	uitable	business o	wners	hip for the	eir enterp	orise and	l illustra	ate mana	agerial fu	unctions		Applying	(K3)
CO3	infe	r marke	ting m	anagement	decisi	ons							Ur	nderstand	ing (K2)
CO4	app	ly appro	opriate	operation i	manag	ement co	ncept in I	busines	s situat	tions				Applying	(K3)
CO5	inte	rpret fin	ancial	and accou	nting st	atements	and eva	luate ne	ew prop	oosals				Applying	(K3)
						Маррі	ng of Co	os with	Pos ar	nd PSOs	5				
Cos/P	os	PO1	PO2	PO3	PO	4 PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	1	1	2			3		2	2	2	3	2		
CO	2		1	2			2	2	2	2	2	3	2		
CO	3	1	2	1			2		2	2	2	3	2		
CO	4	1	2	1			2		2	2	2	3	2		
CO	5	2	2				2		2	2	2	3	2		
1 – Slię	ght, 2	– Mode	erate, 3	3 – Substar	itial, B	Γ- Bloom'	s Taxono	omy							
						ASSE	SSMENT	PATTE	RN –	THEOR	(				
	st / Ble atege	oom's ory*		Remembe (K1) %		Underst (K2		Apply (K3)		Analyz (K4) 9	•	Evaluating (K5) %		eating (6) %	Total %
	CAT	1		20		4	0	40	)					100	
	CAT	2		20		4	0	40	)						100
	CAT	3		20		4	0	40	)						100
	ESE	=		20		4	0	40	)						100
* ±3%	may t	be varie	d (CA	T 1, 2 & 3 –	50 ma	irks & ES	E – 100	marks)			·				



Programme Branch	e &	B.E & I	Electroni	cs and (	Commu	nicatio	n Engin	eering		Sem.	Category	' L	Т	Р	Credit
Prerequisite	s	NIL								7	EC	0	0	10	5
															Total: 15
COURSEOU	тсоме	S:													Mapped
On completic		,													st Level)
		alyze, int gy of the	erpret an project	d formul	ate the i	real wor	ld proble	em and	concep	otualize tr	ie			Applyi	ng (K3)
CO2 de	sign the	electroni	cs based	system	using m	athema	tical ana	alysis						Applyi	ng (K3)
CO3 de	velop th	e model	using mo	dern too	ls and d	emonst	rate the	working	g of the	model				Analyz	ing (K4)
CO4 art	ticulate tl	he projec	t report a	nd prese	entations	6								Evalua	ting (K5)
CO5 ^{pla}	an and e	xecute th	e project	as a tea	m									Evalua	ting (K5)
					Марр	oing of (	Cos wit	h Pos a	and PS	Os					
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	2	PSO1	PSO2
CO1	3	3	3	2	2	2	2	2	3	3	3	2		3	3
CO2	3	3	3	3	3	2	2	2	3	3	3	2		3	3
CO3	3	3	3	3	3	2	2	2	3	3	3	2	2 3		3
CO4	3	3	3	3	3	3	3	3	3	3	3	3		3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3		3	3



Branch	8	B.E & E	Electroni	cs and (	Commu	nicatio	n Engin	eering		Sem.	Category	′ L	Т	Р	Credit	
Prerequisites	s	NIL								8	EC	0	0	8	4	
		I.													Total: 12	
COURSEOU	TCOME	S:													Mapped	
On completio		,											(		st Level)	
		alyze, int gy of the	erpret an project	d formul	ate the i	eal wor	ld proble	em and	concep	tualize th	ie			Apply	ing (K3)	
CO2 des	sign the	electroni	cs based	system	using m	athemat	tical ana	alysis						Apply	ing (K3)	
CO3 dev	velop th	ne model	using mo	dern too	ls and d	emonsti	rate the	working	g of the	model			Analyzing (K4)			
CO4 arti	iculate tl	he projec	t report a	nd prese	entations	5								Evalua	ting (K5)	
CO5 ^{pla}	n and e	xecute th	e project	as a tea	m									Evalua	ting (K5)	
					Марр	oing of (	Cos wit	h Pos a	and PS	Os						
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	2	PSO1	PSO2	
CO1	3	3	3	2	2	2	2	2	3	3	3	2		3	3	
CO2	3	3	3	3	3	2	2	2	3	3	3	2		3	3	
CO3	3	3	3	3	3	2	2	2	3	3	3	2	2 3		3	
CO4	3	3	3	3	3	3	3	3	3	3	3	3		3	3	
CO5	3	3	3	3	3	3	3	3	3	3	3	3		3	3	



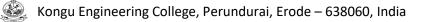
	amme & :h	B.E – Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prere	quisites	Nil	5	PE	2	0	2	3
Pream	ble	To understand the principles of various instruments and tran instrumentation in system design.	sducers and t	o learn the imp	oortar	nce of	f virtua	al
Unit –	1	Measurement Concepts And Measuring Instruments:						6
		ems- Static and dynamic characteristics – Units and standard meters – wheatstone bridge.	ls of measure	ments – Error	anal	ysis ·	–Digit	al meters
Unit –		Transducers:						6
		ar variable differential transformer- Capacitive transducer – Pi tion of Instrumentation amplifier with sensor.	ezoelectric tra	insducers – Vi	bratio	on se	nsor–	Proximit
Unit –		Virtual Instrumentation & Software:						6
Advan	tages– LabV	a virtual instrument – Physical quantities and analog interfa IEW – Graphical user interfaces – Controls and indicators.	aces – Hardw	are and softw	vare	– Us	er int	
Unit –		VI Software Tools & Programming Techniques:		. <b>F</b> acatoria	-1 -1-			6
		and running a virtual instrument – Graphical programming pa b-VI Decision structures – Formula nodes – Sequence structure			iei od	jects	– ⊢ur	iction and
Unit –		PLC Programming:						6
		omponents of PLC – Advantages over relay logic – PLC progr	amming langu	ages – Ladde	r diag	gram	– Pro	gramming
timers	and counters	s – PLC specifications – Timer functions: Types, Programming.						
		ENTS / EXERCISES:						
-	-							
1.	Programm	ing exercises on Basic Arithmetic Operations.						
2.	Programm	ing exercises on Boolean Operations.						
3.	Programm	ing exercises for loops and charts						
	5							
4.	Programm	ing exercises for clusters and graphs.						
4. 5.								
	Programm	ing exercises for clusters and graphs.						
5. 6.	Programm Programm	ing exercises for clusters and graphs. ing exercises on string.	t					
5.	Programm Programm Programm	ing exercises for clusters and graphs. ing exercises on string. ing exercises on Shift Registers.	t					
5. 6. 7. 8.	Programm Programm Programm Programm	ing exercises for clusters and graphs. ing exercises on string. ing exercises on Shift Registers. ing exercises on case and sequence structures, file input/outpu	t					
<ol> <li>5.</li> <li>6.</li> <li>7.</li> <li>8.</li> <li>9.</li> </ol>	Programm Programm Programm Programm	ing exercises for clusters and graphs. ing exercises on string. ing exercises on Shift Registers. ing exercises on case and sequence structures, file input/output ing exercises on Arrays. irtual Instrumentation for simple applications.	t					
5. 6. 7. 8. 9.	Programm Programm Programm Programm Creating V	ing exercises for clusters and graphs. ing exercises on string. ing exercises on Shift Registers. ing exercises on case and sequence structures, file input/output ing exercises on Arrays. irtual Instrumentation for simple applications.	t	Lecture:	30, P	ractio	cal:30	), Total:60
5. 6. 7. 8. 9. 10.	Programm Programm Programm Programm Creating V	ing exercises for clusters and graphs. ing exercises on string. ing exercises on Shift Registers. ing exercises on case and sequence structures, file input/output ing exercises on Arrays. irtual Instrumentation for simple applications.	t	Lecture:	30, P∣	ractio	cal:30	), Total:60
<ol> <li>5.</li> <li>6.</li> <li>7.</li> <li>8.</li> <li>9.</li> <li>10.</li> </ol>	Programm Programm Programm Creating V Mini Project BOOKS: Helfrick Alt	ing exercises for clusters and graphs. ing exercises on string. ing exercises on Shift Registers. ing exercises on case and sequence structures, file input/outpu ing exercises on Arrays. irtual Instrumentation for simple applications. et. pert D. and Cooper William D, "Modern Electronic Instrumentation						
<ol> <li>5.</li> <li>6.</li> <li>7.</li> <li>8.</li> <li>9.</li> <li>10.</li> <li>TEXT</li> </ol>	Programm Programm Programm Creating V Mini Project BOOKS: Helfrick Alt Learning, N Jeffery Tra	ing exercises for clusters and graphs. ing exercises on string. ing exercises on Shift Registers. ing exercises on case and sequence structures, file input/outpu ing exercises on Arrays. irtual Instrumentation for simple applications. et.	on and Measu	rement Techn	iques	", 2 nd	Editio	on, PHI



1.	Jovit	tha Jero	ome, "Vir	tual Instru	umentatio	on using	LabVIEV	V",1 st E	dition,	PHI Lear	ning, N	lew Delhi, 2010	).		
2.	Labo	oratory I	Manual												
		JTCOM ion of tl		se, the st	udents	will be a	ble to						(	BT Mapp Highest L	
CO1				ring instru										Applying ( Precision	(K3), (S3)
CO2	unde	erstand	the work	ing princi	ple of va	rious trai	nsducers	s for real	time a	pplication	IS.			derstandi Precision	(S3)
CO3	infer	the bas	sics of vi	rtual instr	umentati	on								derstandi anipulatio	
CO4	deve	elop pro	grams a	nd desigr	virtual s	systems								Applying ( Precision	(S3)
CO5	build	l ladder	diagram	for indus	trial app	lications.								Applying ( Precision	
						Марр	ing of C	os with	Pos ar	nd PSOs					
Cos/F	Pos	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	0 PO11	PO12	PSO1	PSO2
CO		3	2										1	2	
CO		2	1										2	3	
CO	-	3	2			3				2	2		2	3	2
CO	-	3	2		2	3				2	2		2	3	2
CO: 1 – Slie	-	3 – Mode	2 rate 3 –	Substant	2 ial BT- I	3 Bloom's ⁻	Taxonom	עו וע		2	2		2	2	2
	g , <u>-</u>	mode		Cubotan	iai, D1										
<b>T</b>		! .								THEORY			<b>5</b> ) <b>0</b>		Tatal
	Catego	oom's ory*	Re	member (K1) %	ing u	Jndersta (K2)		Apply (K3)		Analyzi (K4) %		Evaluating (K %		reating K6) %	Total
	CAT			10		60		30		-		-		-	100
	CAT	2		10		50		40	)	-		-		-	100
	CAT	3		10		40		50	)	-		-		-	100
	ESE			10		40		50	)	-		-		-	100
* ±3%	may b	e varied	d (CAT 1	,2,3 – 50	marks &	ESE – 1	00 mark	s)							



	22ECE01 – MEDICAL ELECTRO						
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	5	PE	3	0	0	3
Preamble	To understand the working of the various physiological system basics of bio signals recording, various diagnostic, therapeut			also	to c	ompr	ehend the
Unit – I	Human Physiology:		•				9
design of medic ECG,EEG and E <b>Unit – II</b>	Basic Medical Recording System:	agation of ac	tion potentials	- Bio	elect	ric p	otentials 9
	CG – Electrodes for EEG – Electrodes for EMG – Basic recording s implifiers – Sources of noise in low level recording circuits – Digita			on for	eleo	troni	ic recorde
Unit – III	Depending and Manitaring Instruments:						9
	Recording and Monitoring Instruments:		<b>-</b> 1 /		~		_
Basic electrocard in ECG and EMC	diograph machine – ECG leads – Phonocardiograph –Electroence – Measurement of heart rate- direct method of Blood pressure m nt –Single channel telemetry systems –Multichannel wireless televity	neasurement -	- Carbon di-oxi	ide m			n artefact
Basic electrocard in ECG and EMC rate measureme <b>Unit – IV</b>	<ul> <li>diograph machine – ECG leads – Phonocardiograph –Electroence</li> <li>Measurement of heart rate- direct method of Blood pressure mat –Single channel telemetry systems –Multichannel wireless tele</li> <li>Measurements and Analysis Techniques:</li> </ul>	neasurement - metry system	- Carbon di-oxi – Pulse Oxime	ide m eter	etho	d of I	n artefact respiration 9
Basic electrocard in ECG and EMC rate measureme <b>Unit – IV</b> Basic principles	diograph machine – ECG leads – Phonocardiograph –Electroence     A – Measurement of heart rate- direct method of Blood pressure m     nt –Single channel telemetry systems –Multichannel wireless tele     Measurements and Analysis Techniques:     of external cardiac pacemaker and ventricular synchronous dem     izards –Leakage currents – Test instruments for checking safety p	measurement - metry system	- Carbon di-oxi – Pulse Oxime ker – Basic pri	ide m eter nciple	etho	d of	n artefact respiratio 9 efibrillator
Basic electrocard in ECG and EMC rate measureme <b>Unit – IV</b> Basic principles Electric shock ha monitoring syste	diograph machine – ECG leads – Phonocardiograph –Electroence     A – Measurement of heart rate- direct method of Blood pressure m     nt –Single channel telemetry systems –Multichannel wireless tele     Measurements and Analysis Techniques:     of external cardiac pacemaker and ventricular synchronous dem     izards –Leakage currents – Test instruments for checking safety p	measurement - metry system	- Carbon di-oxi – Pulse Oxime ker – Basic pri	ide m eter nciple	etho	d of	n artefact respiration 9 efibrillator
Basic electrocard in ECG and EMC rate measureme Unit – IV Basic principles Electric shock ha monitoring syste Unit – V Haemodialysis m	diograph machine – ECG leads – Phonocardiograph –Electroence     A Measurement of heart rate- direct method of Blood pressure m     nt –Single channel telemetry systems –Multichannel wireless tele     Measurements and Analysis Techniques:     of external cardiac pacemaker and ventricular synchronous dem     Izards –Leakage currents – Test instruments for checking safety p m	neasurement - metry system nand pacemak arameters of l n Tomograph	- Carbon di-oxi – Pulse Oxime ker – Basic pri piomedical equ y (PET) scanr	nciple ipme	etho es of nt- E	d of i	n artefact respiratio 9 efibrillator arrhythmi 9 diatherm
Basic electrocard in ECG and EMC rate measureme Unit – IV Basic principles Electric shock ha monitoring syste Unit – V Haemodialysis m machine- Electro	diograph machine – ECG leads – Phonocardiograph –Electroence     A Measurement of heart rate- direct method of Blood pressure m     Measurements and Analysis Techniques:     Measurements and Analysis Techniques:     of external cardiac pacemaker and ventricular synchronous dem     Izards –Leakage currents – Test instruments for checking safety p     Medical Instrumentation:     nachine –Radio isotopes in medical diagnosis- Positron Emissio	neasurement - metry system nand pacemak arameters of l n Tomograph	- Carbon di-oxi – Pulse Oxime ker – Basic pri piomedical equ y (PET) scanr	nciple ipme	etho es of nt- E	d of i	n artefact respiratio 9 efibrillator arrhythmi 9 diatherm
Basic electrocard in ECG and EMC rate measureme Unit – IV Basic principles Electric shock ha monitoring syste Unit – V Haemodialysis m machine- Electro	diograph machine – ECG leads – Phonocardiograph –Electroence     A Measurement of heart rate- direct method of Blood pressure m     Measurements and Analysis Techniques:     Measurements and Analysis Techniques:     of external cardiac pacemaker and ventricular synchronous dem     Izards –Leakage currents – Test instruments for checking safety p     Medical Instrumentation:     nachine –Radio isotopes in medical diagnosis- Positron Emissio	neasurement - metry system nand pacemak arameters of l n Tomograph	- Carbon di-oxi – Pulse Oxime ker – Basic pri piomedical equ y (PET) scanr	nciple ipme	etho es of nt- E	d of i	n artefact respiratio 9 efibrillator arrhythmi 9 diatherm 9 pressur
Basic electrocard in ECG and EMC rate measureme Unit – IV Basic principles Electric shock ha monitoring syste Unit – V Haemodialysis n machine- Electro ventilator.	diograph machine – ECG leads – Phonocardiograph –Electroence     A Measurement of heart rate- direct method of Blood pressure m     Measurements and Analysis Techniques:     Measurements and Analysis Techniques:     of external cardiac pacemaker and ventricular synchronous dem     Izards –Leakage currents – Test instruments for checking safety p     Medical Instrumentation:     hachine –Radio isotopes in medical diagnosis- Positron Emissio	neasurement - metry system nand pacemal arameters of l n Tomograph gical units - /	- Carbon di-oxi – Pulse Oxime ker – Basic pri piomedical equ y (PET) scanr Artificial ventila	nciple ipme	etho es of nt- E	d of i	n artefact respiratio 9 efibrillato arrhythmi 9 diatherm 9 pressur
Basic electrocard in ECG and EMC rate measureme Unit – IV Basic principles Electric shock ha monitoring syste Unit – V Haemodialysis m machine- Electro ventilator. TEXT BOOK: 1. Khandpu	diograph machine – ECG leads – Phonocardiograph –Electroence     Measurement of heart rate- direct method of Blood pressure m     Measurements and Analysis Techniques:     Measurements and Analysis Techniques:     of external cardiac pacemaker and ventricular synchronous dem     izards –Leakage currents – Test instruments for checking safety p     Medical Instrumentation:     hachine –Radio isotopes in medical diagnosis- Positron Emissio     odes used with surgical diathermy –Safety aspects in electrosure	neasurement - metry system nand pacemal arameters of l n Tomograph gical units - /	- Carbon di-oxi – Pulse Oxime ker – Basic pri piomedical equ y (PET) scanr Artificial ventila	nciple ipme	etho es of nt- E	d of i	n artefact respiratio 9 efibrillator arrhythmi 9 diatherm 9 pressur
Basic electrocard in ECG and EMC rate measureme Unit – IV Basic principles Electric shock ha monitoring syste Unit – V Haemodialysis n machine- Electro ventilator. TEXT BOOK: 1. Khandpu REFERENCES:	diograph machine – ECG leads – Phonocardiograph –Electroence     Measurement of heart rate- direct method of Blood pressure m     Measurements and Analysis Techniques:     Measurements and Analysis Techniques:     of external cardiac pacemaker and ventricular synchronous dem     izards –Leakage currents – Test instruments for checking safety p     Medical Instrumentation:     hachine –Radio isotopes in medical diagnosis- Positron Emissio     odes used with surgical diathermy –Safety aspects in electrosure	neasurement - metry system nand pacemal arameters of l n Tomograph gical units – /	- Carbon di-oxi - Pulse Oxime ker – Basic pri biomedical equ y (PET) scanr Artificial ventila w Delhi, 2014.	ide m eter nciple ipme ner – ttion -	etho es of nt- E Surq - Pc	d of f	n artefact respiratio 9 efibrillato arrhythmi 9 diatherm pressur Total:4



		UTCON ion of t		se, the st	udents	will be a	able to						(	BT Mapp Highest L	
CO1	com	prehen	d the ph	ysiological	system	s of the	human	body					Ur	nderstandir	ng (K2)
CO2	para	aphrase	the type	es of electr	odes us	ed in me	easurem	ent of b	oio signa	als in rec	ording sys	stem	Ur	nderstandir	ng (K2)
CO3		cate the		ters of hur	nan sys	tem usir	ng the pi	rinciples	s of reco	ording an	d monitori	ng	Ur	nderstandir	ng (K2)
CO4	deso devi		e various	s measure	ment te	chniques	and the	e need t	for elect	rical safe	ety of biom	nedical	Ur	nderstandir	ng (K2)
CO5	expl	ain the	working	principles	of few r	nedical i	nstrume	ents					Ur	nderstandir	ng (K2)
						Марр	ing of C	cos wit	h Pos a	nd PSOs	6				
Cos/	Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CC	)1	3	2				1						2	3	
CC	)2	3	2	2			1		2	3			2	3	
CC	)3	3	2	2			1		2	3			2	3	
CC	)4	3	2	2			2						2	3	
CC	)5	3	2				1						2	3	
1 – Sli	ight, 2	– Mode	erate, 3 -	- Substant	ial, BT-	Bloom's	Taxono	my							
						ASSE	SSMEN	T PAT	FERN –	THEOR	Y				
	st / Blo Catego	oom's ory*	Re	ememberi (K1) %	ng L	Indersta (K2)		Apply (K3)		Analyz (K4)		Evaluating (K5) %		reating (K6) %	Total %
	CAT	1		25		75		-		-		-		-	100
	CAT	2		20		80		-		-		-		-	100
	CAT	3		25		75		-		-		-		-	100
	ESE			25		75		-		-		-		-	100
* ±3%	may b	e varie	d (CAT [·]	,2,3 – 50	marks 8	ESE -	100 mai	rks)							



Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	5	PE	3	0	0	3
Preamble	To understand the fundamental structure of computer system high performance processors and systems.	and design of v	various functio	nal ur	nits us	ed to	build the
Unit – I	Structure of Computers and Machine Instructions:						9
	Basic operational concepts – Bus structures – Software – Perforn I instruction sequencing – Addressing modes – Basic I/O operatio			Addre	sses	and o	perations
Unit – II	Computer Arithmetic:						9
	otraction of signed numbers – Design of fast adders – Multiplicati cation – Integer division – Floating point numbers and operations						tiplication
	Desta Deservator II. M					1	9
Unit – III	Basic Processing Unit:						9
Fundamental co	<ul> <li>Basic Processing Unit:</li> <li>ncepts – Execution of a complete instruction – Multiple bus orgative – asynchronous DRAM – synchronous DRAM-ROMs – Speed, site</li> </ul>		rdwired Contro	ol – S	emico	nduc	•
Fundamental co	ncepts - Execution of a complete instruction - Multiple bus orga		rdwired Contro	ol – S	emico	onduc	•
Fundamental co Static memories Unit – IV Cache memorie	ncepts – Execution of a complete instruction – Multiple bus orga – asynchronous DRAM – synchronous DRAM-ROMs – Speed, si	ize and cost.					tor RAM
Fundamental co Static memories Unit – IV Cache memorie	ncepts – Execution of a complete instruction – Multiple bus orga – asynchronous DRAM – synchronous DRAM-ROMs – Speed, si Virtual Memory and Input / Output Modules: s – Mapping functions- Virtual memory – Address translation-E	ize and cost.					tor RAM-
Fundamental co Static memories Unit – IV Cache memorie Interrupt-driven Unit – V Data hazards a	ncepts – Execution of a complete instruction – Multiple bus orga – asynchronous DRAM – synchronous DRAM-ROMs – Speed, si <b>Virtual Memory and Input / Output Modules:</b> s – Mapping functions- Virtual memory – Address translation-E I/O – Direct Memory Access – I/O channels and processors.	ize and cost. External device	es – I/O modu ocessing-Arra	lles –	Prog	ramn	9 ned I/O - 9
Fundamental co Static memories Unit – IV Cache memorie Interrupt-driven Unit – V Data hazards a	ncepts – Execution of a complete instruction – Multiple bus orgat – asynchronous DRAM – synchronous DRAM-ROMs – Speed, si <b>Virtual Memory and Input / Output Modules:</b> s – Mapping functions- Virtual memory – Address translation-E //O – Direct Memory Access – I/O channels and processors. <b>Pipelining and Large Computer Systems:</b> nd Instruction hazards(Concepts)-Superscalar operations-Forms	ize and cost. External device	es – I/O modu ocessing-Arra	lles –	Prog	ramn	9 ned I/O - 9 ructure of
Fundamental co Static memories Unit – IV Cache memorie Interrupt-driven Unit – V Data hazards a	ncepts – Execution of a complete instruction – Multiple bus orgat – asynchronous DRAM – synchronous DRAM-ROMs – Speed, si <b>Virtual Memory and Input / Output Modules:</b> s – Mapping functions- Virtual memory – Address translation-E //O – Direct Memory Access – I/O channels and processors. <b>Pipelining and Large Computer Systems:</b> nd Instruction hazards(Concepts)-Superscalar operations-Forms	ize and cost. External device	es – I/O modu ocessing-Arra	lles –	Prog	ramn	9 ned I/O - 9
Fundamental co Static memories Unit – IV Cache memorie Interrupt-driven Unit – V Data hazards a general purpose TEXT BOOK:	ncepts – Execution of a complete instruction – Multiple bus orgat – asynchronous DRAM – synchronous DRAM-ROMs – Speed, si <b>Virtual Memory and Input / Output Modules:</b> s – Mapping functions- Virtual memory – Address translation-E //O – Direct Memory Access – I/O channels and processors. <b>Pipelining and Large Computer Systems:</b> nd Instruction hazards(Concepts)-Superscalar operations-Forms	ize and cost. External device of parallel pr m parallelism a	es – I/O modu ocessing-Arra nd shared vari	iles – y proc	Prog cesso	ramn rs-Sti	9 ned I/O - 9 ructure of Total:45
Fundamental co Static memories Unit – IV Cache memorie Interrupt-driven Unit – V Data hazards a general purpose TEXT BOOK:	<ul> <li>ncepts – Execution of a complete instruction – Multiple bus orga – asynchronous DRAM – synchronous DRAM-ROMs – Speed, si</li> <li>Virtual Memory and Input / Output Modules:</li> <li>s – Mapping functions- Virtual memory – Address translation-El/O – Direct Memory Access – I/O channels and processors.</li> <li>Pipelining and Large Computer Systems:</li> <li>nd Instruction hazards(Concepts)-Superscalar operations-Forms multiprocessors-Memory organization in Multiprocessors-Program</li> </ul>	ize and cost. External device of parallel pr m parallelism a	es – I/O modu ocessing-Arra nd shared vari	iles – y proc	Prog cesso	ramn rs-Sti	9 ned I/O - 9 ructure of Total:45
Fundamental co Static memories Unit – IV Cache memorie Interrupt-driven Unit – V Data hazards a general purpose TEXT BOOK: 1. Hamac REFERENCES:	Ancepts – Execution of a complete instruction – Multiple bus orgat – asynchronous DRAM – synchronous DRAM-ROMs – Speed, si Virtual Memory and Input / Output Modules: s – Mapping functions- Virtual memory – Address translation-E //O – Direct Memory Access – I/O channels and processors. Pipelining and Large Computer Systems: nd Instruction hazards(Concepts)-Superscalar operations-Forms multiprocessors-Memory organization in Multiprocessors-Program scher Carl, Vranesic Zvonko & Zaky Safwat, "Computer Organization gs William, "Computer Organization and Architecture: Designing for	ize and cost. External device of parallel pr m parallelism a	es – I/O modu ocessing-Arra nd shared vari	y proc ables	Prog cesso Delhi,	ramn rs-Sti 2011	9 9 1/O - 9 ructure of Total:45



COURSE On comp			ourse, the	stud	ents will b	e able t	o							lapped st Level)
CO1	describe	the bas	sic structu	re and	d operatior	of a dig	gital com	puter					Understa	anding (K2)
CO2	design fa	ist adde	er and fas	t multi	plier for ar	ithmetic	operatio	ons for Al	JU				Apply	ing (K3)
CO3	design m	emory	sub-syste	m for	a typical c	ompute	-						Apply	ing (K3)
CO4	describe	the var	ious type:	s I/O c	levices an	d memo	ry organ	ization					Understa	anding (K2)
CO5	infer abo	ut pipel	ining and	large	computer	systems	;						Understa	anding (K2)
					M	apping	of Cos v	with Pos	and PS	Os				
Cos/Pos	PO1	PO2	PO3	PO	4 PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	2												
CO2	3	3	3	3	2								3	3
CO3	3	3	3	3									3	3
CO4	3	2	2	3								2	2	
CO5	3	2	3	3								2	2	
1 – Slight	, 2 – Moo	derate,	3 – Subst	antial,	BT- Bloor	n's Taxo	onomy							
					AS	SESSN		TTERN	– THEO	RY				
	Bloom's gory*	Re	emember (K1) %	ing	Understa (K2)			olying 3) %	Analy (K4)		Evaluat (K5)		Creatin (K6) %	
C/	AT1		25		55			20	-		-		-	100
C/	AT2		25		55			20	-		-		-	100
C	AT3		30		70			-	-		-		-	100
E	SE		25		55			20	-		-		-	100
* ±3% ma	y be vari	ed (CA	T 1,2,3 –	50 ma	arks & ESE	– 100 r	narks)		·	·			•	•



	22ECE03 – EMBEDDED SYSTEM D	DESIGN					
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Microprocessor and Microcontroller	5	PE	3	0	0	3
Preamble	To understand the concept of embedded system life cycle inc	cluding partitio	oning, toolset,	emula	ators	and te	esting.
Unit – I	Embedded Design Life Cycle						9
	If a life cycle – Product specification – Hardware / Software part duct testing selection processes: Performance tools – Benchmark on processes.						
Unit – II	Partitioning Decision						9
	vare duality – Coding hardware – ASIC revolution: Managing the r stem start-up – Hardware manipulation: Memory mapped access			tion e	nviro	nment	: Memor
Unit – III	Embedded Toolset						9
	routines – Watch dog timers – Flash memory – Basic toolset : c analyzer and caches – BDM – JTAG	Host based d	lebugging – R	emot	e deb	ouggin	g – ROI
Unit – IV	In circuit Emulators and Testing						9
Bullet proof run o - Types of testin	control – Real time trace – Hardware break points – Testing: Bug tr	acking - Red	uction of risks	and	costs	– Pei	formanc
Unit – V	Analysis and Feasibility						9
Power analysis - Structural – Pl	- DC analysis –AC analysis – Thermal analysis – Signal integrity – I – EMI/EMC.	MIBF – Reliab	ility analysis –	BOM	com	olianc	e analysi
							Total:4
TEXT BOOKS:							
Arnold S	Berger, "Embedded Systems Design: An Introduction to Processes, USA, 2017, for Units I, II, III, IV.	es, Tools, and	Techniques H	lardc	over"	1 st E	dition,
1. Arnold S CRC pre		· · ·	·	lardc	over"	1 st E	dition,
Arnold S CRC pre2.Vilas S	ess, USA, 2017, for Units I, II, III, IV.	· · ·	·	lardc	over"	, 1 st E	dition,
1.     Arnold S CRC pre       2.     Vilas S       REFERENCES:	ess, USA, 2017, for Units I, II, III, IV.	tion,2020, for	Unit V.	lardc	over"	, 1 st E	dition,



		UTCOM ion of t		se, the st	udents	will be a	ble to						(	BT Mapp Highest L	
CO1	com	preheno	d the des	ign flow o	of an em	bedded s	system						Und	erstanding	g(K2)
CO2		erstand anizatior		vare hard	ware du	ality of er	nbedded	system	design	and me	mory		Und	erstanding	g(K2)
CO3	use	various	tools for	hardware	e- softwa	are debug	gging						App	lying (K3)	
CO4			re debug nbedded		g emula	tor for em	nbedded	product	and un	derstand	I the diffe	erent types of	Und	erstanding	g(K2)
CO5	und	erstand	and inte	erpret the	feasibilit	ies in em	bedded	software	e desigr	1			Und	erstanding	g(K2)
Cos/	205	PO1	PO2	PO?	PO4		ing of C	1			1	PO11	PO12	PSO1	<b>BSO</b> 2
Cos/F	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3												2	
CO	2	3	2											2	
CO	3	3	2	3	2	3		2	2					2	2
CO	4	3	2	2	3	2	2				2			2	2
CO	5	3	2		2						2		3	2	2
1 – Slig	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's ⁻	Faxonom	ıy							
						ASSE	SSMEN		ERN – 1	HEORY	,				
		oom's	Re	member (K1) %	ing	Jndersta (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		eating K6) %	Total %
	St / Bi	ory*		(11) /0											400
				20		80		-		-		-		-	100
	Catego	1				80 60		- 20	)	-		-		-	100
	Catego CAT	1 2		20				- 20 -	)	-		-		-	



Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	s Nil	5	PE	2	0	2	3
Preamble	To learn and apply the various Digital Image Processing to	echniques on re	al time images				
Unit – I	Digital Image Fundamentals:	•	5				6
Elements of c effect – Image	ligital image processing systems – Elements of visual perception e sampling– Quantization – Basic relationship between pixels - Co FT, DCT, and Haar transformation						lach ban
Unit – II	Image Enhancement:						6
	cement: Basic intensity transformations, Piecewise linear transfo nain filtering: Smoothing and sharpening filters.	rmation function	ns, Histogram	equa	alizatio	on, Sj	patial an
Unit – III	Image Restoration:						6
	tion: Degradation model – Noise distributions– Median – Geome statistics filters – Inverse and wiener filtering – Constrained least s		rmonic mean ·	– Co	ntra I	narmo	onic mea
Unit – IV	Image Segmentation, Representation and Description	•					6
	d edge detection – Basics of intensity thresholding – Region based ge representation : Chain codes, – Boundary descriptors – Regi closing						
Unit – V	Image Compression:						6
LIST OF EXP	ERIMENTS / EXERCISES:						
1 Study	of Image Processing tool box - MATLAR						
	of Image Processing tool box – MATLAB	sion					
2. Extra	v of Image Processing tool box – MATLAB ction of R,G,B componenets using color image and image convers the following Image Processing techniques:	sion					
2. Extra Simulation of	ction of R,G,B componenets using color image and image convers	sion					
2. Extra Simulation of 3. DCT	ction of R,G,B componenets using color image and image convers the following Image Processing techniques:		ane extraction				
2. Extra Simulation of 3. DCT 4. Image	ction of R,G,B componenets using color image and image convers the following Image Processing techniques: and DFT on an input image	ualization/Bit pla		filter	S		
2. Extra Simulation of 3. DCT 4. Image 5. Image	ction of R,G,B componenets using color image and image convers the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ	ualization/Bit pla Edge detection		filter	S		
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Resto 7. Morp	ction of R,G,B componenets using color image and image convers the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and pration of an original image by the addition of noise (Gaussian & Im hological operation on an input image	ualization/Bit pla Edge detection		filter	S		
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Resto 7. Morp	ction of R,G,B componenets using color image and image convers the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and pration of an original image by the addition of noise (Gaussian & Im	ualization/Bit pla Edge detection		filter	S		
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Resto 7. Morp	ction of R,G,B componenets using color image and image convers the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and pration of an original image by the addition of noise (Gaussian & Im hological operation on an input image	ualization/Bit pla Edge detection				al:30	, Total:6
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Resto 7. Morp	ction of R,G,B componenets using color image and image convers the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and pration of an original image by the addition of noise (Gaussian & Im hological operation on an input image roject	ualization/Bit pla Edge detection	by sharpening			al:30	, Total:6
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Reste 7. Morp 8. Minip	ction of R,G,B componenets using color image and image convers the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and pration of an original image by the addition of noise (Gaussian & Im hological operation on an input image roject	ualization/Bit pla Edge detection npulse)	by sharpening Lecture:3	0, Pi	ractic		, Total:6
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Resto 7. Morpl 8. Minip TEXT BOOK: 1. Rafae REFERENCE	ction of R,G,B componenets using color image and image converse the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and boration of an original image by the addition of noise (Gaussian & Im hological operation on an input image roject el C Gonzalez & Richard E Woods, "Digital Image Processing", 4 th S/MANUAL / SOFTWARE:	ualization/Bit pla Edge detection npulse) Edition, Pearso	by sharpening Lecture:3	6 <b>0, P</b> i ew D	r <b>actic</b> velhi, 2	2020	
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Resto 7. Morpl 8. Minip TEXT BOOK: 1. Rafae REFERENCE 1. Jayar 2018.	ction of R,G,B componenets using color image and image converse the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and pration of an original image by the addition of noise (Gaussian & Im hological operation on an input image roject el C Gonzalez & Richard E Woods, "Digital Image Processing", 4 th <b>S/ MANUAL / SOFTWARE:</b> aman S, Esakkirajan S & Veerakumar T, "Digital Image Processing	ualization/Bit pla Edge detection npulse) Edition, Pearso	by sharpening Lecture:3	6 <b>0, P</b> i ew D	r <b>actic</b> velhi, 2	2020	
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Reste 7. Morpl 8. Minip TEXT BOOK: 1. Rafae REFERENCE 1. Jayar 2018.	ction of R,G,B componenets using color image and image converse the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and pration of an original image by the addition of noise (Gaussian & Im hological operation on an input image roject el C Gonzalez & Richard E Woods, "Digital Image Processing", 4 th <b>S/ MANUAL / SOFTWARE:</b> aman S, Esakkirajan S & Veerakumar T, "Digital Image Processing	ualization/Bit pla Edge detection npulse) Edition, Pearson g", 1 st Edition, 22	by sharpening Lecture:3	6 <b>0, P</b> i ew D	r <b>actic</b> velhi, 2	2020	
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Resto 7. Morpl 8. Minip TEXT BOOK: 1. Rafae REFERENCE 1. Jayar 2018. 2. Alan of 2. Alan of 2. Alan of 2. Alan of 2. Alan of 2. Alan of 100000000000000000000000000000000000	ction of R,G,B componenets using color image and image converse the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and poration of an original image by the addition of noise (Gaussian & Im hological operation on an input image roject el C Gonzalez & Richard E Woods, "Digital Image Processing", 4 th S/MANUAL / SOFTWARE: aman S, Esakkirajan S & Veerakumar T, "Digital Image Processing	ualization/Bit pla Edge detection npulse) Edition, Pearson g", 1 st Edition, 22 Academic Press	by sharpening Lecture:3 n Education, No nd Reprint, Tata s, 2009	6 <b>0, P</b> i ew D	r <b>actic</b> velhi, 2	2020	
2. Extra Simulation of 3. DCT 4. Image 5. Image 6. Resto 7. Morpl 8. Minip TEXT BOOK: 1. Rafae REFERENCE 1. Jayar 2018. 2. Alan of 3. Anil K	ction of R,G,B componenets using color image and image converse the following Image Processing techniques: and DFT on an input image e enhancement using basic intensity transformation /histogram equ e Smoothening Filters(Mean and Median filtering of an Image and pration of an original image by the addition of noise (Gaussian & Im hological operation on an input image roject el C Gonzalez & Richard E Woods, "Digital Image Processing", 4 th <b>S/ MANUAL / SOFTWARE:</b> aman S, Esakkirajan S & Veerakumar T, "Digital Image Processing", 1 st Edition, 7	ualization/Bit pla Edge detection npulse) Edition, Pearson g", 1 st Edition, 22 Academic Press	by sharpening Lecture:3 n Education, No nd Reprint, Tata s, 2009	6 <b>0, P</b> i ew D	r <b>actic</b> velhi, 2	2020	

B.E.– Electronics and Communication Engineering, Regulation, Curriculum and Syllabus – R2022



	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	interpret the fundamental concepts and image transforms	Applying (K3) , Precision (S3)
CO2	apply Image enhancement in both spatial and frequency domain to improve the quality of images	Applying (K3) , Precision (S3)
CO3	apply Image restoration techniques to restore the original image from noisy image	Applying (K3) , Precision (S3)
CO4	extract the features and region of interest of an image using segmentation, representation and description techniques for image classification	Applying (K3) , Precision (S3)
CO5	use image compression algorithms on digital images	Applying (K3) , Precision (S3)

					Маррі	ng of C	Os with	POs an	d PSOs	;				
COs,POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3			2	2	2		2	2	
CO2	3	2	2	2	3	2		2	2	2		2	2	
CO3	3	2	2	2	3	2		2	2	2		2	2	
CO4	3	2	2	2	3	2		2	2	2		2	2	
CO5	3	2	2						2	2		2	2	
1 Slight 2	Mada	roto 2	Substant		Plaam'a	Tayanan			1					

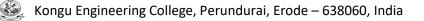
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

		ASSESSMEN ⁻	F PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	10	60	30	-	-	-	100
CAT2	10	60	30	-	-	-	100
CAT3	10	60	30	-	-	-	100
ESE	15	55	30	-	-	-	100
ESE	-	55	30	-	-	-	



## 22ECF03 - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Branc	amme & h	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerec	quisites	Transforms and Probability Theory	5	PE	2	0	2	3
Pream	ble	This course provides an insight towards data hand	ling and predicti	ve modelling				
Unit –	1	Artificial Intelligence:	0					6
Need t	o study AI - A	pplications of AI, Branches of AI, - defining intelligen	ce using Turing	test - Building a	an Inte	lligent	agent	1
Unit –		Preprocessing data:						6
	<b>v</b> . <b>v</b>	Loading data - binarization - Mean removal - scaling	g – Normalisatio	n - Label encodi	ng			
Unit –		Supervised and Unsupervised Learning:						6
Linear	Regression -	Logistic Regression classifier - Naïve Bayes classifier	er - Support Vec	tor Machine - K-	means	s cluste	ering	
Unit –		Probabilistic Reasoning for Sequential Data:						6
Handli recogr		Operating on time series data - Extracting statistics f	rom time-series	data - Generatir	ng data	a using	, HMM	<ul> <li>Speec</li> </ul>
Unit –		Artificial Neural Network:						6
		on – Constructing single layered and multilayer neur	al networks – A	rchitecture of Co	onvolu	tional	Neural	Network
lypes	of layers in a	CNN						
		ENTS / EXERCISES:						
<u>1.</u>		ngle variable regressor						
2.	Build a m	ultivariable regressor						
3.	Build a pe	erceptron-based linear regressor						
4.	Estimate	housing prices using a Support Vector Regressor						
	Stock ma	rket analysis using HMM						
5.								
5. 6.		mage classifier using a single layer neural network						
	Build an i							
6.	Build an i	mage classifier using a single layer neural network mage classifier using a convolutional neural network						
6. 7.	Build an i Build an i	mage classifier using a single layer neural network mage classifier using a convolutional neural network		Lect	ure:30	, Prac	tical:3	0 Total:6
6. 7. 8.	Build an i Build an i	mage classifier using a single layer neural network mage classifier using a convolutional neural network		Lect	ure:30	, Prac	tical:3	0 Total:6
6. 7. 8.	Build an i Build an i Miniproje BOOK:	mage classifier using a single layer neural network mage classifier using a convolutional neural network	nited Kingdom:				tical:3	0 Total:6
6. 7. 8. <b>TEXT</b> 1.	Build an i Build an i Miniproje BOOK: Joshi,	mage classifier using a single layer neural network mage classifier using a convolutional neural network ct	nited Kingdom:				tical:3	0 Total:6
6. 7. 8. <b>TEXT</b> 1. <b>REFEI</b>	Build an i Build an i Miniproje BOOK: Joshi, RENCES/ MA	mage classifier using a single layer neural network mage classifier using a convolutional neural network ct P "Artificial Intelligence with Python", First Edition, L		Packt Publishin	g, 201	7		0 Total:6
6. 7. 8. <b>TEXT</b> 1. <b>REFE</b> 1.	Build an i Build an i Miniproje BOOK: Joshi, RENCES/ MA	mage classifier using a single layer neural network mage classifier using a convolutional neural network ct P "Artificial Intelligence with Python", First Edition, L	irst Edition, Unit	Packt Publishing ed Kingdom: MI	g, 201 T Pres	7		0 Total:6
6. 7. 8. <b>TEXT</b> 1.	Build an i Build an i Miniproje BOOK: Joshi, RENCES/ MA Courvil Raschl	mage classifier using a single layer neural network mage classifier using a convolutional neural network ct P "Artificial Intelligence with Python", First Edition, L INUAL / SOFTWARE: le, A., Goodfellow, I., Bengio, Y. ,"Deep Learning", F	irst Edition, Unit	Packt Publishing red Kingdom: MI ackt Publishing.,2	g, 2017 T Pres 2015	7 ss., 201	16	



	E OUTCOMES: pletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	comprehend about the intelligent agent	Understanding (K2) , Imitation (S1)
CO2	handle missing and outlier kinds of data	Applying(K3), Manipulation(S2)
CO3	develop and test different regression and classification models	Applying(K3, Manipulation(S2)
CO4	determine the analysis of time series data	Applying(K3) , Precision(S3)
CO5	build and test deep learning models	Applying(K3) , Precision(S3)

					Марр	ing of C	Cos with	Pos an	d PSOs					
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	2						2	2	
CO2	3	2	2	1	2	2						2	2	
CO3	3	2	2	2	2	2			2	2		2	3	
CO4	3	2	2	2	2	2			2	2		2	2	
CO5	3	2	2	2	2	2			2	2		2	3	
1 Slight 2	Mode	roto 2	Substant		Plaam'a	Toyong	m							

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

		ASSESSMEN	IT PATTERN	– THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	10	50	40	-	-	-	100
CAT2	10	40	50	-	-	-	100
CAT3	10	40	50	-	-	-	100
ESE	20	45	35	-	-	-	100
* +3% may be varie	d (CAT 1,2,3 – 50 ma	arks & ESE – 100 ma	urks)			1	



		22ECF04 – LINUX OPERATING SYS	TEM					
Progra Branc	amme & h	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Cre dit
Prerec	quisites	Nil	5	PE	2	0	2	3
Pream	ıble	This course provides the foundations for understanding of the		Irce platform				
Unit –	I	Introduction:						6
		tributions – Installing Linux – First step on command line – Mar file contents – Linux file tree	n pages- V	Vorking with c	lirec	tories	s- Work	ing with
Unit –		Shell Expansion:						6
Comm	ands and arg	uments – Control operators – Shell Variables – Shell embeddir	ng and opt	ions – File glo	bbir	ıg.		
Unit –	III	Pipes and commands:						6
	direction : Std ssions –Bash	in, stdout, stderr, input redirection, output redirection – filters with history	n example	s – Basic Unix	< too	ls – I	Regular	
Unit –		Vi Editor and Scripting :						6
		Scripting: Introduction – Scripting loops – Scripting parameters	– more sc	ripting.				
Unit –	V	User Management & File Security :						6
User n	nanagement	– User passwords – User Profiles- standard file permission- acc	cess contr	ol lists-file link	S			
LIST	OF EXPERIM	ENTS / EXERCISES:						
1.	Illustrate th	e working of file directories, files and file contents						
2.	Write a she	Il program with control operators						
3.	Display the	shell variables illustrating all parameters						
4.	Manipulate	files with file globbing methods						
5.	Create a fil	e as needed and apply all the filters and use all the basic Unix	Tools					
6.	Write a scr	ipt in Vi Editor illustrating the conditional and looping statements	S					
7.	Display the	list of users logged on and create a user in home directory and	l bash she	èll				
8.	Demonstra	te password management and file security features						
				Lecture:3	80, P	racti	ical:30,	Total:60
TEXT	BOOK:							
1.	Paul Cobba	aut, "Linux Fundamentals", GNU Free Documentation License 2	2015.					
REFE	RENCES/ M/	ANUAL / SOFTWARE:						
1.	https://wwv	v.linux.org/docs/						
2.	https://wwv	v.raspberrypi.com/documentation/computers/using_linux.html						
3.	Laboratory	Manual						

		UTCOM ion of t		se, the st	udents	will be a	able to							T Mappe phest Lev	
CO1	real	ize diffe	rent Linu	ıx distribut	tions ar	nd Linux f	ile tree							rstanding ecision(S	
CO2	use	Linux c	ommand	s and app	ly shel	operato	rs						Ap	plying(K ecision(S	3)
CO3	inter	rpret pip	e comm	ands and	regular	express	ions							plying(K ecision(S	
CO4	appl	ly script	ing and l	ooping me	ethods	in Vi Edit	or							plying(K ecision(S	
CO5	dem	onstrat	e the var	ious file s	ecurity	operatior	ns and	user ma	nager	nent				plying(K ecision(S	
						Mappir	ng of C	os with	Pos a	and PSOs	5				
Cos/P	os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO	B PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	2		2								2	
CO	2	3	2	2		2								2	
CO	3	3	2	2		2								2	
CO	4	3	2	2		2								2	
CO	5	3	2	2		2								2	
1 – Slig	ght, 2	– Mode	erate, 3 -	- Substan	tial, B1	- Bloom	's Taxo	nomy				L			
						ASSES	SMEN		ERN –	THEOR	(				
	/ Bloc tegor			embering K1) %	g U	Indersta (K2) 9		Apply (K3)		Analyzii (K4) %		valuating (K5) %		ating 6) %	Total %
CA	AT1			15		60	)	25	5	-					100
CA	AT2			10		40		50	0	-					100
CA	۹T3			10		40		50	0	-					100
ES				10		40		50	0	-					100

				1			
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	5	PE	3	0	0	3
Preamble	To acquire the basic concepts of data science to analyse la approaches and store the processed data in distributed environmentations.		s of data usir	ig ma	achin	e lear	ning
Unit – I	Introduction to data science						9
Hadoop. The dat	science – Facets of data – Data science process –Big data a science process: Overview – Defining research goals – R Building models – Building applications						
Unit – II	Machine learning and handling big data						9
ML.handling Large	e Data: Problems in handling large data – General techniques	– Program	mina tins – C	200	Study:	Pred	ictina
	e Data. I Toblems in handling large data – General techniques	riogram			Juay.	1100	loung
malicious URLs. <b>Unit – III</b>	Distributed data storage and processing				-		9
malicious URLs. <b>Unit – III</b> Distributing data s	<b>Distributed data storage and processing</b> storage and processing with frameworks: Hadoop – Spark – Ca				-		<b>9</b> oney.
malicious URLs. Unit – III Distributing data s Unit – IV	Distributed data storage and processing storage and processing with frameworks: Hadoop – Spark – Ca NoSQL and graph database	ase study: A	ssessing risk	with	loan	ing m	9 oney. 9
malicious URLs. <b>Unit – III</b> Distributing data s <b>Unit – IV</b> Introduction to NC	<b>Distributed data storage and processing</b> storage and processing with frameworks: Hadoop – Spark – Ca	ase study: A Databases	ssessing risk	with	loan e typ	ing m es – C	9 oney. 9
malicious URLs. <b>Unit – III</b> Distributing data s <b>Unit – IV</b> Introduction to NC	Distributed data storage and processing           storage and processing with frameworks: Hadoop – Spark – Ca           NoSQL and graph database           DSQL: ACID– CAP Theorem – The BASE Principles of NoSQL	ase study: A Databases	ssessing risk	with	loan e typ	ing m es – C	9 oney. 9
malicious URLs. <b>Unit – III</b> Distributing data s <b>Unit – IV</b> Introduction to NC Disease predictio <b>Unit – V</b> Test mining in rea	Distributed data storage and processing         storage and processing with frameworks: Hadoop – Spark – Ca         NoSQL and graph database         DSQL: ACID– CAP Theorem – The BASE Principles of NoSQL In– Graph Database: Introducing connected data and graph d         Text Mining and Text Analytics         al world – Text mining techniques: Bag of words – Stemming and Text	ase study: A Databases - latabases -	- NoSQL data	with abas data	loan e type exan	ing m es – C nple.	9 oney. 9 Case Stuc 9
malicious URLs. <b>Unit – III</b> Distributing data s <b>Unit – IV</b> Introduction to NC Disease predictio <b>Unit – V</b>	Distributed data storage and processing         storage and processing with frameworks: Hadoop – Spark – Ca         NoSQL and graph database         DSQL: ACID– CAP Theorem – The BASE Principles of NoSQL In– Graph Database: Introducing connected data and graph d         Text Mining and Text Analytics         al world – Text mining techniques: Bag of words – Stemming and Text	ase study: A Databases - latabases -	- NoSQL data	with abas data	loan e type exan	ing m es – C nple.	9 oney. 9 Case Stud 9 fier –Cas
malicious URLs. <b>Unit – III</b> Distributing data s <b>Unit – IV</b> Introduction to NC Disease predictio <b>Unit – V</b> Test mining in rea	Distributed data storage and processing         storage and processing with frameworks: Hadoop – Spark – Ca         NoSQL and graph database         DSQL: ACID– CAP Theorem – The BASE Principles of NoSQL In– Graph Database: Introducing connected data and graph d         Text Mining and Text Analytics         al world – Text mining techniques: Bag of words – Stemming and Text	ase study: A Databases - latabases -	- NoSQL data	with abas data	loan e type exan	ing m es – C nple.	9 oney. 9 Case Stuc 9
malicious URLs. <b>Unit – III</b> Distributing data s <b>Unit – IV</b> Introduction to NC Disease predictio <b>Unit – V</b> Test mining in rea	Distributed data storage and processing         storage and processing with frameworks: Hadoop – Spark – Ca         NoSQL and graph database         DSQL: ACID– CAP Theorem – The BASE Principles of NoSQL In– Graph Database: Introducing connected data and graph d         Text Mining and Text Analytics         al world – Text mining techniques: Bag of words – Stemming and Text	ase study: A Databases - latabases -	- NoSQL data	with abas data	loan e type exan	ing m es – C nple.	9 oney. 9 Case Stud 9 fier –Cas
malicious URLs. Unit – III Distributing data s Unit – IV Introduction to NC Disease predictio Unit – V Test mining in rea Study: Classifyir TEXT BOOK: 1 Davy Ciel	Distributed data storage and processing         storage and processing with frameworks: Hadoop – Spark – Ca         NoSQL and graph database         DSQL: ACID– CAP Theorem – The BASE Principles of NoSQL In– Graph Database: Introducing connected data and graph d         Text Mining and Text Analytics         al world – Text mining techniques: Bag of words – Stemming and Text	ase study: A Databases - latabases - nd lemmatia	- NoSQL data - Connected zation – Deci	with abas data sion	loan e typ exan tree o	ing m es – C nple. classi	9 oney. 9 Case Stud 9 fier –Cas
malicious URLs. Unit – III Distributing data s Unit – IV Introduction to NC Disease predictio Unit – V Test mining in rea Study: Classifyir TEXT BOOK: 1 Davy Ciel	Distributed data storage and processing         storage and processing with frameworks: Hadoop – Spark – Ca         NoSQL and graph database         DSQL: ACID– CAP Theorem – The BASE Principles of NoSQL I         n– Graph Database: Introducing connected data and graph d         Text Mining and Text Analytics         al world – Text mining techniques: Bag of words – Stemming and Reddit posts.         len, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Scie	ase study: A Databases - latabases - nd lemmatia	- NoSQL data - Connected zation – Deci	with abas data sion	loan e typ exan tree o	ing m es – C nple. classi	9 oney. 9 Case Stud 9 fier –Cas
malicious URLs. Unit – III Distributing data s Unit – IV Introduction to NC Disease predictio Unit – V Test mining in rea Study: Classifyir TEXT BOOK: 1. Davy Cie more,Usi REFERENCES: http://edu	Distributed data storage and processing         storage and processing with frameworks: Hadoop – Spark – Ca         NoSQL and graph database         DSQL: ACID– CAP Theorem – The BASE Principles of NoSQL I         n– Graph Database: Introducing connected data and graph d         Text Mining and Text Analytics         al world – Text mining techniques: Bag of words – Stemming and Reddit posts.         len, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Scie	ase study: A Databases - latabases - nd lemmatiz	Sessing risk - NoSQL data Connected zation – Decison Data, Machine	with abas data sion	loan e typ exan tree o	ing m es – C nple. classi	9 oney. 9 Case Stud 9 fier –Cas Total:4

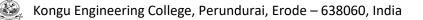
Page 197

bly machi beriment bly the da abase ke use of <b>PO1</b> 3	with Had	alytics tech	ods to so Spark pl ss to solv	blve prob latform fi ve real w	olems wi or data s vorld pro ding solu	itions fo	applica using N r text n	loSQL d	oblem	and Graph		nderstandi Applying ( Applying ( Applying( Applying(	(K3) (K3) K3)
beriment bly the da abase ke use of <b>PO1</b> 3	with Had ata sciend f text and <b>PO2</b>	loop and s ce proces alytics tech PO3	Spark pl	latform for ve real w for build <b>Mappir</b>	or data s vorld pro	itions fo	applica using N r text n	loSQL d	oblem	and Graph		Applying ( Applying(	(K3) K3)
bly the database ke use of <b>PO1</b>	ata sciend f text ana PO2	e proces alytics tect PO3	hniques	ve real w for build <b>Mappir</b>	vorld pro	blems u	using N	loSQL d	oblem	and Graph		Applying(	K3)
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<b>PO1</b> 3	PO2	PO3		Mappir	•			0.				Applying(	K3)
3			PO4		ng of Co	e with	_						
3			PO4	PO5		S WILLI	Pos ar	nd PSOs	;				
-	2	0			PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
-		2									2		
3	2	2	2	3						2	2	2	2
3	2	2	2	3						2	2	2	2
3	2	2	2	3						2	2	2	2
3	2	2	2	3						2	2	2	2
loom'o	Pa	momhori			-	1				Svoluoting		rooting	
jory*	Re	(K1) %								(K5) %			Total %
Γ1		15		60		25	5	-		-		-	100
Г2		10		40		50	)	-		-		-	100
Г3		10		40	)	50	)	-		-		-	100
Ξ		10		40		50	)	-		-		-	100
	oom's ory* 1 2 3	oom's Re ory* -1 -2 -3 	oom's ory*         Rememberi (K1) %           ~1         15           ~2         10           ~3         10           =         10	oom's ory*         Remembering (K1) %         L           ~1         15         -           ~2         10         -           ~3         10         -           =         10         -	S         Z         Z         Z         Z         ASSES           oom's ory*         Remembering (K1) %         Understa (K2)           1         15         60           2         10         40           3         10         40           1         10         40	S         Z         Z         Z         Z         ASSESSMENT           oom's ory*         Remembering (K1) %         Understanding (K2) %           1         15         60           2         10         40           3         10         40           10         40         40	oom's ory*         Remembering (K1) %         Understanding (K2) %         Apply (K3)           1         15         60         25           2         10         40         50           3         10         40         50           1         10         40         50	oom's ory*         Remembering (K1) %         Understanding (K2) %         Applying (K3) %           1         15         60         25           2         10         40         50           3         10         40         50	Some interview         Assessment Pattern – THEORY           oom's ory*         Remembering (K1) %         Understanding (K2) %         Applying (K3) %         Analyzie (K4) %           1         15         60         25         -           2         10         40         50         -           3         10         40         50         -           10         40         50         -         -	S         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Malyzing (K1) %         Malyzing (K2) %         Analyzing (K3) %         Analyzing (K4) %         Z         Z         Z         10         40         50         -         Z         Z         10         40         50         -         Z         Z         10         40         50         -         Z         Z         Z         10         40         50         -         Z         Z         Z         Z <thz< th="">         &lt;</thz<>	S         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Main and and and and and and and and and an	S         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Mail and	S         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Z         Main and and and and and and and and and an



	22ECE05-MOBILE COMMUNICAT	ION					
Programme &Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Analog & Digital communication	6	PE	3	0	0	3
Preamble	To acquire the fundamental concepts in cellular communica mobile technologies.	tion techno	logy and artic	ulate	e the	study	of 5G
Unit– I	Cellular Concept						9
	Channel assignment strategies – Handoff strategies – Interfere ystem capacity- Improving coverage and capacity	nce and sy	stem capacity	′ – C	o-cha	annel	
Unit– II	Propagation models and Channel Models						9
Large scale propa	agation: Free space propagation model- Terrestrial propagation	on: Reflecti	on- Two ray	grou	ind m	nodel	- Outdo
	I — Durkin model – Small-scale multipath propagation and mea		-	-			
-Types of small-s	cale fading- Rayleigh and Rician channel models.						
Unit– III	Equalizers and Diversity Techniques						9
Introduction to eq	ualization – A generic adaptive equalizer – Linear equalizers	, Nonlinear	equalizers- I	Equa	lizer	algor	ithms—
Zero forcing-Leas	st mean square-Selection diversity – Maximum ratio diversity	-RAKE rec	eiver				
Unit-IV	Multiple Access Techniques for Wireless Communication	ons					9
FDMA-TDMA-Spr	ead spectrum multiple access-Capacity of cellular CDMA – SDI	MA – WCDI	MA-Packet ra	dio p	rotoc	cols-C	apture
FDMA-TDMA-Spr effect in packet ra	adio	MA – WCDI	VA-Packet ra	dio p	orotoc	ols-C	-
FDMA-TDMA-Spr effect in packet ra Unit– V	adio Advanced Wireless Communication						9
FDMA-TDMA-Spr effect in packet ra <b>Unit– V</b> System architectu	Adio Advanced Wireless Communication re evolution – Architecture of LTE : High level architecture, User	equipment,	Evolved UMT	STe	errest	rial ra	9 dio acces
FDMA-TDMA-Spr effect in packet ra <b>Unit– V</b> System architectu network, Evolved	adio Advanced Wireless Communication re evolution – Architecture of LTE : High level architecture, User packet core, Roaming architecture–OFDMA in a Mobile cellula	equipment,	Evolved UMT	STe	errest	rial ra	9 dio acces
FDMA-TDMA-Spr effect in packet ra <b>Unit– V</b> System architectu network, Evolved	Adio Advanced Wireless Communication re evolution – Architecture of LTE : High level architecture, User	equipment,	Evolved UMT	STe	errest	rial ra	9 dio acces frequenc
FDMA-TDMA-Spr effect in packet ra <b>Unit– V</b> System architectu network, Evolved	adio Advanced Wireless Communication re evolution – Architecture of LTE : High level architecture, User packet core, Roaming architecture–OFDMA in a Mobile cellula	equipment,	Evolved UMT	STe	errest	rial ra	9 dio acces
FDMA-TDMA-Spr effect in packet ra <b>Unit– V</b> System architectu network, Evolved	adio Advanced Wireless Communication re evolution – Architecture of LTE : High level architecture, User packet core, Roaming architecture–OFDMA in a Mobile cellula	equipment,	Evolved UMT	STe	errest	rial ra	9 dio acces frequenc
FDMA-TDMA-Spr effect in packet ra Unit– V System architectu network, Evolved Re-use, Channel TEXTBOOK: 1. Rappapor	adio Advanced Wireless Communication re evolution – Architecture of LTE : High level architecture, User packet core, Roaming architecture–OFDMA in a Mobile cellula estimation–SCFDMA,5G communication –Application t S.Theodore, "Wireless Communications",2 nd Edition, Pearson	equipment, ar network : Education,	Evolved UMT Multiple acco 2010, for Un	S Teess,	Fract	rial ra iional	dio acces frequenc Total:4
FDMA-TDMA-Spr effect in packet ra Unit– V System architectu network, Evolved Re-use, Channel TEXTBOOK: 1. Rappapor	Adio Advanced Wireless Communication re evolution – Architecture of LTE : High level architecture, User packet core, Roaming architecture–OFDMA in a Mobile cellula estimation–SCFDMA,5G communication –Application	equipment, ar network : Education,	Evolved UMT Multiple acco 2010, for Un	S Teess,	Fract	rial ra iional	dio acces frequenc Total:4
FDMA-TDMA-Spr effect in packet ra Unit– V System architectu network, Evolved Re-use, Channel TEXTBOOK: 1. Rappapor	Adio Advanced Wireless Communication The evolution – Architecture of LTE : High level architecture, User packet core, Roaming architecture–OFDMA in a Mobile cellula estimation–SCFDMA,5G communication –Application t S.Theodore, "Wireless Communications",2 nd Edition, Pearson er Cox., "An Introduction to LTE:LTE, LTE Advanced, SAE, VoL	equipment, ar network : Education,	Evolved UMT Multiple acco 2010, for Un	S Teess,	Fract	rial ra iional	dio acces frequenc Total:4
FDMA-TDMA-Spr effect in packet ra Unit– V System architectu network, Evolved Re-use, Channel TEXTBOOK: 1. Rappapor 2. Christoph Wiley Put	Adio Advanced Wireless Communication The evolution – Architecture of LTE : High level architecture, User packet core, Roaming architecture–OFDMA in a Mobile cellula estimation–SCFDMA,5G communication –Application t S.Theodore, "Wireless Communications",2 nd Edition, Pearson er Cox., "An Introduction to LTE:LTE, LTE Advanced, SAE, VoL	equipment, ar network : Education, .TE and 4G	Evolved UMT Multiple acco 2010, for Un Mobile Comr	its I,I	Fract	rial ra ional V. v.	dio acces frequence Total:4

		JTCOM ion of t		se, the st	udents	will be a	able to							BT Mapı Highest L	
CO1	des	cribe the	e cellular	concept a	and its	coverage	with ca	pacity ir	nprov	ement te	chniques	6.	Ur	nderstandi	ng (K2)
CO2	ider	tify the	propaga	tion mode	ls and	channel r	nodels						Ur	nderstandi	ng (K2)
CO3	inte	rpret the	effects	of multipa	th prop	agation a	and the o	compen	sation	by diver	sity and	equalization	n	Applying	(K3)
CO4	elab	orate th	ne conce	pts of mul	tiple ac	cess tecl	nniques	for real	world	problem	S		Ur	nderstandi	ng (K2)
CO5	Sun	nmarize	the char	acteristics	s of 4G	wireless	network	s, archi	tectur	e and mu	iltiple ac	cess	Ur	nderstandi	ng (K2)
						Mappin	ng of Co	s with	Pos a	nd PSOs	;				
Cos/	Pos	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	2											
CO	2	3	2	2	2	3									
CO	3	2		3		3								2	
CO	4	3	2			2									
CO	5	3											2	2	
1–Slig	ht,2–N	/loderat	e,3–Subs	stantial, B	T-Bloo	m's Taxo	nomy								
						ASSES	SMENT	PATTE	ERN –	THEORY	,				
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating (K6) %	Total %
	CA	T 1		30		70				-		-		-	100
	CA	T2		10		60		30	)	-		-		-	100
	CA	\T3		30		70				-		-		-	100
	ESE	=		20		60		20		-		-		-	100



	22ECE06 – EMBEDDED ARCHITECTURE ANI						
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Microprocessor and Microcontroller	6	PE	3	0	0	3
Preamble	Interpret the concepts of hardware, software &PCB architec product.	ctures and m	nanufacturing p	roce	dures	s for e	embeddeo
Unit – I	HARDWARE ARCHITECTURE:						9
	of embedded system- Product specifications with examples – Costem design flow types- Preparation of block diagram to final product a			mpor	nent p	backa	ige types
Unit – II	SOFTWARE ARCHITECTURE:						9
	are-Embedded system software layered architecture-Understanding RTOS) features and architectures - Basics of boot loader functionali						
Unit – III	PCB ARCHITECTURE:						9
•	of PCB design principles – Different PCB options – PCB component	placement g	uidelines – PC	B lay	out ro	outing	g – Gerbe
generation	DESIGN FOR MANUFACTURING:			-			9
generation Unit – IV Understanding storage option		- Machine as	ssembly/manua	al ass	sembl	y – C	9 omponen
generation Unit – IV Understanding storage option & disadvantag	DESIGN FOR MANUFACTURING: of basic component assembly process – Different ways of assembly – s – Assembly flow understanding of basic mechanical ID design – Di	- Machine as	ssembly/manua	al ass	sembl	y – C	9 omponen
generation Unit – IV Understanding storage option & disadvantag Unit – V Different certifi	DESIGN FOR MANUFACTURING: of basic component assembly process – Different ways of assembly – s – Assembly flow understanding of basic mechanical ID design – Di es of different mechanical enclosure	- Machine as fferent mecl	ssembly/manua nanical enclosu	al ass ure o	sembl ptions	y – C s – Ad	9 omponer dvantage 9
generation Unit – IV Understanding storage option & disadvantag Unit – V Different certifi	DESIGN FOR MANUFACTURING:           of basic component assembly process – Different ways of assembly – s – Assembly flow understanding of basic mechanical ID design – Di es of different mechanical enclosure           CERTIFICATION OF STANDARDS:           cations – Types of certifications for embedded system product feature	- Machine as fferent mecl	ssembly/manua nanical enclosu	al ass ure o	sembl ptions	y – C s – Ad	9 omponer dvantage 9 standard
generation Unit – IV Understanding storage option & disadvantag Unit – V Different certifi	DESIGN FOR MANUFACTURING:           of basic component assembly process – Different ways of assembly – s – Assembly flow understanding of basic mechanical ID design – Di es of different mechanical enclosure           CERTIFICATION OF STANDARDS:           cations – Types of certifications for embedded system product feature	- Machine as fferent mecl	ssembly/manua nanical enclosu	al ass ure o	sembl ptions	y – C s – Ad	9 omponer dvantage 9
generation Unit – IV Understanding storage option & disadvantag Unit – V Different certifi and its compor	DESIGN FOR MANUFACTURING:           of basic component assembly process – Different ways of assembly – s – Assembly flow understanding of basic mechanical ID design – Di es of different mechanical enclosure           CERTIFICATION OF STANDARDS:           cations – Types of certifications for embedded system product feature	- Machine as fferent mecl es of FCC/C	ssembly/manua nanical enclosu	al ass ure o	sembl ptions	y – C s – Ad	9 omponer dvantage 9 standard
generation Unit – IV Understanding storage option & disadvantag Unit – V Different certifi and its compor	DESIGN FOR MANUFACTURING:         of basic component assembly process – Different ways of assembly – s – Assembly flow understanding of basic mechanical ID design – Di es of different mechanical enclosure         CERTIFICATION OF STANDARDS:         cations – Types of certifications for embedded system product featurements- DO178 standards and its components         s S Bagad, "Electronics product design", Technical publications, 3 rd E	- Machine as fferent mecl es of FCC/C	ssembly/manua nanical enclosu	al ass ure o	sembl ptions	y – C s – Ad	9 omponer dvantage 9 standard
generation Unit – IV Understanding storage option & disadvantag Unit – V Different certifi and its compon TEXT BOOK: 1. Vila REFERENCES	DESIGN FOR MANUFACTURING:         of basic component assembly process – Different ways of assembly – s – Assembly flow understanding of basic mechanical ID design – Di es of different mechanical enclosure         CERTIFICATION OF STANDARDS:         cations – Types of certifications for embedded system product featurements- DO178 standards and its components         s S Bagad, "Electronics product design", Technical publications, 3 rd E	- Machine as fferent meck es of FCC/C dition,2020.	ssembly/manua nanical enclosu E and UL stand	dards	sembl ptions	y – C s – Ad	9 omponer dvantage 9 standard

	OUTCON		rse, the st	udents	will be ab	ole to							BT Mappe ghest Lev	
CO1	explain th	ne hardv	vare archit	ecture o	f embedde	ed produ	ct					Unde	erstanding	(K2)
CO2	understa	nd the s	oftware lay	vered ar	chitecture	of embe	dded pro	oduct				Unde	erstanding	(K2)
CO3	describe	the prin	ted circuit	board de	esign princ	ples						Unde	erstanding	(K2)
CO4	understa	nd the c	oncept of f	inal pro	duct asser	nbly seq	uence					Unde	erstanding	(K2)
CO5	distinguis	sh differe	ent certifica	ation sta	ndards							Unde	erstanding	(K2)
					Mappir	ng of Co	s with F	Pos an	d PSOs					
Cos/Pos	s PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3										2		2	2
CO2	3	2			2						2		2	2
CO3	3	2	2		2		3				2		2	2
CO4	3	2	3	2		3	3	3			3	3	3	3
CO5	3		3			3	3	3					3	3
1 – Slight	, 2 – Mode	erate, 3 ·	<ul> <li>Substant</li> </ul>	ial, BT-	Bloom's T	axonom	у							
					ASSES	SMENT	PATTE	RN – T	HEORY					
	/ Bloom's itegory*		Remembe (K1) %	-	Understa (K2)	•	Apply (K3)	-	Analyzin (K4) %	•	luating (5) %		ating 6) %	Total %
	CAT1		20		80		-		-		-		-	100
	CAT2		20		80		-		-		-		-	100
	CAT3		20		80		-		-		-		-	100
	ESE		20		80		-		-		-		-	100
' ±3% ma	ay be varie	d (CAT	1,2,3 – 50	marks &	ESE - 10	00 marks	3)							



	22ECF05- ELECTRONICS CIRCUIT	BOARD DESIGN					
Programm Branch	ne & B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisi	ites Nil	6	PE	2	0	2	3
Preamble	To understand the different types of Printed Circuit Boa different tools for PCB design and component tracing in			steps	s to fa	bricat	e PCB,
Unit – I	Introduction to PCB designing concepts:						6
	components used in PCB – Types of PCBs – Single layer – D iring basics	ouble layer and r	nulti-layer PCE	3 — F	lexib	le PC	B – PCE
Unit – II	PCB Design Considerations:						6
	mechanical and electrical considerations – Design rules for anal ce/ Compatibility (EMI/ EMC).	og, digital and hig	gh frequency o	circuit	s — E	Electro	omagnetio
Unit – III	Design and Simulation of PCB:						6
	Design Automation (EDA) Tools – Single layer PCB – Two layer	PCB – Circuit des	sign and simul	ation	– Cre	eating	footprint
Unit – IV	t and routing- Generating Gerber file for single layer PCB. PCB Fabrication Techniques:						6
Image trans operations.	nsfer techniques – Plating techniques: Immersion, Electro less, Elec	troplating – Solder	Mask – Etching	g tech	inique	es – M	lechanica
Unit – V	Circuit Tracing and Testing & Case studies:						6
Soldering t	techniques – Testing PCB – Environmental concern – Case studies	: Power supply, W	ien-bridge Osc	illato	r.		
LIST OF E	EXPERIMENTS / EXERCISES:						
1. De	esign of single layer circuit board using discrete components.						
	esign of single layer circuit board using discrete components. oldering and de-soldering the components on the PCB including SN	ID devices					
2. Sc		ID devices					
2. Sc 3. De	oldering and de-soldering the components on the PCB including SN	ID devices					
2. Sc 3. De 4. De	oldering and de-soldering the components on the PCB including SM esign and Simulation of 230V AC to 5V/9V/12V DC Power Supply	ID devices					
2. Sc 3. De 4. De 5. Pr	oldering and de-soldering the components on the PCB including SM esign and Simulation of 230V AC to 5V/9V/12V DC Power Supply esign and implementation of IR Sensor Module.	ID devices					
2. Sc 3. De 4. De 5. Pr 6. Tr	oldering and de-soldering the components on the PCB including SM esign and Simulation of 230V AC to 5V/9V/12V DC Power Supply esign and implementation of IR Sensor Module. reparation of layout from the circuit design	/ID devices					
2. Sc 3. De 4. De 5. Pr 6. Tr 7. Tr	oldering and de-soldering the components on the PCB including SM esign and Simulation of 230V AC to 5V/9V/12V DC Power Supply esign and implementation of IR Sensor Module. reparation of layout from the circuit design rouble shooting of single layer PCB	/ID devices					
2. Sc 3. De 4. De 5. Pr 6. Tr 7. Tr	oldering and de-soldering the components on the PCB including SM esign and Simulation of 230V AC to 5V/9V/12V DC Power Supply esign and implementation of IR Sensor Module. reparation of layout from the circuit design rouble shooting of single layer PCB rouble shooting of multi-layer PCB	ID devices	Lecture:		ractic	al:30	, Total:6(
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2. Sc 3. De 4. De 5. Pr 6. Tr 7. Tr 8. Mi TEXT BOC 1 Kh	oldering and de-soldering the components on the PCB including SM esign and Simulation of 230V AC to 5V/9V/12V DC Power Supply esign and implementation of IR Sensor Module. reparation of layout from the circuit design rouble shooting of single layer PCB rouble shooting of multi-layer PCB iniProject						
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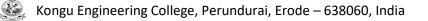
B.E.– Electronics and Communication Engineering, Regulation, Curriculum and Syllabus – R2022

	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	summarize different types of PCBs	Understanding (K2)
CO2	outline the PCB design rules and considerations	Understanding (K2)
CO3	apply the PCB Design rules to construct, simulate and verify the working of a single layer PCB	Applying (K3) , Precision (S3)
CO4	develop Gerber file for fabrication of a single layer PCB for any given circuit	Applying (K3) , Precision (S3)
CO5	identity the, faults and suggest solutions to rectify the faults in single layer PCBs	Applying (K3), Precision (S3)

					wapp		05 WILLI	FUS and	1 - 303					
Cos/Pos	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											2	2
CO2	3	2											2	2
CO3	3	2	3		3				2	2		2	2	2
CO4	3	2	3	2	3			2	2	2		2	2	2
CO5	3	3	3	2	3	2	2	2	2	2		2	3	2

1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy

		ASSESSMENT	PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	30	70	-	-	-	-	100
CAT2	30	50	20	-	-	-	100
CAT3	20	50	30	-	-	-	100
ESE	20	50	30	-	-	-	100
* ±3% may be varied (	CAT 1,2,3 – 50 mark	s & ESE – 100 mark	s)	· ·		1	



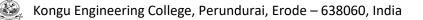
Brar	Jramme &	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
	equisites	Nil	6	PE	2	0	2	3
Prea	mble	To apply basic knowledge of single board computer for mul research applications.	tifunctiona	Il tasks like lo	T, Im	age	analys	is for
Unit		Introduction to SBC and Linux Basics:						6
	es of single bo or- Accessing f	ard computer – Raspberry pi setup and management – Netwiles.	working –	Raspbian OS	5 – T	ermir	nal ac	cess – Tex
Unit		Python Programming and Sensor Interfacing:						6
	on programmi T – GPS inter	ng: GPIO pin out and access – LED & Switch – Timers – Digit facing.	al sensor	interfacing – I	Exter	nal c	ircuit i	nterfacing -
Unit		Peripheral Control:						6
Rela scree		DC motor control using PWM – Stepper motor interfacing – Ex	ternal ana	log to digital c	onve	rter -	- Inter	acing touc
Unit		Internet of Things:						6
		rnet of Things – Display sensor readings on webpage – Send			ngsp	eak -	- Senc	ling Email
Resp Unit		ets using dweet and IFTTT - Control peripheral device : Small	rt switches	5				6
		Image Processing in SBC: ENCV – Reading and writing images : Create image – Convers	ion - Cant	uring camera	fram	00	Image	-
	3C: Edge dete		ion oup	anng camera	nam	00	inage	processin
		MENTS / EXERCISES:						
1.		of bootable OS and Initialize the setup for Raspberry Pi						
2.	Interfacing	of GPIO for I/O devices in Raspberry Pi						
3.	Interfacing	of digital sensors with Raspberry Pi						
4.	Interfacing	DC Motor Control using PWM with Raspberry Pi						
5.	Develop a	n IoT based device using SBC						
~	Interfacing							
6.	Build a bu	a camera with SBC						
6. 7.		g a camera with SBC rglar detector with photo capture using SBC						
	Miniprojec	rglar detector with photo capture using SBC						
7.	Miniprojec	rglar detector with photo capture using SBC		Lecture	:30,	Prac	tical:3	30, Total:60
7. 8.	Miniprojec	rglar detector with photo capture using SBC		Lecture	:30,	Prac	tical:3	80, Total:60
7. 8.	T BOOKS:	rglar detector with photo capture using SBC	ms and S					
7. 8. <b>TEX</b> 1.	T BOOKS: Simon Mo California, Joe Minich	rglar detector with photo capture using SBC t nk, "Raspberry Pi Cookbook: Software and Hardware Proble	with Pytho	olutions", 3 rd n 3 –Get to g	Editio	on, O with t	'Reilly tools,	Media Ind     techniques
7. 8. <b>TEX</b> 1. 2.	T BOOKS: Simon Mo California, Joe Minich and algorit	rglar detector with photo capture using SBC t nk, "Raspberry Pi Cookbook: Software and Hardware Proble USA, 2020, for Units I, II,III,IV. nino, Joseph Howse, "Learning OpenCV 4 Computer Vision v	with Pytho	olutions", 3 rd n 3 –Get to g	Editio	on, O with t	'Reilly tools,	Media Ind     techniques
7. 8. TEX 1. 2. REF	T BOOKS: Simon Mo California, Joe Minich and algorit ERENCES/ M	rglar detector with photo capture using SBC it nk, "Raspberry Pi Cookbook: Software and Hardware Proble USA, 2020, for Units I, II,III,IV. nino, Joseph Howse, "Learning OpenCV 4 Computer Vision v thms for computer vision and machine learning", 3 rd Edition, F ANUAL / SOFTWARE: Guillen, "Sensor Projects with Raspberry Pi: Internet of Things	with Pytho Packt Publ	olutions", 3 rd n 3 –Get to g shing Ltd.,202	Editio rips 20, I\$	on, O with SBN,	'Reilly tools, for Ur	v Media Ind techniques nit V
7. 8. <b>TEX</b> 1. 2. <b>REF</b> 1.	T BOOKS: Simon Mo California, Joe Minich and algorit ERENCES/ M Guillermo Edition 20	rglar detector with photo capture using SBC it nk, "Raspberry Pi Cookbook: Software and Hardware Proble USA, 2020, for Units I, II,III,IV. nino, Joseph Howse, "Learning OpenCV 4 Computer Vision v thms for computer vision and machine learning", 3 rd Edition, F ANUAL / SOFTWARE: Guillen, "Sensor Projects with Raspberry Pi: Internet of Things	with Pytho Packt Publ	olutions", 3 rd n 3 –Get to g shing Ltd.,202	Editio rips 20, I\$	on, O with SBN,	'Reilly tools, for Ur	v Media Ind techniques nit V
<ol> <li>7.</li> <li>8.</li> <li>TEX</li> <li>1.</li> <li>2.</li> </ol>	T BOOKS: Simon Mo California, Joe Minich and algorit ERENCES/ M Guillermo Edition 20 https://ww	rglar detector with photo capture using SBC it nk, "Raspberry Pi Cookbook: Software and Hardware Proble USA, 2020, for Units I, II,III,IV. nino, Joseph Howse, "Learning OpenCV 4 Computer Vision v thms for computer vision and machine learning", 3 rd Edition, F <b>ANUAL / SOFTWARE:</b> Guillen, "Sensor Projects with Raspberry Pi: Internet of Things 19.	with Pytho Packt Publ	olutions", 3 rd n 3 –Get to g shing Ltd.,202	Editio rips 20, I\$	on, O with SBN,	'Reilly tools, for Ur	v Media Inc techniques nit V

		UTCOM		se, the s	tudent	s will be a	able to						(1	BT Map Highest L	
CO1	outl	ine the f	undame	ntals of a	n SBC	for develo	opment o	f embec	lded ap	plication	S			nderstand Precision	
CO2	buil	d progra	im to acc	cess ports	s and i	nterface p	eripheral	S						Applying ( Precision	
CO3	dev	elop em	bedded	applicatio	ons usi	ng a single	e board o	compute	r					Applying ( Precision	
CO4	app	ly the c	oncepts	of interne	et of thi	ings in an	SBC							Applying ( Precision	
CO5	арр	ly comp	uter visio	on and im	iage pr	ocessing	using SB	SC						Applying ( Precision	
						Mappin	g of Co	s with P	os and	PSOs					
Cos/F	Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	2				2									
CO	2	2	2	2		3								3	
CO	3	2	2	2		3								3	
CO	4	2	2	2	2	3	2			3	2	2	3	3	2
CO	5	2	2	2	2	3	2			3	2	2	2	3	2
1 – Sli	ght, 2	– Mode	rate, 3 –	Substan	tial, B1	- Bloom's	Taxonor	my							
						ASSES	SMENT	PATTE	RN – TH	IEORY					
	st / Bl Categ	oom's ory*	Re	member (K1) %	ing	Understa (K2)		Appl (K3)		Analyzi (K4) %		Evaluating (K5) %		reating K6) %	Tota %
	CAT	1		20		60		20	)	-		-		-	100
	CAT	2		10		20		70	)	-		-		-	100
	CAT	3		10		20		70	)	-		-		-	100
	ESI			10		20		70				-			100



Branch       VLSI Design       6       PE       2       0       2         Preamble       To understand the architecture of programmable ASICs and to perform logic synthesis and physical design flot       ASIC design       ASIC design       Image: AsiC desiG design       Image: AsiC design <th></th> <th></th> <th>22ECF07 - ASIC DESIGN</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>			22ECF07 - ASIC DESIGN							
Preamble       To understand the architecture of programmable ASICs and to perform logic synthesis and physical design flate ASICs and Programming Technologies:         Types of ASICs – Design flow – Transistor parasilic capacitance – Logical effort-Antifuse – Static RAM – EPROM and EEPI technology.         Unit – I       Programmable ASICs, logic cells and V/O Cells:         Actel ACT – Xilinx LCA – DC & AC inputs and outputs – Clock & power inputs.         Unit – II       Programmable Interconnects and Logic Synthesis:         Actel ACT – Xilinx LCA – Verilog logic synthesis: Delays, blocking and nonblocking assignment, combinational logic, multiplexers, statement, decoders, arithmetic and sequential logic.         Unit – IV       Partitioning, Floorplanning and Placement.         Physical design flow –System partitioning – FPGA partitioning: KL algorithm –Floorplanning –Placement algorithms         Unit – V       Partitioning, Floorplanning and Placement.         Physical design, simulation and synthesis of Adders       2.         2.       Design, simulation and synthesis of memory         For the following circuits.       3.         a) Perform the functional verification       b) Synthesis         b) Synthesis the dathine       7.         Vending Machine       8.         Milneroje ct       Lecture:30, Practical:30, for Units and III.         2.       Design, simulation and synthesis of memory         For the following circuits.<		me&	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit	
ASIC design         Unit - I       Introduction to ASICs and Programming Technologies:         Introduction to ASICs - Design flow - Transistor parasitic capacitance - Logical effort-Antifuse - Static RAM - EPROM and EEPI technology.         Unit - II       Programmable ASICs, logic cells and VO Cells:         Actel ACT - Xilinx LCA - DC & AC inputs and outputs - Clock & power inputs.       Introduction to ASICs and Logic Synthesis:         Init - II       Programmable Interconnects and Logic Synthesis:       Introduction to ASICs and Parametein Inputs.         Init - IV       Partitioning, Floorplanning and Placement:       Introduction to ASICs System partitioning: RL algorithm -Floorplanning -Placement : placement algorithms         Unit - V       Partitioning, Floorplanning and Placement:       Intervent         Unit - V       Partitioning, Floorplanning and Placement:       Intervent         Unit - V       Partitioning, Floorplanning and Placement:       Intervent         Unit - V       Routing:       Intervent       Intervent         Global routing - Detailed routing - Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.       Its Y         Isign, simulation and synthesis of Adders       Imperiod the functional verification       Imperiod the functional verification         9 Perform the layout (Automatic)       Imperiod the functional verification       Imperiod the layout (Automatic)       Imperiod the layout (Automati	Prerequis	sites	VLSI Design	6	PE	2	0	2	3	
Types of ASICs – Design flow – Transistor parasitic capacitance – Logical effort-Antifuse – Static RAM – EPROM and EEPI         Unit – II       Programmable ASICs, logic cells and VO Cells:         Actel ACT – Xilinx LCA – DC & AC inputs and outputs – Clock & power inputs.         Unit – III       Programmable Interconnects and Logic Synthesis:         Actel ACT – Xilinx LCA – Verilog logic synthesis: Doleking and nonblocking assignment, combinational logic, multiplexers, statement, decoders, arithmetic and sequential logic.         Unit – IV       Partitioning, Floorplanning and Placement:         Physical design flow – System partitioning – FPGA partitioning: KL algorithm –Floorplanning –Placement : placement algorithms         Unit – V       Routing:         Global routing – Detailed routing – Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.         LIST OF EXPERIMENTS / EXERCISES:         1.       Design, simulation and synthesis of Adders         2.       Design, simulation and synthesis of multipliers         3.       Design, simulation and synthesis of memory         For the following circuits, a)       Pordom the layout (Automatic)         0) albelate the area, power, delay       E         5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject <td colspace<="" t<="" td=""><td>Preamble</td><td></td><td></td><td>to perform log</td><td>gic synthesis a</td><td>nd pł</td><td>nysica</td><td>al desi</td><td>gn flow i</td></td>	<td>Preamble</td> <td></td> <td></td> <td>to perform log</td> <td>gic synthesis a</td> <td>nd pł</td> <td>nysica</td> <td>al desi</td> <td>gn flow i</td>	Preamble			to perform log	gic synthesis a	nd pł	nysica	al desi	gn flow i
Init - II       Programmable ASICs, logic cells and I/O Cells:         Actel ACT - Xilinx LCA - DC & AC inputs and outputs - Clock & power inputs.         Init - III       Programmable Interconnects and Logic Synthesis:         Actel ACT - Xilinx LCA - DC & AC inputs and outputs - Clock & power inputs.         Init - III       Programmable Interconnects and Logic Synthesis:         Actel ACT - Xilinx LCA - Verilog logic synthesis: Delays, blocking and nonblocking assignment, combinational logic, multiplexers, statement, decoders, arithmetic and sequential logic.         Unit - V       Partitioning, Floorplanning and Placement:         Physical design flow -System partitioning - FPGA partitioning: KL algorithm -Floorplanning -Placement : placement algorithms         Unit - V       Partitioning - FPGA partitioning: KL algorithm -Floorplanning -Placement : placement algorithms         Unit - V       Routing:         Clobal routing - Detailed routing -/rare routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.         LIST OF EXPERIMENTS / EXERCISES:       1         1       Design, simulation and synthesis of doders         2       Design, simulation and synthesis of counters         3       Design, simulation and synthesis of memory         For the following circuits,       a) Perform the functional verification         b) Synthesis the design       Cig Clu Int         5       Arithmetic and Logic Unit									6	
Unit - II       Programmable ASICs, logic cells and I/O Cells:         Actel ACT - Xilinx LCA - DC & AC inputs and outputs - Clock & power inputs.       IActel ACT - Xilinx LCA - DC & AC inputs and outputs - Clock & power inputs.         Unit - III       Programmable Interconnects and Logic Synthesis:       Actel ACT - Xilinx LCA - DC & AC inputs and outputs - Clock & power inputs.         Unit - IV       Programmable Interconnects and Logic Synthesis:       Actel ACT - Xilinx LCA - DC & AC inputs and outputs - Clock & power inputs.         Unit - IV       Partitioning, Floorplanning and Placement:       Physical design flow -System partitioning - FPGA partitioning: KL algorithm -Floorplanning -Placement : placement algorithms         Unit - V       Routing:       I         Global routing - Detailed routing -Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.       LIST OF EXPERIMENTS / EXERCISES:         1.       Design, simulation and synthesis of Adders       2.         2.       Design, simulation and synthesis of counters       4.         4.       Design, simulation and synthesis of memory       For the following circuits, a) Perform the functional verification         0.       Synthesis the design       .       .         1.       Global routing Machine       .       .         2.       Arithmetic and Logic Unit       .       .         3.       Design, simulation and synthesis o			Design flow – Transistor parasitic capacitance – Logical effo	ort-Antifuse –	Static RAM -	- EP	ROM	and	EEPROI	
Actel ACT - Xilinx LCA - DC & AC inputs and outputs - Clock & power inputs.         Unit - III       Programmable Interconnects and Logic Synthesis:         Actel ACT - Xilinx LCA - Verilog logic synthesis: Delays, blocking and nonblocking assignment, combinational logic, multiplexers, statement, decoders, arithmetic and sequential logic.         Unit - IV       Partitioning - FPGA partitioning: Floorplanning and Placement:         Physical design flow - System partitioning - FPGA partitioning: KL algorithm -Floorplanning -Placement : placement algorithms         Unit - V       Routing:         Global routing - Detailed routing - Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.         LIST OF EXPERIMENTS / EXERCISES:         1.       Design, simulation and synthesis of Adders         2.       Design, simulation and synthesis of multipliers         3.       Design, simulation and synthesis of memory         For the following circuits,       a) Perform the functional verification         b) Synthesis the design       c) Arithmetic and Logic Unit         6.       Finite State Machine         7.       Verding Machine         8.       MiniProject         Lecture:30, Practical:30, Tot         TEXT BOOKS:         1.       Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Unitst and III. <t< td=""><td></td><td>,</td><td>Programmable ASICs logic cells and I/O Cells:</td><td></td><td></td><td></td><td></td><td></td><td>6</td></t<>		,	Programmable ASICs logic cells and I/O Cells:						6	
Unit - III         Programmable Interconnects and Logic Synthesis:           Actel ACT - Xilinx LCA - Verilog logic synthesis: Delays, blocking and nonblocking assignment, combinational logic, multiplexers, statement, decoders, arithmetic and sequential logic.           Unit - IV         Partitioning, Floorplanning and Placement:           Physical design flow - System partitioning - FPGA partitioning: KL algorithm -Floorplanning -Placement : placement algorithms           Unit - V         Routing:           Global routing - Detailed routing - Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.           LIST OF EXPERIMENTS / EXERCISES:         I           0         Design, simulation and synthesis of Adders           2.         Design, simulation and synthesis of counters           4.         Design, simulation and synthesis of counters           9.         Design, simulation and synthesis of memory           For the following circuits, a) Perform the functional verification b) Synthesis the design c) Generate the layout (Automatic) d) Tabulate the area, power, delay           5.         Arithmetic and Logic Unit           6.         Finite State Machine           7.         Vending Machine           8.         MiniProject           Lecture:30, Practical:30, for Unit IV,V.           REFERENCES/MANUAL/SOFTWARE :           1.         Gerez, S.H, "Algorithms for V		– Xilinx L							U	
Actel ACT - Xilinx LCA - Verligo logic synthesis: Delays, blocking and nonblocking assignment, combinational logic, multiplexers, statement, decoders, arithmetic and sequential logic.         Unit - IV       Partitioning, Floorplanning and Placement:         Physical design flow -System partitioning - FPGA partitioning: KL algorithm -Floorplanning -Placement : placement algorithms         Unit - V       Routing:         Clobal routing - Detailed routing -Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.         LIST OF EXPERIMENTS / EXERCISES:         1.       Design, simulation and synthesis of Adders         2.       Design, simulation and synthesis of counters         3.       Design, simulation and synthesis of memory         For the following circuits, a) Perform the functional verification         b) Synthesis the design () data and synthesis of memory         For the following circuits, a) Perform the functional verification         b) Synthesis the design () data and bynthesis of memory         5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject         Lecture:30, Practical:30, Tot.         Sinth M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.         Simith M.J.S, "Application									6	
statement, decoders, arithmetic and sequential logic. Unit – IV Partitioning, Floorplanning and Placement: Physical design flow – System partitioning, – FPGA partitioning: KL algorithm –Floorplanning –Placement : placement algorithms Unit – V Routing: Global routing – Detailed routing – Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing. LIST OF EXPERIMENTS / EXERCISES: 1. Design, simulation and synthesis of Adders 2. Design, simulation and synthesis of counters 4. Design, simulation and synthesis of counters 4. Design, simulation and synthesis of memory For the following circuits, a) Perform the functional verification ) Synthesis the design ) Generate the layout (Automatic) d) Tabulate the area, power, delay 5. Arithmetic and Logic Unit 6. Finite State Machine 7. Vending Machine 8. MiniProject Lecture:30, Practical:30, Tot TEXT BOOKS: 1. Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III. Cerers, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V. REFERENCES/MANUAL/SOFTWARE : 1. Wayne Wolf, "FPGA-Based System Design", 1% Edition, PHI, New Delhi, 2009. Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005		– Xiliny I		a assignment	combinations		c mi	ultinle	-	
Unit - IV       Partitioning, Floorplanning and Placement:       Image: Constraint of the second of the se				y assignment		u iogi	0, m	nupiez	(ers, cas	
Physical design flow -System partitioning - FPGA partitioning: KL algorithm -Floorplanning -Placement : placement algorithms         Unit - V       Routing:         Global routing - Detailed routing - Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.         LIST OF EXPERIMENTS / EXERCISES:         1.       Design, simulation and synthesis of Adders         2.       Design, simulation and synthesis of counters         3.       Design, simulation and synthesis of memory         For the following circuits, a) Perform the functional verification b) Synthesis the design         b) Synthesis the design         c) Generate the layout (Automatic)         d) Tabulate the area, power, delay         5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject         Lecture:30, Practical:30, Tot:         TERENECS/MANUAL/SOFTWARE :         1.       Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and Ill.         2.       Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.         REFERENCES/MANUAL/SOFTWARE :         1.       Wayne Wolf, "FPGA-Based System Design", 1 st Edition, PHI, New Delhi, 2009.		., 40004010							6	
Unit - V         Routing:           Global routing – Detailed routing –Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.           LIST OF EXPERIMENTS / EXERCISES:           1.         Design, simulation and synthesis of Adders           2.         Design, simulation and synthesis of counters           3.         Design, simulation and synthesis of multipliers           3.         Design, simulation and synthesis of memory           For the following circuits, al Perform the functional verification b) Synthesis the design (Automatic)           3.         Perform the functional verification b) Synthesis the design (Counters)           5.         Arithmetic and Logic Unit           6.         Finite State Machine           7.         Vending Machine           8.         MiniProject           Lecture:30, Practical:30, Tot:           TEXT BOOKS:           1.         Smith M.J.S. "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.           2.         Gerez, S.H., "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.           REFERENCES/MANUAL/SOFTWARE :         1.           1.         Wayne Wolf, "FPGA-Based System Design", 1 st Edition, PHI, New Delhi, 2009.           2.         Erik 207arson, "Introducti	Physical c	design flow		rplanning –Pla	acement : plac	emer	nt algo	orithm	S	
Global routing – Detailed routing –Area routing-Maze algorithm-Channel routing- Left edge algorithm-Special routing.         LIST OF EXPERIMENTS / EXERCISES:         1.       Design, simulation and synthesis of Adders         2.       Design, simulation and synthesis of multipliers         3.       Design, simulation and synthesis of counters         4.       Design, simulation and synthesis of memory         For the following circuits, a) Perform the functional verification b) Synthesis the design C) Generate the layout (Automatic) d) Tabulate the area, power, delay         5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject         Lecture:30, Practical:30, Tota TEXT BOOKS:         1.       Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.         2.       Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.         REFERENCES/MANUAL/SOFTWARE :       1.         1.       Wayne Wolf, "FPGA-Based System Design", 1%t Edition, PHI, New Delhi, 2009.         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005	-	U			•				6	
LIST OF EXPERIMENTS / EXERCISES:         1.       Design, simulation and synthesis of Adders         2.       Design, simulation and synthesis of multipliers         3.       Design, simulation and synthesis of counters         4.       Design, simulation and synthesis of memory         For the following circuits,       a) Perform the functional verification         a) Perform the functional verification       b) Synthesis the design         b) Synthesis the design       c) Generate the layout (Automatic)         d) Tabulate the area, power, delay       f         5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject         Lecture:30, Practical:30, Tota         TEXT BOOKS:         1.       Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.         2.       Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.         REFERENCES/MANUAL/SOFTWARE :       1.         1.       Wayne Wolf, "FPGA-Based System Design", 1%t Edition, PHI, New Delhi, 2009.         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1%t Edition, Springer, USA, 2005		iting Dot		oft odgo olgor	ithm Special r	outin	~		0	
1.       Design, simulation and synthesis of Adders         2.       Design, simulation and synthesis of multipliers         3.       Design, simulation and synthesis of counters         4.       Design, simulation and synthesis of memory         For the following circuits, a)       Perform the functional verification         9) Synthesis the design       9         9) Generate the layout (Automatic)       9         0) Tabulate the area, power, delay       5         5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject         Lecture:30, Practical:30, Tota and III.         2       Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.         2.       Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.         REFERENCES/MANUAL/SOFTWARE :       Image: New Yolf, "FPGA-Based System Design", 1%t Edition, PHI, New Delhi, 2009.         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1% Edition, Springer, USA, 2005				en euge algoi	inini-Special in	Juing	J.			
	IST OF I	EXPERIM	ENTS / EXERCISES:							
	1.	Design s	imulation and synthesis of Adders							
3.       Design, simulation and synthesis of counters         4.       Design, simulation and synthesis of memory         For the following circuits,       a)         a) Perform the functional verification         b) Synthesis the design         c) Generate the layout (Automatic)         d) Tabulate the area, power, delay         5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject         Lecture:30, Practical:30, Tota         TEXT BOOKS:         Intel Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.         Serez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.         REFERENCES/MANUAL/SOFTWARE :         1.       Wayne Wolf, "FPGA-Based System Design", 1 st Edition, PHI, New Delhi, 2009.         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005	••	Design, s								
4.       Design, simulation and synthesis of memory         For the following circuits,       a) Perform the functional verification         b) Synthesis the design       b) Synthesis the design         c) Generate the layout (Automatic)       d) Tabulate the area, power, delay         5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject         Lecture:30, Practical:30, Total         FEXT BOOKS:         1.       Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.         2.       Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.         REFERENCES/MANUAL/SOFTWARE :       Image: Single Colspan="2">Image: Single Colspan="2">Single Colspan="2">Single Colspan="2">Single Colspan= 2"         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005	2.	Design, s	imulation and synthesis of multipliers							
For the following circuits, a) Perform the functional verification b) Synthesis the design c) Generate the layout (Automatic) d) Tabulate the area, power, delay 5. Arithmetic and Logic Unit 6. Finite State Machine 7. Vending Machine 8. MiniProject TEXT BOOKS: 1. Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III. 2. Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V. REFERENCES/MANUAL/SOFTWARE : 1. Wayne Wolf, "FPGA-Based System Design", 1 st Edition, PHI, New Delhi, 2009. 2. Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005	3.	Design, s	imulation and synthesis of counters							
a) Perform the functional verification b) Synthesis the design c) Generate the layout (Automatic) d) Tabulate the area, power, delay 5. Arithmetic and Logic Unit 6. Finite State Machine 7. Vending Machine 8. MiniProject TEXT BOOKS: 1. Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III. 2. Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V. REFERENCES/MANUAL/SOFTWARE : 1. Wayne Wolf, "FPGA-Based System Design", 1 st Edition, PHI, New Delhi, 2009. 2. Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005	4.	Design, s	imulation and synthesis of memory							
5.       Arithmetic and Logic Unit         6.       Finite State Machine         7.       Vending Machine         8.       MiniProject         Lecture:30, Practical:30, Tota         TEXT BOOKS:         1.       Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.         2.       Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.         REFERENCES/MANUAL/SOFTWARE :         1.       Wayne Wolf, "FPGA-Based System Design", 1 st Edition, PHI, New Delhi, 2009.         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005	a) Perforn b) Synthe c) Genera	n the funct sis the des ite the layc	ional verification sign out (Automatic)							
<ul> <li>6. Finite State Machine</li> <li>7. Vending Machine</li> <li>8. MiniProject</li> <li>Lecture:30, Practical:30, Total</li> <li>TEXT BOOKS: <ul> <li>1. Smith M.J.S, "Application Specific Integrated Circuits", 12th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.</li> <li>2. Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley &amp; Sons, Newyork, Reprint 2008, for Unit IV,V.</li> </ul> </li> <li>REFERENCES/MANUAL/SOFTWARE : <ul> <li>1. Wayne Wolf, "FPGA-Based System Design", 1st Edition, PHI, New Delhi, 2009.</li> <li>2. Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1st Edition, Springer, USA, 2005</li> </ul> </li> </ul>										
<ul> <li>7. Vending Machine</li> <li>8. MiniProject</li> <li>Lecture:30, Practical:30, Total</li> <li>TEXT BOOKS:</li> <li>1. Smith M.J.S, "Application Specific Integrated Circuits", 12th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.</li> <li>2. Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley &amp; Sons, Newyork, Reprint 2008, for Unit IV,V.</li> <li>REFERENCES/MANUAL/SOFTWARE :</li> <li>1. Wayne Wolf, "FPGA-Based System Design", 1st Edition, PHI, New Delhi, 2009.</li> <li>2. Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1st Edition, Springer, USA, 2005</li> </ul>	-									
<ul> <li>8. MiniProject</li> <li>Lecture:30, Practical:30, Total</li> <li>TEXT BOOKS:         <ol> <li>Smith M.J.S, "Application Specific Integrated Circuits", 12th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.</li> <li>Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley &amp; Sons, Newyork, Reprint 2008, for Unit IV,V.</li> </ol> </li> <li>REFERENCES/MANUAL/SOFTWARE :         <ol> <li>Wayne Wolf, "FPGA-Based System Design", 1st Edition, PHI, New Delhi, 2009.</li> <li>Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1st Edition, Springer, USA, 2005</li> </ol> </li> </ul>										
Lecture:30, Practical:30, Tota         TEXT BOOKS:         1.       Smith M.J.S, "Application Specific Integrated Circuits", 12 th Edition, Pearson Education Pvt. Ltd, New Delhi, 2013, for Units and III.         2.       Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V.         REFERENCES/MANUAL/SOFTWARE :         1.       Wayne Wolf, "FPGA-Based System Design", 1 ^s t Edition, PHI, New Delhi, 2009.         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005										
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1.       and III.         2.       Gerez, S.H, "Algorithms for VLSI Design Automation" John Wiley & Sons, Newyork, Reprint 2008, for Unit IV,V. <b>REFERENCES/MANUAL/SOFTWARE :</b> 1.       Wayne Wolf, "FPGA-Based System Design", 1 ^s t Edition, PHI, New Delhi, 2009.         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005	ТЕХТ ВО	OKS:			Leoture.	<i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	actic	ai.50	, 10121.0	
REFERENCES/MANUAL/SOFTWARE :         1.       Wayne Wolf, "FPGA-Based System Design", 1 st Edition, PHI, New Delhi, 2009.         2.       Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005			S, "Application Specific Integrated Circuits", 12th Edition, Pears	on Education	Pvt. Ltd, New	Delh	i, 201	3, for	Units I,II	
<ol> <li>Wayne Wolf, "FPGA-Based System Design", 1^st Edition, PHI, New Delhi, 2009.</li> <li>Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1st Edition, Springer, USA, 2005</li> </ol>	2. (	Gerez, S.⊢	I, "Algorithms for VLSI Design Automation" John Wiley & Sons,	, Newyork, Re	print 2008, for	Unit	IV,V.			
2. Erik 207arson, "Introduction to Advanced System-on-Chip Test Design and Optimization", 1 st Edition, Springer, USA, 2005	REFERE	NCES/MAI	NUAL/SOFTWARE :							
	1.	Wayne Wo	lf, "FPGA-Based System Design", 1st Edition, PHI, New Delhi,	2009.						
2 Laboratory Manual	2. I	Erik 207ars	son, "Introduction to Advanced System-on-Chip Test Design ar	nd Optimizatio	on", 1 st Edition,	Sprii	nger,	USA,	2005.	
	<b>γ</b> ι	aboratory	Manual							

		UTCOM ion of t		se, the st	udents	will be a	ble to						(1	BT Mapı Highest L	
CO1	illu	strate th	e types	of ASICs	and prog	gramming	g technol	ogies						derstandir anipulatic	
CO2	elu	cidate th	ne progra	ammable	ASIC log	gic cells a	and I/O c	ells						derstandir anipulatio	
CO3	infe	er the pr	ogramm	able inter	connect	s and syr	thesis						M	derstandir anipulatic	on(S2)
CO4	ap	oly algoi	rithms fo	r partition	ing, floo	r planning	g and pla	cement						Applying ( anipulation	
CO5	cor	nstruct r	outing de	esign in a	n ASIC									Applying ( anipulation	
						Маррі	ng of C(	Os with	POs ar	nd PSOs	;				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	3										3	3	3
CO2	2	3	3										3	3	3
COS	3	3	3	3		3				3	3		3	3	3
CO4	4	3	3	3		3				3	3		3	3	3
COS	5	3	3	3		3				3	3		3	3	3
1 – Slig	ght, 2	– Mode	rate, 3 –	Substant	tial, BT-	Bloom's ⁻	Taxonom	ıy							
						ASSE	SSMEN	Γ ΡΑΤΤΙ	ERN - T	HEORY					
	t / Bl ateg	oom's ory*	Re	member (K1) %	ing	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		eating K6) %	Total %
	CAT	1		10		90		-		-		-		-	100
	CAT	2		10		90		-		-		-		-	100
	CAT	3		10		20		70	)	-		-		-	100
	ESI	=		10		55		35	. Т	-		-		-	100



		22ECF08– SOFT COMPUTING TEC	CHNIQUES							
Programr Branch	ne &	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit		
Prerequis	sites	Nil	6	PE	2	0	2	3		
Preamble	То	learn and apply the neural network algorithms and fuzzy logic	to solve real w	orld problem	s.					
Unit - I	Inti	roduction To Neural Networks:						(		
	functio	mans and computers - Organization of the brain, Biological on - Terminologies of ANN - Learning strategy (Supervised, U								
Unit - II		arning Networks:								
Architectu	re- Tra	ning networks: Perceptron network: Theory – Architecture- I aining and testing algorithm - Radial Basis Function Network (F eature maps.	Learning rule, I RBFN) – Unsup	Back propaga ervised learni	ition ng ne	netv etwo	vork: rks:	Theory - - Kohoner		
Unit - III		netic Algorithm :						(		
		asic terminologies – Operators in GA : Encoding, Selection	n, Crossover, N	lutation, Stop	ping	crite	rion ·	- Problen		
Unit - IV	Ba	sic Concepts of Fuzzy Logic:						(		
		uzzy logic - Classical sets and fuzzy sets - Fuzzy relations - Me Fuzzy rules and reasoning - Fuzzy If-Then rules	embership funct	ion - Feature	s of n	neml	bersh	ip functio		
Unit - V	Fuz	zzy Inference Systems (FIS):								
LIST OF E	EXPER	RIMENTS / EXERCISES:								
1. S	tudy o	f Neural Network tool box -MATLAB								
2. S	imulate	e an AND/OR network using Perceptron network with binary/	bipolar input an	d targets						
3. S	imulati	ion of Back propagation network for a simple application								
4. S	imulati	ion of Kohenen's network for clustering of data								
5. S	tudy o	f Fuzzy tool box -MATLAB								
6. N	liniproj	ject using Fuzzy Inference System								
7. N	liniproj	ject using genetic algorithm for function minimization								
	<u>0</u> .			Lecture:3	0, Pra	actio	al:30	, Total:60		
TEXT BO		ekharan & G. A. Vijayalakshmi Pai, "Neural Networks, Fuzzy	Systems and E	Evolutionary a	Igorit	thms	: syn	thesis and		
1. a	pplicat	ions", 2 nd Edition, Prentice Hall of India, New Delhi, 2018.	-	, 	-		-			
		MANUAL / SOFTWARE:								
		J.Ross, "Fuzzy Logic with Engineering Applications", 3 rd Editi								
		ndam S.N. & Deepa S.N, "Principles of Soft Computing", 2 nd ec								
		ndam S.N, Sumathi S & Deepa S.N, "Introduction to Neural Net w Delhi, 2006.	works using MA	ATLAB 6.0", 1	st Ec	lition	, Tata	a McGraw		
		ory Manual								

	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	illustrate the concepts of neural network	Applying (K3) , Precision (S3)
CO2	build neural network architecture using supervised and unsupervised learning algorithms	Applying (K3) , Precision (S3)
CO3	make use of genetic algorithm for function optimization	Applying (K3) , Precision (S3)
CO4	interpret the concepts of fuzzy logic	Applying (K3) , Precision (S3)
CO5	construct the three types of fuzzy inference system	Applying (K3) , Precision (S3)

				r	Mapping	g of Cos	s with P	os and	PSOs					
Cos/Pos	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		3									
CO2	3	2	2		3	2	2	2	2	2		2	2	
CO3	3	2	2				2					2	2	
CO4	3	2	2		3	2	2	2	2	2		2	2	
CO5	3	2	2		3	2	2	2	2	2		2	2	
4 Olivity (	> • • • • •		0			<b>-</b>								-

1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy

		ASSESSMENT F	ATTERN – 1	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	10	60	30	-	-	-	100
CAT2	10	60	30	-	-	-	100
CAT3	10	70	20	-	-	-	100
ESE	15	65	20	-	-	-	100
	15	65	20	-	-	-	

Branch	nme & B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequ	isites Digital signal Processing	6	PE	2	0	2	3
Preambl Unit – I		and to implement	real time applic	ations	5		0
	Introduction to Real-Time Digital Signal Processing:						6
	rdware-DSP system design- Multiplier accumulator (MAC) – Modified le access memory – Multi-port memory – VLIW architecture – pipelir		a memory acce	ss in p	orogra	amma	
Unit – II	Introduction to TMS320C67xx Digital Signal Processo	:					6
Fundame interrupts	entals of programmable DSPs – Architecture of TMS320C67XX – Be	uses- Computation	al unitsOn-cl	nip pe	ripher	als-T	ïmers an
Unit – III							6
	operation - Address generation units-Memory organization- Memor	y architecture –Ad	dressing mode	s			r
Unit – IV	/ TMS320C67xx Programming:						6
Instructic example	on set-Assembly language instructions – DSP Tools : Assembler, as using C code with CCS	Debugger, C con	npiler, Linker a	and Lo	bader	, Pro	grammin
Unit – V	Peripheral Interfacing and Applications Using TMS32	)C67xx:					6
Interfacir	ng with serial I/O, A/D, D/A converters – FIR filter applications-Adap	tive filter applicatio	ns				
I IST OF	EXPERIMENTS / EXERCISES:						
1.	Perform Bit Reversal using TMS320C67xx DSK						
2.	Implementation of convolution of 2 sequences using TMS320C6	7xx DSK					
3.	Complex number multiplication using TMS320C67xx DSK						
4.	Implementation of Radix-2 and Radix-4 FFT using TMS320C67	xx DSK					
5.	Computation of power density spectrum of a sequence						
6.	MiniProject: Signal or Image Processing Application using TMS	320C67xx DSK					
			Lecture:	30, Pr	actic	al:30	, Total:6
TEXT BO	ООК:						nd Edition
	OOK: Venkataramani B. and Bhaskar M., "Digital Signal Processors: . McGraw Hill, New Delhi, 2011.	Architecture, Prog	ramming and	Applic	ation	s", 2'	Latto
<b>TEXT BO</b>	Venkataramani B. and Bhaskar M., "Digital Signal Processors:	Architecture, Prog	ramming and	Applic	ation	s", 2'	Land
<b>TEXT BO</b>	Venkataramani B. and Bhaskar M., "Digital Signal Processors: McGraw Hill, New Delhi, 2011.		ramming and	Applic	cation	s", 2'	
TEXT BO	Venkataramani B. and Bhaskar M., "Digital Signal Processors: McGraw Hill, New Delhi, 2011. ENCES/ MANUAL / SOFTWARE:	c, Arizona, 2003.					

	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	infer the basic concepts of real time DSP processor	Understanding(K2), Imitation (S1)
CO2	summarize the architectural concepts of C67xx processor	Understanding(K2), Manipulation (S2)
CO3	explain the internal memory organization of C67xx processor	Understanding (K2) , Manipulation (S2)
CO4	implement various digital signal processing algorithms using Code Composer Studio in simulation mode.	Applying(K3), Precision(S3)
CO5	use DSP hardware for digital signal and image processing applications	Applying(K3), Precision(S3)

					Марріі	ng of CC	Os with	POs and	d PSOs					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3		1						1	2	
CO2	3	3	3	3		1						1	2	
CO3	3	3	3	3	3	2			2	2		2	3	
CO4	3	3	3	3	2	1			2	2		2	3	
CO5	3	2	3	3	3	2			2	2		2	3	
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT- E	Bloom's T	Taxonom	iy							·

		ASSESSMENT	PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	80	-	-	-	-	100
CAT2	20	80	-	-	-	-	100
CAT3	10	60	30	-	-	-	100
ESE	10	50	40	-	-	-	100

*  $\pm$ 3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



Program Branch	me& B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequi	isites Linear Algebra and Transforms, Probability and Stochastic process	6	PE	2	0	2	3
Preamble	le To develop the foundations of deep learning algorithms from	as in percep	tron to compl	lex mo	dels us	sed for	image and t
Unit- I	processing Neurons:						
	ron – Perceptron – Feed Forward Neural Network -Perceptron I d, Tanh, and ReLU neurons- Softmax output layer	learning algo	orithm –Line	ear ne	urons	and th	neir Limitati
Unit- II	Training Feed-Forward Neural Network:						
	nt descent- The delta rule and learning rates- Gradient descent (	(GD) with sig	gmoidal neu	rons -	-Back	oropa	gation
algorithr Unit- III	Optimization:						6
Challen	ges with GD – Momentum based optimization - Nesterov accele	erated GD -	Stochastic a	and m	ini bat	ch GD	
adaptati <b>Unit- IV</b>							
Vanilla d	deep neural networks- Filters and feature maps- Convolutional layer – I	Pooling – Bat	ch normalizat	tion-Bu	uild for	CIFAR	R-10
Unit- V	Sequential Neural Network:						6
ecurrer	ng variable-Length inputs- POS tagger- Recurrent neural networ nt unit- Sentiment analysis model Exercises / Experiments :	rks – Vanish	ing gradient	probl	em- L	STM u	
recurren	nt unit- Sentiment analysis model						
List of	nt unit- Sentiment analysis model Exercises / Experiments :	ral changes	on different				
List of 1.	nt unit- Sentiment analysis model Exercises / Experiments : Simulate perceptron of sigmoid neurons to show the behavior	ral changes ation technic	on different				
List of 1. 2.	nt unit- Sentiment analysis model  Exercises / Experiments :  Simulate perceptron of sigmoid neurons to show the behavior Simulate to visualize through contour plot on different optimize	ral changes ation technic	on different				
List of 1. 2. 3.	Int unit- Sentiment analysis model         Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimize         Simulate to classify images using Convolutional neural netwo         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN	ral changes ation technic	on different				
List of 1. 2. 3. 4.	Int unit- Sentiment analysis model         Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimize         Simulate to classify images using Convolutional neural networ         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN         Simulate Stock Price prediction application using LSTM	ral changes ation technic	on different				
List of 1. 2. 3. 4. 5.	Int unit- Sentiment analysis model         Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimize         Simulate to classify images using Convolutional neural netwo         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN	ral changes ation technic	on different ques.	weigh	ts and	l bias.	unit, Gated
List of 1. 2. 3. 4. 5. 6. 7.	Int unit- Sentiment analysis model         Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimiz.         Simulate to classify images using Convolutional neural netwo         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN         Simulate Stock Price prediction application using LSTM         MiniProject	ral changes ation technic	on different ques.	weigh	ts and	l bias.	
List of 1. 2. 3. 4. 5. 6. 7. TEXT B	Int unit- Sentiment analysis model         Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimize         Simulate to classify images using Convolutional neural netwo         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN         Simulate Stock Price prediction application using LSTM         MiniProject	ral changes ation technic rks	on different ques. The	weigh	ts and	l bias.	anit, Gated
List of 1. 2. 3. 4. 5. 6. 7.	Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimize         Simulate to classify images using Convolutional neural netwo         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN         Simulate Stock Price prediction application using LSTM         MiniProject         BOOK:         Nikhil Buduma, "Fundamentals of Deep Learning Designing Next	ral changes ation technic rks	on different ques. The	weigh	ts and	l bias.	anit, Gated
List of 1. 2. 3. 4. 5. 6. 7. TEXT B 1	Int unit- Sentiment analysis model         Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimize         Simulate to classify images using Convolutional neural netwo         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN         Simulate Stock Price prediction application using LSTM         MiniProject	ral changes ation technic rks	on different ques. The	weigh	ts and	l bias.	anit, Gated
List of 1. 2. 3. 4. 5. 6. 7. <b>TEXT B</b> 1	Int unit- Sentiment analysis model         Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimize         Simulate to classify images using Convolutional neural netwo         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN         Simulate Stock Price prediction application using LSTM         MiniProject         BOOK:         Nikhil Buduma, "Fundamentals of Deep Learning Designing Next O'Reilly Media, 2017.	ral changes ation technic rks	on different ques. The	weigh	ts and	l bias.	anit, Gated
List of 1. 2. 3. 4. 5. 6. 7. <b>TEXT B</b> 1 <b>REFER</b>	Int unit- Sentiment analysis model         Exercises / Experiments :         Simulate perceptron of sigmoid neurons to show the behavior         Simulate to visualize through contour plot on different optimize         Simulate to classify images using Convolutional neural netwo         Simulate to recognize hand written character using CNN         Simulate to classify sentiment of text using 1DCNN/RNN         Simulate Stock Price prediction application using LSTM         MiniProject         BOOK:         Nikhil Buduma, "Fundamentals of Deep Learning Designing Next O'Reilly Media, 2017.         RENCES:	ral changes ation technic rks	on different ques. The	weigh	ts and	l bias.	anit, Gated

COURSE	OUTC	OMES:												T Mapped		
On com	pletion	of the o	cours	e, the s	tudents	will be al	ole to						(Hig	hest Leve	÷I)	
CO1	use m	ultilaye	r Perc	eptron a	and its lea	arning alg	orithm fo	or linearly	non-sep	arable pi	oblems.			oplying(K3	-	
	annly	the hac	knror	nanation	algorithr	ns to lear	n the nai	rameters	of food f	orward n	oural noty	vorks		nitation (S1 pplying(K3	,	
CO2	арріу		n proj	Jagation	aigontin		ii tile pai	ameters				VOIRS.		nipulation (		
CO3	use va	arious o	ptimiz	zation alg	go rithms	to updat	e model	paramete	rs.				A	pplying(K3	3)	
	apply	regulari	izatior	n and dif	ferent hy	per parar	neter tun	ing strate	gies to ir	nprove tl	ne		Precision(S3) Applying(K3),			
CO4	perfor	mance	of the	models									Precision(S3)			
CO5	make	use of	CNN	and RN		A	oplying(K3	),								
						P	recision(S3	3)								
						Марр	ing of C	Os with F	Os and	PSOs						
COs,PO s	PO1	P	02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3		2	2		2				2			2	3		
CO2	3	:	2	2		2							2 3			
CO3	3		2	2	2	2	2						2	3	2	
CO4	3		2	2	2	3	2		2				2	3	2	
CO5	3	:	2	2	2	3	2		2	2	2		2	3	2	
1 – Slight	t, 2 – M	oderate	e, 3 – S	Substan	tial, BT- E	Bloom's T	axonom	у								
Test						ASSE	SSMEN	T PATTE	RN - TH	EORY					<del></del>	
Bloom	ı's	Remer (K	mberi 1) %	ing l	Jndersta (K2)		Apply	ving (K3) %		alyzing (4) %		uating 5) %		ating 6) %	Total %	
CAT	1	6	6		60	)		34		-		-		-	100	
CAT	2	6	6		60			34		-		-		-	100	
CAT	3	1	4		70	)		16		-		-		-	100	
ESE		1	0		60	)		30		-		-		-	100	
* ±3% ma	ay be va	aried (C	AT 1,	2,3 – 50	marks &	ESE – 1	00 marks	s)								



Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Data Communication and Networking	7	PE	3	0	0	3
Preamble	To explore IEEE 802.16- WiMAX broadband wireless comr	nunication a	and its associa	ated te	echnic	ques.	
Unit - I	Wireless MAN :						9
Evolution of broad	pand wireless -Spectrum options for broadband wireless-Techn	ical challen	ges for broad	band	wirele	ess- B	ackgrour
on iEEE802.16 and	WiMAX- Salient features of WiMAX						
Unit - II	Medium Access Control in Wireless MAN:						9
Sub layers of the M	AC layer of IEEE 802.16 –Service flows and connection – Frame	e structure -	- Open issues	in IEE	EE 80	2.16-	MAC lay
of ETSI Hiper CCE	SS.						
Unit - III	Radio Resource Management:						9
Mesh mode operat	ions – RRM in tree topology– RRM in mesh topology.						
QoS in WiMAX Me	sh Networks: Services provisioning-QoS framework– QoS sch	eduling					
Unit - IV	Mobility Management:						9
Mobile WiMAX net	work - Idle-mode management- Anchored mobility management	- (ASN and	CSN).				
Energy managem	ent: PMP and mesh modes in IEEE 802.16 WiMAX- Sleep mod	e in the IEE	E 802.16e- Er	nergy	consi	umptio	on analys
with downlink. Upli	nk traffic and generalized traffic process.						
							9
Unit - V	IEEE 802.16j Multi-hop Relay Networks:			ılti-hop	o 802	.16 ne	etworks
Unit - V		Dimensioni	ng cellular mu				
Unit - V	IEEE 802.16j Multi-hop Relay Networks: es- Tunneling and aggregation- Resource scheduling methods-	Dimensioni	ng cellular mu				Total 14
Unit - V Overview-Challeng		Dimension	ng cellular mu				Total :4
Unit - V Overview-Challeng TEXT BOOK:	es- Tunneling and aggregation- Resource scheduling methods-						
Unit - V Overview-Challeng TEXT BOOK:	es- Tunneling and aggregation- Resource scheduling methods-			etwork	s", A	uerba	
Unit - V Overview-Challeng TEXT BOOK:	es- Tunneling and aggregation- Resource scheduling methods-			etwork	s", A	uerba	
Unit - V Overview-Challeng TEXT BOOK: 1. Yan Zhang Publication REFERENCES:	es- Tunneling and aggregation- Resource scheduling methods-	eless metro	politan area ne				ch
Unit - V Overview-Challeng TEXT BOOK: 1. Yan Zhang Publication REFERENCES: 1 M. K. Saln 2018.	es- Tunneling and aggregation- Resource scheduling methods- and Hsiao-Hwa Chen, "Mobile WiMAX : toward broadband wires, 2008. an and Abid Yahya, "Mobile WiMAX Systems: Performance An Sedani, Komal R. Borisagar and Rohit M. Thanki, "WiMAX Mo	eless metrop nalysis of F	politan area ne ractional Freq	uency	Reu	se", C	ch CRC Pres

		UTCON		urse, the s	tudent	s will be a	ble to							BT Map (Highest I			
CO1				ioning of fix				I MAC la	ayer fur	nctionalitie	s.			Inderstand	,		
CO2	арр	ly suital	ole Qo	S framewoi	k and re	esource m	anagem	ent of w	/ireless	broadban	d networl	ks.		Applying	(K3)		
CO3	com	nprehen	d diffe	rent energy	efficier	t algorithr	ns suitat	ole for w	rireless	broadban	d network	(S.	L	Inderstand	ing(K2)		
CO4	арр	ly the s	uitable	methods ir	n solving	g mobility	related is	ssues.						Applying(K3)			
CO5	com	nprehen	d tech	nical issues	s in Cell	ular Multi-	hop 802	.16 Netv	vorks.				L	Inderstand	ing(K2)		
						Маррі	ing of C	Os with	POs a	and PSOs							
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2		
CO1	1	3	2	2								2		2			
CO2	2	3	2	2	2												
COS	3	3	2	2	2	2					2	2	2				
CO4	1	3	2	2	2												
COS	5	3	3	2	2	2								2			
1 – Slię	ght, 2	– Mode	erate, 3	8 – Substar	tial, BT	- Bloom's	Taxonor	ny		1							
						ASSE	SSMEN	Τ ΡΑΤΤ	ERN -	THEORY							
	st / B Categ	loom's gory*		Remember (K1) %		Understa (K2)		Apply (K3)		Analyzin (K4) %	g E	valuating (K5) %	9	Creating (K6) %	Tota %		
	CA	T1		15		60		25	5	-		-		-	100		
	CAT2 15							30	)	-		-		-	100		
CAT3 15 60 25 ⁻ ⁻										-		-		-	100		
		SE		10		65		25	-	-		-		-	100		

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Programme &Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Data communication and Networking	7	PE	3	0	0	3
Preamble	To provide a broad overview on cryptographic algorithms, se implemented in data communication networks.	cure key ma	anagement ar	nd di	stribu	ution n	nechanisr
Unit– I	Network Security Concepts:						9
	y concepts - the OSI security architecture - Security attacks, Ser e division algorithm - Euclidean algorithm - Modular arithmetic l arithmetic						
Unit– II	Number Theory and Classical Encryption Techniques:						9
	Fermat's and Euler's theorems- Testing for primality -The clion techniques: Symmetric cipher model - Substitution technique				Discr	ete al	gorithms.
Unit– III	Symmetric Key Cryptography and Public Key Cryptogra	aphy:					9
	cipher - Data encryption standard - Block cipher principles- Bloc ard (AES-512) - Public key cryptography: Principles of public ke						
Unit– IV	Public-Key Cryptosystems:						9
	y exchange-Elgamal cryptographic system- Elliptic curve arithm	etic- Elliptic	curve cryptog	grap	hy-P:	seudo	random
	on based on an asymmetric cipher						
							9
number generation	on based on an asymmetric cipher	Email threa	ats and comp	rehe	nsive	emai	
number generation	Mobile device security - IEEE 802.11i Wireless LAN security -	Email threa	ats and comp	rehe	nsive	emai	
number generation	Mobile device security - IEEE 802.11i Wireless LAN security -	Email threa	ats and comp	rehe	nsive	emai	l security-
number generation Unit– V Wireless security S/MIME- Pretty g	Mobile device security - IEEE 802.11i Wireless LAN security -						I security Total:4
number generation         Unit-V         Wireless security         S/MIME- Pretty g         TEXTBOOK:         1.       William S	Mireless and Email Security:     Mobile device security - IEEE 802.11i Wireless LAN security -     ood privacy- DNS security extensions -DDoS attacks						I security-
number generation Unit– V Wireless security S/MIME- Pretty g TEXTBOOK: 1. William S REFERENCES: Bebrouz	A. Ferouzan & Debdeep Mukhopadhyay, "Cryptography and Network Security", "Cryptography", "Cryptography	on Educatio	on Pvt. Ltd., N	lew [	Delhi	, 2017	Total:4
number generation         Unit- V         Wireless security         S/MIME- Pretty g         TEXTBOOK:         1.       William S         REFERENCES:         1.       Behrouz         NewDelh	A. Ferouzan & Debdeep Mukhopadhyay, "Cryptography and Network Security"	on Educatio	n Pvt. Ltd., N rity", 3 rd Editio	lew [	Delhi	, 2017	I security Total:4

		UTCOM ion of t		se, the st	udent	s will be	able to							BT Mappe ghest Le	
CO1	unde	erstand	OSI sec	urity archi	tecture	e and mat	hematic	s of cry	otograp	ohy			Unde	erstanding	g (K2)
CO2	illus	trate nu	mber the	eory and c	lassica	al encrypt	ion tech	niques					А	pplying(K	3)
CO3	appl	ly knowl	edge in	symmetric	and p	oublic key	cryptog	raphy					А	pplying(K	3)
CO4	appl	ly knowl	edge in	public key	crypto	osystems							А	pplying(K	3)
CO5	infer	r differei	nt wirele	ss and err	nail seo	curity mea	chanism						Und	lerstandin	g (K2)
						Mappir	ng of Co	s with	POs ar	nd PSOs	5				
COs/F	POs	PO1	PO2	PO3	PO4		PO6	PO7	PO8	1	PO10	PO11	PO12	PSO1	PSO2
CO	1	2	1	3										2	
CO	2	2	1	3										3	
CO	3	3	2	1	1				2					3	1
CO	4	2	1	3					2					3	
CO	5	3	3	2	2				3					3	
1–Sligl	ht,2–N	loderate	e,3–Sub	stantial, B	T-Bloc	m's Taxo	nomy								
					۵۵	SESSME		TERN	. THE	ORY					
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	-	Understa (K2)	anding	Apply (K3)	/ing	Analyz (K4) %	•	Evaluating (K5) %		ating 6) %	Total %
	CA	T1		20		60	)	20	)	-		-		-	100
	CA	T2		15		40	)	45	5	-		-		-	100
	CA	T3		15		60	)	25	5	-		-		-	100
	ESE			15		45	5	40	)	-		-		-	100
*±3% r	may b	e varied	I (CAT1,	2,3– 50 m	arks 8	ESE-10	0 marks)	)	ľ				•		•



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Programme Branch	e & B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisit	tes Nil	7	PE	3	0	0	3
Preamble	To understand the concepts of real time operating system a development.	nd to apply its	s concepts for	embe	eddec	l appl	ication
Unit – I	Introduction:						9
scheduling - real time ke Unit – II Tasks –Tas	Task Management:           sk states – TCB – Task scheduling – Locking and unlocking the schedule	pts – Clock ti rs – Idle task	cks – Advanta	ges a sk - C	and di	sadva	antages o 9
	ack checking – Deleting a task– Changing a task's priority – Suspending	task – Resum	ning task – Tas	sk que	ery.		
1.1.14	Time Management and Event Central Pleaker						9
Delaying a from an ECI	Time Management and Event Control Blocks:           task – Resuming a delayed task – System time - Event control blocks:           B wait list – Finding the highest priority task – List of free ECBs – Initialized						ving a tas nt.
Delaying a from an ECI <b>Unit – IV</b> Semaphore – Deleting – Creating – I	task – Resuming a delayed task – System time - Event control blocks: F	e – Task read and Query - N s a binary ser	ly, Wait and tin //essage Mailb naphore, Mess	ne ou ox Ma age (	it of a anage Queu	n eve emen e Mar	ring a tas nt. 9 t: Creatin
Delaying a from an ECI <b>Unit – IV</b> Semaphore – Deleting – Creating – I	task – Resuming a delayed task – System time - Event control blocks: F B wait list – Finding the highest priority task – List of free ECBs – Initialize Inter-task Communication Management: Management: Creating – Deleting – Waiting – Signaling - Non-blocking a Waiting - Sending and getting a message - Query and using a mailbox as Deleting – Waiting - Sending (FIFO and LIFO) and getting a message – Fi	e – Task read and Query - N s a binary ser	ly, Wait and tin //essage Mailb naphore, Mess	ne ou ox Ma age (	it of a anage Queu	n eve emen e Mar	ring a tas nt. 9 t: Creatin nagemen
from an ECI Unit – IV Semaphore – Deleting – Creating – I inputs and u Unit – V Memory cor	task – Resuming a delayed task – System time - Event control blocks: F B wait list – Finding the highest priority task – List of free ECBs – Initialize Inter-task Communication Management: Management: Creating – Deleting – Waiting – Signaling - Non-blocking a - Waiting - Sending and getting a message - Query and using a mailbox as Deleting – Waiting - Sending (FIFO and LIFO) and getting a message – Fl using a queue as a counting semaphore	e – Task read and Query - N s a binary ser lushing – Que memory block	ly, Wait and tin Aessage Mailb naphore, Mess ery - Using a qu	ne ou ox Ma sage ( ueue	anage Queu when	n eve emen e Mar read	ring a tas nt. 9 t: Creatin nagemen ing analo
Delaying a from an ECI Unit – IV Semaphore – Deleting – Creating – I inputs and u Unit – V Memory cor	task – Resuming a delayed task – System time - Event control blocks: F B wait list – Finding the highest priority task – List of free ECBs – Initialize Inter-task Communication Management: A Management: Creating – Deleting – Waiting – Signaling - Non-blocking a - Waiting - Sending and getting a message - Query and using a mailbox as Deleting – Waiting - Sending (FIFO and LIFO) and getting a message – Fl using a queue as a counting semaphore Memory Management and Case Studies: ntrol blocks - Creating partition - Obtaining a memory block - Returning a	e – Task read and Query - N s a binary ser lushing – Que memory block	ly, Wait and tin Aessage Mailb naphore, Mess ery - Using a qu	ne ou ox Ma sage ( ueue	anage Queu when	n eve emen e Mar read	ring a tas nt. 9 t: Creatin nagemen ing analo
Delaying a t from an ECI Unit – IV Semaphore – Deleting – Creating – I inputs and u Unit – V Memory cor for memory	task – Resuming a delayed task – System time - Event control blocks: F B wait list – Finding the highest priority task – List of free ECBs – Initialize Inter-task Communication Management: Management: Creating – Deleting – Waiting – Signaling - Non-blocking a - Waiting - Sending and getting a message - Query and using a mailbox as Deleting – Waiting - Sending (FIFO and LIFO) and getting a message – Fl using a queue as a counting semaphore Memory Management and Case Studies: ntrol blocks - Creating partition - Obtaining a memory block - Returning a blocks from a partition - Porting μC/OS-II - Automatic chocolate vending	e – Task read and Query - N s a binary ser lushing – Que memory block	ly, Wait and tin Aessage Mailb naphore, Mess ery - Using a qu	ne ou ox Ma sage ( ueue	anage Queu when	n eve emen e Mar read	ring a tas nt. 9 t: Creatin nagemen ing analo 9 nd waitin
Delaying a from an ECI Unit – IV Semaphore – Deleting – Creating – I inputs and u Unit – V Memory cor for memory	task – Resuming a delayed task – System time - Event control blocks: F B wait list – Finding the highest priority task – List of free ECBs – Initialize Inter-task Communication Management: Management: Creating – Deleting – Waiting – Signaling - Non-blocking a - Waiting - Sending and getting a message - Query and using a mailbox as Deleting – Waiting - Sending (FIFO and LIFO) and getting a message – Fl using a queue as a counting semaphore Memory Management and Case Studies: ntrol blocks - Creating partition - Obtaining a memory block - Returning a blocks from a partition - Porting μC/OS-II - Automatic chocolate vending	e – Task read and Query - N s a binary sen lushing – Que memory block machine	ly, Wait and tin Aessage Mailb naphore, Mess ery - Using a qu	ne ou ox Ma sage ( ueue	anage Queu when	n eve emen e Mar read	ring a tas nt. 9 t: Creatin nagemen ing analo 9 nd waitir
Delaying a t from an ECI Unit – IV Semaphore – Deleting – Creating – I inputs and u Unit – V Memory cor for memory TEXT BOO	task – Resuming a delayed task – System time - Event control blocks: F B wait list – Finding the highest priority task – List of free ECBs – Initialize Inter-task Communication Management: A Management: Creating – Deleting – Waiting – Signaling - Non-blocking a - Waiting - Sending and getting a message - Query and using a mailbox as Deleting – Waiting - Sending (FIFO and LIFO) and getting a message – Fl using a queue as a counting semaphore Memory Management and Case Studies: ntrol blocks - Creating partition - Obtaining a memory block - Returning a blocks from a partition - Porting μC/OS-II - Automatic chocolate vending	e – Task read and Query - N s a binary sen lushing – Que memory block machine	ly, Wait and tin Aessage Mailb naphore, Mess ery - Using a qu	ne ou ox Ma sage ( ueue	anage Queu when	n eve emen e Mar read	ring a tas nt. 9 t: Creatin nagemen ing analo 9 nd waitin
Delaying a f from an ECI Unit – IV Semaphore – Deleting – Creating – I inputs and u Unit – V Memory cor for memory TEXT BOO 1. Je REFERENC	task – Resuming a delayed task – System time - Event control blocks: F B wait list – Finding the highest priority task – List of free ECBs – Initialize Inter-task Communication Management: A Management: Creating – Deleting – Waiting – Signaling - Non-blocking a - Waiting - Sending and getting a message - Query and using a mailbox as Deleting – Waiting - Sending (FIFO and LIFO) and getting a message – Fl using a queue as a counting semaphore Memory Management and Case Studies: ntrol blocks - Creating partition - Obtaining a memory block - Returning a blocks from a partition - Porting μC/OS-II - Automatic chocolate vending	e – Task read and Query - N s a binary sen lushing – Que memory block machine	ly, Wait and tin Aessage Mailb naphore, Mess ery - Using a qu k – Query - Me	ne ou ox Ma age ( aeue ' mory	anage Queu when	n eve	ring a tas nt. 9 t: Creatin nagemen ing analo 9 nd waitin Total:4
Delaying a from an ECI Unit – IV Semaphore – Deleting – Creating – Creatin	task – Resuming a delayed task – System time - Event control blocks: F B wait list – Finding the highest priority task – List of free ECBs – Initialize Inter-task Communication Management: e Management: Creating – Deleting – Waiting – Signaling - Non-blocking a - Waiting - Sending and getting a message - Query and using a mailbox as Deleting – Waiting - Sending (FIFO and LIFO) and getting a message – Fl using a queue as a counting semaphore Memory Management and Case Studies: ntrol blocks - Creating partition - Obtaining a memory block - Returning a e blocks from a partition - Porting μC/OS-II - Automatic chocolate vending MK: ean J. Labrosse. μC/OS - II The Real Time Kernel, 2 nd Edition, CMP Book CES: braham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System	e – Task read and Query - M s a binary ser lushing – Que memory block machine	ly, Wait and tin Aessage Mailb naphore, Mess ery - Using a qu k – Query - Me	ox Ma cage ( ueue ) mory	it of a anage Queu when y parti	n eve emen e Mar read tion a	ring a tas nt. 9 t: Creatin nagemer ing analo 9 nd waitin Total:4

	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	comprehend the fundamental concepts and scheduling algorithms for real time applications	Understanding (K2)
CO2	write task management codes for RTOS	Applying (K3)
CO3	use time management principles and write programs for RTOS	Applying (K3)
CO4	employ the principles of Inter-task communication services in operating systems	Applying (K3)
CO5	design real time embedded systems using the concepts of RTOS	Applying (K3)

					Mappin	g of CO	s with P	Os and	PSOs					
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	2											2	2
CO2	3	3	2	2	3				2				3	2
CO3	3	2	2	2	3				2				3	2
CO4	3	2	2	2	3			2	2		2		3	2
CO5	3	2	2	2	3	2			2		2	2	3	2
1 – Slight, 2	– Mode	rate, 3 –	Substantia	al, BT- Blo	oom's Ta	xonomy								

		ASSESSMENT	PATTERN - T	HEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	50	30	-	-	-	100
CAT2	15	35	50	-	-	-	100
CAT3	10	30	60	-	-	-	100
ESE	10	45	45	-	-	-	100
±3% may be varied (C	AT 1.2.3 – 50 marks a	& ESE – 100 marks)		1 1			

Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	6	PE	2	0	2	3
•							
Preamble	To apply the concept of script writing and customize and automate manipulate the netlist and write utilities for the TCL interface proce		sis flow. To pe	rforn	n data	base	1
Unit – I Characteristics	Introduction to Scripting and PERL : of scripting languages - Introduction to PERL -	nomoo	and value		,	/ariab	6 bles and
assignment - with arrays Subroutines - S	Scalar expressions - Control structures - Built-in fur - Lists and hashes - Simple input and output – Stri cripts with arguments	nctions -	Collections	of	Data	a -	Working
Unit – II	Advanced PERL :	\\/	uide Class			- 43	6
system - Ty Objects and me	of Looping – Subroutines - Using Pack and Unpack of globs – Eval – References - Data structures – Pac odules in action - Tied variables - Interfacing to the operating systems	kages -	Libraries and				the file Objects- 6
Unit – III The TCL ph	<b>TCL:</b> enomena – Philosophy – Structure – Syntax – Parser - \	/ariables a	nd data in	TCI	- (	Contr	-
	es - Simple input/output – Procedures - Working with					and	Pipes
Unit – IV	Advanced TCL :						6
errors -	, 1	nd packa ternet-awar	0		baces ind-bo		Trappino interne
Unit – V	TK and JAVA Script :						6
Java Šcript cor	PERL-TK. JavaScript – Object models - Design phil e language		ents and Versions	bind of	Javas		Geometry - The
	RIMENTS / EXERCISES:						
	simple PERL/TCL Script for arithmetic expression evaluation and me lop PERL/TCL Script to use decision making and looping statements		ing				
	lop PERL/TCL Script to implements array functionalities						
	lop PERL/TCL Script to implement functions						
4. Deve							
	lop PERL/TCL Script to implement strings.						
5. Deve 6. Deve	lop PERL/TCL Script to implement strings. lop TK and Java Script to implement VLSI testing environment						
5. Deve 6. Deve 7. Minip	lop PERL/TCL Script to implement strings.		Lecture:	30, P	ractio	al:30	), Total:60
5. Deve 6. Deve 7. Minip TEXT BOOK:	lop PERL/TCL Script to implement strings. lop TK and Java Script to implement VLSI testing environment	00.	Lecture:	30, P	ractio	al:30	), Total:6(
5.Deve6.Deve7.MinipTEXT BOOK:1.Davi	lop PERL/TCL Script to implement strings. lop TK and Java Script to implement VLSI testing environment project	00.	Lecture:	30, P	ractio	:al:30	), Total:6(
5. Deve 6. Deve 7. Minip TEXT BOOK: 1. Davi REFERENCES	lop PERL/TCL Script to implement strings. lop TK and Java Script to implement VLSI testing environment project d Barron, "The World of Scripting Languages", Wiley Publications, 200	00.	Lecture:	30, P	ractio	al:30	), Total:6(
5.Deve6.Deve7.MinipTEXT BOOK:1.DavionREFERENCES1.Bren	Iop PERL/TCL Script to implement strings. Iop TK and Java Script to implement VLSI testing environment project d Barron, "The World of Scripting Languages", Wiley Publications, 200 / MANUAL / SOFTWARE:	00.	Lecture:	30, P	ractio	:al:30	), Total:6(
5.Deve6.Deve7.MinipTEXT BOOK:1.DavionREFERENCES1.Bren2.Random	Iop PERL/TCL Script to implement strings. Iop TK and Java Script to implement VLSI testing environment project d Barron, "The World of Scripting Languages", Wiley Publications, 200 / MANUAL / SOFTWARE: t Welch, "Practical Programming in TCL and TK",4 th Edition, 2003.			30, P	ractio	al:30	), Total:6(
5.     Deve       6.     Deve       7.     Minip   TEXT BOOK:       1.     Davia   REFERENCES       1.     Bren       2.     Random       3.     Guid	Iop PERL/TCL Script to implement strings. Iop TK and Java Script to implement VLSI testing environment project d Barron, "The World of Scripting Languages", Wiley Publications, 200 / MANUAL / SOFTWARE: t Welch, "Practical Programming in TCL and TK",4 th Edition, 2003. lal L. Schwartz, "Learning PERL", 6 th Edition, O"Reilly, 2005.			80, P	ractio	al:30	), Total:6

	OUTCON		rse, the st	udents	will be ab	le to							BT Mapp lighest Lo	
CO1	interpret t	he conc	epts of PE	RL scri	pting langu	ages							lerstandin mitation (	
CO2	articulate	VLSI de	esign using	) Perl so	ripting lang	juages							pplying ( Precision(	
CO3	demonstr	ate the	syntax of T	CL scri	pting langu	ages							lerstandin Precision(	
CO4	employ a	dvanced	I TCL scrip	ot for ad	vanced app	olications	6						pplying ( Precision(	
CO5	construct	TK and	Java Scrip	ot scripti	ing languag	jes to au	tomate s	syntheti	c flow				pplying ( Precision(	
					Mapping	g of COs	s with P	Os and	PSOs					
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	2				3	3		3	3	3
CO2	3	2	3	3	2				3	3		3	3	3
CO3	2	2	3	3	3				3	3		3	3	3
CO4	3	2	3	3	3				3	3		3	3	3
CO5	2	2	3	3	3				3	3		3	3	3
1 – Slight	, 2 – Mode	erate, 3 -	- Substant	ial, BT-	Bloom's Ta	axonomy	,							
					ASSES	SMENT	PATTER	RN - TH	IEORY					
	/ Bloom's itegory*	j	Rememb (K1) %		Understa (K2)		Apply (K3)		Analyzi (K4) %		/aluating (K5) %		ating 6) %	Total %
	CAT1		10		75		15	5	-		-		-	100
	CAT2		10		75		15	5	-		-		-	100
	CAT3		5		35		60	)	-		-		-	100
	ESE		10		40		50	)	-		-		-	100
±3% ma		d (CAT		marks &	40 & ESE – 10			,						100



Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	7	PE	3	0	0	3
Preamble	To infer the concepts of quantum information theory (qubi discuss quantum algorithms and physical realization of su			qubit	syste	ems) a	nd to
Unit – I	Fundamental concepts of Quantum Computing:						9
	res-Quantum bits- Quantum computation: single qubit gates, information- Linear algebra-The postulates of quantum mech Quantum computation:						
Quantum algorith model of compute	ms- Single qubit operations - Controlled operations – Measu ation - Simulation of quantum systems- Quantum fourier trans ons of the quantum Fourier transform						antum circu
Unit – III	Quantum search algorithms & physical realization						9
The guesting at							
Quantum search Conditions for q	arch algorithm- Quantum search as a quantum simulation-S of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance	rithm-Blac	k box algorith	nm li	mits-	Guidin	g principles
Quantum search Conditions for q	of an unstructured database- Optimality of the search algo	rithm-Blac	k box algorith	nm li	mits-	Guidin	g principles
Quantum search Conditions for q quantum electrod <b>Unit – IV</b> Classical noise a	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance	rithm-Blac r-Optical	k box algorith photon quant and quantum	nm li um ( n ope	mits-( comp	Guiding uter-O	g principles ptical cavit <b>9</b>
Quantum search Conditions for q quantum electrod <b>Unit – IV</b> Classical noise a	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance Quantum Information nd Markov processes -Quantum operations-Examples of quar	rithm-Blac r-Optical	k box algorith photon quant and quantum	nm li um ( n ope	mits-( comp	Guiding uter-O	g principles ptical cavit <b>9</b>
Quantum search Conditions for q quantum electrod Unit – IV Classical noise a quantum operatio Unit – V Introduction-The	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance <b>Quantum Information</b> nd Markov processes -Quantum operations-Examples of quar ons-Limitations of the quantum operations formalism-Distance	rithm-Blac r-Optical ntum noise measures ing quant	k box algorith photon quant e and quantum for quantum um codes-St	nm li um ( n ope infor abiliz	mits-( comp eration matio	Guiding uter-O ns-App n odes-F	g principles ptical cavit 9 lications of 9 ault-tolerar
Quantum search Conditions for q quantum electrod Unit – IV Classical noise a quantum operatio Unit – V Introduction-The	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance <b>Quantum Information</b> nd Markov processes -Quantum operations-Examples of quar ons-Limitations of the quantum operations formalism-Distance <b>Quantum error-correction</b> Shor code-Theory of quantum error correction-Construct	rithm-Blac r-Optical ntum noise measures ing quant	k box algorith photon quant e and quantum for quantum um codes-St	nm li um ( n ope infor abiliz	mits-( comp eration matio	Guiding uter-O ns-App n odes-F	g principles ptical cavit 9 lications of 9 ault-tolerar
Quantum search Conditions for q quantum electrod Unit – IV Classical noise a quantum operatio Unit – V Introduction-The	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance <b>Quantum Information</b> nd Markov processes -Quantum operations-Examples of quar ons-Limitations of the quantum operations formalism-Distance <b>Quantum error-correction</b> Shor code-Theory of quantum error correction-Construct	rithm-Blac r-Optical ntum noise measures ing quant	k box algorith photon quant e and quantum for quantum um codes-St	nm li um ( n ope infor abiliz	mits-( comp eration matio	Guiding uter-O ns-App n odes-F	g principles ptical cavit 9 Ilications of 9 Fault-toleran nputation
Quantum search Conditions for q quantum electrod Unit – IV Classical noise a quantum operatio Unit – V Introduction-The quantum comput TEXT BOOK: 1 Michael	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance <b>Quantum Information</b> nd Markov processes -Quantum operations-Examples of quar ons-Limitations of the quantum operations formalism-Distance <b>Quantum error-correction</b> Shor code-Theory of quantum error correction-Construct	rithm-Blac r-Optical ntum noise measures ing quant nt and Eler	k box algorith photon quant e and quantum s for quantum um codes-St ments of resilio	nm li um o n ope infor abiliz	mits-( comp eration matio	Guidin uter-O ns-App n odes-F im con	g principles ptical cavin 9 lications of 9 ault-toleran nputation Total:4
Quantum search Conditions for q quantum electrod Unit – IV Classical noise a quantum operatio Unit – V Introduction-The quantum comput TEXT BOOK: 1 Michael	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance         Quantum Information         nd Markov processes -Quantum operations-Examples of quarons-Limitations of the quantum operations formalism-Distance         Quantum error-correction         Shor code-Theory of quantum logic-Fault-tolerant measuremer         A. Nielsen & Isaac L. Chuang, "Quantum Computation and States"	rithm-Blac r-Optical ntum noise measures ing quant nt and Eler	k box algorith photon quant e and quantum s for quantum um codes-St ments of resilio	nm li um o n ope infor abiliz	mits-( comp eration matio	Guidin uter-O ns-App n odes-F im con	g principles ptical cavin 9 lications of 9 ault-toleran nputation Total:4
Quantum search Conditions for q quantum electrod Unit – IV Classical noise a quantum operatio Unit – V Introduction-The quantum comput TEXT BOOK: 1. Michael Universit REFERENCES:	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance         Quantum Information         nd Markov processes -Quantum operations-Examples of quarons-Limitations of the quantum operations formalism-Distance         Quantum error-correction         Shor code-Theory of quantum logic-Fault-tolerant measuremer         A. Nielsen & Isaac L. Chuang, "Quantum Computation and States"	rithm-Blac r-Optical measures ing quant at and Eler	k box algorith photon quant and quantum for quantum um codes-St ments of resilion m Information	nm li nope infor abiliz ent q	mits- comp eration matio eer c uantu th Ec	Guidin uter-O ns-App n odes-F im con	g principle ptical cavi 9 lications o 9 Fault-tolera nputation Total:4
Quantum search         Conditions for q         quantum electrod         Unit – IV         Classical noise a         quantum operation         Unit – V         Introduction-The         quantum compute         TEXT BOOK:         1.         Michael         Universit         REFERENCES:         1.         Eleanor	of an unstructured database- Optimality of the search algo uantum computation-Harmonic oscillator quantum compute ynamics-ion traps-Nuclear magnetic resonance Quantum Information nd Markov processes -Quantum operations-Examples of quar ons-Limitations of the quantum operations formalism-Distance Quantum error-correction Shor code-Theory of quantum error correction-Construct ation: Fault-tolerant quantum logic-Fault-tolerant measuremer A. Nielsen & Isaac L. Chuang, "Quantum Computation an y Press, 2010.	rithm-Blac r-Optical ntum noise measures ing quant at and Eler ind Quantu	k box algorith photon quant e and quantum for quantum um codes-St ments of resilion m Information	nm li nope infor abiliz ent q	mits- comp eration matio eer c uantu th Ec	Guidin uter-O ns-App n odes-F im con	g principle ptical cavi 9 lications o 9 Fault-tolera nputation Total:4

COUR	RSE O	UTCON	IES:										В	T Mappe	d
On co	mple	tion of t	he cour	se, the s	tudents	will be a	able to						(Hig	ghest Lev	vel)
CO1	des	scribe th	e quantu	ım mech	anics usi	ng linear	algebra						Unde	erstanding	g(K2)
CO2	par	aphrase	e with qu	bits and	designin	g of quar	ntum gate	es					Unde	erstanding	g(K2)
CO3	inte	erpret qu	iantum p	arallelisr	n using c	quantum	search a	lgorithm	IS				Unde	erstanding	g(K2)
CO4	eluc	cidate qu	uantum ii	nformatio	on proces	ssing							Unde	erstanding	g(K2)
CO5	infe	r the co	ncepts of	f quantur	n error c	orrection	l						Unde	erstanding	g(K2)
						Mappin	g of CO	s with P	Os and	PSOs					
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	01	3	2	2									2	2	
CO	)2	3	2	3									2	2	
CO	)3	2	2	2									2	2	
CO	)4	2	2	2									2	2	
CO	)5	2	2	2									2	2	
1 – Sli	ight, 2	– Mode	erate, 3 -	Substar	itial, BT-	Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	RN - TH	IEORY					
To	et / Bl	oom's	Po	member	ina I	Indersta	andina	Δnnly	ling	Δnalvz	ing E	valuatin		eating	Total

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Tota %
CAT1	10	90	-	-	-	-	100
CAT2	10	90	-	-	-	-	100
CAT3	10	90	-	-	-	-	100
ESE	10	90	-	-	-	-	100

Programme& Branch       B.E. & Electronics and Communication Engineering       Sem.       Category       L       T       P       Cred Cred Cred Prerequisites         Linear Algebra and Transforms       7       PE       2       0       2       3         Preamble       To apply the various Wavelet Transform techniques on real time signals and images.       6         Unit - I       Wavelet Fundamentals:       6         Vector spaces – Relationship between functions, Sequences, Vectors – Properties – Fourier transform and Non-stationary signals Limitations – Review of sampling theorem.       6         Unit - II       Haar Wavelet       6       6         Analysis of Haar wavelet in function of scale and time – Haar multirate solution Analysis: Analysis part and Synthesis part – Frequency domain analysis of Haar filter bank       6         Unit - III       Continuous Wavelet Transform:       6         Dreducentary principle – Time-bandwidth product – Time-Frequency tiling – STFT and wavelets – CWT-Comparison of STFT a CWT-Integretation of spectrogram plot.       6         Unit - V       Discrete Wavelet Transform:       6         Opadic MRA: Theorem – Inverse DWT computation – Bi-orthogonal and orthogonal filter banks – Construction of orthogonal filter banks       - Variants of MRA: Splines and wavelet packets.         Unit - V       Applications:       6         Compression – Denoising - Analysis of biomedical sig		22ECF12 – WAVELET TRANSFORM ANI							
Preamble       To apply the various Wavelet Transform techniques on real time signals and images.         Unit - 1       Wavelet Fundamentals:       6         Vector spaces – Relationship between functions, Sequences, Vectors – Properties – Fourier transform and Non-stationary signals Limitations – Review of sampling theorem.       6         Analysis of Haar Wavelet in function of scale and time – Haar multirate solution Analysis: Analysis part and Synthesis part – Frequency domain analysis of Haar filter bank       6         Unit - II       Continuous Wavelet Transform:       6         The uncertainty principle – Time-bandwidth product – Time-Frequency tiling – STFT and wavelets – CWT-Comparison of STFT a CWT–Interpretation of spectrogram plot.       6         Unit - V       Discrete Wavelet Transform:       6         Opadic MRA Theorem – Inverse DWT computation – Bi-orthogonal and orthogonal filter banks – Construction of orthogonal filter banks – Variants of MRA: Splines and wavelet packets.       6         Opadic MRA Theorem – Inverse DWT computation – Bi-orthogonal and orthogonal filter banks – Construction of orthogonal filter banks – Construction of orthogonal filter banks – Variants of MRA: Splines and wavelet packets.       6         Configuration of multi-level wavelet transform       6         Configuration of multi-level wavelet transforms for 1D and 2D signals.       6         Detection of R-Peaks in ECG signal using Wavelet Transform.       6         Detosing the user given images using Wavelet transform       6		B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit	
Unit - I         Wavelet Fundamentals:         6           Vector spaces – Relationship between functions, Sequences, Vectors – Properties – Fourier transform and Non-stationary signals Limitations – Review of sampling theorem.         6           Analysis of Haar wavelet in function of scale and time – Haar multirate solution Analysis: Analysis part and Synthesis part – Frequency domain analysis of Haar filter bank         6           Unit - II         Haar Wavelet:         6           Continuous Wavelet Transform:         6           The uncertainty principle – Time-bandwidth product – Time-Frequency tiling – STFT and wavelets – CWT-Comparison of STFT a CWT-Interpretation of spectrogram plot.         6           Unit - IV         Discrete Wavelet Transform:         6           Oyadic MRA Theorem – Inverse DWT computation – Bi-orthogonal and orthogonal filter banks – Construction of orthogonal filter banks - Variants of MRA': Splines and wavelet packets.         6           Compression – Denoising – Analysis of biomedical signals and images using wavelets         6           LIST OF EXPERIMENTS / EXERCISES:         1         Implementation of multi-level wavelet transform for 1D and 2D signals.           1.         Denoising Bi-orthogonal and orthogonal filter banks using wavelet Transform.         6           2.         Configuration of multi-level wavelet transform for 1D and 2D signals.         6           3.         Designing Bi-orthogonal and orthogonal filter banks using wavelet Transform.         6	Prerequisite	s Linear Algebra and Transforms	7	PE	2	0	2	3	
Unit - I         Wavelet Fundamentals:         6           Vector spaces – Relationship between functions, Sequences, Vectors – Properties – Fourier transform and Non-stationary signals Limitations – Review of sampling theorem.         6           Analysis of Haar wavelet in function of scale and time – Haar multirate solution Analysis: Analysis part and Synthesis part – Frequency domain analysis of Haar filter bank         6           Unit - II         Continuous Wavelet Transform:         6           The uncertainty principle – Time-bandwidth product – Time-Frequency tiling – STFT and wavelets – CWT-Comparison of STFT a CWT-Interpretation of spectrogram plot.         6           Unit - IV         Discrete Wavelet Transform:         6           Oyadic MRA Theorem – Inverse DWT computation – Bi-orthogonal and orthogonal filter banks – Construction of orthogonal filter banks – Variants of MRA': Splines and wavelet packets.         6           Optications:         6           Compression – Denoising – Analysis of biomedical signals and images using wavelets         6           LIST OF EXPERIMENTS / EXERCISES:         1           1         Implementation of multi-level wavelet transforms for 1D and 2D signals.           2         Configuration of multi-level wavelet transform for 1D and 2D signals.           3         Designing Bi-orthogonal and indiges using Wavelet Transform.           4         Implementation of empirical wavelet signal denosing toobox.           5 <td< td=""><td>Preamble</td><td>To apply the various Wavelet Transform techniques on real</td><td>time signals</td><td>and images.</td><td></td><td></td><td></td><td></td></td<>	Preamble	To apply the various Wavelet Transform techniques on real	time signals	and images.					
Vector spaces – Relationship between functions, Sequences, Vectors – Properties – Fourier transform and Non-stationary signals Limitations – Review of sampling theorem.       6         Unit – II       Haar Wavelet:       6         Analysis of Haar wavelet in function of scale and time – Haar multirate solution Analysis: Analysis part and Synthesis part – Frequency domain analysis of Haar filter bank       6         Unit – III       Continuous Wavelet Transform:       6         Frequency domain analysis of Haar filter bank       6         Unit – IV       Discrete Wavelet Transform:       6         Oyadio MRA Theorem – Inverse DWT computation – Bi-orthogonal and orthogonal filter banks – Construction of orthogonal filter banks – Variants of MRA: Splines and wavelet packets.       6         Unit – V       Applications:       6         Comfiguration of signals in continuous and discrete wavelet transform domains.       6         Configuration of multi-level wavelet transforms for 1D and 2D signals.       6         Designing Bi-orthogonal and orthogonal filter banks using wavelet Transform.       6         Implementation of Regrads and orthogonal filter banks using wavelets       6         Configuration of multi-level wavelet transforms for 1D and 2D signals.       6         Designing Bi-orthogonal and orthogonal filter banks using wavelet Signal using Wavelet Transform.       6         Detection of R-Peaks in ECG signal using Wavelet Transform.       6				and imageo.				6	
Limitations – Review of sampling theorem.			ution Esseri		-1			-	
Analysis of Haar wavelet in function of scale and time – Haar multirate solution Analysis: Analysis part and Synthesis part –         Frequency domain analysis of Haar filter bank         Unit - III       Continuous Wavelet Transform:       6         The uncertainty principle – Time-bandwidth product – Time-Frequency tiling – STFT and wavelets – CWT-Comparison of STFT a       6         Dyadic MRA Theorem – Inverse DVT computation – Bi-orthogonal and orthogonal filter banks – Construction of orthogonal filter banks – Variants of MRA: Splines and wavelet packets.       6         Unit - V       Applications:       6         Compression – Denoising – Analysis of biomedical signals and images using wavelets       6         Compression – Denoising – Analysis of biomedical signals and images using wavelets       6         LIST OF EXPERIMENTS / EXERCISES:       6         1.       Implementation of signals in continuous and discrete wavelet transform domains.       2         2.       Configuration of multi-level wavelet transforms for 1D and 2D signals.       6         3.       Designing Bi-orthogonal and orthogonal filter banks using wavelet Transform.       6         4.       Implementation of empirical wavelet transforms for 1D and 2D signals.       6         5.       Detection of R-Paeks in ECG signal wing Wavelet Transform.       6         6.       Denoising the user given images using DWT with different decomposition levels.       7			erties – Fourie	er transform an	a nor	i-stati	ionary	signais -	
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	3 Vikr	am M Gadre and Aditya S Abhyankar, "Multiresolution and Mult					Educa	tion, 1 st	

	SEWARE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	interpret the fundamentals of vectors spaces and properties	Understanding (K2), Precision (S3)
CO2	apply haar wavelet and daubechies wavelet on discrete samples	Applying (K3) , Precision (S3)
CO3	utilize continuous wavelet transform for the interpretation of spectrum plots.	Applying (K3), Precision (S3)
CO4	experiment with discrete wavelet transform of orthogonal filter banks.	Applying (K3), Precision (S3)
CO5	demonstrate the application of different wavelet on biomedical signals and images.	Understanding (K2), Precision (S3)

	Mapping of Cos with Pos and PSOs														
CosKPos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	2	2			3				3	3					
CO2	3	2	2	2	3				3	3			2		
CO3	3	2	2	2	3				3	3			2		
CO4	3	2	2	2	3				3	3			2		
CO5	2	1			3				3	3			3		
1 – Slight, 2 -	- Moder	ate, 3 – 8	Substantia	I, BT- E	Bloom's ⊺	Faxonon	ny								
					ASSESS	MENT	PATTER	RN – T	HEORY						
Test / Blo Catego		Rer	nemberin (K1) %	ig U	ndersta (K2)		Apply (K3)	•	Analyzing (K4) %		uating 5) %		ating 6) %	Total %	
CAT	1		20		70		10		-		-		-	100	
CAT	2		10		80		10		-		-		-	100	
CAT	3		10		80		10		-		-		-	100	
ESE			10		80		10		-		-		-	100	
* ±3% may be	e varied	(CAT 1,2	2,3– 50 m	arks & I	ESE – 10	00 mark	s)	•							



	o						
Programme Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisite	es Nil	7	PE	2	0	2	3
Preamble	To understand and utilize the intelligent algorithms which can	perform/mimic t	he task of hum	nan vi	sual p	erce	ption.
Unit – I	Image Formation:						6
•	ation – Geometric primitives and transformations-2D-transformat	ions-3D transfo	ormations-Phot	ometr	ric im	age f	formatior
Lighting-Refi	lectance and shading-Sampling and aliasing-Color						
Unit – II	Feature Detection:						6
	atches-Feature detectors-Feature descriptors-Feature matching-Ed essive approximation	lges and contou	Irs-Contour tra	cking-	Lines	s and	vanishir
Unit – III	Segmentation:						6
	ours: Snakes – Dynamic Snakes – Level Sets –Split and merge: Wat		n splitting-Reg	ion m	ergin	g-Gra	aph-base
segmentation	n-Mean shift and mode finding-K-means and mixtures of Gaussians Object Classification:	5					6
Support Vec	tor Machines – Linear classification – Separable case – Multi class cl	assification: Mu	Iticlass classifi	cation	prob	lem-	Multiclas
SVMs- Multio	class boosting algorithms Recognition:						c
	tion- Face recognition- Instance recognition- Category recognition-	Recognition da	tabases and te	st set	s		6
-		Ū.					
	Conversion of Color image into graysacle image and display R,G, B Display of colour Image and perform shifting, rotations and scaling u		olor image				
2. [ 3. E 4. [ 5. ]	Display of colour Image and perform shifting, rotations and scaling u Extracting grayscale pixel value and edges of the image using pytho mage segmentation using contour detection using python mage segmentation using k means algorithm	using python	olor image				
2. [ 3. ] 4. ] 5. ] 6. §	Display of colour Image and perform shifting, rotations and scaling u Extracting grayscale pixel value and edges of the image using pytho mage segmentation using contour detection using python	using python	olor image				
2. [ 3. E 4. [ 5. ] 6. S 7. E	Display of colour Image and perform shifting, rotations and scaling u Extracting grayscale pixel value and edges of the image using pytho mage segmentation using contour detection using python mage segmentation using k means algorithm Simulate neural network back-propagation using python	using python	olor image				
2. [ 3. E 4. [ 5. ] 6. S 7. E	Display of colour Image and perform shifting, rotations and scaling u Extracting grayscale pixel value and edges of the image using pytho mage segmentation using contour detection using python mage segmentation using k means algorithm Simulate neural network back-propagation using python Build a CNN model to perform face recognition using Keras	using python	olor image	30 Pr	actic	al :30	) Total:6
2. [ 3. ] 4. ] 5. ] 6. § 7. ] 8. ]	Display of colour Image and perform shifting, rotations and scaling u Extracting grayscale pixel value and edges of the image using python mage segmentation using contour detection using python mage segmentation using k means algorithm Simulate neural network back-propagation using python Build a CNN model to perform face recognition using Keras MiniProject	using python		30 Pr	actic	al :30	) Total:6
2. [ 3. E 4. [ 5. [ 6. [ 7. [ 8. [] 8. []	Display of colour Image and perform shifting, rotations and scaling u Extracting grayscale pixel value and edges of the image using python mage segmentation using contour detection using python mage segmentation using k means algorithm Simulate neural network back-propagation using python Build a CNN model to perform face recognition using Keras MiniProject	using python	Lecture:		actic	al :30	) Total:6
2. [ 3. [ 4. 1] 5. 1 6. 5 7. E 8. N TEXT BOOK	Display of colour Image and perform shifting, rotations and scaling using python Extracting grayscale pixel value and edges of the image using python mage segmentation using contour detection using python mage segmentation using k means algorithm Simulate neural network back-propagation using python Build a CNN model to perform face recognition using Keras MiniProject C: hard Szeliski, "Computer Vision: Algorithms and Applications", 2 nd E	using python	Lecture:		actic	al :30	) Total:6
2. [ 3. E 4. 1 5. 1 6. S 7. E 8. M TEXT BOOK 1. Ric REFERENC 1. M M	Display of colour Image and perform shifting, rotations and scaling u Extracting grayscale pixel value and edges of the image using python mage segmentation using contour detection using python mage segmentation using k means algorithm Simulate neural network back-propagation using python Build a CNN model to perform face recognition using Keras MiniProject C: hard Szeliski, "Computer Vision: Algorithms and Applications", 2 nd E ES: Mohri, A Rostamizadeh& A Talwalkar, "Foundations of Machine Lea	using python on Edition, Springe	Lecture: r, NewYork, 20	)11.			) Total:6
2. [ 3. [ 4. 1] 5. 1] 6. 5 7. [ 8. [] TEXT BOOK 1. [] REFERENC 1. [] 2. [] Sta	Display of colour Image and perform shifting, rotations and scaling u Extracting grayscale pixel value and edges of the image using python mage segmentation using contour detection using python mage segmentation using k means algorithm Simulate neural network back-propagation using python Build a CNN model to perform face recognition using Keras MiniProject K: hard Szeliski, "Computer Vision: Algorithms and Applications", 2 nd E ES:	using python on Edition, Springe	Lecture: r, NewYork, 20	)11.			) Total:6

	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	apply the various spatial transformations on the image	Applying (K3) , Precision (S3)
CO2	make use of various feature detector and matching techniques	Applying (K3) , Precision (S3)
CO3	make use of various established segmentation algorithms for a specific task	Applying (K3) , Precision (S3)
CO4	apply linear classification algorithms for image classification and recognition	Applying (K3) , Precision (S3)
CO5	model artificial neural networks and deep convolutional neural networks for face recognition	Applying (K3) , Precision (S3)

	Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2				2			2	3	2
CO2	3	2	2	2	2							2	3	2
CO3	3	2	2	2	3							2	3	2
CO4	3	2	2	2	3				2			2	3	2
CO5	3	2	2	2	3				2			2	3	2
4 Olianh+ 0	Mada	rata 0	Cubatant											

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

		ASSESSMENT	PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	10	60	30	-	-	-	100
CAT2	10	50	40	-	-	-	100
CAT3	15	55	30	-	-	-	100
ESE	10	60	30	-	-	-	100



	22ECE11- EDGE COMPUT	ING					
Programme &Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	NIL	7	PE	3	0	0	3
Preamble	ThIS course provides information on the different types of ed compute services (such as CDN Edge, IOT Edge, and Multi-			diffe	rent	types	of edge
Jnit – I	IoT and Edge Computing:						9
	-loT potential-Definition of the IoT-Example use case and depledge Hardware Architectures-Operating Systems-Edge platforms					urpose	e and definition
Jnit – II	Edge routing and Networking and Edge to cloud protocols						9
	inctions at the edge-Edge-level Network security-Software defin	ned network	ing. Protocols	-MQ	TT-N	IQTT-	SN-Constrain
	ol-Other protocols-Protocol summary and comparison						
Init – III	Cloud and Fog Topologies					l. : 4 4	9
	odel-Public, private, and hybrid cloud-The open stack cloud an	chitecture-C	constraints of	clouc	a arc	nitecti	ures for IOI-F
omputing <b>Jnit – IV</b>	Data Analytics and Machine Learning in the cloud and Edg	le:					9
	in IoT-Machine Learning in IoT-IoT data Analytics and machine		mparison and	asse	ssm	ent.	•
Jnit – V	Io I and Edge Security						9
<b>Jnit – V</b> Cybersecurity ver	loT and Edge Security nacular-Anatomy of IoT cyber attacks-Physical and hardware	e security-S	hell security-	Crypt	ogra	phy-S	
Cybersecurity ver							•
Cybersecurity ver	nacular-Anatomy of IoT cyber attacks-Physical and hardware						•
Cybersecurity ver	nacular-Anatomy of IoT cyber attacks-Physical and hardware						oftware-Defir
Cybersecurity ver Perimeter-Block c TEXT BOOK:	nacular-Anatomy of IoT cyber attacks-Physical and hardware	ntervention-	oT Security b				oftware-Defir
Cybersecurity ver Perimeter-Block c TEXT BOOK:	nacular-Anatomy of IoT cyber attacks-Physical and hardware hain and crypto currencies in IoT-Government regulations and li	ntervention-	oT Security b				oftware-Defir
Cybersecurity ver         Verimeter-Block c         TEXT BOOK:         1.         Perry Le         REFERENCES:	nacular-Anatomy of IoT cyber attacks-Physical and hardware hain and crypto currencies in IoT-Government regulations and li	ntervention-	oT Security b	est p	ractio		oftware-Defir Total:4
Cybersecurity ver       Verimeter-Block c       TEXT BOOK:       1.       Perry Le       REFERENCES:       1.       Rajkumar	nacular-Anatomy of IoT cyber attacks-Physical and hardware hain and crypto currencies in IoT-Government regulations and In ea , " IoT and Edge Computing for Architects ", 2nd Edition, Pack	ntervention-	, 2020. d Paradigms	est p	ey pu	iblicat	oftware-Defir Total: ion, 2019.

		-	ne studer	nts will	be able	to										
Descr	ibe the co	oncept of o	edge com	puting								Understa	nding (K	2)		
Descr	ibe the ar	chitecture	e and its ir	npleme	ntation in	n variou	s case st	udies				Unders	tanding (I	K2)		
Exper	iment with	n Raspbe	erry pi for	implem	entation	of edg	e comput	ing				Apply	ing(K3)			
Choos	se the inte	erfacing P	rotocols f	or impro	oved perf	orman	ce of edg	e compu	ting		Applying(K3)					
Implei	ment the e	edge com			Apply	ing(K3)										
				Μ	apping	of COs	with PO	s and P	SOs							
POs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
D1	3	2	2													
)2	3	2	2													
)3	3	2	2		2											
04	3	2	2		2			2	2							
D5	3	2	2		2			2	2							
			1 – Slig	ht, 2 – I	Moderate	e, 3 – S	Substanti	al, BT- E	loom's	Taxonomy	/					
				Α	SSESSI		PATTERI	N - THEC	RY							
														otal %		
CAT	1		9		70		10	-		-		-		100		
CAT	2	2	20		50		30	-		-		-		100		
CAT	3	2	20		50		30	-		-		-		100		
ESE		2	5		45		30	-		-		-		100		
	mpletio Descr Descr Exper Choos Implet POs 01 02 03 04 05 05 04 05 05 04 05 05 04 05 05	mpletion of the or         Describe the cc         Describe the ar         Experiment with         Choose the interview         Implement the or         01         02         03         04         305         304         305         304         305         304         CAT 1         CAT2         CAT3	Describe the concept of a Describe the architectureExperiment with RaspbeChoose the interfacing PImplement the edge comPOSPO1PO23201320232033203320432053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053205320532053	mpletion of the course, the studenDescribe the concept of edge comDescribe the architecture and its inExperiment with Raspberry pi forChoose the interfacing Protocols fImplement the edge computing inPOSPO1PO2PO30132202322033220432205322I – Sligt / Bloom's category*Remembering (K1) %CAT220CAT220CAT320	mpletion of the course, the students willDescribe the concept of edge computingDescribe the architecture and its implementExperiment with Raspberry pi for implementChoose the interfacing Protocols for improvingImplement the edge computing in InternetMPOSPO1PO232O232O2O332O2O3O2O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3O3 <td cols<="" td=""><td>mpletion of the course, the students will be ableDescribe the concept of edge computingDescribe the architecture and its implementation inExperiment with Raspberry pi for implementationChoose the interfacing Protocols for improved perfImplement the edge computing in Internet of thingsMappingPOsPO1PO2PO3PO4PO5013222023222033222043222053222L Slight, 2 – ModeratASSESSIt / Bloom'sRemembering (K1) %Understandin (K2) %cAT 11970cAT22050</td><td>mpletion of the course, the students will be able toDescribe the concept of edge computingDescribe the architecture and its implementation in variouExperiment with Raspberry pi for implementation of edgeChoose the interfacing Protocols for improved performanceImplement the edge computing in Internet of thingsMapping of COsPO1PO2PO3PO4PO5PO6D132222D232222D332222D432222D532222ASSESSMENT Rt / Bloom's category*Remembering (K1) %Understanding (K2) %A CCAT 11970250CAT3205066</td><td>mpletion of the course, the students will be able to         Describe the concept of edge computing         Describe the architecture and its implementation in various case st         Experiment with Raspberry pi for implementation of edge comput         Choose the interfacing Protocols for improved performance of edge         Implement the edge computing in Internet of things         Mapping of COs with PO         POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7         01       3       2       2      </td><td>mpletion of the course, the students will be able to         Describe the concept of edge computing         Describe the architecture and its implementation in various case studies         Experiment with Raspberry pi for implementation of edge computing         Choose the interfacing Protocols for improved performance of edge computing         Implement the edge computing in Internet of things         Mapping of COs with POs and PS         POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8         PO3       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2</td><td>mpletion of the course, the students will be able toDescribe the concept of edge computingDescribe the architecture and its implementation in various case studiesExperiment with Raspberry pi for implementation of edge computingChoose the interfacing Protocols for improved performance of edge computingImplement the edge computing in Internet of thingsPOsPO1PO2PO3PO4PO5PO6PO7PO8PO9013222222222222OPSPO6PO7PO8PO9013222222222222OPSPO6PO7PO8PO901322222222222OPSPO6PO7PO8PO901322222220222</td><td>mpletion of the course, the students will be able to           Describe the concept of edge computing           Describe the architecture and its implementation in various case studies           Experiment with Raspberry pi for implementation of edge computing           Choose the interfacing Protocols for improved performance of edge computing           Implement the edge computing in Internet of things           Mapping of COs with POs and PSOs           POs         PO1         PO2         PO3         PO6         PO7         PO8         PO9         PO10           1         3         2         2           PO1         PO2         PO6         PO7         PO8         PO10           1         3         2         2           PO6         PO7         PO8         PO10           1         9         PO10           1         2         2           2         2         2         <th col<="" td=""><td>mpletion of the course, the students will be able to           Describe the concept of edge computing           Describe the architecture and its implementation in various case studies           Experiment with Raspberry pi for implementation of edge computing           Choose the interfacing Protocols for improved performance of edge computing           Implement the edge computing in Internet of things           Mapping of COs with POs and PSOs           PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           3         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2</td><td>(Highest definition of the course, the students will be able to       (Highest definition of the course, the students will be able to         Describe the concept of edge computing       Understate         Describe the architecture and its implementation of edge computing       Understate         Describe the architecture and its implementation of edge computing       Apply         Experiment with Raspberry pi for implementation of edge computing       Apply         Choose the interfacing Protocols for improved performance of edge computing       Apply         Implement the edge computing in Internet of things       Apply         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO2         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO12         Of 2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2</td><td>Highest Level)         Highest Level)         Describe the concept of edge computing       Understanding (K2)         Describe the architecture and its implementation in various case studies       Understanding (K2)         Experiment with Raspberry pi for implementation of edge computing       Applying(K3)         Choose the interfacing Protocols for improved performance of edge computing       Applying(K3)         Implement the edge computing in Internet of things       POs       PO1       PO1</td></th></td></td>	<td>mpletion of the course, the students will be ableDescribe the concept of edge computingDescribe the architecture and its implementation inExperiment with Raspberry pi for implementationChoose the interfacing Protocols for improved perfImplement the edge computing in Internet of thingsMappingPOsPO1PO2PO3PO4PO5013222023222033222043222053222L Slight, 2 – ModeratASSESSIt / Bloom'sRemembering (K1) %Understandin (K2) %cAT 11970cAT22050</td> <td>mpletion of the course, the students will be able toDescribe the concept of edge computingDescribe the architecture and its implementation in variouExperiment with Raspberry pi for implementation of edgeChoose the interfacing Protocols for improved performanceImplement the edge computing in Internet of thingsMapping of COsPO1PO2PO3PO4PO5PO6D132222D232222D332222D432222D532222ASSESSMENT Rt / Bloom's category*Remembering (K1) %Understanding (K2) %A CCAT 11970250CAT3205066</td> <td>mpletion of the course, the students will be able to         Describe the concept of edge computing         Describe the architecture and its implementation in various case st         Experiment with Raspberry pi for implementation of edge comput         Choose the interfacing Protocols for improved performance of edge         Implement the edge computing in Internet of things         Mapping of COs with PO         POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7         01       3       2       2      </td> <td>mpletion of the course, the students will be able to         Describe the concept of edge computing         Describe the architecture and its implementation in various case studies         Experiment with Raspberry pi for implementation of edge computing         Choose the interfacing Protocols for improved performance of edge computing         Implement the edge computing in Internet of things         Mapping of COs with POs and PS         POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8         PO3       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2</td> <td>mpletion of the course, the students will be able toDescribe the concept of edge computingDescribe the architecture and its implementation in various case studiesExperiment with Raspberry pi for implementation of edge computingChoose the interfacing Protocols for improved performance of edge computingImplement the edge computing in Internet of thingsPOsPO1PO2PO3PO4PO5PO6PO7PO8PO9013222222222222OPSPO6PO7PO8PO9013222222222222OPSPO6PO7PO8PO901322222222222OPSPO6PO7PO8PO901322222220222</td> <td>mpletion of the course, the students will be able to           Describe the concept of edge computing           Describe the architecture and its implementation in various case studies           Experiment with Raspberry pi for implementation of edge computing           Choose the interfacing Protocols for improved performance of edge computing           Implement the edge computing in Internet of things           Mapping of COs with POs and PSOs           POs         PO1         PO2         PO3         PO6         PO7         PO8         PO9         PO10           1         3         2         2           PO1         PO2         PO6         PO7         PO8         PO10           1         3         2         2           PO6         PO7         PO8         PO10           1         9         PO10           1         2         2           2         2         2         <th col<="" td=""><td>mpletion of the course, the students will be able to           Describe the concept of edge computing           Describe the architecture and its implementation in various case studies           Experiment with Raspberry pi for implementation of edge computing           Choose the interfacing Protocols for improved performance of edge computing           Implement the edge computing in Internet of things           Mapping of COs with POs and PSOs           PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           3         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2</td><td>(Highest definition of the course, the students will be able to       (Highest definition of the course, the students will be able to         Describe the concept of edge computing       Understate         Describe the architecture and its implementation of edge computing       Understate         Describe the architecture and its implementation of edge computing       Apply         Experiment with Raspberry pi for implementation of edge computing       Apply         Choose the interfacing Protocols for improved performance of edge computing       Apply         Implement the edge computing in Internet of things       Apply         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO2         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO12         Of 2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2</td><td>Highest Level)         Highest Level)         Describe the concept of edge computing       Understanding (K2)         Describe the architecture and its implementation in various case studies       Understanding (K2)         Experiment with Raspberry pi for implementation of edge computing       Applying(K3)         Choose the interfacing Protocols for improved performance of edge computing       Applying(K3)         Implement the edge computing in Internet of things       POs       PO1       PO1</td></th></td>	mpletion of the course, the students will be ableDescribe the concept of edge computingDescribe the architecture and its implementation inExperiment with Raspberry pi for implementationChoose the interfacing Protocols for improved perfImplement the edge computing in Internet of thingsMappingPOsPO1PO2PO3PO4PO5013222023222033222043222053222L Slight, 2 – ModeratASSESSIt / Bloom'sRemembering (K1) %Understandin (K2) %cAT 11970cAT22050	mpletion of the course, the students will be able toDescribe the concept of edge computingDescribe the architecture and its implementation in variouExperiment with Raspberry pi for implementation of edgeChoose the interfacing Protocols for improved performanceImplement the edge computing in Internet of thingsMapping of COsPO1PO2PO3PO4PO5PO6D132222D232222D332222D432222D532222ASSESSMENT Rt / Bloom's category*Remembering (K1) %Understanding (K2) %A CCAT 11970250CAT3205066	mpletion of the course, the students will be able to         Describe the concept of edge computing         Describe the architecture and its implementation in various case st         Experiment with Raspberry pi for implementation of edge comput         Choose the interfacing Protocols for improved performance of edge         Implement the edge computing in Internet of things         Mapping of COs with PO         POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7         01       3       2       2	mpletion of the course, the students will be able to         Describe the concept of edge computing         Describe the architecture and its implementation in various case studies         Experiment with Raspberry pi for implementation of edge computing         Choose the interfacing Protocols for improved performance of edge computing         Implement the edge computing in Internet of things         Mapping of COs with POs and PS         POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8         PO3       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2	mpletion of the course, the students will be able toDescribe the concept of edge computingDescribe the architecture and its implementation in various case studiesExperiment with Raspberry pi for implementation of edge computingChoose the interfacing Protocols for improved performance of edge computingImplement the edge computing in Internet of thingsPOsPO1PO2PO3PO4PO5PO6PO7PO8PO9013222222222222OPSPO6PO7PO8PO9013222222222222OPSPO6PO7PO8PO901322222222222OPSPO6PO7PO8PO901322222220222	mpletion of the course, the students will be able to           Describe the concept of edge computing           Describe the architecture and its implementation in various case studies           Experiment with Raspberry pi for implementation of edge computing           Choose the interfacing Protocols for improved performance of edge computing           Implement the edge computing in Internet of things           Mapping of COs with POs and PSOs           POs         PO1         PO2         PO3         PO6         PO7         PO8         PO9         PO10           1         3         2         2           PO1         PO2         PO6         PO7         PO8         PO10           1         3         2         2           PO6         PO7         PO8         PO10           1         9         PO10           1         2         2           2         2         2 <th col<="" td=""><td>mpletion of the course, the students will be able to           Describe the concept of edge computing           Describe the architecture and its implementation in various case studies           Experiment with Raspberry pi for implementation of edge computing           Choose the interfacing Protocols for improved performance of edge computing           Implement the edge computing in Internet of things           Mapping of COs with POs and PSOs           PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           3         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2</td><td>(Highest definition of the course, the students will be able to       (Highest definition of the course, the students will be able to         Describe the concept of edge computing       Understate         Describe the architecture and its implementation of edge computing       Understate         Describe the architecture and its implementation of edge computing       Apply         Experiment with Raspberry pi for implementation of edge computing       Apply         Choose the interfacing Protocols for improved performance of edge computing       Apply         Implement the edge computing in Internet of things       Apply         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO2         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO12         Of 2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2</td><td>Highest Level)         Highest Level)         Describe the concept of edge computing       Understanding (K2)         Describe the architecture and its implementation in various case studies       Understanding (K2)         Experiment with Raspberry pi for implementation of edge computing       Applying(K3)         Choose the interfacing Protocols for improved performance of edge computing       Applying(K3)         Implement the edge computing in Internet of things       POs       PO1       PO1</td></th>	<td>mpletion of the course, the students will be able to           Describe the concept of edge computing           Describe the architecture and its implementation in various case studies           Experiment with Raspberry pi for implementation of edge computing           Choose the interfacing Protocols for improved performance of edge computing           Implement the edge computing in Internet of things           Mapping of COs with POs and PSOs           PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           3         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2</td> <td>(Highest definition of the course, the students will be able to       (Highest definition of the course, the students will be able to         Describe the concept of edge computing       Understate         Describe the architecture and its implementation of edge computing       Understate         Describe the architecture and its implementation of edge computing       Apply         Experiment with Raspberry pi for implementation of edge computing       Apply         Choose the interfacing Protocols for improved performance of edge computing       Apply         Implement the edge computing in Internet of things       Apply         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO2         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO12         Of 2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2</td> <td>Highest Level)         Highest Level)         Describe the concept of edge computing       Understanding (K2)         Describe the architecture and its implementation in various case studies       Understanding (K2)         Experiment with Raspberry pi for implementation of edge computing       Applying(K3)         Choose the interfacing Protocols for improved performance of edge computing       Applying(K3)         Implement the edge computing in Internet of things       POs       PO1       PO1</td>	mpletion of the course, the students will be able to           Describe the concept of edge computing           Describe the architecture and its implementation in various case studies           Experiment with Raspberry pi for implementation of edge computing           Choose the interfacing Protocols for improved performance of edge computing           Implement the edge computing in Internet of things           Mapping of COs with POs and PSOs           PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           3         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2	(Highest definition of the course, the students will be able to       (Highest definition of the course, the students will be able to         Describe the concept of edge computing       Understate         Describe the architecture and its implementation of edge computing       Understate         Describe the architecture and its implementation of edge computing       Apply         Experiment with Raspberry pi for implementation of edge computing       Apply         Choose the interfacing Protocols for improved performance of edge computing       Apply         Implement the edge computing in Internet of things       Apply         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO2         PO5       PO6       PO7       PO8       PO9       PO10       PO1       PO12         Of 2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2	Highest Level)         Highest Level)         Describe the concept of edge computing       Understanding (K2)         Describe the architecture and its implementation in various case studies       Understanding (K2)         Experiment with Raspberry pi for implementation of edge computing       Applying(K3)         Choose the interfacing Protocols for improved performance of edge computing       Applying(K3)         Implement the edge computing in Internet of things       POs       PO1       PO1

Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Analog and Digital Communication	7	PE	3	0	0	3
•							
Preamble	To understand the basic terminologies related to satellites, v and applications of a satellite.	/arious sub	systems, mu	ltiple	acce	ss te	chniques
Unit– I	Overview of Satellite Systems:						9
elements–Apog orbits–Calendar topocentric hor	equency allocations for satellite services–Kepler's law–Definit ee and Perigee heights–Orbital perturbations–Effects of a s–The Orbital plane–The Geocentric equatorial coordinate sys- izon coordinate system-The subsatellite point.	non spher	ical earth-A	tmos	pher	ic dra	ag–Incline frame–Th
Unit– II	Geostationary Orbit and Space Segment:						9
	ngles – Limits of visibility - Earth eclipse of satellite – Sun trans - telemetry, tracking and command sub system - Transponder f						
11.14 111							
	Earth Segment & Space Link:						9
Earth Segment:	Earth Segment & Space Link: Introduction–Receive only home TV systems –Outdoor unit-						/ system-
CATV system-	Earth Segment & Space Link:	ropic radia					/ system-
Earth Segment: CATV system- power budget er Unit- IV	Earth Segment & Space Link: Introduction–Receive only home TV systems –Outdoor unit Transmit receive earth stations - Space link: Equivalent isot quation–Carrier to noise ratio–Uplink C/N–Downlink C/N–Effer Satellite Access:	ropic radia cts of rain	ited power-T	rans	miss	ion Ic	/ system- osses-Linl
Earth Segment: CATV system- power budget er Unit- IV Single access - Postamble- Carr	Earth Segment & Space Link: Introduction–Receive only home TV systems –Outdoor unit- Transmit receive earth stations - Space link: Equivalent isot quation–Carrier to noise ratio–Uplink C/N–Downlink C/N–Effer	ropic radia cts of rain ystem TDM affic data-	Ited power-T MA: Reference Frame efficier	rans e bu	miss urst -	ion Ic	/ system- osses-Lin <b>9</b> amble and
Earth Segment: CATV system- power budget er Unit- IV Single access - Postamble- Carr	Earth Segment & Space Link:           Introduction-Receive only home TV systems -Outdoor unit- Fransmit receive earth stations - Space link: Equivalent isot quation-Carrier to noise ratio-Uplink C/N-Downlink C/N-Effect Satellite Access:           Preassigned FDMA- Demand assigned FDMA- SPADE spiter recovery- Network synchronization-Unique word detection-Tr	ropic radia cts of rain ystem TDM affic data-	Ited power-T MA: Reference Frame efficier	rans e bu	miss urst -	ion Ic	/ system- osses-Linl 9 amble and
Earth Segment: CATV system— power budget en Unit— IV Single access - Postamble- Carr Preassigned TDI Unit— V INMARSAT:VS/	Earth Segment & Space Link:           Introduction-Receive only home TV systems -Outdoor unit- Transmit receive earth stations - Space link: Equivalent isot quation-Carrier to noise ratio-Uplink C/N-Downlink C/N-Effect           Satellite Access:           - Preassigned FDMA- Demand assigned FDMA- SPADE spiter recovery- Network synchronization-Unique word detection-Tr MA- Demand assigned TDMA- Code division multiple access-Spiter	ropic radia cts of rain ystem TDN affic data- ace divisio	Ated power-T MA: Reference Frame efficier n multiple acc	rans e bu ncy a ess.	miss urst - Ind cl	Prea	/ system- bsses-Lini 9 amble and capacity 9
Earth Segment: CATV system- power budget en Unit- IV Single access - Postamble- Carr Preassigned TDI Unit- V INMARSAT:VS/	Earth Segment & Space Link:         Introduction-Receive only home TV systems -Outdoor unit- Transmit receive earth stations - Space link: Equivalent isot quation-Carrier to noise ratio-Uplink C/N-Downlink C/N-Effect         Satellite Access:         Preassigned FDMA- Demand assigned FDMA- SPADE system         WA- Demand assigned TDMA- Code division multiple access-Sp         Satellite systems:         AT Systems: Network architectures, Access control, Multiple	ropic radia cts of rain ystem TDN affic data- ace divisio	Ated power-T MA: Reference Frame efficier n multiple acc	rans e bu ncy a ess.	miss urst - Ind cl	Prea	/ system- bsses-Lin amble an el capacity 9 arsat an
Earth Segment: CATV system— power budget en Unit— IV Single access — Postamble- Carr Preassigned TDI Unit— V INMARSAT:VS/	Earth Segment & Space Link:         Introduction-Receive only home TV systems -Outdoor unit- Transmit receive earth stations - Space link: Equivalent isot quation-Carrier to noise ratio-Uplink C/N-Downlink C/N-Effect         Satellite Access:         Preassigned FDMA- Demand assigned FDMA- SPADE system         WA- Demand assigned TDMA- Code division multiple access-Sp         Satellite systems:         AT Systems: Network architectures, Access control, Multiple	ropic radia cts of rain ystem TDN affic data- ace divisio	Ated power-T MA: Reference Frame efficier n multiple acc	rans e bu ncy a ess.	miss urst - Ind cl	Prea	/ system- bsses-Lini 9 amble and capacity 9
Earth Segment: CATV system- power budget en Unit- IV Single access - Postamble- Carr Preassigned TDI Unit- V INMARSAT:VS/ GEOSAT-Study TEXTBOOK:	Earth Segment & Space Link:         Introduction-Receive only home TV systems -Outdoor unit- Transmit receive earth stations - Space link: Equivalent isot quation-Carrier to noise ratio-Uplink C/N-Downlink C/N-Effect         Satellite Access:         Preassigned FDMA- Demand assigned FDMA- SPADE system         WA- Demand assigned TDMA- Code division multiple access-Sp         Satellite systems:         AT Systems: Network architectures, Access control, Multiple	ropic radia cts of rain ystem TDN affic data- ace divisio access so	MA: Reference Frame efficier n multiple acco election - Ov	rans e bu ncy a ess.	miss urst - Ind cl	Prea	/ system- bsses-Lin amble an el capacity 9 arsat an
Earth Segment: CATV system- power budget en Unit- IV Single access - Postamble- Carr Preassigned TDI Unit- V INMARSAT:VS/ GEOSAT-Study TEXTBOOK:	Earth Segment & Space Link:         Introduction-Receive only home TV systems -Outdoor unit- Fransmit receive earth stations - Space link: Equivalent isot quation-Carrier to noise ratio-Uplink C/N-Downlink C/N-Effect         Satellite Access:         - Preassigned FDMA- Demand assigned FDMA- SPADE spiter recovery- Network synchronization-Unique word detection-Tr         MA- Demand assigned TDMA- Code division multiple access-Spiter Spiter Systems:         AT Systems: Network architectures, Access control, Multiple of recently launched GEOSAT and its applications.	ropic radia cts of rain ystem TDN affic data- ace divisio access so	MA: Reference Frame efficier n multiple acco election - Ov	rans e bu ncy a ess.	miss urst - Ind cl	Prea	y system- basses-Lini amble and capacity g arsat and
Earth Segment: CATV system— power budget en Unit— IV Single access - Postamble- Carr Preassigned TDI Unit— V INMARSAT:VS/ GEOSAT-Study TEXTBOOK: 1. Roddy E REFERENCES:	Earth Segment & Space Link:         Introduction-Receive only home TV systems -Outdoor unit- Fransmit receive earth stations - Space link: Equivalent isot quation-Carrier to noise ratio-Uplink C/N-Downlink C/N-Effect         Satellite Access:         - Preassigned FDMA- Demand assigned FDMA- SPADE spiter recovery- Network synchronization-Unique word detection-Tr         MA- Demand assigned TDMA- Code division multiple access-Spiter Spiter Systems:         AT Systems: Network architectures, Access control, Multiple of recently launched GEOSAT and its applications.	York, 2017	MA: Reference Frame efficier n multiple acc election - Ov	e bu ncy a ess.	miss urst - nnd cl	Preamanne	/ system bsses-Lin amble an capacity g arsat an

		JTCOM tion of t		se, the st	udent	s will be a	able to						(Н	BT Mapp lighest-lev	
CO1	inte	rpret the	e various	terminolo	gies ir	satellite	commur	nication	proble	ms			l	Jnderstan	ding(K2)
CO2	com	nprehen	d the wo	rking of va	arious	sub syste	ms of a	satellite						Applying	g(K3)
CO3				al stations		adcast the	e progra	mmes t	hrougł	n satellite	earth st	ations and		Applying	(K3)
CO4	illustrate the different types of satellite based on applications														ing(K2)
CO5	U4 illustrate the different types of establite based on applications														ing(K2)
						Мар	ping of	COs w	ith PC	s and P	SOs				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2											2	
CO	2	3	2	2	2								2	2	
CO	3	3	2		2								2	2	
CO	4	3	2		2		2		2				2	2	
CO	5	3	2	2	2		2		2				2	2	2
1–Slig	ht,2–N	Noderat	e,3–Sub	stantial, B	T-Bloc	m's Taxo	nomy								
						ASS	ESSME	NTPAT	TERN	-THEOF	RY				
	st / Ble Catege	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating K6) %	Total %
	CA	T 1		40		60		-		-		-		-	100
	CA	T 2		20		55		25	5	-		-		-	100
	CA	T 3		20		80		-		-		-		-	100
	ESE	Ξ		20		60		20	)	-		-		-	100
*±3% I	may b	e varied	I (CAT1,	2,3–50 ma	arks &	ESE-100	marks)								



Programme &Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Data Communication and Networking	7	PE	3	0	0	3
Preamble	To acquire broad overview on various wireless standards, to wireless systems.	echnologies	s and function	alitie	s of	FCP /	IP suite i
Unit– I	Wireless Local Area Network(WLAN):						9
	02.11 - Emerging IEEE802.11 Standards - Wireless LAN Topolo Packet structure and Packet types	ogies - Esta	blishing a wir	eles	s con	nectio	on -
Unit– II	WLAN QoS:						9
Channel access	- Admission control - Power management - QoS in Wireless mes	h networks					
Unit– III	WLAN MAC:						9
IFFE 802 11MA	C protocol - MAC enhancements for QoS support - Perforn	nanco und				00 44	
		nance unu	erstanding of	IEE	:E 8	JZ.11	e edca
IEEE802.11n sta			erstanding of		:E 8	JZ.11	9 EDCA
IEEE802.11n sta Unit– IV Introduction to 80	ndard.	1ac, Transr	nission: Modu				9
IEEE802.11n sta Unit– IV Introduction to 80 Guard interval - I	ndard. High Speed WLAN: )2.11ac, Core technology of 802.11 ac, Radio channels in 802.11	1ac, Transr	nission: Modu				9
IEEE802.11n sta Unit– IV Introduction to 80 Guard interval - F Unit– V Framing - Mediu	ndard. High Speed WLAN: 02.11ac, Core technology of 802.11 ac, Radio channels in 802.11 PHY-Level framing, Transmission and reception process, 802.11	1ac, Transr ac data rate	nission: Modu es.	latio	n, Cc	oding,	<b>9</b> and <b>9</b>
IEEE802.11n sta Unit– IV Introduction to 80 Guard interval - F Unit– V Framing - Mediu	ndard. High Speed WLAN: D2.11ac, Core technology of 802.11 ac, Radio channels in 802.11 PHY-Level framing, Transmission and reception process, 802.11 IEEE80211.ac (MAC): m access procedures - Beamforming basics - Single-User Beam	1ac, Transr ac data rate	nission: Modu es.	latio	n, Cc	oding,	<b>9</b> and <b>9</b>
IEEE802.11n sta Unit– IV Introduction to 80 Guard interval - F Unit– V Framing - Mediu an 802.11ac netv	ndard. High Speed WLAN: D2.11ac, Core technology of 802.11 ac, Radio channels in 802.11 PHY-Level framing, Transmission and reception process, 802.11 IEEE80211.ac (MAC): m access procedures - Beamforming basics - Single-User Beam	1ac, Transr ac data rate	nission: Modu es.	latio	n, Cc	oding,	9 and 9 - Building
IEEE802.11n sta Unit- IV Introduction to 80 Guard interval - F Unit- V Framing - Mediu an 802.11ac netw TEXTBOOKS: Benny B	ndard. High Speed WLAN: D2.11ac, Core technology of 802.11 ac, Radio channels in 802.11 PHY-Level framing, Transmission and reception process, 802.11 IEEE80211.ac (MAC): m access procedures - Beamforming basics - Single-User Beam	1ac, Transr ac data rate nforming, M	nission: Modu es. 1ulti-User(MU	latio ) Bea	n, Co amfoi	oding, rming	9 and 9 - Building Total:4
IEEE802.11n sta Unit– IV Introduction to 80 Guard interval - F Unit– V Framing - Mediu an 802.11ac netw TEXTBOOKS: 1. Benny B Universit	Indard.         High Speed WLAN:         D2.11ac, Core technology of 802.11 ac, Radio channels in 802.11         DHY-Level framing, Transmission and reception process, 802.11         IEEE80211.ac (MAC):         Imaccess procedures - Beamforming basics - Single-User Beamwork- 802.11ax overview         ing, "Emerging Technologies in Wireless LANs Theory, Design, a	1ac, Transr ac data rate nforming, M and Deploy	nission: Modu es. 1ulti-User(MU ment", 1 st Edi	latio ) Bea	n, Co amfoi	oding, rming	9 and 9 - Buildin Total:4
IEEE802.11n sta Unit– IV Introduction to 80 Guard interval - F Unit– V Framing - Mediu an 802.11ac netw TEXTBOOKS: 1. Benny B Universit 2. Matthew	Indard.         High Speed WLAN:         D2.11ac, Core technology of 802.11 ac, Radio channels in 802.11         PHY-Level framing, Transmission and reception process, 802.11         IEEE80211.ac (MAC):         Imaccess procedures - Beamforming basics - Single-User Beamwork- 802.11ax overview         ing, "Emerging Technologies in Wireless LANs Theory, Design, and y Press, 2008, for Units I, II, III.	1ac, Transr ac data rate nforming, M and Deploy	nission: Modu es. 1ulti-User(MU ment", 1 st Edi	latio ) Bea	n, Co amfoi	oding, rming	9 and 9 - Buildin Total:4
IEEE802.11n sta Unit- IV Introduction to 80 Guard interval - F Unit- V Framing - Mediu an 802.11ac netw TEXTBOOKS: 1. Benny B Universit 2. Matthew REFERENCES:	Indard.         High Speed WLAN:         D2.11ac, Core technology of 802.11 ac, Radio channels in 802.11         PHY-Level framing, Transmission and reception process, 802.11         IEEE80211.ac (MAC):         Imaccess procedures - Beamforming basics - Single-User Beamwork- 802.11ax overview         ing, "Emerging Technologies in Wireless LANs Theory, Design, and y Press, 2008, for Units I, II, III.	1ac, Transr ac data rate nforming, M and Deploy for Units IN	nission: Modu es. 1ulti-User(MU ment", 1 st Edi /, V.	latio ) Bea	n, Co amfoi	oding, rming	9 and 9 - Buildin Total:4

		JTCOM tion of t		se, the st	udents	will be a	able to							BT Mapı (Highest L	
CO1	outl	ine vario	ous wirel	ess stand	ards an	d techno	logies						ι	Inderstand	ling(K2)
CO2	com	prehen	d the fur	octionalitie	s of Qo	S in WLA	AN syste	ems					ι	Inderstand	ling(K2)
CO3	app	ly the M	AC laye	r techniqu	es to in	nprove W	'LAN thr	oughpu	t perfc	rmance				Applying	(K3)
CO4	com	prehen	d various	s high thro	ughput	wireless	technol	ogies					ι	Inderstand	ling(K2)
CO5	арр	ly differ	ent conc	epts in IE	EE 802	11.ac M/	AC layer	•						Applying	(K3)
						Марр	ing of C	COs wit	h POs	and PS	SOs				
COs/PC	Ds	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO1	PO12	PSO1	PSO2
CO	)1			2	2	2	3							3	
CO	)2	3	2	2			2						1	3	2
CO	3	3	2		2	2	2							3	2
CO	94	3	2				2							3	2
CO	95	3	3	2	2	1	2					1		3	3
1–Slig	ht,2–N	/loderate	e,3–Sub	stantial, B	T-Bloor	n's Taxo	nomy								
						ASS	SESSME	ENTPA	TERN	I - THEC	RY				
	st / Ble Catege	oom's ory*	Re	memberi (K1) %	ng	Jndersta (K2)		Apply (K3)		Analyz (K4) 9	•	Evaluating (K5) %		reating (K6) %	Total %
	CA	\T1		20		80		-		-		-		-	100
	CA	T2		20		60		20	)	-		-		-	100
	CA	<b>T</b> 3		10		60		30	)	-		-		-	100
	ES	=		15		60		25	5	-		-		-	100
*±3%	may b	e varied	I(CAT1,2	2,3–50 ma	rks & E	SE-100	marks)								

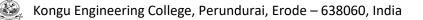


Programme &	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Branch					-		
Prerequisites	Nil	7	PE	3	0	0	3
Preamble	To understand the architecture of ARM Cortex Microprocesso using ARM Cortex.	or and also im	plement basic	Inter	acing	j Appl	ications
Unit – I	ARM Cortex M Processors:						9
	x M Processors- Advantages- Evolution- Architecture : Programm sets- Exceptions and interrupts	er's model- Ap	oplication Prog	ram s	tatus	regis	ter-Syste
Unit – II	CMSIS Standard and Cortex M Programming:						9
	ment flow- Software flow- Inputs, outputs, and peripherals acces oftware Interface standard (CMSIS)- Organization and standardiz						
Unit – III	Memory System and Interrupts:						9
Memory system for Bit-band operation	Memory System and Interrupts: eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking.	access attribut Interrupt mana	tes- Default me agement- Prior	emory ities-	acce Exce	ess pe ption	ermission
Memory system for Bit-band operation NVIC and SCB re Unit – IV	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point:	Interrupt mana	agement- Prior	ities-	Exce	ption	ermissions sequence 9
Memory system for Bit-band operation NVIC and SCB re <b>Unit – IV</b> Single precision-	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float	Interrupt mana	agement- Prior	ities-	Exce	ption	ermission: sequence 9
Memory system for Bit-band operation NVIC and SCB re <b>Unit – IV</b>	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float	Interrupt mana	agement- Prior	ities-	Exce	ption	ermissions sequence 9
Memory system for Bit-band operation NVIC and SCB re <b>Unit – IV</b> Single precision- DSP applications <b>Unit – V</b> Getting started w	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float using FPU	interrupt mana ing point unit- tion options- ł	egement- Prior	ities-	Exce sters-	Lazy	ermissions sequence stacking stacking 9 ISIS- OS debuggin
Memory system for Bit-band operation NVIC and SCB re <b>Unit – IV</b> Single precision- DSP applications <b>Unit – V</b> Getting started w examples on Serr	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float using FPU Embedded OS and Keil MDK: ith uVision- Project options- Using IDE and debugger- Optimizat	interrupt mana ing point unit- tion options- ł	egement- Prior	ities-	Exce sters-	Lazy	ermission: sequence 9 stacking 9 ISIS- OS
Memory system for Bit-band operation NVIC and SCB re <b>Unit – IV</b> Single precision- DSP applications <b>Unit – V</b> Getting started w	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float using FPU Embedded OS and Keil MDK: ith uVision- Project options- Using IDE and debugger- Optimizat	interrupt mana ing point unit- tion options- ł	egement- Prior	ities-	Exce sters-	Lazy	ermission: sequence stacking stacking 9 ISIS- OS debuggin
Memory system for Bit-band operation NVIC and SCB re <b>Unit – IV</b> Single precision- DSP applications <b>Unit – V</b> Getting started w examples on Serr <b>TEXT BOOK:</b>	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float using FPU Embedded OS and Keil MDK: ith uVision- Project options- Using IDE and debugger- Optimizat	ing point unit- tion options- I	Agement- Prior	ities-	Exce sters- cerne OS a	Lazy	ermission sequence stacking stacking 9 ISIS- OS debuggin
Memory system for Bit-band operation NVIC and SCB re <b>Unit – IV</b> Single precision- DSP applications <b>Unit – V</b> Getting started w examples on Serr <b>TEXT BOOK:</b>	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float using FPU Embedded OS and Keil MDK: ith uVision- Project options- Using IDE and debugger- Optimizat haphores- Mutual exclusion- Message queue- Mail queue- Timer a	ing point unit- tion options- I	Agement- Prior	ities-	Exce sters- cerne OS a	Lazy	ermission sequence stacking stacking 9 ISIS- OS debuggin
Memory system for Bit-band operation NVIC and SCB re Unit – IV Single precision- DSP applications Unit – V Getting started w examples on Sem TEXT BOOK: 1. Joseph Y REFERENCES:	eatures overview- Memory maps- Memory endianness- Memory a ns- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float using FPU Embedded OS and Keil MDK: ith uVision- Project options- Using IDE and debugger- Optimizat haphores- Mutual exclusion- Message queue- Mail queue- Timer a	Interrupt mana ing point unit- tion options- H and signal eve ocessors", 3 rd	Agement- Prior	ities- I regi ime k tion-	Exce sters- cerne OS a SA, 2	Lazy Lazy I - CM ware o	ermission sequenc 9 stacking 9 MSIS- OS debuggin Total:2
Memory system for         Bit-band operation         NVIC and SCB re         Unit – IV         Single precision-         DSP applications         Unit – V         Getting started w         examples on Sem         TEXT BOOK:         1.       Joseph Y         REFERENCES:         1.       Trevor Mage	eatures overview- Memory maps- Memory endianness- Memory a hs- Unaligned transfers- Exclusive accesses - Exception types - I gisters for exception control- Registers for interrupt masking. Floating Point: half precision and double precision floating point numbers- Float using FPU Embedded OS and Keil MDK: ith uVision- Project options- Using IDE and debugger- Optimizat haphores- Mutual exclusion- Message queue- Mail queue- Timer a iu, "The Definitive Guide to ARM_ CortexM3 and Cortex-M4 Pro-	Interrupt mana ing point unit- tion options- H and signal even ocessors", 3 rd	Agement- Prior • Overview and Keil RTX real t ent communication Edition, Newn bach", 1 st Edition	I regi ime k tion- es, U	Exce sters- cerne OS a SA, 2	Lazy Lazy I - CM ware o 2014.	9 stacking 9 Stacking 9 SIS- OS debuggir Total:4

	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	summarize the features and architecture of ARM Cortex M processor	Understanding (K2)
CO2	explain the role of CMSIS core in ARM Cortex programming	Understanding (K2)
CO3	Summarize the different memory system configurations and interrupt schemes	Understanding (K2)
CO4	develop application programs using in ARM Cortex	Applying (K3)
CO5	build OS based applications on ARM Cortex M using Keil MD	Applying (K3)

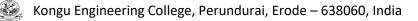
					Марр	ing of C	Os with	POs an	d PSOs	5				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											2	
CO2	3	2	3										2	
CO3	3	2										3		
CO4	3	3	2	2					2	2	3	3	2	2
CO5	3	2	3	2	3	2	2	2	3	3	3	3	3	2
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT- E	Bloom's T	Taxonom	У			1 1				

		ASSESSMEN	T PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Tota %
CAT1	20	80	-	-	-	-	100
CAT2	20	80	-	-	-	-	100
CAT3	10	30	60	-	-	-	100
ESE	15	50	35	-	-	-	100



	22ECE15 - SYSTEM VERILO	G					
Programme& Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	VLSI Design	7	PE	3	0	0	3
Preamble	To impart knowledge on designing and verification of Integr	ated Circui	its using Syste	em V	'eriloo	1	
Unit – I	Introduction to System Verilog:		<u> </u>	-		,	9
	process - Basic testbench functionality - Directed testing - Colorents - Layered Test bench - Building a layered Testbench - Si					ional (	coverage
Unit – II	Data Types:						9
storage type - C Expression width	s - Fixed-size arrays - Dynamic arrays - Queues - Associative reating new types with typedef - Creating user-defined struct - Net types						
Unit – III	Procedural Statements, Routines and Basic OOP:						9
Procedural staten Time values - O	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G vnamic objects - Building a testbench.	ts - Returni Global varia	ng from a rou bles - Class	itine meth	- Loc ods -	al data Scop	a storage ing rules
Procedural staten Time values - O Understanding dy <b>Unit – IV</b> Introduction - Sep	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G	Blobal varia	bles - Class	meth drivir	iods ·	Scop	ing rules 9 pling - To
Procedural staten Time values - O Understanding dy <b>Unit – IV</b> Introduction - Sep level scope - Prog	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G namic objects - Building a testbench. Connecting the Test bench and Design: parating the testbench and design - The interface construct - Sti	Blobal varia	bles - Class	meth drivir	iods ·	Scop	ing rules 9 pling - To
Procedural staten Time values - O Understanding dy Unit – IV Introduction - Sep level scope - Prop block Unit – V Randomization in The prerandomize	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G mamic objects - Building a testbench. Connecting the Test bench and Design: parating the testbench and design - The interface construct - Sti gram module interactions - System verilog assertions - The fou	Blobal varia mulus timir ur-port ATM aint blocks	bles - Class ng - Interface 1 router –Dire - Valid constr	drivir cted	ng and test f	d sam	ing rules 9 pling - To LC3 fetc 9 onstraints
Procedural staten Time values - O Understanding dy Unit – IV Introduction - Sep level scope - Prop block Unit – V Randomization in The prerandomize	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G mamic objects - Building a testbench. Connecting the Test bench and Design: oarating the testbench and design - The interface construct - Sti gram module interactions - System verilog assertions - The fou Randomization: system verilog - Constraint details - Controlling multiple constr e and postrandomize functions - Constraints tips and techniques	Blobal varia mulus timir ur-port ATM aint blocks	bles - Class ng - Interface 1 router –Dire - Valid constr	drivir cted	ng and test f	d sam	ing rules 9 pling - To LC3 fetc 9 onstraints
Procedural staten Time values - O Understanding dy Unit – IV Introduction - Sep level scope - Prop block Unit – V Randomization in The prerandomize	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G mamic objects - Building a testbench. Connecting the Test bench and Design: oarating the testbench and design - The interface construct - Sti gram module interactions - System verilog assertions - The fou Randomization: system verilog - Constraint details - Controlling multiple constr e and postrandomize functions - Constraints tips and techniques	Blobal varia mulus timir ur-port ATM aint blocks	bles - Class ng - Interface 1 router –Dire - Valid constr	drivir cted	ng and test f	d sam	ing rules 9 pling - To LC3 fetc 9 onstraints om contro
Procedural staten Time values - O Understanding dy <b>Unit – IV</b> Introduction - Sep level scope - Pro- block <b>Unit – V</b> Randomization in The prerandomize - Random genera	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G vnamic objects - Building a testbench. Connecting the Test bench and Design: oarating the testbench and design - The interface construct - Sti gram module interactions - System verilog assertions - The fou Randomization: system verilog - Constraint details - Controlling multiple constr e and postrandomize functions - Constraints tips and techniques itors - Random device configuration.	Blobal varia mulus timir ur-port ATM aint blocks s - Iterative	bles - Class ng - Interface 1 router –Dire - Valid constr and array co	drivir cted raints	ng and test f s - In- ints -	d sam for the line co Rand	ing rules 9 pling - To LC3 fetc 9 onstraints om contro Total:4
Procedural staten Time values - O Understanding dy Unit – IV Introduction - Sep level scope - Pro- block Unit – V Randomization in The prerandomize - Random genera TEXT BOOK: 1 Chris Spe	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G vnamic objects - Building a testbench. Connecting the Test bench and Design: oarating the testbench and design - The interface construct - Sti gram module interactions - System verilog assertions - The fou Randomization: system verilog - Constraint details - Controlling multiple constr e and postrandomize functions - Constraints tips and techniques itors - Random device configuration.	Blobal varia mulus timir ur-port ATM aint blocks s - Iterative	bles - Class ng - Interface 1 router –Dire - Valid constr and array co	drivir cted raints	ng and test f s - In- ints -	d sam for the line co Rand	ing rules 9 pling - To LC3 fetc 9 onstraints om contro Total:4
Procedural statem Time values - O Understanding dy Unit – IV Introduction - Sep level scope - Prop block Unit – V Randomization in The prerandomize - Random genera TEXT BOOK: 1. Chris Spe Springer, REFERENCES: 1 Stuart Su	nents - Tasks, functions and Void functions - Routine argument OP terminology - Creating new objects - Static variables vs G vnamic objects - Building a testbench. Connecting the Test bench and Design: oarating the testbench and design - The interface construct - Sti gram module interactions - System verilog assertions - The fou Randomization: system verilog - Constraint details - Controlling multiple constr e and postrandomize functions - Constraints tips and techniques itors - Random device configuration.	Blobal varia mulus timir ur-port ATM aint blocks s - Iterative	bles - Class in ng - Interface of 1 router –Dire - Valid constr and array co anguage Feat	meth drivir cted raints nstra	ng an test f s - In- ints -	Scop	ing rules 9 pling - To LC3 fetc 9 onstraints om contre Total:4 n,

		UTCON		rse, the s	tudent	s will be	able to							BT Map (Highest	
CO1	inte	rpret the	e compo	onents of t	est ber	ich								Understand	ing (K2)
CO2	dem	nonstrat	e Syste	m verilog o	data ty	pes								Understand	ing (K2)
CO3	illus	trate the	e proce	dural state	ments.	tasks an	d functio	ons usin	g OOF	'S conce	epts			Applying	(K3)
CO4	buil	d a test	bench e	environme	nt and	test the c	lesign u	nder tes	st					Applying	(K3)
CO5	con	struct th	ie const	rained ran	dom c	overage	triven ve	erificatio	n in Sy	vstem ve	rilog Env	vironment		Applying	(K3)
						Марріі	ng of CO	Os with	POs a	nd PSO	S				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
СО	1	3		2									2	3	2
CO	2	3		2									2	3	2
CO	3	3		2									2	3	2
CO	4	3		2									2	3	2
CO	5	3		2									2	3	2
1 – Slig	ght, 2	– Mode	erate, 3	<ul> <li>Substan</li> </ul>	tial, B1	- Bloom's	s Taxon	omy							
						ASSES	SMEN	Γ ΡΑΤΤ	ERN -	THEOR	Y				
	st / Bl Catego	oom's ory*	R	ememberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluatir (K5) %		Creating (K6) %	Total %
	CAT	1		10		90		-		-		-		-	100
	CAT	2		5		45		50	)	-		-		-	100
	CAT	3		5		35	_	60	)	-		-	_	-	100
	ESE	1		10		40		50	)	-		-		-	100
* ±3%	may b	be varie	d (CAT	1,2,3 – 50	marks	& ESE -	100 ma	arks)							



Programme &Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	7	PE	3	0	0	3
Preamble	To understand the functioning of the nervous system and a technologies for understanding the functioning of the nervou		gineering opp	ortu	nities	in de	veloping
Unit– I	Molecular Biology of Cells of the Nervous system						9
Membrane potent	e nervous system and basic structure of the nervous system - tial and the passive electrical properties of the neuron - Propaga is system function and hierarchy of neural function from the cell t	ated signalii	ng – The actio				
Unit– II	Synaptic Transmission:						9
	ptic transmission, Signalling at the nerve muscle synapse - Direc ystem - Modulation of synaptic transmission-Second messenger motor unit						
Unit– III	Neural basis of Cognition:						9
	of the central nervous system - Functional organization of perce						
Internal represent imaging of cognition	tation of space and action- Organization of cognition-Cognitivion						Function
Internal represen imaging of cogniti Unit- IV	tation of space and action- Organization of cognition-Cognitivion Constructive nature of visual processing:	ve function	s of the prer	noto	r sys	tems-	Function 9
Internal represent imaging of cogniti Unit– IV Low level visual	tation of space and action- Organization of cognition-Cognitivition Constructive nature of visual processing: processing-The retina - Intermediate level visual processing an	ve function	s of the prer	noto h lev	r sys vel vis	tems-	Function 9 rocessin
Internal represen imaging of cogniti Unit– IV Low level visual Cognitive influence	tation of space and action- Organization of cognition-Cognitivion Constructive nature of visual processing:	ve function	s of the prer	noto h lev	r sys vel vis	tems-	Function 9 rocessin
Internal represen imaging of cogniti Unit– IV Low level visual Cognitive influenc Unit– V	tation of space and action- Organization of cognition-Cognitivition  Constructive nature of visual processing: processing-The retina - Intermediate level visual processing an es -Visual processing and action, inner ear - Auditory central nerv	ve function d visual privous system	s of the prer mitives - High n- Smell and t	noto h lev aste	r sys 'el vis - The	ual p chem	Function 9 rocessin nical sens 9
Internal represent imaging of cognition Unit- IV Low level visual p Cognitive influence Unit- V Computational N devices and system	tation of space and action- Organization of cognition-Cognitivition Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and ses -Visual processing and action, inner ear - Auditory central nerv Computational Neurobiology and Neuro Biopotential leurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimula	d visual privous system d recording	s of the prer mitives - Hig n- Smell and t s: Brain-Com	h lev aste	r sys el vis - The r Inte	tems- sual p chem	Function 9 rocessin nical sens 9 s (BCI)
Internal represent imaging of cognitive Unit- IV Low level visual p Cognitive influence Unit- V Computational N devices and system Neuro Biopotent	tation of space and action- Organization of cognition-Cognitivition  Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and ses -Visual processing and action, inner ear - Auditory central nerv  Computational Neurobiology and Neuro Biopotential leurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimula tial: Introduction to neuro-biopotentials: EEG, EMG and ECoG	d visual privous system d recording	s of the prer mitives - Hig n- Smell and t s: Brain-Com	h lev aste	r sys el vis - The r Inte	tems- sual p chem	Function 9 rocessin nical sens 9 s (BCI)
Internal represent imaging of cognition Unit- IV Low level visual p Cognitive influence Unit- V Computational N devices and system Neuro Biopotent	tation of space and action- Organization of cognition-Cognitivition Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and ses -Visual processing and action, inner ear - Auditory central nerv Computational Neurobiology and Neuro Biopotential leurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimula	d visual privous system d recording	s of the prer mitives - Hig n- Smell and t s: Brain-Com	h lev aste	r sys el vis - The r Inte	tems- sual p chem	Function 9 rocessin nical sens 9 s (BCI)
Internal represent imaging of cognitive Unit- IV Low level visual p Cognitive influence Unit- V Computational N devices and system Neuro Biopotent	tation of space and action- Organization of cognition-Cognitivition  Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and ses -Visual processing and action, inner ear - Auditory central nerv  Computational Neurobiology and Neuro Biopotential leurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimula tial: Introduction to neuro-biopotentials: EEG, EMG and ECoG	d visual privous system d recording	s of the prer mitives - Hig n- Smell and t s: Brain-Com	h lev aste	r sys el vis - The r Inte	tems- sual p chem	Function 9 rocessin ical sens 9 s (BCI) acquisitio
Internal represen imaging of cogniti Unit– IV Low level visual p Cognitive influence Unit– V Computational N devices and syste Neuro Biopotent Signal acquisition	tation of space and action- Organization of cognition-Cognitivition Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and ses -Visual processing and action, inner ear - Auditory central nerv Computational Neurobiology and Neuro Biopotential leurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimula tial: Introduction to neuro-biopotentials: EEG, EMG and ECoG - Conditioning, and processing	ve function d visual pri vous systen d recording ation. - Introduct	s of the prer mitives - Hig n- Smell and t s: Brain-Com ion to biopote	h lev aste pute	r sys rel vis - The r Inte Is - E	tems- sual p chem ffaces	Function 9 rocessin nical sens 9 (BCI) acquisitio Total:4
Internal represen imaging of cogniti Unit– IV Low level visual Cognitive influence Unit– V Computational N devices and syste Neuro Biopotent Signal acquisition TEXTBOOK:	tation of space and action- Organization of cognition-Cognitivition  Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and ses -Visual processing and action, inner ear - Auditory central nerv  Computational Neurobiology and Neuro Biopotential leurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimula tial: Introduction to neuro-biopotentials: EEG, EMG and ECoG	ve function d visual pri vous systen d recording ation. - Introduct	s of the prer mitives - Hig n- Smell and t s: Brain-Com ion to biopote	h lev aste pute	r sys rel vis - The r Inte Is - E	tems- sual p chem ffaces	Function 9 rocessin nical sens 9 (BCI) acquisitio Total:4
Internal represen imaging of cogniti Unit– IV Low level visual p Cognitive influence Unit– V Computational N devices and syste Neuro Biopotem Signal acquisition TEXTBOOK: 1. Eric R. K Neural So	tation of space and action- Organization of cognition-Cognitivition Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and ses -Visual processing and action, inner ear - Auditory central nerv Computational Neurobiology and Neuro Biopotential leurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimula tial: Introduction to neuro-biopotentials: EEG, EMG and ECoG - Conditioning, and processing andel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegel	ve function d visual pri vous systen d recording ation. - Introduct	s of the prer mitives - Hig n- Smell and t s: Brain-Com ion to biopote	h lev aste pute	r sys rel vis - The r Inte Is - E	tems- sual p chem ffaces	Function 9 rocessin nical sens 9 (BCI) acquisitio Total:4
Internal represen imaging of cogniti Unit– IV Low level visual Cognitive influence Unit– V Computational N devices and syste Neuro Biopotent Signal acquisition TEXTBOOK: 1. Eric R. K Neural S REFERENCES:	tation of space and action- Organization of cognition-Cognitivition Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and ses -Visual processing and action, inner ear - Auditory central nerv Computational Neurobiology and Neuro Biopotential leurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimula tial: Introduction to neuro-biopotentials: EEG, EMG and ECoG - Conditioning, and processing andel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegel	ve function d visual pri vous system d recording ation. - Introduct	s of the prer imitives - High n- Smell and t s: Brain-Com ion to biopote	h lev aste pute entia	r sys - The r Inte Is - E	tems- sual p chem ffaces	Function 9 rocessin nical sens 9 (BCI) acquisitio Total:4
Internal represen imaging of cogniti Unit– IV Low level visual Cognitive influence Unit– V Computational N devices and syste Neuro Biopotent Signal acquisition TEXTBOOK: 1. Eric R. K Neural St REFERENCES: 1. Pallas-Ar	tation of space and action- Organization of cognition-Cognitivition Constructive nature of visual processing: processing-The retina - Intermediate level visual processing and action, inner ear - Auditory central nerves -Visual processing and action, inner ear - Auditory central nerves -Visual processing and action, inner ear - Auditory central nerves -Visual processing and action, inner ear - Auditory central nerves -Visual processing and action, inner ear - Auditory central nerves -Visual processing and action, inner ear - Auditory central nerves -Visual processing and action, inner ear - Auditory central nerves -Visual processing and action, inner ear - Auditory central nerves -Visual processing and action to neurobiology and Neuro Biopotential deurobiology: Brain-Computer Interfaces: Neuro modulation and ems, Introduction to BCI devices for neural recording and stimulatial: Introduction to neuro-biopotentials: EEG, EMG and ECoG - Conditioning, and processing andel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegel cience", 5 th Edition, McGrawHill,2013.	ve function d visual pri vous system d recording ation. - Introduct Ibaum, A. J	s of the prer imitives - High n- Smell and t s: Brain-Com ion to biopote . Hudspeth, S	h lev aste pute entia Garah	r sys - The r Inte Is - E	tems- sual p chem rfaces Data a	Function 9 rocessin nical sens 9 s (BCI) acquisitio Total:4



		UTCOM		se, the st	udent	s will be a	able to							Г Маррес Highest L	
CO1	infer	the cor	ncepts of	cell biolo	gy of t	he nervou	is syster	n					U	Inderstand	ling(K2)
CO2	com	prehen	d the fun	ctionalities	s of ne	euro transr	nitter						U	Inderstand	ling(K2)
CO3	inter	pret the	represe	ntation ar	nd func	ctions of c	ognition						U	Inderstand	ling(K2)
CO4	desc	cribe the	e significa	ance of au	uditory	central ne	ervous s	system					U	Inderstand	ling(K2)
CO5	outli	ne the i	mportan	ce of neur	o biop	otential ar	nd neuro	obiology	,				U	nderstand	ing(K2)
						Мар	ping of	COs w	th POs	s and P	SOs				
COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	2			2						2		2
CO2	2	3	2	2	2		2						2		
COS	3	3	2	2	2		2						2		2
CO4	4	3	2	2	2	2	2		2				2		2
COS	5	3	2	2	2	2	2		2				2		2
1–Sligh	ht,2–N	loderate	e,3–Subs	stantial, B	T-Bloo	m's Taxoi	nomy								
						ASS	ESSME		TTERN	- THEC	RY				
	t / Blo atego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyzi (K4) %		Evaluating (K5) %		reating (K6) %	Total %
	CA	.T1		30		70		-		-		-		-	100
	CAT	Γ2		30		70		-		-		-		-	100
	CAT	3		30		70		-		-		-		-	100
	ESE	:		30		70		-		-		-		-	100



	22ECE17 - REMOTE SENSING	3					
Programme &Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	7	PE	3	0	0	3
Preamble	To understand the fundamental concepts of Remote Sensir process the satellite data, GIS and applications Remote Se		nage processi	ing t	echni	ques	used to
Jnit - I	Concepts and Foundations of Remote Sensing :						9
	nd radiation principles - Energy interactions in the atmosphere-E gital image concepts- Data capturing mechanisms: Along track s					ce fea	tures, Dat
Unit - II	Earth Resource Satellites Operating in the Optical Spect	rum:					9
	istics-Moderate resolution systems- Landsat -1 to -7,Landsat -8, ation remote sensing.	SPOT-1 to ·	5,SPOT-6 to	-7-H	igh re	esoluti	ion satellit
Jnit - III	Microwave and LIDAR sensing:						9
	nt-Imaging radar system operation-Synthetic aperture radar- Lidar data analysis and applications- Spaceborne Lidar.	Geometric	characteristics	s of	rada	ır Ima	igery-Bas
Unit - IV	Digital Image Analysis :						9
	images-Image enhancement-Contrast manipulation-Spatial fea	iture manip	ulation-Image	cla	ssifica	ation-	Supervise
Unit - V	Remote Sensing Applications:						9
	ver mapping-Agricultural applications-Water resource applica plications-Environmental assessment and protection-Natural disc			al p	lanni	ng ap	oplications
							Total:4
TEXTBOOK:							
Thomas 1.	M.Lillesand, Ralph W.Kiefer, "Remote Sensing And Image Inter	pretation", 7	th Edition, Jol	hn W	/iley,	New	Delhi, 201
REFERENCES:							
	Janaan "Domoto Concing Of The Environment An Earth Door	urce Perspe	ective", Pears	on E	duca	tion S	eries, 200
1. John R.	Jensen, "Remote Sensing Of The Environment – An Earth Reso						
1.	C.Gonzalez, Richard E.Woods, "Digital Image Processing", 3 rd E	dition, Prent	ice Hall, 2007	7.			

		ITCOM		rse, the st	udent	s will be a	able to							BT Map (Highest	
CO1	des	cribe th	e electr	omagnetic	remote	e sensing	process	and da	ita cap	oturing m	echanisr	ns.	Ur	nderstandi	ng (K2)
CO2	exp	ain the	earth re	source sat	ellites	operating	in the c	ptical s	pectru	IM			Ur	nderstandi	ng (K2)
CO3			e differe		emote	sensing s	systems	, data (	genera	ated and	their ch	aracteristic	s in	Applying	(K3)
CO4		tify the etal iss		riate image	e proce	essing teo	chnique	to proc	ess sa	atellite da	ta with (	GIS for solv	ving	Applying	(K3)
CO5	sele	ct and	process	the satellit	e data	for real ti	me appl	ications	;					Applying	(K3)
						Maj	oping o	f COs v	vith P	Os and F	SOs				
COs/I	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO	B PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	1												
CO	2	3	1			1									
CO	3	3	1			1									
CO	4	3	2	1		2	2	1	2	2	1		1	2	1
CO	5	3	2	1		2	3	2	2	2	1		2	2	2
1–Slig	ht,2– <b>№</b>	loderat	e,3–Sul	ostantial, B	T-Bloo	m's Taxo	nomy								
						ASS	SESSME	ENTPA	TERI	N - THEC	RY				
	st / Blo Catego	oom's ory*	R	ememberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) ^c	•	Evaluating (K5) %		reating (K6) %	Total %
	CAT	1		40		60		-		-		-		-	100
	CAT	2		20		60		20	)	-		-		-	100
	CAT	3		20		50		30	)	-		-		-	100
	ESE			20		60		20	)	-		-		-	100
*±3% I	nay b	e varied	I (CAT	,2,3 – 50 r	narks	& ESE-10	00 mark	s)					•		•



Programme & Branch	B.E & Electronics and Communication Engineering	Sem	Category	L	т	Р	Credit
Prerequisites	Linear algebra and transforms , Python Programming	7	PE	3	0	0	3
Preamble	To model the computer to perform useful tasks involving huma dialogue system, machine translation, question and answering		, task like conv	versa	tiona	lager	nt,
Unit- I	Computer Language Processing and Regular Expressions	:					9
	eech and language processing – Ambiguity - Models and algorith puping and precedence	ms - Turing	Test, Basic re	gular	expr	essio	n patterns
Unit- II	Text Tokenization and Normalization:						9
Words – Corpora	- Word tokenization and normalization - Word segmentation - Ser	ntence segn	nentation - Mini	mum	edit	distar	ce algorit
Unit- III	Language Modeling:						9
	Language Modeling: ating language model - Sampling sentences from a language mode	el - Generaliz	zation and zeros	s - Sr	nootł	ning a	-
N-Grams - Evalu		el - Generaliz	zation and zeros	s - Sr	nootł	ning a	-
Unit- IV	ating language model - Sampling sentences from a language mode						lgorithm
N-Grams - Evalu <b>Unit- IV</b> Training the Naïv	ating language model - Sampling sentences from a language mode						lgorithm
N-Grams - Evalu Unit- IV Training the Naïv Unit- V	ating language model - Sampling sentences from a language mode Logistic Regression as Language Model: /e Bayes - Optimizing for sentimental analysis - Naïve Bayes as la	anguage mo	odeling - Evalu	ation	of m		lgorithm 9
N-Grams - Evalu Unit- IV Training the Naïv Unit- V	ating language model - Sampling sentences from a language mode Logistic Regression as Language Model: /e Bayes - Optimizing for sentimental analysis - Naïve Bayes as la Neural Language Models:	anguage mo	odeling - Evalu	ation	of m		lgorithm 9
N-Grams - Evalu Unit- IV Training the Naïv Unit- V	ating language model - Sampling sentences from a language mode Logistic Regression as Language Model: /e Bayes - Optimizing for sentimental analysis - Naïve Bayes as la Neural Language Models:	anguage mo	odeling - Evalu	ation	of m		lgorithm 9 9
N-Grams - Evalu Unit- IV Training the Naïv Unit- V Vords and Vecto TEXTBOOK:	ating language model - Sampling sentences from a language mode Logistic Regression as Language Model: /e Bayes - Optimizing for sentimental analysis - Naïve Bayes as la Neural Language Models:	anguage mo ion of the T An Introduct	odeling - Evalu F-IDF vector m ion to Natural I	ation nodel	of m	odel	lgorithm 9 9 Total:4
N-Grams - Evalu Unit- IV Training the Naïv Unit- V Vords and Vecto TEXTBOOK:	ating language model - Sampling sentences from a language model Logistic Regression as Language Model: /e Bayes - Optimizing for sentimental analysis - Naïve Bayes as la Neural Language Models: rs - Cosine similarity - TF-IDF weighting terms in vector - Applicat	anguage mo ion of the T An Introduct	odeling - Evalu F-IDF vector m ion to Natural I	ation nodel	of m	odel	lgorithm 9 9 Total:4
N-Grams - Evalu Unit- IV Training the Naïv Unit- V Vords and Vecto TEXTBOOK: 1. Jurafski Comput REFERENCES:	ating language model - Sampling sentences from a language model Logistic Regression as Language Model: /e Bayes - Optimizing for sentimental analysis - Naïve Bayes as la Neural Language Models: rs - Cosine similarity - TF-IDF weighting terms in vector - Applicat	anguage mo ion of the T An Introduct n Education	odeling - Evalu F-IDF vector m ion to Natural I India, New De	ation nodel	of m	odel	lgorithm 9 9 Total:4

		TCOME ion of th		e, the stu	udents	will be a	ble to							BT Ma (High	appeo nest L	
CO1	Und	erstand t	the conc	ept of spe	eech a	nd langua	age proc	essing	for inte	lligent ag	gent			Under	standi	ing (K2)
CO2	Und	erstand f	the patte	ern of reg	ular ex	oressions	to sear	ch in te	xts					Under	standi	ing (K2)
CO3	Арр	ly the tex	t pre-pr	ocessing	technic	que using	NLTK li	brary						Ар	olying	(K3)
CO4	Ass	ign proba	ability to	predict w	ord fro	m preced	ing word	ds using	g skleai	n library	/			Ар	olying	(K3)
CO5	Арр	ly text ca	itegoriza	tion task	of sent	imental a	inalysis	using g	enerati	ve class	ifier using	g sklearn l	ibrary	Ар	olying	(K3)
						Мар	oping of	COs w	vith PO	s and F	PSOs					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	2 P	SO1	PSO2
CO	1	3	2													
CO	2	3	2													
CO	3	3	2	2	2	3				2					2	2
CO	4	3	2	2	2	3	2		2	2					2	2
CO	5	3	2	2	2	3	2		2	2					2	2
1–Slig	ht,2–N	loderate,	3–Subs	tantial, B	Г-Bloor	n's Taxor	nomy	•	•	•	·					•
						ASS	SESSME	ENT PA	TTERM	I -THEO	RY					
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyzi (K4) %		Evaluatin (K5) %	g	Creat (K6)		Total %
	CAT	1		30		70	C		-	-		-		-		100
	CAT	2		10		4(	C	50	)	-		-		-		100
	CAT	3		10		30	C	60	)	-		-		-		100
	ESE			10		50	C	40	)	-		-		-		100
*±3% r	may be	e varied (	CAT 1,2	2,3 – 50 m	narks 8	ESE-10	0 marks	5)			•					



<b>Programme &amp;</b>	22ECE19 - BLOCKCHAIN TE				-	-	•
Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	7	PE	3	0	0	3
Preamble	Block chain is a public digital ledger to share information in peer-to-peer network that no single party can control.	a trustwort	hy and secure	e wa	y. Blo	ockcha	ain rely on
Unit – I	Blockchain 101:						9
	tems – The history of blockchain – Introduction to blockchain - echnology – Tiers – Types of blockchain – Consensus in bloc						
Unit – II	Decentralization, Cryptography and Technical Foundation	tions:					9
	Cryptography – Confidentiality – Integrity – Authentication – Co ivate keys – RSA – Discrete logarithm problem – Hash functions						
Unit – III	Consensus and Smart contracts in Blockchain:						•
							9
Consensus in	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro	of of elaps	ed time-sma				ted system
Consensus in approaches-Lir	nd structure of blockchain blocks-Digital Signature-Distinction b	of of elaps	ed time-sma				ted system
Consensus in approaches-Lir Unit – IV Introduction –	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses Ethereum 101: Ethereum blockchain – Elements of the ethereum blockchain –	of of elaps of blockcha Precompile	ed time-sma ain. ed contracts -	rt co	ontrac	ts-sm	ted system art contra 9
Consensus in approaches-Lir Unit – IV Introduction –	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses Ethereum 101:	of of elaps of blockcha Precompile	ed time-sma ain. ed contracts -	rt co	ontrac	ts-sm	ted syster art contra 9
Consensus in approaches-Lir Unit – IV Introduction – –Messages – Unit – V Projects – pro	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses <b>Ethereum 101:</b> Ethereum blockchain – Elements of the ethereum blockchain – Mining - Clients and wallets – The Ethereum network –Ethere	of of elaps of blockcha Precompile um Develo	ed time-sma ain. ed contracts - pment.	rt co – Ac	coun	ts-sm ts – B	ted systen art contra 9 lock – Eth 9
Consensus in approaches-Lir Unit – IV Introduction – –Messages – Unit – V Projects – pro	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses <b>Ethereum 101:</b> Ethereum blockchain – Elements of the ethereum blockchain – Mining - Clients and wallets – The Ethereum network –Ethere <b>Hyperledger:</b> tocol – Hyperledger Fabric – Sawtooth lake – Corda – Block	of of elaps of blockcha Precompile um Develo	ed time-sma ain. ed contracts - pment.	rt co – Ac	coun	ts-sm ts – B	ted syster art contra 9 lock – Eth 9 et of Thin
Consensus in approaches-Lir Unit – IV Introduction – –Messages – Unit – V Projects – pro	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses <b>Ethereum 101:</b> Ethereum blockchain – Elements of the ethereum blockchain – Mining - Clients and wallets – The Ethereum network –Ethere <b>Hyperledger:</b> tocol – Hyperledger Fabric – Sawtooth lake – Corda – Block t – Health – Finance.	of of elaps of blockcha Precompile um Develo	ed time-sma ain. ed contracts - pment.	rt co – Ac	coun	ts-sm ts – B	ted systen art contra 9 lock – Eth 9
Consensus in approaches-Lir Unit – IV Introduction – -Messages – Unit – V Projects – pro -Governmen TEXT BOOKS	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses <b>Ethereum 101:</b> Ethereum blockchain – Elements of the ethereum blockchain – Mining - Clients and wallets – The Ethereum network –Ethere <b>Hyperledger:</b> tocol – Hyperledger Fabric – Sawtooth lake – Corda – Block t – Health – Finance.	of of elaps of blockcha Precompile um Develo chain – Ou	ed time-sma ain. ed contracts - pment. tside of Curr	rt co - Ac	coun	ts-sm ts – B ntern	ted syster art contra 9 lock – Eth 9 et of Thin
Consensus in approaches-Lir Unit – IV Introduction – –Messages – Unit – V Projects – pro –Governmen TEXT BOOKS 1. Imran Publish	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses <b>Ethereum 101:</b> Ethereum blockchain – Elements of the ethereum blockchain – Mining - Clients and wallets – The Ethereum network –Ethere <b>Hyperledger:</b> tocol – Hyperledger Fabric – Sawtooth lake – Corda – Block t – Health – Finance.	of of elaps of blockcha Precompile um Develo chain – Ou n and smart	ed time-sma ain. ed contracts - pment. tside of Curr contracts Exp	rt co - Ac renc	ies: I	ts-sm ts – B ntern	ted syster art contra 9 lock – Eth 9 et of Thin Total:4
Consensus in approaches-Lir Unit – IV Introduction – –Messages – Unit – V Projects – pro –Governmen TEXT BOOKS 1. Imran Publish	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses <b>Ethereum 101:</b> Ethereum blockchain – Elements of the ethereum blockchain – Mining - Clients and wallets – The Ethereum network –Ethere <b>Hyperledger:</b> tocol – Hyperledger Fabric – Sawtooth lake – Corda – Block t – Health – Finance. Bashir, "Mastering Blockchain Distributed ledgers, decentralization hers, 2017 for Unit I, II Hill, Samanyu Chopra & Paul Valencourt, "Blockchain Quick Refe hain application development", Packt Publishers, 2018 for Units III	of of elaps of blockcha Precompile um Develo chain – Ou n and smart	ed time-sma ain. ed contracts - pment. tside of Curr contracts Exp	rt co - Ac renc	ies: I	ts-sm ts – B ntern	ted syster art contra 9 lock – Eth 9 et of Thin Total:4
Consensus in approaches-Lir Unit – IV Introduction – –Messages – Unit – V Projects – pro –Governmen TEXT BOOKS 1. Imran Publish 2. Brenn blockcl REFERENCES	nd structure of blockchain blocks-Digital Signature-Distinction b blockchain-proof of work-proof of stake-proof of authority- pro nitations of smart contacts-alternate blockchains and various uses <b>Ethereum 101:</b> Ethereum blockchain – Elements of the ethereum blockchain – Mining - Clients and wallets – The Ethereum network –Ethere <b>Hyperledger:</b> tocol – Hyperledger Fabric – Sawtooth lake – Corda – Block t – Health – Finance. Bashir, "Mastering Blockchain Distributed ledgers, decentralization hers, 2017 for Unit I, II Hill, Samanyu Chopra & Paul Valencourt, "Blockchain Quick Refe hain application development", Packt Publishers, 2018 for Units III	of of elaps of blockcha Precompile um Develo chain – Ou n and smart rence: A gu , IV, V.	ed time-sma ain. ed contracts - pment. tside of Curr contracts Exp ide to explorin	rt cc - Ac renc	ed", F	ts-sm ts – B ntern Packt ralized	ted syster art contra 9 lock – Eth 9 et of Thin Total:4

		UTCOM tion of t		se, the st	udent	s will be a	ble to						(	BT Mapı Highest L			
CO1	reca	all the h	istory an	d differen	t appli	cations of	blockch	ain					U	Inderstand	ling (K2)		
CO2	illus	trate de	centraliz	ation and	practio	cal aspect	s of cryp	otograph	лy				U	Inderstand	ding (K2)		
CO3	inte	rpret bit	coin tech	nology, a	lternat	ive coins a	and sma	irt contr	acts				Understanding (K2				
CO4	dev	elop a d	istributed		Applying (K3)												
CO5	con	struct ar	n applica			Applying	g (K3)										
						Марр	oing of (	COs wi	th POs	and PS	Os						
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO	01	3											2	2			
CO	)2	3											2	2			
CO	)3	3											2	2			
CO	)4	3	2	2	2								2	2			
CO	)5	3	2	2	2								2	2			
1 – Sli	ight, 2	– Mode	erate, 3-	- Substar	ntial, B	T- Bloom'	s Taxor	nomy									
						ASSE	SSME		TERN	– THEO	RY						
	st / Bl Categ	oom's ory*	Re	memberi (K1) %	ing	Understa (K2)		Apply (K3)		Analyzi (K4) %		Evaluating (K5) %		Creating (K6) %			
	C	AT1		15		85			-	-		-		-	100		
	CA	\T 2		15		85		-		-		-		-	100		
	C	AT3		15		55		30	)	-		-		-	100		
	ESI	=		10		60		30	)	-		-		-	100		

*  $\pm$ 3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Analog and Digital Communication	7	PE	3	0	0	3
					-	-	_
Preamble	To endow the key technologies of 5G wireless communication	n systems an	d beyond				
Unit – I	5G Use Cases:						9
	ations generations: from 1G to 4G - Introduction to enhanced mol ments - 5G system concept	bile broadban	d - Internet of	Thing	s rela	ted to	5G - Use
Unit – II	5G architecture:						9
	n-level requirements for the 5G architecture - Functional archited munication – Massive machine type communication – Device to					l techi	niques fo
Unit – III	Millimeter Waves for next generation Wireless Communi	cation:					9
Spectrum and reg - Physical layer te	ulations - Channel propagation - Hardware technologies for mm\ chniques	N systems - A	Architecture ar	id mo	bility	– Bea	mforming
Unit – IV	Radio Access Technologies:						9
Multi-carrier with t	iltering: A new waveform - Non-orthogonal multiple access - Radon - Radio access for massive machine-type communication	dio access fo	r dense deploy	ment	s - R	adio a	access fo
Unit – V	Massive MIMO Systems:						9
Single user MIMC RF implementatio	<ul> <li>Multiuser MIMO – Pilot design for Massive MIMO – Resource ans</li> </ul>	allocations and	d transceiver a	lgorit	hms -	Base	band and
							Total:4
TEXT BOOK:							
1. Afif Osse	ran, "5G Mobile and Wireless Communication Technology", $1^{st}$ E	dition, Cambr	idge University	/ Pres	ss, Ne	ew De	lhi, 2016.
REFERENCES:							
	os G. Kanatas, "New Directions in Wireless Communications System v Dolbi	tems from Mo	bile to 5G", 1 st	Editio	on, C	RC Pr	ess
1. Athanasio 2018, Net							
1. 2018, Ne	sif, "5G Mobile Communications Concepts and Technologies", 1	st Edition, CR	C Press 2019,	New	Delhi		

## B.E.– Electronics and Communication Engineering, Regulation, Curriculum and Syllabus – R2022

BT Mapped (Highest Level)
Understanding (K2)
Understanding (K2)
s Understanding (K2)
Understanding (K2)
Understanding (K2)
· · · ·

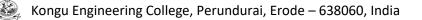
	Mapping of COs with POs and PSOs														
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	2							2	2					
CO2	3	2		2					2	2	2				
CO3	3	3	2	2				2	2	2		2	2		
CO4	3	3	2	2					2	2	2	2	2		
CO5	3	3	2	2				2	2	2		2	2	1	
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT- E	Bloom's T	Faxonom	iy								

		ASSESSMEN	FPATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	80	-	-	-	-	100
CAT2	20	80	-	-	-	-	100
CAT3	20	80	-	-	-	-	100
ESE	20	80	-	-	-	-	100
* ±3% may be varied (	CAT 1,2,3 – 50 mark	s & ESE – 100 mark	s)	·		·	



		22ECE21- RADAR ENGINEERIN	IG					
Program &Branch		B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequi	sites	Antenna and Wave Propagation	7	PE	3	0	0	3
Preamble	9	To gain knowledge in the different types of radar systems u and early-warning systems	sed for air-1	traffic control,	long	ı ranç	je sur	veillance
Unit– I		Radar and Radar Equation:						9
in noise-	Receiver	radar –The simple form of the Radar equation- Radar block dia noise and the signal-to-noise ratio-Probability density funct pulses - Transmitter power - Pulse repetition frequency	• • • •					•
Unit– II		MTI and Pulse Doppler Radar:						9
		ppler and MTI radar-Delay line cancelers—Staggered Pf performance—Pulse doppler radar	RF-Doppler	filter banks-	-Mov	ving t	arget	detector
Unit– III		Tracking Radar:						9
•		-Monopulse tracking-Conical scan and sequential lobing-Limi	tations to tra	acking accura	су –	Low-a	angle	tracking-
-	in range-	-Comparison of trackers						
Unit– IV		Detection of Signals in Noise and Radar Waveform Des	-					9
		Detectors—Automatic detection—Integrators—Constant-False nt - Theoretical accuracy of radar measurements—Time delay					•	
Unit- V	-	Phased Array and Navigational Aids:						9
		asic concepts, feeds, phase shifters, frequency scan ar VOR,ILS and LORAN	rays, appli	cations, adv	anta	ges	and I	imitations
								Total:4
ТЕХТВО	OK:							
1. N	И.I.Skolnik	, Introduction to Radar Systems, McGraw Hill, New Delhi,44 th	Reprint,20	18, for Units	I, II, I	II, IV	•	
2.	G.S.N.Raju	I, Radar Engineering and Fundamentals of Navigational Aids	I.K. Interna	ational, New [	Delhi	,2019	), for l	Jnit V.
REFERE	NCES:							
1.	Gottapu Sa	asi Bhushana Rao, Microwave and Radar Engineering, Pearso	n Educatio	n Chennai 1 st	Ed	tion.2	2014	

		UTCON ion of t		se, the st	udents	s will be a	able to							BT Ma (Highest			
CO1	outli	ine the p	orinciples	s of radar									U	Understanding(K2			
CO2	illus	illustrate the working of pulse Doppler radar and MTI radar Understanding(K							ing(K2)								
CO3	CO3 compare the various types of tracking radar													Understanding(K2			
CO4 infer methods of detecting signals in noise													U	Inderstand	ing(K2)		
CO5	rela	te the p	rinciples	of radar ir	n phase	ed array a	and navi	gational	aids				U	Inderstand	ing(K2)		
						Мар	ping of	COs w	ith PO	s and P	SOs						
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO	01	3	2	2	2				2				2	2	3		
CO	)2	3											2		3		
CO	)3	3		2									2				
CO	)4	3		2	2								2				
CO	)5	3		2	2		2	2	2			1	2	2	3		
1–Slig	ht,2–I	Modera	te,3–Sul	ostantial,	BT-Blo	oom's Ta	xonomy	1		•							
						ASSES	SMENT	PATTE	RN -T	HEORY							
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)	•	Apply (K3)		Analyz (K4) 9	•	Evaluating (K5) %		reating (K6) %	Total %		
	CAT	1		15		85		-		-		-		-	100		
	CAT	2		15	Ì	85		-		-		-		-	100		
	CAT	3		15	Ì	85		-		-		-		-	100		
	ESE			15		85		-		-		-		-	100		
* ±3%	may b	oe varie	d (CAT 1	,2,3 – 50	marks	& ESE –	100 ma	rks)					•		·		



	22ECE22 - AUTOMOTIVE ELECTRONI						
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credi
Prerequisites	Nil	7	PE	3	0	0	3
Preamble	To understand the concepts of automotive systems and apple based automobile devices for all vehicle conditions	y the various	novel methods	s to de	velop	electr	ronic
Unit – I	Introduction						9
Exhaust Analyzer <b>Unit – II</b> Charging system	actuators, Stepper motor actuator and vacuum operated actua -Emission limits. Charging and Starting systems Requirements of the charging system – Principles – Alternato Starter motors and circuits – Types of starter motors.						9
Unit – III	Ignition and Injection Systems						9
(COP) ignition -	Ignition fundamentals – Electronic ignition systems – Electronic Spark Plugs - Electronic fuel Control : Combustion – Engine f						
Engine and Emis	I Injection: Petrol fuel injection – Diesel fuel injection.  Engine and Emission Control Systems sion Control Systems: Control modes for Ignition and fuel contro						9 onverter
EGR – SCR – De	Engine and Emission Control Systems sion Control Systems: Control modes for Ignition and fuel contro Nox Trap - Diagnostics systems in modern automobiles - In vehic						onverter
Engine and Emis EGR – SCR – De <b>Unit – V</b> Antilock braking s	Engine and Emission Control Systems         sion Control Systems: Control modes for Ignition and fuel contro         Nox Trap - Diagnostics systems in modern automobiles - In vehic         Chassis, Comfort and Safety Systems         ystem - Traction and Stability Control – Active Suspension – Elec         control – Airbag and Seat belt tensioners - Centralized door loce	tronic control	CAN, LIN, FLE	XRAY	, MOS	ST. – Crui	onverter 9 ise contro Automat
Engine and Emis EGR – SCR – De <b>Unit – V</b> Antilock braking s – Adaptive cruise Parking System -	Engine and Emission Control Systems         sion Control Systems: Control modes for Ignition and fuel contro         Nox Trap - Diagnostics systems in modern automobiles - In vehic         Chassis, Comfort and Safety Systems         ystem - Traction and Stability Control – Active Suspension – Elec         control – Airbag and Seat belt tensioners - Centralized door loce	tronic control	CAN, LIN, FLE	XRAY	, MOS	ST. – Crui	onverter 9 ise contr Automat
Engine and Emis EGR – SCR – De Unit – V Antilock braking s – Adaptive cruise Parking System - TEXT BOOK:	Engine and Emission Control Systems sion Control Systems: Control modes for Ignition and fuel contro Nox Trap - Diagnostics systems in modern automobiles - In vehic Chassis, Comfort and Safety Systems ystem - Traction and Stability Control – Active Suspension – Elec control – Airbag and Seat belt tensioners - Centralized door loc Electric vehicles.	tronic control o	CAN, LIN, FLE of automatic tra - Obstacle ave	EXRAY ansmis oidanc	r, MOS ssion - e Rac	ST. - Crui lar - J	onverter 9 ise contr
Engine and Emis EGR – SCR – De Unit – V Antilock braking s – Adaptive cruise Parking System - TEXT BOOK:	Engine and Emission Control Systems         sion Control Systems: Control modes for Ignition and fuel contro         Nox Trap - Diagnostics systems in modern automobiles - In vehic         Chassis, Comfort and Safety Systems         ystem - Traction and Stability Control – Active Suspension – Elec         control – Airbag and Seat belt tensioners - Centralized door loce	tronic control o	CAN, LIN, FLE of automatic tra - Obstacle ave	EXRAY ansmis oidanc	r, MOS ssion - e Rac	ST. - Crui lar - J	onverter 9 ise contr Automat
Engine and Emis EGR – SCR – De Unit – V Antilock braking s – Adaptive cruise Parking System - TEXT BOOK: 1. Tom Den	Engine and Emission Control Systems sion Control Systems: Control modes for Ignition and fuel contro Nox Trap - Diagnostics systems in modern automobiles - In vehic Chassis, Comfort and Safety Systems ystem - Traction and Stability Control – Active Suspension – Elec control – Airbag and Seat belt tensioners - Centralized door loc Electric vehicles.	tronic control o	CAN, LIN, FLE of automatic tra - Obstacle ave	EXRAY ansmis oidanc	r, MOS ssion - e Rac	ST. - Crui lar - J	onverter 9 ise contr Automat
Engine and Emis EGR – SCR – De Unit – V Antilock braking s – Adaptive cruise Parking System - TEXT BOOK: 1. Tom Den REFERENCES:	Engine and Emission Control Systems     sion Control Systems: Control modes for Ignition and fuel contro     Nox Trap - Diagnostics systems in modern automobiles - In vehic     Chassis, Comfort and Safety Systems     ystem - Traction and Stability Control – Active Suspension – Elec     control – Airbag and Seat belt tensioners - Centralized door loc     Electric vehicles.	cle networks: ( tronic control c cking system -	CAN, LIN, FLE of automatic tr – Obstacle ave	EXRAY ansmis oidanc	r, MOS ssion - e Rac n, 201	ST. - Crui lar – , 8.	9 ise contr Automat
Engine and Emis         EGR – SCR – De         Unit – V         Antilock braking s         – Adaptive cruise         Parking System -         TEXT BOOK:         1.         Tom Den         REFERENCES:         1.         Hollember	Engine and Emission Control Systems sion Control Systems: Control modes for Ignition and fuel contro Nox Trap - Diagnostics systems in modern automobiles - In vehic Chassis, Comfort and Safety Systems ystem - Traction and Stability Control – Active Suspension – Elec control – Airbag and Seat belt tensioners - Centralized door loc Electric vehicles. ton, "Automobile Electrical and Electronics Systems", 5 th Edition,	cle networks: ( tronic control c cking system - Edward Arno	CAN, LIN, FLE of automatic tr – Obstacle ave Id Publishers, on, Delmar Pu	XRAY ansmis oidanc Londo blishe	r, MOS ssion - e Rac n, 201 rs, Ne	ST. - Crui lar - , 8. w Yor	9 ise contr Automa Total:4

	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	interpret the continuous changes in emission norms of India and uses of electronic devices in automobile applications.	Understanding (K2)
CO2	describe the operations of charging and starting techniques involved in Vehicles.	Understanding (K2)
CO3	utilize the principles of electronic ignition and fuel injection system used in automobile.	Understanding (K2)
CO4	apply the engine and fuel control system for ECU used in engine management system.	Applying (K3)
CO5	employ the essential comfort and safety systems for automobile.	Applying (K3)

	Mapping of COs with POs and PSOs														
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	2	2			2	3	3	3				2	2		
CO2	2				2							2	2		
CO3	3		2	2	3		2					2	2		
CO4	3	2	2	2	3	2	2					2	2		
CO5	3	2	2	2	3	3	2	3				3	2	2	
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT- E	Bloom's T	Taxonom	iy								

	ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	20	80	-	-	-	-	100						
CAT2	20	80	-	-	-	-	100						
CAT3	10	60	30	-	-	-	100						
ESE	10	60	30	-	-	-	100						
±3% may be varied (	CAT 1.2.3 – 50 mark	s & ESE – 100 mark	s)		Ш		1						

Programme &Branch	B.E & Electronics and Communication Engineering	g Sem.	Category	L	т	Р	Credi
Prerequisit	es Nil	7	PE	3	0	0	3
		•					•
Preamble	To impart knowledge on MAC layer and PHY layer fur	nctionalities, rout	ing, mobility a	nd s	ynchr	oniza	tion.
Unit– I	IEEE802.15.4 PHY layer						9
topologies -	<ul> <li>Types of Wireless Sensor Networks - Hardware components Sensor network Communication stack - Superframe structure - D range - Channel assignments -Minimum LIFS and SIFS periods-</li> </ul>	ata transfer mod	el - Frame stru				
Unit– II	Medium Access Protocol						9
	onal description - MAC frame formats and MAC command frame					Protoc	ols - Tir
Division Mul <b>Unit– III</b>	Itiple Access - Carrier Sense Multiple Access -Sensor MAC- Ber Wireless Link Estimation Protocols	rkeley MAC - Op	timizations of	B-M	AC		9
	- Links and geographic distance - Asymmetric links - Link stabili	ty and burstines	Naming and	add	rocci	na - A	-
	es and names - Link estimation protocols - Link quality based p	protocol - Delive	ry rate based	prot	ocol	- Colle	ection tre
protocol <b>Unit– IV</b>	Routing and Data Aggregation		-	<u> </u>			9
protocol <b>Unit– IV</b> Routing ba techniques compressio	Routing and Data Aggregation sics - Full-network broadcast - Location-based routing diru random clustering - Nearest sink - Geographic clusterion-Statistical techniques.	ected diffusion	Collection tr	ee p	protoc	col - I	<b>9</b> Clusteri gregatic
protocol Unit– IV Routing ba techniques compressio Unit– V	Routing and Data Aggregation         usics - Full-network broadcast - Location-based routing direction         random clustering - Nearest sink - Geographic clusterion         bn-Statistical techniques.         Localization and Synchronization	ected diffusion ing -In-network	Collection tropped processing	ee p and	orotoc Dat	col - ( a ag	9 Clusteri gregatic 9
protocol Unit– IV Routing ba techniques compressio Unit– V Time synch protocol - Lu Ranging scł	Routing and Data Aggregation         Isics - Full-network broadcast - Location-based routing direction         random clustering - Nearest sink - Geographic clustering         on-Statistical techniques.         Localization and Synchronization         ronization-Clocks and delay sources -Lightweight tree synchronic ocalization challenges and properties - Types of location inform hemes-Triangulation-Trilateration - Range-based localization - R	ected diffusion ing -In-network nization- Referen nation - Pre-depl	Collection troprocessing	ee p and	orotoc Dat ichror Prox	col - ( a age nizatio	9 Clusteri gregatic 9 on- No ir scheme n - Point
protocol Unit– IV Routing ba techniques compressio Unit– V Time synch protocol - Lu Ranging sch Triangle(PIT	Routing and Data Aggregation         Isics - Full-network broadcast - Location-based routing direction         random clustering - Nearest sink - Geographic clusterion         con-Statistical techniques.         Localization and Synchronization         ronization-Clocks and delay sources -Lightweight tree synchronic clusterion         ocalization challenges and properties - Types of location inform         hemes-Triangulation-Trilateration - Range-based localization - R	ected diffusion ing -In-network nization- Referen nation - Pre-depl	Collection troprocessing	ee p and	orotoc Dat ichror Prox	col - ( a age nizatio	9 Clusteri gregatic 9 on- No ir scheme n - Point
protocol Unit– IV Routing ba techniques compressio Unit– V Time synch protocol - Lu Ranging sch Triangle(PIT	Routing and Data Aggregation         Isics - Full-network broadcast - Location-based routing direction         random clustering - Nearest sink - Geographic clusterion         con-Statistical techniques.         Localization and Synchronization         ronization-Clocks and delay sources -Lightweight tree synchronic clusterion         ocalization challenges and properties - Types of location inform         hemes-Triangulation-Trilateration - Range-based localization - R	ected diffusion ing -In-network nization- Referen nation - Pre-depl Range-free localiz	Collection tr processing nce broadcas oyment scher zation -Hop-ba	ee p and t syn nes- ased	orotoc Dat ochror Prox local	col - ( a age nizatio	9 Clusteri gregatic 9 n- No ir scheme
protocol Unit– IV Routing ba techniques compressio Unit– V Time synch protocol - Le Ranging sch Triangle(PIT TEXTBOOK 1. Anr	Routing and Data Aggregation         asics - Full-network broadcast - Location-based routing direction clustering - Nearest sink - Geographic clustering         constraints         bits         constraints         constration         constraints <td>ected diffusion ing -In-network nization- Referen nation - Pre-depl Range-free localiz</td> <td>Collection tr processing nce broadcas oyment scher zation -Hop-ba</td> <td>ee p and t syn nes- ased</td> <td>orotoc Dat ochror Prox local</td> <td>col - ( a age nizatio</td> <td>9 Clusteri gregatic 9 on- No ir scheme n - Point</td>	ected diffusion ing -In-network nization- Referen nation - Pre-depl Range-free localiz	Collection tr processing nce broadcas oyment scher zation -Hop-ba	ee p and t syn nes- ased	orotoc Dat ochror Prox local	col - ( a age nizatio	9 Clusteri gregatic 9 on- No ir scheme n - Point
protocol Unit– IV Routing ba techniques compressio Unit– V Time synch protocol - Le Ranging sch Triangle(PIT TEXTBOOK 1. Anr REFERENC 1. IEE	Routing and Data Aggregation         asics - Full-network broadcast - Location-based routing direction clustering - Nearest sink - Geographic clustering         constraints         bits         constraints         constration         constraints <td>ected diffusion ing -In-network nization- Referen nation - Pre-depl Range-free localiz</td> <td>Collection traprocessing</td> <td>ee p and t syn nes- ased</td> <td>orotoc Dat Prox local 016.</td> <td>nizatio</td> <td>9 Clusteri gregatic on- No ir scheme n - Point Total:</td>	ected diffusion ing -In-network nization- Referen nation - Pre-depl Range-free localiz	Collection traprocessing	ee p and t syn nes- ased	orotoc Dat Prox local 016.	nizatio	9 Clusteri gregatic on- No ir scheme n - Point Total:
protocol Unit– IV Routing ba techniques compressio Unit– V Time synch protocol - Le Ranging sch Triangle(PIT TEXTBOOK 1. Anr REFERENC 1. IEE WP 2. T.W	Routing and Data Aggregation         sics - Full-network broadcast - Location-based routing direction clustering - Nearest sink - Geographic clustering         bitsics - Full-network broadcast - Location-based routing direction clustering - Nearest sink - Geographic clustering         bitsics - Full-network broadcast - Location-based routing direction clustering - Nearest sink - Geographic clustering         bitsics - Full-network broadcast - Location-based routing direction clustering - Nearest sink - Geographic clustering         bitsics - Statistical techniques.         Localization and Synchronization         ronization-Clocks and delay sources -Lightweight tree synchronic ocalization challenges and properties - Types of location inform hemes-Triangulation-Trilateration - Range-based localization - R         f)         K:         ma Förster, "Introduction to Wireless Sensor Networks", 1 St Edition         CES:         E Standard for Local and metropolitan area networks, Part 1	ected diffusion ing -In-network nization- Referen nation - Pre-depl Range-free localiz	Collection tr processing nce broadcas oyment scher zation -Hop-ba	ee p and t syn nes- ased ey,2	orotoc Dat Cchror Prox Iocal 016.	a age nization ization ization	9 Clusteri gregatio 9 m- No ir scheme n - Poin <b>Total</b> :

		UTCON ion of t		se, the st	udents	will be a	able to							BT Maj (Highest				
CO1	inte	rpret the	e physica	l layer fun	ctional	ities of IE	EE 802	.15.4 se	ensor d	evices			ι	Jnderstand	ding(K2)			
CO2	app	ly MAC	frame m	odeling of	IEEE8	02.15.4 s	ensor d	evices					Applying(K3)					
CO3	identify suitable link estimation protocols for WSN topology management.														Applying(K3)			
CO4	apply routing and data aggregation mechanism of sensor nodes.														ng(K3)			
CO5	.04														ding(K2)			
					1	1				and PS		1						
COs/I	POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2			
CO	)1	3	2	1										2	1			
CO	2	3	2	1									1	3	2			
CO	3	3	3	2	2	1			2	2		2	2	3	2			
CO	4	3	2	1	1				2				1	3	2			
CO	5	2	1									2		3	1			
1–Slig	ht,2–N	loderat	e,3–Subs	stantial, B	T-Bloor	n's Taxoi	nomy											
						ASS	SESSMI		TTERN	- THEO	RY							
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng l	Jndersta (K2)		Apply (K3)	•	Analyzi (K4) 9	•	Evaluating (K5) %		reating (K6) %	Total %			
	CA	T1		20		40		40	)	-		-		-	100			
	CA	Г2		10		45		45	5	-		-		-	100			
	CA	T3		10		45		45	5	-		-		-	100			
	ESE			10		50		40	)	-		-		-	100			
*±3% I	may b	e varied	I (CAT 1,	2,3 – 50 r	narks 8	ESE-10	00 mark	s)										

		22ECE24- INDUSTRY 4.0										
Prog Bran	ramme & ch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit				
Prere	equisites	Microprocessor and Microcontroller7PE300										
Prea	mble	To acquire the fundamentals of industry 4.0 -IIoT revolution identify applications of Sensors for industry 4.0	s, technolc	gy and its bu	sine	ss us	e case	e and				
Unit	-1	Introduction to Industry 4.0 and Industrial Internet of Th	ings					9				
		↓ try 4.0 – IIoT (Industrial Internet of Things) Industry 4.0: Introdu assessment of industries - Smart business perspective – Cybe						of Industr				
Unit		Industrial IoT and Reference Architecture:	. cocanty		0.0.0	. <u>,</u>		9				
Defin		0 – IIC - Industrial internet systems - Industrial sensing -Indu ss models of IoT and IIoT – Reference architecture of IoT and health.										
Unit	- 111	Off-Site and On-Site Key Technologies						9				
		es: Introduction - Cloud computing – Fog computing. On-site data and advanced analytics - Smart factories - Lean manufac			ion -	Aug	mente	ed reality				
Unit	– IV	Industrial Data Acquisition Systems						9				
Indus		on – characteristics – categories. Actuators: Thermal, Hydr mission: Fieldbus – Profibus –HART – Modbus – CAN – Devic										
Unit		Industrial IoT Analytics and Case Study						9				
-Artifi		cs -Categorization of analytics – Usefulness and challenges o e- Applications of analytics across value chain -Plant security										
								Total:4				
TEXT	F BOOK:											
1.		a, Chandana Roy, Anandarup Mukherjee, "Introduction to Indu C Press, USA, 2021.	strial Interr	et of Things	and	Indus	stry 4.0	D", 1 st				
REFE	ERENCES:											
1.	Alasdair Gi	Ichrist, "Industry 4.0: The Industrial Internet of Things", 1 st Edit	ion, APress	s; 2016.								
2.	Alp Ustund	ag, EmreCevikcan , "Industry 4.0: Managing the Digital Transf	ormation",	1 st Edition, Sp	oring	er Int	ernati	onal				

		UTCON tion of t		se, the st	udent	s will be a	able to						(	BT Mapp Highest L	
CO1	sum	maries	the cond	epts and	busine	ess opport	unities c	of Indus	try 4.0				Ur	nderstandi	ng (K2)
CO2	exp	lain the	role of lo	T and Ilo	T archi	itecture fo	r Indust	ry 4.0					Ur	derstandi	ng (K2)
CO3	outl	Understanding (K2)													
CO4	ider	Applying (K3)													
CO5	utili		Applying	(K3)											
						Mappin	g of CC	s with	POs ar	nd PSOs	5				
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CC	01	2	2					2						2	2
CC	)2	2	2	2	2									2	2
CC	)3	3	2	3		3	2				2	2		2	2
CC	)4	3	3	3	2	2	2	2			2	2		2	2
CC	)5	2	3	2	3	2	2	2			2			2	2
1 – Sli	ght, 2	– Mode	erate, 3 -	Substant	ial, BT	- Bloom's	Taxono	omy							
						ASSES	SMENT	PATTE	ERN - T	HEORY	,				
	st / Bl Categ	oom's ory*	Re	ememberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9	•	Evaluating (K5) %		reating (K6) %	Total %
CAT1 30						70		-		-		-		-	100
	CAT	2		30		70		-		-		-	-		100
	CAT	3		20		50		30	)	-		-		-	100
	ESI	=		20		50		30	)	-		-		-	100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



## 22ECE25-TESTING AND FAULT DIAGNOSIS OF VLSI CIRCUITS

Programme& Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	VLSI Design	7	PE	3	0	0	3
Preamble	To infer the process of test generation, Design For Testability	(DFT) archi	tecture and fau	lt dia	gnosi	S	
Unit – I	Fault Modeling and Simulation:						9
	d faults - Functional versus structural testing - Levels of fault mode ithms for true-value simulation - Algorithms for fault simulation - S					cuits	for
Unit – II	Test Generation for Combinational Circuits:						9
	presentation - Redundancy identification - Testing as a global pro I algorithm - Test generation systems -Test compaction.	blem - Comb	inational ATPC	3 algo	orithm	n: D-a	gorithm
Unit – III	Test Generation for Sequential Circuits:						9
ATPG for single of	clock synchronous circuits - Time-Frame expansion method - Simu	ulation based	sequential circ	cuit A	TPG		
Unit – IV	Design for Testability (DFT):						9
	oc design for testability techniques - Controllability and observabilit I scan designs - Board level and system level DFT approaches - E			rs - G	ener	c sca	n based
		Journauly 300	ii standaras				
Unit – V	Logic - level Diagnosis:	Journauly Sea	in standards				9
Basic concepts -		ction-Fault di	agnosis for co		ationa	I circu	uits -
Expert systems for	Logic - level Diagnosis: Fault dictionary – Guided - probe testing - Diagnosis by UUT redu	ction-Fault di	agnosis for co		ationa	I circu	-
Basic concepts - Expert systems for TEXT BOOK:	Logic - level Diagnosis: Fault dictionary – Guided - probe testing - Diagnosis by UUT redu or diagnosis - Effect cause analysis - Diagnostic reasoning based	ction-Fault di on structure a	agnosis for co and behaviour.				uits - Total :4
Basic concepts -       Expert systems for       TEXT BOOK:       1.     Bushne       Academ	Logic - level Diagnosis: Fault dictionary – Guided - probe testing - Diagnosis by UUT redu or diagnosis - Effect cause analysis - Diagnostic reasoning based II M.L. and Agrawal V.D., "Essentials of Electronic Testing for Digi nic Publishers, 2 nd Edition, 2004, for Units I, II, III.	ction-Fault di on structure a tal, Memory a	agnosis for co and behaviour. and Mixed- Sig	nal V	LSI C	ircuit	Total :4
TEXT BOOK:       1.     Bushne Academ       2     Abramo	Logic - level Diagnosis: Fault dictionary – Guided - probe testing - Diagnosis by UUT redu or diagnosis - Effect cause analysis - Diagnostic reasoning based	ction-Fault di on structure a tal, Memory a	agnosis for co and behaviour. and Mixed- Sig	nal V	LSI C	ircuit	Total :4
TEXT BOOK:       1.     Bushne Academ       2     Abramo	Logic - level Diagnosis: Fault dictionary – Guided - probe testing - Diagnosis by UUT redu or diagnosis - Effect cause analysis - Diagnostic reasoning based II M.L. and Agrawal V.D., "Essentials of Electronic Testing for Digi nic Publishers, 2 nd Edition, 2004, for Units I, II, III. vici, M., Breuer, M.A and Friedman, A.D., "Digital Systems Testing	ction-Fault di on structure a tal, Memory a	agnosis for co and behaviour. and Mixed- Sig	nal V	LSI C	ircuit	Total :4
TEXT BOOK:         1.       Bushne         2.       Abramo         Inpress         REFERENCES:         1.       Laung	Logic - level Diagnosis: Fault dictionary – Guided - probe testing - Diagnosis by UUT redu or diagnosis - Effect cause analysis - Diagnostic reasoning based II M.L. and Agrawal V.D., "Essentials of Electronic Testing for Digi nic Publishers, 2 nd Edition, 2004, for Units I, II, III. vici, M., Breuer, M.A and Friedman, A.D., "Digital Systems Testing	ction-Fault di on structure a tal, Memory a g and Testab	agnosis for co and behaviour. and Mixed- Sig le Design", Jai	nal V co Pu	LSI C	Circuits	<b>Total :4</b> s", Kluwe

	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	interpret the types of fault models and simulation approaches	Understanding (K2)
CO2	generate test patterns to detect the fault in combinational circuits	Applying (K3)
CO3	understand the generation of test patterns to detect the fault in sequential circuits	Understanding (K2)
CO4	infer the concepts of Design for testability	Understanding (K2)
CO5	infer the measures of system diagnosability	Understanding (K2)

					Маррі	ing of Co	Os with	POs an	d PSOs	i				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2									2	2	2
CO2	3	3	2									2	2	2
CO3	3	3	2									2	2	2
CO4	3	3	2									2	2	2
CO5	3	3	2									2	2	2
1 – Slight, 2	– Mode	rate, 3 –	Substant	tial, BT- I	Bloom's ⁻	Taxonom	iy							

	ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	15	65	15	-	-	-	100							
CAT2	15	65	15	-	-	-	100							
CAT3	10	90	-	-	-	-	100							
ESE	10	75	15	-	-	-	100							
* +3% may be varied (	CAT 1 2 3 - 50 mark	s & ESE _ 100 mark	e)											

 $\pm 3\%$  may be varied (CAT 1,2,3 – 50 marks & ESE -100 marks)



	22ECE26- MEMS DESIGN						
Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	VLSI DESIGN	7	PE	3	0	0	3
Preamble	To understand the concepts of standard MEMS and apply th design and manufacturing of a MEMS device.	e knowledge	of micro fabric	ation	techn	iques	for the
Unit – I	Materials for MEMS and Scaling Laws:						9
Microsystems and crystals. Scaling la Scaling in heat tra	d microelectronics - Working principle- Si substrate - Silicon aws - Scaling in geometry - Scaling in electrostatic forces - Sca nsfer	compounds - Iling in electro	Gallium arse magnetic force	nide es - S	-Quai Scalin	rtz-pie g in e	zoelectri lectricity
Unit – II	Micro Actuators and Micro Sensors:						9
	echniques- Micro actuators – Micro sensors - Micro motors – rinciples, Design rules, modeling and simulation - Verification an		-Micro valves	– Mi	cro g	ripper	s – Micro
Unit – III	Basic Mechanics for Micro System Design:	0					9
	hin plates - Mechanical vibration - Thermo mechanics - Thermal sess and interfacial fracture mechanics.	stresses - Fra	cture mechani	cs -S	ress	intens	ity factor
Unit – IV	Fabrication Process and Micromachining:						9
	on wafer formation - Photolithography - Ion implantation - Diffus Etching - Bulk Micro manufacturing - Surface micro machining –			hysic	al va	oor de	position
Unit – V	Micro System Design, Packaging and Applications:						9
Device level - Sys	sign considerations - Process design - Mechanical design – Masł tem level – Packaging techniques - Die preparation - Surface bo tive - Aero space – Telecommunications - RF MEMS						
							Total:4
TEXT BOOK:							
1. Tai-Ran H India, 200	Isu, "MEMS and Microsystems Design, Manufacture, and Nano s 8.	scale Enginee	ring", 2 nd Editi	on, J	ohn V	Viley8	sons,
REFERENCES:							
1. Mohamed	I Gad-el-Hak, "The MEMS Hand book", 2 nd Edition, CRC press, 2	2006.					
	o, "Micromechanical Transducers: Pressure Sensors, Accelerome						

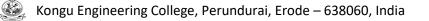
	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	explain MEMS concepts and scaling laws	Understanding(K2)
CO2	design Micro sensors and actuators	Applying (K3)
CO3	infer knowledge about mechanics	Understanding(K2)
CO4	utilize micro fabrication and micro manufacturing techniques for designing MEMS	Applying (K3)
CO5	apply the knowledge of layout and packaging techniques to design a micro system	Applying (K3)

	Mapping of COs with POs and PSOs														
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	2	2	3								2	3		
CO2	3	3	3	3	3							3	3		
CO3	3	2	2	3											
CO4	3	3	3	3	3							3	3		
CO5	3	2	3	3	3							3	3		
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT- E	Bloom's ⁻	Taxonom	iy								

	ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	20	60	20	-	-	-	100							
CAT2	20	60	20	-	-	-	100							
CAT3	25	40	35	-	-	-	100							
ESE	10	50	40	-	-	-	100							
* ±3% may be varied (	CAT 1,2,3 – 50 mark	s & ESE – 100 mark	s)				-							

Program me & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	7	PE	3	0	0	3
Preamble	To understand the concepts and apply the skills needed for soft	vare quality	assurance an	d tes	stina.		
Unit – I	Software Quality Assurance and Review Techniques:						9
SQA group in	ty –Need for quality –Quality control Vs Quality assurance –Qua an Organization. Structured walkthroughs –Inspections –Variou Some psychological aspects of reviews.						
Unit – II	Software Measurement and Metrics:						9
during softwar Requirements	ty –Models for software product Quality –Process Quality. Meas re life cycle context –Defect metrics –Metrics for software ma s related metrics –Measurements and process improvement –M	intenance -	-Classificatio				
Unit – III	Basics of Testing: Definition- Need for Testing- Testing Approaches-Essentials, fea						9
	Assessing Capabilities, Staff Competency, and User Satisfactio	n-Creating a	an environme	nt si	uppor	tive c	of softwar
<b>Unit – IV</b> Overview -The	ng the software testing process — Testing Guidelines. Basics of Software Testing process: Seven Step Software Testing Process - Organizing for testing				lopin	g the	9 test plan
<b>Unit – IV</b> Overview -The Workbench-Pr	<b>Basics of Software Testing process:</b> e Seven Step Software Testing Process - Organizing for testing rocedure, Verification testing-Workbench-Procedure -Validation test				lopin	g the	-
Unit – IV Overview -The Workbench-Pr Unit – V Analyzing and	Basics of Software Testing process: e Seven Step Software Testing Process - Organizing for testing	sting-Workbe	ench-Procedu	re.	•		test plan
Unit – IV Overview -The Workbench-Pr Unit – V Analyzing and	Basics of Software Testing process: e Seven Step Software Testing Process - Organizing for testing rocedure, Verification testing-Workbench-Procedure -Validation test Software Testing process: reporting test results-Workbench-Procedure, Testing software system	sting-Workbe	ench-Procedu	re.	•		test plan 9 ns-Testing
Unit – IV Overview -The Workbench-Pr Unit – V Analyzing and	Basics of Software Testing process: e Seven Step Software Testing Process - Organizing for testing rocedure, Verification testing-Workbench-Procedure -Validation test Software Testing process: reporting test results-Workbench-Procedure, Testing software systems - Using Agile Methods to Improve Software Testing.	sting-Workbe	ench-Procedu	re.	•		test plan 9 ns-Testing
Unit – IV Overview -The Workbench-Pr Unit – V Analyzing and web-based sys TEXT BOOK:	Basics of Software Testing process: e Seven Step Software Testing Process - Organizing for testing rocedure, Verification testing-Workbench-Procedure -Validation test Software Testing process: reporting test results-Workbench-Procedure, Testing software systems - Using Agile Methods to Improve Software Testing.	sting-Workbo	ench-Procedu y-Testing clier	re. nt/se	rver s	systen	test plan 9 ns-Testing Total:4
Unit – IV Overview -The Workbench-Pr Unit – V Analyzing and web-based sys TEXT BOOK: 1. Nina S 2017 f	Basics of Software Testing process:         a Seven Step Software Testing Process - Organizing for testing rocedure, Verification testing-Workbench-Procedure -Validation test         Software Testing process:         reporting test results-Workbench-Procedure, Testing software systems - Using Agile Methods to Improve Software Testing.         S. Godbole, "Software Quality Assurance Principles and Practice",	sting-Workbo	ench-Procedu y-Testing clier Narosa Publi	re. ht/se	rver s	systen	test plan 9 ns-Testing Total:4
Unit – IV Overview -The Workbench-Pr Unit – V Analyzing and web-based sys TEXT BOOK: 1. Nina S 2017 f	Basics of Software Testing process:         a Seven Step Software Testing Process - Organizing for testing rocedure, Verification testing-Workbench-Procedure -Validation test         Software Testing process:         reporting test results-Workbench-Procedure, Testing software systems - Using Agile Methods to Improve Software Testing.         S. Godbole, "Software Quality Assurance Principles and Practice", for Units I, II.         William, "Effective Methods for Software Testing", 3 rd Edition, Wile	sting-Workbo	ench-Procedu y-Testing clier Narosa Publi	re. ht/se	rver s	systen	test plan 9 ns-Testing Total:4
Unit – IV Overview -The Workbench-Pr Unit – V Analyzing and web-based sys TEXT BOOK: 1. Nina S 2017 f 2. Perry V REFERENCES	Basics of Software Testing process:         a Seven Step Software Testing Process - Organizing for testing rocedure, Verification testing-Workbench-Procedure -Validation test         Software Testing process:         reporting test results-Workbench-Procedure, Testing software systems - Using Agile Methods to Improve Software Testing.         S. Godbole, "Software Quality Assurance Principles and Practice", for Units I, II.         William, "Effective Methods for Software Testing", 3 rd Edition, Wile	2 nd Edition, y, New Delh	y-Testing clier Narosa Publi	re. nt/se shino	rver s g Hou I, IV,	ysten Ise, N V.	test plan 9 ns-Testing Total:4
Unit – IV Overview -The Workbench-Pr Unit – V Analyzing and web-based sys TEXT BOOK: 1. Nina S 2017 f 2. Perry N REFERENCES 1. Morde Delhi,	Basics of Software Testing process:         a Seven Step Software Testing Process - Organizing for testing rocedure, Verification testing-Workbench-Procedure -Validation test         Software Testing process:         reporting test results-Workbench-Procedure, Testing software systems - Using Agile Methods to Improve Software Testing.         S. Godbole, "Software Quality Assurance Principles and Practice", for Units I, II.         William, "Effective Methods for Software Testing", 3 rd Edition, Wile         S:         echai Ben-Menachem & Garry S. Marliss, "Software Quality", 2 nd E	2 nd Edition, y, New Delh	y-Testing clier Narosa Publi i,2006, for Ur	re. ht/se shinq its II	g Hou I, IV, Pvt.	vsten Ise, N V.	test plan 9 ns-Testing Total:4 lew Delhi, New

		UTCOM		se, the st	udent	s will be a	able to						(	BT Map Highest L	
CO1	expl	lain the	compon	ents of sof	tware	quality as	surance	system	าร				Ur	nderstandi	ng (K2)
CO2	app	ly the co	oncepts,	metrics, a	nd mo	dels in so	ftware q	uality a	ssuran	се				Applying	(K3)
CO3	inte	rpret the	e step by	step activ	rities a	ind set up	environ	ment fo	r softw	are testi	ng		Ur	nderstandi	ng(K3)
CO4	deve	elop pro	cedures	and work			Applying	(K3)							
CO5				nt server, ng the tes	the agile		Applying	(K3)							
						Марр	ing of C	COs wit	h POs	and PS	Os				
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	)1	3													
CO	)2	3	2	2	2				2					2	2
CO	)3	3	2	2		3			2				2	2	2
CO	)4	3	2	2	2	2			2			2	2	2	2
CO	)5	3	2	2	2	2			2			2	2	2	2
1 – Sli	ight, 2	– Mode	erate, 3-	- Substan	tial, B	T- Bloom'	s Taxor	nomy							
							ASSES	SMENT	PATT	ERN - T	HEORY				
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)	•	Apply (K3)	-	Analyz (K4) 9	•	Evaluating (K5) %		reating (K6) %	Total %
	CA	AT1		10		65		25	5	-		-		-	100
CAT2 10 65 25 ⁻											-		-	100	
	CA	AT3	AT3 10 55 35				-		-	100					
	ESE	Ξ		10		55		35	5	-		-		-	100
* ±3%	may l	oe varie	d (CAT	1,2,3 – 50	mark	s & ESE –	- 100 m	arks)							



	(Common to All BE/B	3Tech branches)					
Programme Branch	& All BE/BTech branches	Sem.	Category	L	т	Ρ	Credit
Prerequisite	s Nil	7	GE	3	0	0	3
Preamble	This course familiarizes the fundamental conc also disseminate the process involved in collec a presentable form using latest tools.						
Unit – I	Introduction to Research						9
	o Research: Types and Process of Research - Outcome search Problem - Errors in Selecting a Research Probl Literature Review			Prob	olem ·	- Char	r
							9
	view: Literature Collection - Methods - Analysis - Citatio	on Study - Gap Analysis	- Problem Fo	rmula	ation	Techr	niques.
Unit – III	Research Methodology						9
D 1 14			0 "	<b>D</b> ·		-	
Experimental Unit – IV	Appropriate Choice of Algorithms/Methodo Methods and Result Analysis - Investigation of Solution Journals and Papers	ns for Research Problem	- Interpretation	on - F	Resea	arch L	imitations 9
Experimental Unit – IV Journals and	Methods and Result Analysis - Investigation of Solution Journals and Papers Papers: Journals in Science/Engineering - Indexing and	ns for Research Problem	- Interpretation	on - F	Resea	arch L	imitations 9
Experimental Unit – IV Journals and	Methods and Result Analysis - Investigation of Solution Journals and Papers	ns for Research Problem	- Interpretation	on - F	Resea	arch L	imitations 9
Experimental Unit – IV Journals and Types of Res Unit – V How to Write	Methods and Result Analysis - Investigation of Solution         Journals and Papers         Papers: Journals in Science/Engineering - Indexing an earch Papers - Original Article/Review Paper/Short Commentations         Reports and Presentations         a Report - Language and Style - Format of Project Res         s - Footnotes - Tables and Figures - Appendix - Biblic	ns for Research Problem nd Impact factor of Journ mmunication/Case Study eport - Title Page - Abstra	- Interpretation nals. Plagiari y. act - Table of	on - F sm a	Resea and R tents	arch L eseai - Hea	imitations 9 rch Ethics 9 adings and
Experimental Unit – IV Journals and Types of Res Unit – V How to Write Sub-Heading PPTs. Resea	Methods and Result Analysis - Investigation of Solution         Journals and Papers         Papers: Journals in Science/Engineering - Indexing an earch Papers - Original Article/Review Paper/Short Con         Reports and Presentations         a Report - Language and Style - Format of Project Res         s - Footnotes - Tables and Figures - Appendix - Biblic rch Tools.	ns for Research Problem nd Impact factor of Journ mmunication/Case Study eport - Title Page - Abstra	- Interpretation nals. Plagiari y. act - Table of	on - F sm a	Resea and R tents	arch L eseai - Hea	imitations 9 rch Ethics 9 adings an
Experimental Unit – IV Journals and Types of Res Unit – V How to Write Sub-Heading	Methods and Result Analysis - Investigation of Solution         Journals and Papers         Papers: Journals in Science/Engineering - Indexing an earch Papers - Original Article/Review Paper/Short Con         Reports and Presentations         a Report - Language and Style - Format of Project Res         s - Footnotes - Tables and Figures - Appendix - Biblic rch Tools.	ns for Research Problem nd Impact factor of Journ mmunication/Case Study eport - Title Page - Abstra	- Interpretation nals. Plagiari y. act - Table of	on - F sm a	Resea and R tents	arch L eseai - Hea	imitations 9 rch Ethics 9 adings an ation usin
Experimental Unit – IV Journals and Types of Res Unit – V How to Write Sub-Heading PPTs. Resea	Methods and Result Analysis - Investigation of Solution         Journals and Papers         Papers: Journals in Science/Engineering - Indexing an earch Papers - Original Article/Review Paper/Short Con         Reports and Presentations         a Report - Language and Style - Format of Project Res         s - Footnotes - Tables and Figures - Appendix - Biblic rch Tools.	ns for Research Problem nd Impact factor of Journ mmunication/Case Study eport - Title Page - Abstra ography etc - Different F	- Interpretation nals. Plagiari y. act - Table of Reference For	on - F sm a Con mats	Resea and R tents s. Pre	esear - Hea esenta	imitations 9 rch Ethics 9 adings an ation usin
Experimental Unit – IV Journals and Types of Res Unit – V How to Write Sub-Heading PPTs. Resea TEXT BOOK 1. Wall	Methods and Result Analysis - Investigation of Solution         Journals and Papers         Papers: Journals in Science/Engineering - Indexing an earch Papers - Original Article/Review Paper/Short Commence         Reports and Presentations         a Report - Language and Style - Format of Project Rest - Footnotes - Tables and Figures - Appendix - Biblic rch Tools.         :         man, Nicholas. "Research Methods: The basics". 2 nd earch	ns for Research Problem nd Impact factor of Journ mmunication/Case Study eport - Title Page - Abstra ography etc - Different F	- Interpretation nals. Plagiari y. act - Table of Reference For	on - F sm a Con mats	Resea and R tents s. Pre	esear - Hea esenta	imitation: 9 rch Ethic: 9 adings an ation usin
Experimental Unit – IV Journals and Types of Res Unit – V How to Write Sub-Heading PPTs. Resea TEXT BOOK 1. Wall REFERENCI	Methods and Result Analysis - Investigation of Solution         Journals and Papers         Papers: Journals in Science/Engineering - Indexing an earch Papers - Original Article/Review Paper/Short Commence         Reports and Presentations         a Report - Language and Style - Format of Project Rest - Footnotes - Tables and Figures - Appendix - Biblic rch Tools.         :         man, Nicholas. "Research Methods: The basics". 2 nd earch	ns for Research Problem nd Impact factor of Journ mmunication/Case Study eport - Title Page - Abstra ography etc - Different F dition, Routledge, 2017.,	- Interpretation nals. Plagiari y. act - Table of Reference For for Units I, II,	on - F sm a Con mats	Resea and R tents s. Pre	esear - Hea esenta	imitation: 9 rch Ethic: 9 adings an ation usin
Experimental Unit – IV Journals and Types of Res Unit – V How to Write Sub-Heading PPTs. Resea TEXT BOOK 1. Wall REFERENCI 1. Mish	Methods and Result Analysis - Investigation of Solution         Journals and Papers         Papers: Journals in Science/Engineering - Indexing at earch Papers - Original Article/Review Paper/Short Commentations         Reports and Presentations         a Report - Language and Style - Format of Project Rest - Footnotes - Tables and Figures - Appendix - Biblio rch Tools.         :         man, Nicholas. "Research Methods: The basics". 2 nd eactors	ns for Research Problem nd Impact factor of Journ mmunication/Case Study eport - Title Page - Abstra ography etc - Different F dition, Routledge, 2017.,	- Interpretation nals. Plagiari y. act - Table of Reference For for Units I, II, ing, 2017	Con mats	tents s. Pre	esear - Hea esenta	imitation 9 rch Ethice 9 adings an ation usin

COUR	SE O	UTCOM	IES:											ВТ Мар	
On co	mplet	tion of t	he cours	se, the st	udents	will be a	able to						(	Highest L	.evel)
CO1	list t	the vario	ous stage	es in resea	arch an	d catego	rize the	quality o	of journ	als				Applying	(K3)
CO2	form	nulate a	research	n problem	from p	ublished	literatur	e/journa	l paper	S				Evaluating	ı (K5)
CO3	write	e, prese	nt a jour	nal paper	[/] projec	t report ir	n proper	format						Creating	(K6)
CO4	sele	ect suital	ble journ	al and sul	omit a r	esearch	paper							Applying	(K3)
CO5	com	npile a re	esearch i	report and	the pro	esentatio	n							Applying	(K3)
						Mappin	g of CC	s with	POs ar	nd PSO:	6				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	3	2	2	2	1	1	3	3	1	1	3	3	3
CO	2	3	3	3	3	2	1	1	3	3	3	3	3	3	3
CO	3	3	3	3	3	3	1	1	3	3	3	1	3	3	3
CO	4	3	2	1	1	2	1	1	3	2	1	1	3	3	3
CO	5	3	3	2	2	3	1	1	3	3	3	1	3	3	3
1 – Slig	ght, 2	- Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	my							
						ASSES	-			-					
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating (K6) %	Tota %
	CAT	1				40		50	)	10					100
	CAT	2				30		50	)	10		10			100
	CAT3 20 30 30 10 10												100		
	CAT	3				20									



		22ECE28- SOFTWARE DEFINED R						
Progra &Bran		B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prereq	uisites	Analog and Digital Communication	8	PE	3	0	0	3
Preamb	ble	To provide an insight regarding the functioning of different be defined radio architecture and its flexible transmitters.	olocks, techn	iques associ	atec	l with	softw	are
Unit– I		Introduction to Software Defined Radio:						9
		adio- Requirement for Software Defined Radio (SDR) - Bei iness models for SDR - Smart antenna systems.	nefits of mu	lti-standard t	erm	inals	- Op	erational
Unit– I		Architecture of a Software Defined Radio:						9
		adio architectures - Hardware specifications - Digital aspects of Superconducting Technologies on future SDR Systems	of software	defined radi	io -	Curre	ent teo	chnology
Unit-I		Flexible RF Receiver Architectures:						9
Noise f Unit– ľ Multiba	igure - Rece V and Flexible	nder sampling - Achieving processing gain using oversampli iver sensitivity - ADC spurious signals. Multi-Band and General Coverage Systems: receiver design - RF Transmit/receive switch Image rejectior - cascaded non-linearity techniques						9
Unit- V		Flexible Transmitters and PAs:						9
		s - Power amplifiers - Analog quadrature upconversion - Inte er - All pass filtering - Polyphase filtering	erpolated ba	andpass upc	onv	ersior	ו - PL	L based
								Total:45
TEXT E	BOOK:							
1.	P Keningto	n, "RF and Baseband Techniques for Software Defined Radio	", Artec Hou	se, 2005.				
REFER	RENCES:							
			es for 3G Ha	ndsets and E	Base	stati	ons",	John
1.	Wiley & sor	/. Tuttle bee, "Software Defined Radio: Baseband Technologiens,2003						

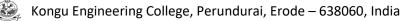
		UTCOM		se, the stu	udents	will be a	able to						()	BT Map Highest Lo	•
CO1	expl	ain abo	ut softwa	re defined	d radio	architect	ures for	perform	nance o	ptimizat	ion.		Ur	nderstandi	ing(K2)
CO2	iden	tify the	requirem	ients, ben	efits, a	nd differe	ent archit	tectural	models	for soft	ware def	ined radio	Ur	nderstandi	ing(K2)
CO3	cons for S		ne functio	oning of di	fferent	blocks a	nd techr	niques a	issociat	ed with	flexible F	F receiver		Applying	(K3)
CO4	com	prehen	d the des	sign techni	ques f	or multi-b	and and	l genera	al cover	age sys	tems		Ur	nderstandi	ing(K2)
CO5	rela	te the m	ethodolo	ogies used	for fle	xible tran	smitter a	and PA	design				Ur	nderstandi	ing(K2)
						Mappin	g of CO	s with F	POs an	d PSOs					
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
СО	)1	3	2	2		2		2	2						
CO	)2	3	2	2		3		2	2						
CO	)3	3	2	2		2		2	2	2	2			3	2
CO	)4	3	2	2		2									
CO	)5	3	2	2		2		2	2	2	2				3
1–Slig	ht,2–N	loderate	e,3–Subs	stantial, B	T-Bloor	n's Taxo	nomy								
						ASSE	ESSMEN		TERN	THEOR	Y				
	t / Blo atego			nemberin (K1) %	g	Understa (K2)		Appl (K3)		Analyz (K4)		valuating (K5) %		reating K6) %	Total %
	CA	Г1		20		80			-	-		-		-	100
	CA	Г2		20		60		2	0	-		-		-	100
	CA	ГЗ		15		85			-	-		-		-	100
	ES			20		65		1	5	-		-		-	100



	22ECE29-RF COMMUNICATIO	NS					
Programm &Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisi	Analog and Digital Communication	8	PE	3	0	0	3
Preamble	To study the RF System transceiver architecture and under Phase Locked Loop, Oscillators and Mixers.	rstand the co	oncepts of Lo	w No	oise A	Amplif	iers,
Jnit – I	Transceiver Specifications And Architectures:						9
neterodyne -	ngle conversion receiver – Upconversion – Dual conversion – Ima Direct upconversion–Transmitter with offset frequency synthesizer- ( vity – SFDR - Noise: Thermal, shot, flicker, popcorn noise Components and Amplifiers:						
Passive IC of	omponents characteristics - OC time constants in bandwidth estimate t – Series amplifier	ation and ei	nhancement	- Hig	gh fre	equen	-
Jnit – III	Low Noise Amplifier Design:						9
NA topolog	es -Design examples of Low Noise Amplifiers (LNA) - Single ended	and differen	tial LNAs-Ter	mina	ated	with re	esistors a
	neration LNAs						
Jnit – IV	PLL and Frequency Synthesizers:						9
	ed Model - Noise properties - Phase detectors - Loop filters and char	ge pumps -	Sequential ph	ase	dete	ctors	- Frequen
	- Integer-N frequency synthesizers	0 1 1					
synthesizers <b>Jnit – V</b>	- Integer-N frequency synthesizers Mixers and Oscillators:						9
synthesizers <b>Jnit – V</b> Mixer: Chara	- Integer-N frequency synthesizers						-
synthesizers <b>Jnit – V</b> Mixer: Chara	Integer-N frequency synthesizers     Mixers and Oscillators:     cteristics — Non-linear based mixers- Multiplier based mixers - Sir						ced mixe
synthesizers <b>Unit – V</b> Mixer: Chara	Integer-N frequency synthesizers     Mixers and Oscillators:     cteristics — Non-linear based mixers- Multiplier based mixers - Sir mixers - Oscillators: Colpitts oscillators Resonators – Tuned oscilla						-
synthesizers Jnit – V Mixer: Chara Subsampling TEXTBOO	Integer-N frequency synthesizers     Mixers and Oscillators:     cteristics — Non-linear based mixers- Multiplier based mixers - Sir mixers - Oscillators: Colpitts oscillators.— Resonators — Tuned oscilla	ators – Nega	tive resistanc	e os	cillat	ors	ced mixe
synthesizers Jnit – V Mixer: Chara Subsampling TEXTBOO	Integer-N frequency synthesizers     Mixers and Oscillators:     cteristics — Non-linear based mixers- Multiplier based mixers - Sir     mixers - Oscillators: Colpitts oscillators Resonators - Tuned oscilla      C:     omas H. Lee, "Design of CMOS RF Integrated Circuits",2 nd Edition, Ca	ators – Nega	tive resistanc	e os	cillat	ors	ced mixe
synthesizers Jnit – V Mixer: Chara Subsampling TEXTBOO 1. The REFERENC	Integer-N frequency synthesizers     Mixers and Oscillators:     cteristics — Non-linear based mixers- Multiplier based mixers - Sir     mixers - Oscillators: Colpitts oscillators Resonators - Tuned oscilla      C:     omas H. Lee, "Design of CMOS RF Integrated Circuits",2 nd Edition, Ca	ators – Nega ambridge Ur	tive resistanc	e os	cillat	ors	ced mixe



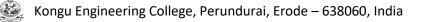
		JTCOM tion of t		se, the st	udent	s will be a	able to							BT Mapı (Highest L	
CO1	chara	acterize	and un	derstand th	ne RF	system ar	chitectu	re for va	arious	application	ons		Ur	nderstandir	ng (K2)
CO2	chara	acterize	the per	ormance of	of the	circuit for l	bandwid	th enha	nceme	ent and a	mplifiers	3	Ur	nderstandir	ng (K2)
CO3	com	orehend	the fun	damentals	of Lo	w Noise A	mplifier	design					Ur	nderstandir	ng (K2)
CO4	unde	erstand t		Understanding (K2											
CO5	unde	erstand t	he vario	ous configu	ratior	s of Mixer	s and O	scillator	S				Ur	nderstandir	ng (K2)
						Mappin	g of CO	s with	POs a	nd PSOs	6				
COs/	POs	P01	PO2	PO3	PO	4 PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CC	)1	3	2						2		2	2	2		
CC	)2	3	3	2	2				2				2	2	1
CC	)3	3											2	2	1
CC	)4	3	3	2									2	2	1
CC	)5	3	3	2									2	2	1
1–Slig	ht,2–N	Noderate	e,3–Sub	stantial, B	T-Blo	om's Taxo	nomy								
							00500								
To	st / Bl	oom's	P	ememberi	ng	A Understa				RN - THE Analyzi	-	Evaluating		ating (K6)	1
-	Catego			(K1) %	ng	(K2)	•	(K3)	-	(K4) %		K5) %		%	Total %
	CA	\T 1		20		80		-		-		-		-	100
	CAT	Г2		20		80		-		-		-		-	100
	CA	Т3		20		80		-		-		-		-	100
	ESE	Ξ		20		80		-		-		-		-	100
*±3%	may b	e varied	I (CAT1	2,3–50 m	arks &	ESE-100	marks)				•		•		



Programr Branch	ne & B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequis	sites Nil	8	PE	2	0	2	3
Preamble	To apply the concept of wearable sensors, implantables and ap	plications of we	arable techno	logy i	n dis	ease c	letections
Unit – I	Introduction to Wearables :						6
The ecosy	s: Fundamentals – Advancements - Roadmap for the future : The role of w ystem enabling digital life-Attributes of wearables-Textiles and clothing: vearables: Defining the research roadmap						
Unit – II	From Wearables to Implantables :						6
regenerati	rive and technical challenges : Introduction-Wearables- Implantable ion-Regenerative and biohybrid approaches-Packaging, biocompatibility				mon	itoring	1
Unit – III	Disease Detection using Wearable Sensors :	- <b>(</b> - <b>I</b> )		0			6
Neurologi	sensors inside and outside of the human body for the early detection cal diseases-Gastrointestinal diseases	of diseases :	Introduction -	Card	llovas	scular	
Unit – IV	Mechanical and Chemical Sensors :						6
	nanical and biochemical sensors: Mechanical sensors-Biochemical sens able bioanalytes in WFs and IFs - Methods of bioanalyte detection in W						
-			lalleriges of m	r ar	ia ir-	buood	
sensors <b>Unit – V</b> UHF epid	High Frequency Sensors and Applications: ermal sensors: Technology and applications-Introduction-Rationale of	UHF epidermal	antennas-Ex	ampl	es of	UHF	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s	High Frequency Sensors and Applications: ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc	UHF epidermal	antennas-Ex	ampl	es of	UHF	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s LIST OF I	High Frequency Sensors and Applications: ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc EXPERIMENTS / EXERCISES:	UHF epidermal ccupational mec	antennas-Ex	ampl	es of	UHF	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s	High Frequency Sensors and Applications: ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc	UHF epidermal ccupational mec	antennas-Ex	ampl	es of	UHF	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s LIST OF I 1.	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc         EXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set	UHF epidermal ccupational mec	antennas-Ex	ampl	es of	UHF	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s LIST OF I 1. 2.	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc         EXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain sen         Design and measurement of electrical activity of heart.	UHF epidermal ccupational mec	antennas-Ex	ampl	es of	UHF	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s LIST OF E 1. 2. 3.	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc         Stems and manufacturing-Applications to healthcare-Applications to oc         EXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.	UHF epidermal ccupational mec	antennas-Ex	ampl	es of	UHF	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s LIST OF I 1. 2. 3. 4.	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc         EXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of muscle cells	UHF epidermal ccupational mec	antennas-Ex	ampl	es of	UHF	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s LIST OF I 1. 2. 3. 4. 5.	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc         EXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of muscle cells         Design a Wearable body temperature sensors.	UHF epidermal ccupational med	antennas-Ex licine, wellnes	ampl s, sp	es of orts-{	UHF Safety	6 epiderma issue
sensors Unit – V UHF epid antenna s LIST OF I 1. 2. 3. 4. 5. 6. 7.	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc         SYPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of muscle cells         Design and measurement of electrical activity of muscle cells         Design and measurement of electrical activity of muscle cells         Design and measurement of electrical activity of muscle cells         Design a Wearable body temperature sensors.         Demonstrate the working of wristband for fitness tracker         Design of smart shoe insole that tracks the user's gait, step counts, and state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks tracks tracks trackstrate tracks tracks tracks tracks tracks track	UHF epidermal ccupational med	antennas-Ex licine, wellnes	ampl s, sp	es of orts-{	UHF Safety	<b>6</b> epiderma
sensors Unit – V UHF epid antenna s LIST OF I 1. 2. 3. 4. 5. 6. 7. TEXT BO	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of tystems and manufacturing-Applications to healthcare-Applications to oc         SEXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of muscle cells         Design a Wearable body temperature sensors.         Demonstrate the working of wristband for fitness tracker         Design of smart shoe insole that tracks the user's gait, step counts, and other insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tracks the user's gait, step counts, and the insole that tr	UHF epidermal coupational med nsors	antennas-Ex licine, wellnes notion. Lecture:	ampl s, sp	es of orts-{	UHF Safety	6 epiderma issue
Sensors Unit – V UHF epid antenna s LIST OF E 1. 2. 3. 4. 5. 6. 7. TEXT BO 1 S	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of ystems and manufacturing-Applications to healthcare-Applications to oc         SYPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of muscle cells         Design and measurement of electrical activity of muscle cells         Design and measurement of electrical activity of muscle cells         Design and measurement of electrical activity of muscle cells         Design a Wearable body temperature sensors.         Demonstrate the working of wristband for fitness tracker         Design of smart shoe insole that tracks the user's gait, step counts, and state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks the user's gait, step counts, and the state tracks tracks tracks trackstrate tracks tracks tracks tracks tracks track	UHF epidermal coupational med nsors	antennas-Ex licine, wellnes notion. Lecture:	ampl s, sp	es of orts-{	UHF Safety	6 epiderma issue
Sensors Unit – V UHF epid antenna s LIST OF E 1. 2. 3. 4. 5. 6. 7. TEXT BO 1. S (I	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of tystems and manufacturing-Applications to healthcare-Applications to oc         SEXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of muscle cells         Design a Wearable body temperature sensors.         Demonstrate the working of wristband for fitness tracker         Design of smart shoe insole that tracks the user's gait, step counts, an         OK:	UHF epidermal coupational med nsors	antennas-Ex licine, wellnes notion. Lecture:	ampl s, sp	es of orts-{	UHF Safety	6 epiderma issue
Sensors       Unit – V       UHF epid       antenna s       LIST OF I       1.       2.       3.       4.       5.       6.       7.       TEXT BO       1.       S.       (I       REFEREN       1.       N	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of I         ystems and manufacturing-Applications to healthcare-Applications to oc         EXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of muscle cells         Design a Wearable body temperature sensors.         Demonstrate the working of wristband for fitness tracker         Design of smart shoe insole that tracks the user's gait, step counts, an         OK:         azonov, Edward, "Wearable Sensors: Fundamentals, implementation ar         Elsevier), 2020.         NCES/ MANUAL / SOFTWARE:         Mukhopadhyay, Subhas C., " Wearable electronics sensors: For safe and	UHF epidermal ccupational med nsors	antennas-Ex licine, wellnes notion. Lecture: ', Academic P	ampl s, sp 30 P ress,	raction 2 nd E 2015	UHF Safety	6 epiderma issue
sensors Unit – V UHF epid antenna s LIST OF F 1. 2. 3. 4. 5. 6. 7. TEXT BO 1. S. (I REFEREN 1. N	High Frequency Sensors and Applications:         ermal sensors: Technology and applications-Introduction-Rationale of I         ystems and manufacturing-Applications to healthcare-Applications to oc         EXPERIMENTS / EXERCISES:         Design a Textile based electrodes as temperature sensors & strain set         Design and measurement of electrical activity of heart.         Design and measurement of electrical activity of brain.         Design and measurement of electrical activity of muscle cells         Design a Wearable body temperature sensors.         Demonstrate the working of wristband for fitness tracker         Design of smart shoe insole that tracks the user's gait, step counts, an         OK:         azonov, Edward, "Wearable Sensors: Fundamentals, implementation ar         Elsevier), 2020.         NCES/ MANUAL / SOFTWARE:         Mukhopadhyay, Subhas C., "Wearable electronics sensors: For safe and	UHF epidermal coupational med nsors nd direction of n nd applications' d healthy living" afe and Healthy	antennas-Ext licine, wellnes notion. Lecture: ', Academic Pi , Vol. 15,Sprin y Living",Ist Ed	ampl s, sp 30 P ress,	es of orts-{ raction 2 nd E 2015 Sprir	UHF Safety	6 epiderma issue



		JTCOM	-	e, the stu	udents v	vill be ab	ole to						(	BT Map Highest L	
CO1	und	erstand	the conc	ept of we	arable te	echnology	to differ	entiate f	rom coi	nvention	al technol	ogies	Un	derstandiı Imitation	
CO2	com	pare we	arables a	and impla	Intables									iderstandi Ianipulatio	
CO3	appl	ly weara	ible sens	ors for dis	sease de	etection a	nd diagn	osis						Applying( Precision	
CO4	inter	rpret the	Understanding(K2) Precision (S3)												
CO5	appl	ly weara	Ible sens	ors emplo	oying Hig	gh freque	ncy							Applying( Precision	
						Маррі	ng of CC	)s with I	POs an	d PSOs					
COs/F	POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3		3		2		2		2					
CO	2	3	2				2	2	2						
CO	3	3		3		2	2	2	2	2			2	2	
CO	4	3		3		2	2	2	2	2			2	2	
CO	5	3		3	2	2	2	2	2	2	2	2	2	2	2
1 – Slię	ght, 2	– Modeı	rate, 3 – 3	Substanti	al, BT- E	Bloom's T	axonom	/							
						ASSE	SSMENT	PATTE	RN - TI	HEORY					
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyzi (K4) %		Evaluating (K5) %		reating K6) %	Total %
	CAT	1		20		80		-		-		-		-	100
	CAT	2		10		50		40	)	-		-		-	100
	CAT	3		10		50		40	)	-		-		-	100
	ESE	=		10		50		40	<b>`</b>	-		-			



Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	8	PE	3	0	0	3
Preamble	To explore the logical foundations of Cyber-Physical System modeling, control and computational thinking.	ns organize	ed along the c	lime	nsior	ıs like	
Unit – I	Introduction:						9
control (STARMA control - Continuc Finite- State Mac	system (CPS)-structure of a cyber-physical system-Stanford to C)-The Design Process-Modelling, Design and Analysis-Applic us Dynamics-Newtonian Mechanics- Actor Models- Properties of hines- Extended State Machines- Non-determinism- Behaviors	ations: He	art surgery, f - Feedback C	ly-by	/-wire	aircr	aft, Traffi Systems
Unit – II	Modeling Dynamic Behaviors:						9
State Machines, ( Computation- Tin	Modal Models- Classes of Hybrid Systems. Composition of State Concurrent Models of Computation: Structure of Models- Syn- med Models of Computation						Models c
Unit – III	Security of Cyber-Physical Systems:						9
Cyber Security R	equirements- Defining Security and Privacy -Attack Model -Co	ountermea	sures -Svster	n Th	eore	tic Ap	proaches
Examples of Sec Challenges for Cl		nysical Sys					nd Privacy
Examples of Sec Challenges for Cl Unit – IV	Surity and Privacy in Action- Approaches to Secure Cyber-Pl PSs Synchronization in Distributed Cyber-Physical Systems	nysical Sys	stems- Óngoi	ng S	Secu	ity ar	nd Privac
Examples of Sec Challenges for CI Unit – IV Formal Software	surity and Privacy in Action- Approaches to Secure Cyber-Pl PSs	nysical Sys	stems- Óngoi	ng S	Secu	ity ar	nd Privacy
Examples of Sec Challenges for Cl Unit – IV Formal Software	Surity and Privacy in Action- Approaches to Secure Cyber-PleSs Synchronization in Distributed Cyber-Physical Systems Engineering- Distributed Consensus Algorithms- Synchronous L gy- Physically Asynchronous, Logically Synchronous Systems.	nysical Sys	stems- Óngoi	ng S	Secu	ity ar	nd Privacy
Examples of Sec Challenges for Cl Unit – IV Formal Software Related Technolo Unit – V Scheduling with F	curity and Privacy in Action- Approaches to Secure Cyber-Pl PSs Synchronization in Distributed Cyber-Physical Systems Engineering- Distributed Consensus Algorithms- Synchronous L	ockstep E	stems- Óngoi xecutions- Tir	ng S ne-T	Secur rigge	red A	nd Privacy 9 .rchitectur 9
Examples of Sec Challenges for Cl Unit – IV Formal Software Related Technolo Unit – V Scheduling with F	Survivation       Action- Approaches to Secure Cyber-Pless         Synchronization in Distributed Cyber-Physical Systems         Engineering- Distributed Consensus Algorithms- Synchronous L         gy- Physically Asynchronous, Logically Synchronous Systems.         Real-Time Scheduling for Cyber-Physical Systems         Fixed Timing Parameters- Memory Effects, Multiprocessor/ Multiprocessor/ Multiprocessor/ Systems	ockstep E	stems- Óngoi xecutions- Tir	ng S ne-T	Secur rigge	red A	nd Privacy 9 rchitectur 9 ability and
Examples of Sec Challenges for Cl Unit – IV Formal Software Related Technolo Unit – V Scheduling with F	Survivation       Action- Approaches to Secure Cyber-Pless         Synchronization in Distributed Cyber-Physical Systems         Engineering- Distributed Consensus Algorithms- Synchronous L         gy- Physically Asynchronous, Logically Synchronous Systems.         Real-Time Scheduling for Cyber-Physical Systems         Fixed Timing Parameters- Memory Effects, Multiprocessor/ Multiprocessor/ Multiprocessor/ Systems	ockstep E	stems- Óngoi xecutions- Tir	ng S ne-T	Secur rigge	red A	nd Privacy 9 rchitectur 9 ability and
Examples of Sec Challenges for Cl Unit – IV Formal Software Related Technolo Unit – V Scheduling with F Uncertainty- Man TEXT BOOK: 1. E. A. Lee Edition, F	Synchronization in Distributed Cyber-Physical Systems     Synchronization in Distributed Cyber-Physical Systems     Engineering- Distributed Consensus Algorithms- Synchronous L     gy- Physically Asynchronous, Logically Synchronous Systems.     Real-Time Scheduling for Cyber-Physical Systems     ixed Timing Parameters- Memory Effects, Multiprocessor/ Multi     aging Other Resources- Rhythmic Tasks Scheduling.     and S. A. Seshia "Introduction to Embedded Systems - A Cyber     eb, 2017, for Units I, II.	ockstep E core Schee er-Physical	stems- Óngoi xecutions- Tir duling- Accon SystemsApp	ng S ne-T nmoo	Frigge dating h", T	ered A g Vari	9 rchitectur 9 ability and Total:4 T Press,2
Examples of Sec Challenges for Cl Unit – IV Formal Software Related Technolo Unit – V Scheduling with F Uncertainty- Man TEXT BOOK: 1. E. A. Lee Edition, F	Synchronization in Distributed Cyber-Physical Systems     Synchronization in Distributed Cyber-Physical Systems     Engineering- Distributed Consensus Algorithms- Synchronous L     gy- Physically Asynchronous, Logically Synchronous Systems.     Real-Time Scheduling for Cyber-Physical Systems     ixed Timing Parameters- Memory Effects, Multiprocessor/ Multi     aging Other Resources- Rhythmic Tasks Scheduling.     and S. A. Seshia "Introduction to Embedded Systems - A Cyber     eb, 2017, for Units I, II.     umar, Dionisio de Niz , Mark Klein "Cyber-Physical Systems", F	ockstep E core Schee er-Physical	stems- Óngoi xecutions- Tir duling- Accon SystemsApp	ng S ne-T nmoo	Frigge dating h", T	ered A g Vari	9 rchitectur 9 ability and Total:4 T Press,2
Examples of Sec Challenges for Cl Unit – IV Formal Software Related Technolo Unit – V Scheduling with F Uncertainty- Man TEXT BOOK: 1. E. A. Lee Edition, F 2 Raj Rajku	Synchronization in Distributed Cyber-Physical Systems     Synchronization in Distributed Cyber-Physical Systems     Engineering- Distributed Consensus Algorithms- Synchronous L     gy- Physically Asynchronous, Logically Synchronous Systems.     Real-Time Scheduling for Cyber-Physical Systems     ixed Timing Parameters- Memory Effects, Multiprocessor/ Multi     aging Other Resources- Rhythmic Tasks Scheduling.     and S. A. Seshia "Introduction to Embedded Systems - A Cyber     eb, 2017, for Units I, II.     umar, Dionisio de Niz , Mark Klein "Cyber-Physical Systems", F	ockstep E core Schee er-Physical	stems- Óngoi xecutions- Tir duling- Accon SystemsApp	ng S ne-T nmoo	Frigge dating h", T	ered A g Vari	9 rchitectur 9 ability and Total:4 T Press,2
Examples of Sec Challenges for Cl Unit – IV Formal Software Related Technolo Unit – V Scheduling with F Uncertainty- Man TEXT BOOK: 1. E. A. Lee Edition, F 2. Raj Rajku III, IV & V REFERENCES:	Synchronization in Distributed Cyber-Physical Systems     Synchronization in Distributed Cyber-Physical Systems     Engineering- Distributed Consensus Algorithms- Synchronous L     gy- Physically Asynchronous, Logically Synchronous Systems.     Real-Time Scheduling for Cyber-Physical Systems     ixed Timing Parameters- Memory Effects, Multiprocessor/ Multi     aging Other Resources- Rhythmic Tasks Scheduling.     and S. A. Seshia "Introduction to Embedded Systems - A Cyber     eb, 2017, for Units I, II.     umar, Dionisio de Niz , Mark Klein "Cyber-Physical Systems", F	ockstep E core Scher er-Physical	stems- Ongoi xecutions- Tir duling- Accon SystemsApp ucation, Inc, 1	ng S ne-T nmoo	Frigge dating h", T	ered A g Vari	9 rchitectur 9 ability and Total:4 T Press,2



		UTCON		rse, the s	tuden	ts will be	able to						(	BT Map Highest L	
CO1	exp	lain the	design	constraint	s of Cy	/ber-Phys	ical Sys	tems (C	PS).				Ur	nderstandi	ng (K2)
CO2	em	ploy the	functior	al behavi	or of C	PS based	d on sta	ndard m	odelin	g				Applying	(K3)
CO3	inte	erpret the	e securi	ty require	nents	and challe	enges in	CPS					Ur	nderstandi	ng (K2)
CO4	cho	ose CP	S requir	ements ba	hardware architecture constraints. Applying					Applying	(K3)				
CO5		ly the c straints		ss of CPS	ning		Applying	(K3)							
						Мар	oping of	COs w	vith PC	s and P	SOs				
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	)1	3													
CO	)2	3	2	2	2									2	
CO	)3	2					3		3					2	
CO	)4	3	2	2	2									2	2
CO	95	3	2	2	2									3	2
1 – Sli	ight, 2	2 – Mod	erate, 3	– Substa	ntial, E	3T- Bloon	ı's Taxo	onomy							
						ASS	ESSME		ITERN	- THEO	RY				
	st / Bl Categ	oom's ory*	Re	emember (K1) %	ing	Understa (K2)		Apply (K3)		Analyzi (K4) 9		Evaluating (K5) %		reating K6) %	Total %
	CA	\T1		10		65		25	5	-		-		-	100
	CAT 2 10 65 25 ⁻											-		-	100
	CA	AT3		10		55		35	5	-		-		-	100
	ESI	E		10		55		35	5	-		-		-	100
* ±3%	may	be varie	ed (CAT	1,2,3 – 5	0 marl	ks & ESE	– 100 n	narks)							



Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	8	PE	3	0	0	3
Preamble	To impart knowledge on nanotechnology, synthesis of nano storage applications.	omaterials,	analysis and	its u	ses ir	n ener	ЗÀ
Jnit - I	Nanoscience and Technology:						9
	nanoscience and technology - Challenges in nanoscience and intum dots - Optical, electrical, mechanical, and magnetic propertion of the sector			e-nev	v forn	n of ca	arbon (CN
Jnit - II	Synthesis of Nanomaterials:						9
	om-Up approach - Chemical precipitation - Sol-gel synthesis - milling - Types of nanocomposite (i.e. metal oxide and polyme		heating and l	Elect	ro de	positi	on – CVD
Jnit - III	Structural, Electrochemical Measurements and Analysis						9
	ay diffraction - Raman spectroscopy - BET analysis - Cyclic vol ectrochemical impedance spectroscopy.	tammetry -	Galvanostati	c cha	arge a	and di	scharge
Jnit - IV	Renewable Energy Storage Mechanism						9
Ragone plot, Batter Supercapacitor.	ies: Lithium ion battery - Supercapacitor: Taxonomy of superca	apacitor – E	EDLC – Pseud	loca	oactio	or - Hy	/brid
Jnit - V	Applications of Nanomaterials in Energy Conversion and	d Storage:					9
	eries - Fuel cells - PEM fuel cell - Acid/ alkaline fuel cells - Desi able batteries based on nanomaterials.	ign of fuel o	cells - Carbon	nan	otube	es for	energy
							Total:45
TEXT BOOK:							
1. 2012 for l	P. Poole JR. & Franks. J. Qwens, "Introduction to Nanotechnolo Jnits I, II, III.					n , Ne	w Delhi,
2. Linden, "I	Hand book of Batteries and fuel cells", 4 th Edition, McGraw Hill,	New Delhi	, 2011 for Uni	ts IV	,V.		
<b>REFERENCES</b> :							
Mick Wilso	n & Kamali Kannagara, "Nanotechnology – Basics Science a	nd Emergir	ng Technolog	ies",	1 st E	dition	, Oversea
1. Press , Net	w Deini, 2005.						



		UTCON	-	se, the s	tudents	will be	able to						(	BT Map Highest L	
CO1	expla	in the fu	undamer	itals of na	noscier	nce and	technolo	ogy					Un	derstandii	רg (K2)
CO2	apply	the me	thods to	synthesiz	ze nanoi	material	s for ene	ergy sto	rage de	vices				Applying	(K3)
CO3	desci	ribe the	structura	al and ele	ctrocher	nical an	alysis of	f nanom	aterials				Un	derstandi	ng (K2)
CO4	sumn	narize a	and the w	orking pr	inciples	of energ	gy stora	ge devic	es				Un	derstandi	ng (K2)
CO5	interp	oret the	design o	f superca	pacitor,	fuel cell	and ba	tteries						Applying	(K3)
						Мар	ping of	COs w	ith POs	s and P	SOs				
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	01	3	2			2				1				2	
CO	)2	3	2	2	2	2				2	1			2	
CO	)3	3	2	2	2	2				2	2			2	
CO	)4	3	2	2	2	2				2	1			2	
CO	)5	3	3	3	3	3	2	2		2	2			2	

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

		ASSESSME	ENT PATTER	RN - THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	60	20	-	-	-	100
CAT2	10	60	30	-	-	-	100
CAT3	10	60	30	-	-	-	100
ESE	10	60	30	-	-	-	100



		22ECE32 – LOW POWER VLSI DE	ESIGN					
Prograi Branch	mme&	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
rereq	uisites	VLSI Design	8	PE	3	0	0	3
Preamb		To design digital VLSI circuits with emphasis on low power a	spects.					
<b>Jnit – I</b> Sources lissipat	s of power di	Sources of Power Dissipation: ssipation: Short-circuit power dissipation - Switching power	sipation - Glite	ching power di	ssipat	ion -	Leaka	<b>9</b> age powe
Jnit – I	1	Supply Voltage Scaling for Low Power:						9
		scaling - Architectural-level approaches - Voltage scaling using in MVS - Dynamic voltage and frequency scaling - Adaptive vo						ge Scalin
Jnit – I	111	Switched Capacitance Minimization:						9
		nch: Hardware–Software Codesign - Transmeta's crusoe proces ng - FSM Partitioning - Operand Isolation – Precomputation - Gli						
Jnit – I		Leakage Power Minimization:						9
trategy	y - State rete	ble threshold voltages - VTCMOS approach - Transistor stack ntion strategy - Power-gating controller - Power management CMOS Circuits – Energy, Constrained Dual Vt CMOS Circuits	- Dual, Vt As	signment App				
Jnit – V			Dynamie Vi					•
	tic charging -	Adiabatic Logic Circuits and Battery-Aware Systems:						9
Adiabat	- The wider	Adiabatic Logic Circuits and Battery-Aware Systems: Adiabatic amplification - Adiabatic logic gates -Pulsed power s ning battery gap - Overview of battery technologies - Battery ch riven system design						adiabati e - Batter
Adiabat ircuits nodelin	- The wider ng - Battery-d	Adiabatic amplification - Adiabatic logic gates -Pulsed power s ning battery gap - Overview of battery technologies - Battery ch						adiabati
Adiabat ircuits nodelin	- The wider	Adiabatic amplification - Adiabatic logic gates -Pulsed power s ning battery gap - Overview of battery technologies - Battery ch						adiabati e - Batter
Adiabat circuits nodelin	- The wider ng - Battery-d 300K:	Adiabatic amplification - Adiabatic logic gates -Pulsed power s ning battery gap - Overview of battery technologies - Battery ch	haracteristics					adiabati e - Batter
Adiabat sircuits nodelin	- The wider ng - Battery-d 300K:	Adiabatic amplification - Adiabatic logic gates -Pulsed power s ning battery gap - Overview of battery technologies - Battery ch riven system design	haracteristics					adiabati e - Batter
Adiabat sircuits nodelin	- The wider ng - Battery-d BOOK: Ajit Pal, "Low RENCES:	Adiabatic amplification - Adiabatic logic gates -Pulsed power s ning battery gap - Overview of battery technologies - Battery ch riven system design	5.	Principles of I	batter	y diso	charge	adiabati e - Batter Total:4



		UTCOM		se, the st	udents	will be a	ble to							(	BT Mapp Highest L	
CO1	enu	merate t	he sourc	es of pov	ver dissi	pation in	CMOS c	ircuits						Un	derstandi	ng (K2)
CO2	und	erstand	the volta	ge scalin	g techni	ques at c	ircuit leve	el						Un	derstandi	ng (K2)
CO3	inte	rpret the	approad	hes for s	witched	capacita	nce minir	mization						Un	derstandi	ng (K2)
CO4	outl	ine the le	eakage p	ower mir	nimizatio	n techniq	lues							Un	derstandi	ng (K2)
CO5	und	erstand	the adiat	patic circu	uits and	power ma	anageme	ent meth	ods to o	optimize	the bat	tery lifetim	e.	Un	derstandi	ng (K2)
						Маррі	ing of C	Os with	POs ai	nd PSOs	5					
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	0 PO1	1 F	PO12	PSO1	PSO2
CO	1	3	3	2										2	3	2
CO	2	3	3	2										2	3	2
CO	3	3	3	2										2	3	2
CO	4	3	3	2										2	3	2
CO	5	3	3	2										2	3	2
1 – Sli	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's T	Taxonom	iy								·
						ASSE	SSMEN	Τ ΡΑΤΤΙ	ERN - 1	HEORY						
	st / Bl Categ	oom's ory*	Re	memberi (K1) %	ing	Understa (K2)		Apply (K3)		Analyzi (K4) 9		Evaluatin %	g (K5)		reating K6) %	Total %
	CAT	1		15		85		-		-		-			-	100
	CAT	2		15		85		-		-		-			-	100
	CAT	3		15		85		-		-		-			-	100
	ESI	=		15		85		-		-		-			-	100
* <b>±</b> 3%	may b	be varied	d (CAT 1	,2,3 – 50	marks &	ESE – 1	00 mark	s)								

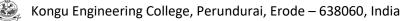


## 22ECE33- BRAIN COMPUTER INTERFACE AND APPLICATIONS

Programme & Branch	B.E & Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	8	PE	3	0	0	3
Preamble	To understand the fundamentals, building blocks of a Brain extraction techniques, classification algorithms that are used		ter Interface	and	the o	differe	ent feature
Unit – I	Introduction to BCI:						9
	ain structure and function - Brain Computer Interface (BCI) Types - e BCI - Noninvasive BCI - Structure of BCI system - BCI monitoring						
Unit – II	Brain Activation:						9
related to cogniti		2300 and	auditory evok	ked p	ooten	tials -	1
Unit – III	Feature Extraction Methods:			_			9
Signal Processin reduction	g : Spike sorting - Frequency domain analysis - Wavelet analysis -	lime dom	ain analysis -	Spa	tial fili	tering	- Artifact
Unit – IV	Machine Learning Methods for BCI:						9
<b>Unit – IV</b> Classification te	Machine Learning Methods for BCI: chniques : Binary classification, Ensemble classification, Multicla egression : Linear, Polynomial, RBF, Gaussian processes	ass Class	sification - Ex	/alua	ation	of cla	
Unit – IV Classification te performance - R Unit – V	chniques : Binary classification, Ensemble classification, Multicla egression : Linear, Polynomial, RBF, Gaussian processes Applications of BCI:						assification
Unit – IV Classification ter performance - R Unit – V Case Studies: Tr implant – Medica	chniques : Binary classification, Ensemble classification, Multiclaegression : Linear, Polynomial, RBF, Gaussian processes	or and rot	ootic control u	sing	multi	elect	ssification 9 rode arra
Unit – IV Classification ter performance - R Unit – V Case Studies: Tr implant – Medica	chniques : Binary classification, Ensemble classification, Multicla egression : Linear, Polynomial, RBF, Gaussian processes Applications of BCI: acking arm (hand) position – Controlling prosthetic devices - Curse al Applications: Motor Restoration, Brain control wheel chair- Nor	or and rot	ootic control u	sing	multi	elect	ssification 9 rode arra
Unit – IV Classification te performance - R Unit – V Case Studies: Tr implant – Medica entertainment - E	chniques : Binary classification, Ensemble classification, Multicla egression : Linear, Polynomial, RBF, Gaussian processes Applications of BCI: acking arm (hand) position – Controlling prosthetic devices - Curse al Applications: Motor Restoration, Brain control wheel chair- Nor	or and rot	ootic control u	sing	multi	elect	essification 9 rode arra rtness an
Unit – IV         Classification terperformance - R         Unit – V         Case Studies: Trimplant – Medica         entertainment - E         TEXT BOOK:         1.	chniques : Binary classification, Ensemble classification, Multicla egression : Linear, Polynomial, RBF, Gaussian processes Applications of BCI: acking arm (hand) position – Controlling prosthetic devices - Curse al Applications: Motor Restoration, Brain control wheel chair- Non thics of Brain Computer Interfacing.	or and rob -medical Principles	ootic control u applications: and practice"	sing Mon	multi itorin Editic	elect g ale	9 rode arra rtness an Total:4
Unit – IV         Classification terperformance - R         Unit – V         Case Studies: Trimplant – Medica         entertainment - E         TEXT BOOK:         1.       Jonatha         2       Rajesh	chniques : Binary classification, Ensemble classification, Multicla egression : Linear, Polynomial, RBF, Gaussian processes Applications of BCI: acking arm (hand) position – Controlling prosthetic devices - Curse al Applications: Motor Restoration, Brain control wheel chair- Non thics of Brain Computer Interfacing.	or and rob -medical Principles	ootic control u applications: and practice"	sing Mon	multi itorin Editic	elect g ale	9 rode arra rtness an Total:4
Unit – IV         Classification terperformance - R         Dit – V         Case Studies: Trimplant – Medica         entertainment - E         TEXT BOOK:         1.       Jonatha         2       Rajesh	chniques : Binary classification, Ensemble classification, Multicla egression : Linear, Polynomial, RBF, Gaussian processes Applications of BCI: acking arm (hand) position – Controlling prosthetic devices - Curse al Applications: Motor Restoration, Brain control wheel chair- Non thics of Brain Computer Interfacing.	or and rob -medical Principles	ootic control u applications: and practice"	sing Mon	multi itorin Editic	elect g ale	9 rode arra rtness an Total:4
Unit – IV Classification terperformance - R Unit – V Case Studies: Trimplant – Medica entertainment - E TEXT BOOK: 1. Jonatha Universi 2. Rajesh . for Units	chniques : Binary classification, Ensemble classification, Multicla egression : Linear, Polynomial, RBF, Gaussian processes Applications of BCI: acking arm (hand) position – Controlling prosthetic devices - Curse al Applications: Motor Restoration, Brain control wheel chair- Non thics of Brain Computer Interfacing.	or and rob -medical Principles , Cambric	ootic control u applications: and practice" ge University	sing Mon ', 1 st Pre	multi itorin Editic ss, 1 ^s	elect g ale	9 rode arra rtness an Total:4 ford on, 2013,



		UTCON		se, the st	udents	will be a	able to						(	BT Mapp Highest L	
CO1	com	prehen	d and ap	preciate t	he type	s and str	ucture a	moderi	n BCI s	system.			Ur	derstandii	ng (K2)
CO2	diffe	erentiate	various	brain pote	entials a	and their	significa	ince.					Ur	derstandi	ng (K2)
CO3	cho	ose app	ropriate	feature ex	traction	n techniqu	ues for t	he BCI	applica	ations				Applying	(K3)
CO4	use	classific	cation an	d regress	ion tecl	nniques f	or the B	CI signa	als					Applying	(K3)
CO5	com	prehen	d invasiv	e and nor	n-invasi	ve class	BCI app	lication	S				Ur	nderstandii	ng (K2)
						Mappin	g of CO	s with	POs a	nd PSO:	S				
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	)1	2	2											2	2
CO	)2	2	2											2	2
CO	)3	3	2	2	2								2	2	2
CO	)4	3	2	2	2	2							2	2	2
CO	)5	2	2						2				2	2	2
1 – Sli	ight, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	RN - 1	THEORY	,				
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating (K6) %	Total %
	CAT	1		30		70		-		-		-		-	100
	CAT	2		30		50		20	)	-		-		-	100
	CAT	3		20		60		20	)	-		-		-	100
	ESE	=		10		60		30	\	-		-		-	100



_	(Offered by Department of Electronics and Co	minunical		····y)			
Programr Branch	Me & All BE/BTech Branches except Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequis	sites Nil	5	OE	3	0	2	4
Preamble	To understand the working principles of electronics in appliances and ide	ntity the or	plications of	conce	vrc in		tropic
rieamble	Device.	antity the ap	plications of	361130	//3 ///	CICC	
Unit – I	Introduction to Electronic Components:						9
	– Mechanical switches – Poles and throws – Push-button switches – Resistors – Ca	pacitors – I	Diodes – Trar	nsisto	rs – F	owe	r Source
	s – Soldering – Safety – Applications.						
Unit – II	Electronics and Sensors in Practice:	light on	d Color cono	0.50	Infra	radr	9
	nd controllers – Sensors – Accelerometers – Digital compasses or Magnetometers e oven – Television (TV) – Washing machine – Air Conditioner (AC) – Vacuum clea	-	a Color sens	ors –	Infra	rea r	emote -
Unit – III	Electronics in Automotive System Gadgets:						9
	electronic engine control: Concept of an electronic engine control system- Cruis	e control e	electronics- A	ntiloc	k bra	king	system
	suspension control system - Blind spot detection- Automatic collision avoidance sy					0	5
Unit – IV	IoT Enabled Automation System Architecture:						9
	ndustrial and societal automation and digitization - Arrowhead framework architectur	•	•				
	acility - Component-based engineering methodology- Safety and security engine	ering of lo	T automation	i syst	ems.	Cas	e study
-	system management and automation						
Unit – V	Electronic Product Safety Standards:						9
	afety Standards: What Is a Standard, Structure of the product safety standard - C	onformity to	o product sate	ety st	andai	'ds-	I vpes o
		dovolonor	-	Jroto	stion		
-	afety standards- Objectives for products safety standards- product safety standard plated to EMC- Serviceability	developers	-	Protec	ction-		
aspects re	elated to EMC- Serviceability.	developers	-	Protec	ction-		
aspects re EXPERIM	elated to EMC- Serviceability.	developers	-	Protec	ction-		
aspects re EXPERIM	elated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor	developers	-	Protec	ction-		
aspects re EXPERIM	elated to EMC- Serviceability.	developers	-	Protec	ction-		
aspects re EXPERIM 1. 2.	elated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor	developers	-	Protec	ction-		
aspects re EXPERIM 1. 2. 3.	elated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple	developers	-	Protec	ction-		
aspects re EXPERIM 1. 2. 3. 4.	elated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple         Measurement of torque/ Strain using Strain Gauge	developers	-	Protec	ction-		
aspects re <b>EXPERIM</b> 1. 2. 3. 4. 5.	elated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple         Measurement of torque/ Strain using Strain Gauge         Speed measurement using Encoder and Opto-coupler	developers	-	Protec	ction-		
aspects re <b>EXPERIM</b> 1. 2. 3. 4. 5.	Belated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple         Measurement of torque/ Strain using Strain Gauge         Speed measurement using Encoder and Opto-coupler         Measurement of displacement using Potentiometer	developers	-			Con	structive
aspects re <b>EXPERIM</b> 1. 2. 3. 4. 5. 6.	Belated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple         Measurement of torque/ Strain using Strain Gauge         Speed measurement using Encoder and Opto-coupler         Measurement of displacement using Potentiometer         Measurement of displacement using LVDT / Capacitive transducer	developers	s- Means of I			Con	structive
aspects re EXPERIM 1. 2. 3. 4. 5. 6. TEXT BO	Belated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple         Measurement of torque/ Strain using Strain Gauge         Speed measurement using Encoder and Opto-coupler         Measurement of displacement using Potentiometer         Measurement of displacement using LVDT / Capacitive transducer		S- Means of F	5 Prac	ctical	: <b>30</b>	Total:75
aspects re <b>EXPERIM</b> 1. 2. 3. 4. 5. 6. <b>TEXT BO</b> 1.	elated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple         Measurement of torque/ Strain using Strain Gauge         Speed measurement using Encoder and Opto-coupler         Measurement of displacement using Potentiometer         Measurement of displacement using LVDT / Capacitive transducer         OK:	tion Stylus	Lecture: 45	5 Prac	ctical	Con	Total:75
	Belated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple         Measurement of torque/ Strain using Strain Gauge         Speed measurement using Encoder and Opto-coupler         Measurement of displacement using Potentiometer         Measurement of displacement using LVDT / Capacitive transducer         OK:         Westcott, S., & Westcott, J. R, "Basic Electronics: Theory and Practice", 3 rd Edi         William B. Ribbens, "Understanding Automotive Electronics an Engineering Per Unit III.	tion Stylus	Lecture: 45	5 Prac	ctical	Con	Total:75
aspects re <b>EXPERIM</b> 1. 2. 3. 4. 5. 6. <b>TEXT BOO</b> 1. 2.	Belated to EMC- Serviceability.         IENTS:         Measurement of temperature using Thermistor         Measurement of temperature using Thermocouple         Measurement of torque/ Strain using Strain Gauge         Speed measurement using Encoder and Opto-coupler         Measurement of displacement using Potentiometer         Measurement of displacement using LVDT / Capacitive transducer         OK:         Westcott, S., & Westcott, J. R, "Basic Electronics: Theory and Practice", 3 rd Edi         William B. Ribbens, "Understanding Automotive Electronics an Engineering Per Unit III.	tion Stylus	Lecture: 45 Publishing, Ll 3 th Edition, Els	5 Prac	ctical 220, f	Con : 30	Total:75 nits I, II. 7 , for



COURSE	EOUTCOMES:	BT Mapped
On comp	pletion of the course, the students will be able to	(Highest Level)
CO1	understand basic of electronic components	Understanding(K2)
CO2	demonstrate real life electronic appliances	Understanding(K2)
CO3	conceptualize the connected device architecture	Applying(K3) / Precision(S3)
CO4	relate electronics in modern automotive	Understanding(K2) / Precision(S3)
CO5	relate the requirements of safety standard for different products	Understanding(K2) / Precision(S3)

					Mapping	g of COs	with PO	s and PS	SOs					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2
CO1	2	2	2								2	2		
CO2	2	2	2			2	2				2	2		
CO3	2	2	2	2		2	2	3			2	2		
CO4	2	2	2	2		2	2	3			2	2		
CO5	2	2	2	2		2	2	3			2	3		

		ASSESSMENT F	PATTERN - THEO	RY			
Test / Bloom's Category*	Remembering (K1) %	Understandin g (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	80	-	-	-	-	100
CAT2	10	60	30	-	-	-	100
CAT3	20	80	-	-	-	-	100
ESE	20	65	15	-	-	-	100
* +3% may be varied (CAT 1	2 3 – 50 marks & ES	SE = 100  marks					

±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



		22ECO02 – IMAGE PROCES						
		(Offered by Department of Electronics and Comr	nunication En	gineering)	1	1		T
Prog Bran	ramme & ich	All BE/BTech Branches except Electronics and Communication Engineering	Sem.	Category	L	Т	Ρ	Credit
Prere	equisites	Nil	5	OE	3	0	2	4
Prea	mble	This course enables the students to learn and apply the var images	rious Digital Im	age Processing	g tech	nniqu	es on	real time
Unit	-	Digital Image Fundamentals:						9
-		st– Hue– Saturation– Mach band effect, Image sampling– Qua B– HSI models - Need for transforms - DFT-DCT- Haar Trans		relationship be	etwee	en pix	els-Co	olor image
Unit	- 11	Image Enhancement and Restoration:						9
		nt: Basic intensity transformations – Piecewise linear transfor filtering: Smoothing and sharpening filters.	mation function	ns, Histogram	equa	lizatio	on - S	patial and
Unit	- 111	Image Restoration						9
•	•	n model - Noise distributions– Median – Geometric mean – H verse and wiener filtering – Constrained least square filtering.	larmonic mean	– Contra harn	nonic	mea	n filte	rs – Orde
Unit	- IV	Image Segmentation, Representation and Description:						9
	-	e detection – Basics of intensity thresholding – Region based gy – dilation and erosion – opening and closing	segmentation	: Region grow	ing –	Regi	ion sp	litting and
	, 3, -1	gy – dilation and erosion – opening and closing						
Unit		Image Compression:						9
Fund	- V lamentals: Fide less and Lossy	Image Compression: elity Criteria – Types of redundancy – Huffmann – Run length v Predictive coding	coding – Arith	metic coding –	Block	< Trar	nsform	
Fund	- V lamentals: Fide less and Lossy OF EXPERIM	Image Compression: elity Criteria – Types of redundancy – Huffmann – Run length Predictive coding ENTS / EXERCISES:	coding – Arith	metic coding –	Block	< Trar	nsform	
Fund	- V lamentals: Fide less and Lossy OF EXPERIM	Image Compression: elity Criteria – Types of redundancy – Huffmann – Run length v Predictive coding	coding – Arith	metic coding –	Block	< Trar	nsform	
Fund	- V lamentals: Fide less and Lossy OF EXPERIM Simulation	Image Compression: elity Criteria – Types of redundancy – Huffmann – Run length Predictive coding ENTS / EXERCISES:	coding – Arith	metic coding –	Block	< Trar	nsform	
Fund Loss	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:	coding – Arith	metic coding –	Block	< Trar	nsform	n Coding -
Fund Loss LIST	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:         CT of an input image	coding – Arith	metic coding –	Block	k Trar	nsform	
Fund Loss LIST 1. 2.	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast er	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:         CT of an input image         ancement using basic intensity transformation techniques.	coding – Arith	metic coding –	Block	< Trar	nsform	
Fund Loss LIST 1. 2. 3.	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast en Edge Dete	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:         CT of an input image         ancement using basic intensity transformation techniques.         nhancement using Histogram Equalisation		metic coding –	Block	< Trar	nsform	
Fund Loss LIST 1. 2. 3. 4.	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast en Edge Dete Restoration	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:         CT of an input image         ancement using basic intensity transformation techniques.         nhancement using Histogram Equalisation         ction in images using image sharpening masks		metic coding –	Block	< Trar	nsform	
Fund Loss LIST 1. 2. 3. 4. 5.	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast en Edge Dete Restoration	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:         CT of an input image         ancement using basic intensity transformation techniques.         nhancement using Histogram Equalisation         ction in images using image sharpening masks         n of an original image by the addition of noise (Gaussian & Imp		metic coding –				n Coding
Fund Loss LIST 1. 2. 3. 4. 5. 6.	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast en Edge Dete Restoration	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:         CT of an input image         ancement using basic intensity transformation techniques.         nhancement using Histogram Equalisation         ction in images using image sharpening masks         n of an original image by the addition of noise (Gaussian & Imp						n Coding
Fund Loss LIST 1. 2. 3. 4. 5. 6.	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast en Edge Dete Restoration Morpholog	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:         CT of an input image         ancement using basic intensity transformation techniques.         nhancement using Histogram Equalisation         ction in images using image sharpening masks         n of an original image by the addition of noise (Gaussian & Imp	pulse)	Lecture:	45, P	ractio	cal:30	n Coding
Fund Loss LIST 1. 2. 3. 4. 5. 6. <b>TEX</b> 1.	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast en Edge Dete Restoration Morpholog	Image Compression:         elity Criteria – Types of redundancy – Huffmann – Run length         Predictive coding         ENTS / EXERCISES:         of the following Image Processing techniques:         CT of an input image         ancement using basic intensity transformation techniques.         nhancement using Histogram Equalisation         ction in images using image sharpening masks         n of an original image by the addition of noise (Gaussian & Implical operation on an input image	pulse)	Lecture:	45, P	ractio	cal:30	n Coding
Fund Loss LIST 1. 2. 3. 4. 5. 6. <b>TEX</b> 1.	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast en Edge Dete Restoration Morpholog T BOOK: Rafael C G ERENCES/ M/	Image Compression: elity Criteria – Types of redundancy – Huffmann – Run length / Predictive coding ENTS / EXERCISES: of the following Image Processing techniques: CT of an input image ancement using basic intensity transformation techniques. Inhancement using Histogram Equalisation ction in images using image sharpening masks in of an original image by the addition of noise (Gaussian & Imp ical operation on an input image sonzalez & Richard E Woods, "Digital Image Processing", 4 th E	Dulse)	Lecture:	<b>45, P</b> ew Dr	ractic	<b>cal:30</b>	n Coding
Fund Loss LIST 1. 2. 3. 4. 5. 6. 6. <b>TEX</b> 1. <b>REF</b>	- V lamentals: Fide less and Lossy OF EXPERIM Simulation Finding DC Image enh Contrast en Edge Dete Restoration Morpholog T BOOK: Rafael C G ERENCES/ M/ Jayaraman 2018.	Image Compression: elity Criteria – Types of redundancy – Huffmann – Run length / Predictive coding ENTS / EXERCISES: of the following Image Processing techniques: CT of an input image ancement using basic intensity transformation techniques. Inhancement using Histogram Equalisation ction in images using image sharpening masks in of an original image by the addition of noise (Gaussian & Imp ical operation on an input image conzalez & Richard E Woods, "Digital Image Processing", 4 th E ANUAL / SOFTWARE:	bulse)	Lecture: DEducation, No	<b>45, P</b> ew Dr	ractic	<b>cal:30</b>	n Coding



COUR	SE OUTCOMES:	BT Mapped
On co	mpletion of the course, the students will be able to	(Highest Level)
CO1	demonstrate the fundamental concepts and image transforms	Applying (K3) / Precision (S3)
CO2	apply Image enhancement in both spatial and frequency domain to improve the quality of images	Applying (K3) / Precision (S3)
CO3	Use image restoration techniques to restore the original images from noisy images	Applying (K3) / Precision (S3)
CO4	identify the features and region of interest of an image using segmentation, representation and description techniques for image classification	Applying (K3) / Precision (S3)
CO5	employ image compression algorithms on digital images	Applying (K3)

					Mappi	ing of C	Os with	POs an	d PSOs					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	3				2	2		2		
CO2	3	2	2	2	3				2	2		2		
CO3	3	2	2	2	3				2	2		2		
CO4	3	2	2	2	3				2	2		2		
CO5	3	2	2	2					2	2		2		
1 – Slight 2	– Mode	rate 3_	Substant	ial BT-F	- Bloom's -	Taxonom	nv							

Inding         Applyin           %         (K3) %           30		Evaluating (K5) % -	Creating (K6) %	<b>Total</b> % 100
30	-	-	-	100
			1	100
30	-	-	-	100
30	-	-	-	100
30	-	-	-	100
	30	30 - 30 -	30         -           30         -           30         -	30         -         -         -           30         -         -         -         -           30         -         -         -         -



		(Offered by Department of Electronics and Com	munication En	gineering)				
Prog Bran	ramme &	All BE/BTech Branches except Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prere	equisites	Nil	6	OE	3	0	2	4
						1		
Prea	mble	To fabricate PCB boards						T
Unit	-	Introduction to PCB Designing Concepts:						9
Type basic		nts used in PCB - Types of PCBs: Single layer - Double layer a	and Multi-layer F	PCB - Flexible F	РСВ -	- PCE	3 man	ufacturin
Unit		PCB Design Considerations:						9
		al and Electrical considerations - Design rules for Analog, atibility (EMI/ EMC).	Digital and High	gh frequency o	circuit	ts - E	Electro	omagneti
Unit	- 111	Design and Simulation of PCB:						9
		Automation (EDA) Tools – Single layer PCB, Two layer PC	CB - Circuit des	sign and simula	ation	- Cre	eating	footprin
Place Unit		ting, Generating Gerber file for single layer PCB.  PCB Fabrication Techniques:						9
		aniques - Plating techniques: Immersion, Electro less, Electro	onlating Solder	r Mask Etching	n terl	nniau	es M	-
	ations				9 1001	inqu	00, 10	
Unit		Circuit Tracing and Testing:						9
Sold	ering technique	es - Testing PCB - Environmental concern - Case studies: Pov	wer supply, Wie	n-bridge oscilla	ator.			
1.	Study of C	ENTS / EXERCISES: AD for PCB Design	daviana					
1. 2.	Study of Ca Soldering a Design and Design, sin							
1. 2. 3. 4.	Study of CA Soldering a Design and Design, sin Preparation	AD for PCB Design and de-soldering the components on the PCB including SMD of d Simulation of 230V AC to 5V/9V/12V DC Power Supply in Ca nulating, assembling and soldering of IR Sensor Module						
1. 2. 3. 4. 5.	Study of CA Soldering a Design and Design, sin Preparation	AD for PCB Design and de-soldering the components on the PCB including SMD of d Simulation of 230V AC to 5V/9V/12V DC Power Supply in Co nulating, assembling and soldering of IR Sensor Module in of layout from the circuit design boting of single layer and multi-layer PCB						
1. 2. 3. 4. 5. 6.	Study of CA Soldering a Design and Design, sin Preparation Troublesho	AD for PCB Design and de-soldering the components on the PCB including SMD of d Simulation of 230V AC to 5V/9V/12V DC Power Supply in Co nulating, assembling and soldering of IR Sensor Module in of layout from the circuit design boting of single layer and multi-layer PCB		Lecture:4	15, Pr	actic	:al:30	, Total:7
1. 2. 3. 4. 5. 6. 7.	Study of CA Soldering a Design and Design, sin Preparation Troublesho	AD for PCB Design and de-soldering the components on the PCB including SMD of d Simulation of 230V AC to 5V/9V/12V DC Power Supply in Co nulating, assembling and soldering of IR Sensor Module in of layout from the circuit design boting of single layer and multi-layer PCB		Lecture:4		actio	al:30	, Total:7
1. 2. 3. 4. 5. 6. 7.	Study of CA Soldering a Design and Design, sin Preparation Troublesho Miniproject	AD for PCB Design and de-soldering the components on the PCB including SMD of d Simulation of 230V AC to 5V/9V/12V DC Power Supply in Co nulating, assembling and soldering of IR Sensor Module in of layout from the circuit design boting of single layer and multi-layer PCB	AD Tool		-			
1. 2. 3. 4. 5. 6. 7. <b>TEX</b> 1.	Study of CA Soldering a Design and Design, sin Preparation Troublesho Miniproject <b>F BOOK:</b> Khandpur F New Delhi,	AD for PCB Design and de-soldering the components on the PCB including SMD of d Simulation of 230V AC to 5V/9V/12V DC Power Supply in Co nulating, assembling and soldering of IR Sensor Module in of layout from the circuit design boting of single layer and multi-layer PCB	AD Tool		-			
1. 2. 3. 4. 5. 6. 7. <b>TEX</b> 1. 2.	Study of CA Soldering a Design and Design, sin Preparation Troublesho Miniproject <b>F BOOK:</b> Khandpur F New Delhi, Laboratory	AD for PCB Design and de-soldering the components on the PCB including SMD of d Simulation of 230V AC to 5V/9V/12V DC Power Supply in Ca nulating, assembling and soldering of IR Sensor Module in of layout from the circuit design boting of single layer and multi-layer PCB	AD Tool		-			
1. 2. 3. 4. 5. 6. 7. <b>TEX</b> 1. 2.	Study of CA Soldering a Design and Design, sin Preparation Troublesho Miniproject <b>F BOOK:</b> Khandpur F New Delhi, Laboratory <b>ERENCES/ MA</b>	AD for PCB Design and de-soldering the components on the PCB including SMD of d Simulation of 230V AC to 5V/9V/12V DC Power Supply in Co nulating, assembling and soldering of IR Sensor Module in of layout from the circuit design boting of single layer and multi-layer PCB R.S., "Printed Circuit Board: Design, Fabrication, Assembly an 2017 for Units I,II, IV,V. Manual for Unit III.	AD Tool	Edition, McGrav	-			



CO4

CO5

		UTCOM ion of t		e, the st	udents v	vill be al	ble to						()	BT Mapp Highest L		
CO1	clas	sify the	different	types of F	PCBs								Un	derstandi	ng (K2)	
CO2	outli	ne the F	PCB desig	gn rules a	and cons	ideration	IS						Understanding (K			
CO3	apply the PCB design rules to develop and simulate single layer PCB													Applying (K3)/ Precision (S3)		
CO4	D4 experiment with a single layer PCB for a given circuit													Applying ( Precision		
CO5														Applying (K3)/ Precision (S3)		
						Маррі	ing of C	Os with	POs an	d PSOs						
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO	1	3	2													
CO	2	3	2													
CO	3	3	2	2		3				2	2		2			

1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy

		ASSESSMENT	FALLERN-	INCORT			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	30	70	-	-	-	-	100
CAT2	30	50	20	-	-	-	100
CAT3	20	50	30	-	-	-	100
ESE	20	50	30	-	-	-	100



	(Common to All Engineering and Tech	nology Branches)					
Programme &	All BE/BTech Branches except Electronics and			_		_	
Branch	Communication Engineering	Sem.	Category	L	Т	P	Credi
Prerequisites	Nil	6	OE	3	0	0	3
Preamble	To understand the concept of wearable Sensors and its	applications in va	rious sectors				
Unit – I	Data Acquisition and Sensor Characteristics :						9
	and Systems-Sensor Classification-Units of Measurements-S	Sensor Characteris	stics: Transfer	Funct	ion-S	pan (	Full-Scal
	Output-Accuracy-Calibration-Calibration Error-Hysteresis-No					• •	
	s-Output Impedance-Excitation-Dynamic Characteristics-Env			-			
Uncertainty			-				
Unit – II	Position, Displacement and Level Sensors :						9
	ensors-Gravitational Sensors-Capacitive Sensors-Inductive ar	nd Magnetic Sens	ors-Optical Se	nsors	-Ultra	isonic	Sensors
	hickness and Level Sensors						•
Unit – III	Sensors for Wearable Devices :					-	9
	s-Flow Sensors- Acoustic Sensors-Humidity and Moisture S	sensors-Light Dete	ectors-Radiatio	n De	tecto	rs-lei	mperatur
Sensors							-
l Init _ IV	Chemical Sensors :						9
					_		-
Chemical Sensor	Characteristics-Specific Difficulties-Classification of Chemica	Il-Sensing Mechar	nisms-Direct S	ensor	s-Co	mplex	_
Chemical Sensor Chemical Sensor	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments	Il-Sensing Mechar	nisms-Direct S	ensor	s-Co	mplex	Sensor
Chemical Sensor Chemical Sensor Unit – V	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices:						Sensors
Chemical Sensor Chemical Sensor Unit – V Role of Wearable	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles	and clothing, Soc	ial Aspects: In	terpre	etation	n of A	Sensors 9 .esthetics
Chemical Sensor Chemical Sensor <b>Unit – V</b> Role of Wearable Adoption of Innov	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm	and clothing, Soc	ial Aspects: In	terpre	etation	n of A	Sensors 9 .esthetics
Chemical Sensor Chemical Sensor <b>Unit – V</b> Role of Wearable Adoption of Innov	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles	and clothing, Soc	ial Aspects: In	terpre	etation	n of A	Sensors 9 .esthetics
Chemical Sensor Chemical Sensor <b>Unit – V</b> Role of Wearable Adoption of Innov	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm	and clothing, Soc	ial Aspects: In	terpre	etation	n of A	Sensors 9 .esthetics
Chemical Sensor Chemical Sensor <b>Unit – V</b> Role of Wearable Adoption of Innov	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm	and clothing, Soc	ial Aspects: In	terpre	etation	n of A	Sensors 9 esthetic: enges an
Chemical Sensor Chemical Sensor <b>Unit – V</b> Role of Wearable Adoption of Innov Opportunities, Fu	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm	and clothing, Soc	ial Aspects: In	terpre	etation	n of A	Sensors 9 esthetic: enges an
Chemical Sensor Chemical Sensor <b>Unit – V</b> Role of Wearable Adoption of Innov Opportunities, Fu	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm	and clothing, Soc	ial Aspects: In	terpre	etation	n of A	Sensors 9 .esthetics
Chemical Sensor Unit – V Role of Wearable Adoption of Innov Opportunities, Fu	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm	and clothing, Soc hart glasses, fithe	ial Aspects: In ss trackers, W	terpre	etation bles: (	n of A Challe	Sensors 9 eesthetic: enges an Total:4
Chemical Sensor Chemical Sensor Unit – V Role of Wearable Adoption of Innov Opportunities, Fu TEXT BOOK: 1. Jacob Fra IV. 2 Edward	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm ture and Research Roadmap.	and clothing, Soc hart glasses, fitnes	ial Aspects: In ss trackers, W edition., Spring	terpre earat	etation bles: ( 016, f	n of A Challe	Sensor 9 esthetic enges ar <b>Total:4</b> its I, II, I
Chemical Sensor Chemical Sensor Unit – V Role of Wearable Adoption of Innov Opportunities, Fu TEXT BOOK: 1. Jacob Fra IV. 2. Edward Edition., 2	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm ture and Research Roadmap.	and clothing, Soc hart glasses, fitnes	ial Aspects: In ss trackers, W edition., Spring	terpre earat	etation bles: ( 016, f	n of A Challe	Sensor 9 esthetic enges ar <b>Total:4</b> its I, II, I
Chemical Sensor Chemical Sensor Unit – V Role of Wearable Adoption of Innov Opportunities, Fu TEXT BOOK: 1. Jacob Fra IV. 2. Edward Edition., 2 REFERENCES:	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm ture and Research Roadmap.	and clothing, Soc hart glasses, fitnes Applications", 5 th o mentals, Impleme	ial Aspects: In ss trackers, W edition., Spring entation and A	terpre earab	otation oles: ( 016, f	n of A Challe for Un	Sensor 9 Lesthetic enges ar Total:4 its I, II, I evier, 2
Chemical Sensor Chemical Sensor Unit – V Role of Wearable Adoption of Innov Opportunities, Fu TEXT BOOK: 1. Jacob Fra IV. 2. Edward 2 Edition., 2 REFERENCES: 1. Subhas C	Characteristics-Specific Difficulties-Classification of Chemica s Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm ture and Research Roadmap. aden, "Hand Book of Modern Sensors: physics, Designs and Sazonov, Michael R Neuman, "Wearable Sensors: Fundar 2020 for Unit V.	and clothing, Soc hart glasses, fitnes Applications", 5 th mentals, Impleme	ial Aspects: In ss trackers, W edition., Spring entation and A y Living",I st Edi	terpre earab	etation les: ( 016, f ations	n of A Challe for Un	Sensor 9 Lesthetic enges ar Total:4 its I, II, I evier, 2
Chemical Sensor Chemical Sensor Unit – V Role of Wearable Adoption of Innov Opportunities, Fu TEXT BOOK: 1. Jacob Fra IV. 2. Edward 2 Edition., 2 REFERENCES: 1. Subhas C 2. A.K. Saw	Characteristics-Specific Difficulties-Classification of Chemicals Versus Instruments Scope of Wearable Devices: es, Attributes of Wearables, The Meta Wearables – Textiles vation, On-Body Interaction; Case Study: Smart watches, Sm ture and Research Roadmap.	and clothing, Soc hart glasses, fitnes Applications", 5 th mentals, Impleme r Safe and Health ntation", Dhanpat	ial Aspects: In ss trackers, W edition., Spring entation and A y Living",I st Edi Rai. ",I st Editio	terpre earab ger, 20 tion : n 20	etation les: ( 016, f ations	n of A Challe for Un	Sensor 9 Lesthetic enges ar Total:4 its I, II, I evier, 2



ESE

20

* ±3% may be varied (CAT 1,2,3 - 50 marks & ESE - 100 marks)

		UTCOM ion of t		se, the st	udents	will be a	ble to						(	BT Mapp Highest L		
CO1	und	erstand	the conc	epts of D	ata Acq	uisition a	nd Senso	or Chara	cteristic	cs			Ur	nderstandi	ng(K2)	
CO2	disc	uss the	concepts	s of variou	us weara	able Posi	tion, Disp	laceme	nt and	Level Sei	nsors		Ur	nderstandi	ng(K2)	
CO3	acq	uire kno	wledge c	on Sensor	s for We	earable d	evices						Ur	Understanding(K2)		
CO4	des	describe the different chemical sensors in wearable													ng(K2)	
CO5	apply the usage of wearable devices as assistive devices, diagnostic devices, and other modern													Applying(	(K3)	
						Маррі	ing of Co	Os with	POs a	nd PSOs	;					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	0 PO11	PO12	PSO1	PSO2	
CO	1	3														
CO	2	3	2	2						2			2			
CO	3	3	2	2						2			2			
CO	4	3	2			2	2						2			
CO	5	3	2	2	2	2	2	2		2	2	2	2			
1 – Slig	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's ⁻	Taxonom	iy	1		1			1		
						ASSE	SSMEN		ERN - 1	THEORY						
Tes	st / Bl	oom's	Re	member	ing	Understa	anding	Apply	ying	Analyz	ing	Evaluating (K5)	C	reating	Tota	
C	Catego	ory*		(K1) %	-	(K2)	%	(K3)	%	(K4) %		%	(	K6) %	%	
	CAT	1		30		70		-		-		-		-	100	
	CAT	2		30		70		-		-		-		-	100	
	CAT	3		20		40		40	0	-		-		-		

40

-

-

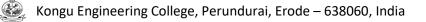
-

100

40



		(Offered by Department of Electronics and Com	munication Engi	neering)				
Progi Branc	ramme & ch	All BE/BTech Branches except Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prere	quisites	Nil	7	OE	2	0	2	3
Prear		To test and troubleshoot electronic hardwares		<u> </u>				
Unit -	-	Introduction to Electronic Hardware Troubleshooting						6
		nalysis-Circuit faults-Troubleshooting methods-Safety cons Electron tubes-Ultra capacitors-Inductors.	siderations-Testi	ng basic com	pone	nts-5	emico	nductors
Unit -	- 11	Troubleshooting Industrial Controls Device:						6
		truments: Digital multimeter-Oscilloscope, Troubleshooting procedures-Preventive maintenance.	industrial contro	ols: Fundamen	tals-T	Гуре	s of c	ontrollers
Unit -	- 111	Troubleshooting Consumer Electronic Systems:						6
		it repair-Lighting and control system repair-TV distribution sys itor troubleshooting.	stem repair- Fibe	r optic commun	icatic	on rej	bair-Ca	ase study
Unit -	- IV	Troubleshooting Digital Circuits:						6
shorts		circuits: Binary Code-Logic gates-Digital technologies-Voltag - Open inputs - Open outputs- Short circuit, Installation and r			-	-		-
Unit -	- V	PCB Manufacturing, Maintenance and Safety Aspects	3:					6
mach	ines-X-ray ma			ECG systems-	EEG	syste	ems-U	ltra soun
mach LIST	ines-X-ray ma			ECG systems-	EEG	syste	ems-U	ltra soun
mach LIST 1.	ines-X-ray ma	ENTS / EXERCISES:		ECG systems-	EEG	syste	ems-U	Itra soun
<u>mach</u> LIST 1. 2.	ines-X-ray ma OF EXPERIN Dismantlin Troublesh	echines.		ECG systems-	EEG	syste	ems-U	Itra soun
<u>mach</u> LIST 1. 2. 3.	ines-X-ray ma OF EXPERIN Dismantlin Troublesho Troublesho	IENTS / EXERCISES: g and Assembling of electronic hardware. poting of digital circuits		ECG systems-	EEG	syste	ems-U	Itra soun
<u>mach</u> LIST 1. 2. 3. 4.	ines-X-ray ma OF EXPERIN Dismantlin Troublesh Troublesh	IENTS / EXERCISES: g and Assembling of electronic hardware. poting of digital circuits poting of Shift registers		ECG systems-	EEG	syste	ems-U	Itra soun
mach LIST 1. 2. 3. 4. 5.	ines-X-ray ma OF EXPERIN Dismantlin Troublesho Troublesho Troublesho	IENTS / EXERCISES: g and Assembling of electronic hardware. Doting of digital circuits Doting of Shift registers Doting of speakers and amplifiers		ECG systems-	EEG		ems-U	Itra soun
mach	ines-X-ray ma OF EXPERIN Dismantlin Troublesho Troublesho Troublesho	IENTS / EXERCISES: g and Assembling of electronic hardware. Doting of digital circuits Doting of Shift registers Doting of speakers and amplifiers Doting of home appliances – Radio / TV		ECG systems-				
mach LIST 1. 2. 3. 4. 5. 6.	ines-X-ray ma OF EXPERIN Dismantlin Troublesho Troublesho Troublesho	IENTS / EXERCISES: g and Assembling of electronic hardware. Doting of digital circuits Doting of Shift registers Doting of speakers and amplifiers Doting of home appliances – Radio / TV						
mach LIST 1. 2. 3. 4. 5. 6. TEXT	OF EXPERIN Dismantlin Troubleshe Troubleshe Troubleshe Troubleshe Troubleshe	IENTS / EXERCISES: g and Assembling of electronic hardware. Doting of digital circuits Doting of Shift registers Doting of speakers and amplifiers Doting of home appliances – Radio / TV		Lecture:3	60, Pr	ractio	cal:30	, Total:6
mach LIST 1. 2. 3. 4. 5. 6. TEXT 1.	OF EXPERIN Dismantlin Troublesho Troublesho Troublesho Troublesho Troublesho Troublesho	IENTS / EXERCISES: g and Assembling of electronic hardware. Doting of digital circuits Doting of Shift registers Doting of speakers and amplifiers Doting of home appliances – Radio / TV Doting of PCB of Mobile phone/Modem		Lecture:3	60, Pr	ractio	cal:30	, Total:6
mach LIST 1. 2. 3. 4. 5. 6. TEXT 1. REFE	OF EXPERIN Dismantlin Troublesh Troublesh Troublesh Troublesh Troublesh BOOK: Daniel R. T RENCES/ M. Khandpur New Delhi	IENTS / EXERCISES: g and Assembling of electronic hardware. poting of digital circuits poting of Shift registers poting of speakers and amplifiers poting of home appliances – Radio / TV poting of PCB of Mobile phone/Modem	Edition, McGraw	Lecture:3	<b>30, Pr</b> , Nev	v Del	<b>cal:30</b> hi, 20 ⁻	, Total:6
mach LIST 1. 2. 3. 4. 5. 6. TEXT 1.	OF EXPERIN Dismantlin Troublesh Troublesh Troublesh Troublesh Troublesh BOOK: Daniel R. T RENCES/ M. Khandpur New Delhi	inchines.       IENTS / EXERCISES:         g and Assembling of electronic hardware.         boting of digital circuits         boting of Shift registers         boting of speakers and amplifiers         boting of home appliances – Radio / TV         boting of PCB of Mobile phone/Modem         Formal& Aram S. Agajanian, "Electronic Troubleshooting", 4 th ANUAL / SOFTWARE:         R.S, "Troubleshooting Electronic Equipment: Includes Repai         2011.         ushan Sinha, "Handbook of Repair and Maintenance Of Dom	Edition, McGraw	Lecture:3	<b>30, Pr</b> , Nev	v Del	<b>cal:30</b> hi, 20 ⁻	, <b>Total:6</b> 14, Education



		UTCOM ion of t		se, the st	udents v	will be a	ble to						(	BT Mapı Highest L		
CO1	expl	ain trou	bleshoot	ing princi	oles for t	esting ar	nd point o	out the fa	ailures	of electro	nic equip	oment.	Un	derstandi	ng (K2)	
CO2	inte	rpret the	use of te	esting too	ls and in	strumen	ts for tro	ubleshoo	oting ele	ectronic I	nardware		Un	derstandi	ng (K2)	
CO3	iden	ntify the f	faults and	d troubles	shoot the	home a	ppliance	s using r	nultime	ter.				Applying ( Precision		
CO4	app	ly trouble	eshooting	g principl	es for tes	sting of d	igital circ	uits and	amplifi	ers.			Applying (K3)/ Precision (S3)			
CO5	cO5 apply troubleshooting principle of Biomedical equipment.													Applying ( Precision		
						Маррі	ng of C	Os with	POs ai	nd PSOs						
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2	
CO	1	3	1	2	2								2			
CO	2	3	2	2	2	3		2					2			
CO	3	2	1	3	2	2		2		3	2		3			
CO	4	3	2	2	2	2			2	3	2		2			
CO	5	2	3	3	2	3	2			3	2					
1 – Sli	ght, 2	– Mode	rate, 3 –	Substant	ial, BT- E	Bloom's T	Taxonom	iy								
						ASSE	SSMEN	Τ ΡΑΤΤΙ	ERN - 1	HEORY						
	st / Bl Catego	oom's ory*	Re	member (K1) %	ing l	Jndersta (K2)	•	Apply (K3)	-	Analyz (K4) 9	-	Evaluating (K5) %		reating K6) %	Tota %	
	CAT	1		40		60		-		-		-		-		
	CAT	2		30		50		20	)	-		-		-	100	
	CAT	3		20		40		40	)	-		-		-	100	
	ESE	Ξ		20		50		30	)	-		-		-	100	

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



	(Common to All Engineering and Techn	ology Branches	3)				
Programme & Branch	All BE/BTech Branches except Electronics and Communication Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	8	OE	3	0	0	3
Preamble Unit – I	To study about the various optical fiber modes, configuration Introduction To Optical Fibers :	ion and transm	ission characte	eristic	cs of c	optica	l fibers 9
	ral optical fiber communication system- basic optical laws a	nd definitions-	ontical modes	bne	conf	iaurat	-
-	al propagation through fibers- transverse electric and transv		-			-	
	optic cables-classification of optical fiber	verse magnetic		ma	chaic		labilicatio
Unit – II	Transmission Characteristic Of Optical Fiber :						9
	ptionscattering losses-bending losses-core and cladding lo	osses-signal d	ispersion -inte	er svi	mbol	interf	-
	nodel dispersion-material dispersion- waveguide dispersion						
	single mode fiber-R-I Profile-cutoff wave length-dispersion calc						a.ep 010.01
Unit – III	Optical Sources And Detectors :						9
	c and extrinsic material-direct and indirect band gaps-LEE	-LED structure	es-LASER dir	odes-	mode	s an	-
		riuctures and r	adiation natte	rns	Deter	tore.	PIN photo
	equations-external quantum efficiency-resonant frequencies-size photo diados Photo datactor poico poico sources SNP d		-				-
detector-Avalanch	ne photo diodes-Photo detector noise-noise sources-SNR-d		-				-
detector-Avalanch temperature effec	ne photo diodes-Photo detector noise-noise sources-SNR-d ts-comparisons of photo detectors.		-				ation noise
detector-Avalanch temperature effec Unit – IV	ne photo diodes-Photo detector noise-noise sources-SNR-d ts-comparisons of photo detectors. Optical Receiver and Measurements :	etector respor	ise time-Avala	anche	e mul	tiplica	ation noise
detector-Avalanch temperature effec <b>Unit – IV</b> Fundamental ree	ne photo diodes-Photo detector noise-noise sources-SNR-d ts-comparisons of photo detectors. Optical Receiver and Measurements : ceiver operation-preamplifiers-digital signal transmission-e	etector respor	ise time-Avala	anche	e mul	tiplica	ation noise
detector-Avalanch temperature effec <b>Unit – IV</b> Fundamental re performance-prob	he photo diodes-Photo detector noise-noise sources-SNR-d tts-comparisons of photo detectors. Optical Receiver and Measurements : ceiver operation-preamplifiers-digital signal transmission-e pability of error.	etector respor	Front end a	anche mplifi	e mul	tiplica igital	ation noise 9 receiver
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental re- performance-prob Optical power me	he photo diodes-Photo detector noise-noise sources-SNR-d tts-comparisons of photo detectors. Optical Receiver and Measurements : ceiver operation-preamplifiers-digital signal transmission-e bability of error. asurement-attenuation measurement-dispersion measurement	etector respor	Front end a	anche mplifi	e mul	tiplica igital	ation noise 9 receiver
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental re- performance-prot Optical power me Wave length Mea	he photo diodes-Photo detector noise-noise sources-SNR-d tts-comparisons of photo detectors. Optical Receiver and Measurements : ceiver operation-preamplifiers-digital signal transmission-e pability of error. asurement-attenuation measurement-dispersion measurement surements	etector respor	Front end a	anche mplifi	e mul	tiplica igital	9 receiver
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental re- performance-prob Optical power me Wave length Mea <b>Unit – V</b>	Photo diodes-Photo detector noise-noise sources-SNR-d     Comparisons of photo detectors.     Optical Receiver and Measurements :     ceiver operation-preamplifiers-digital signal transmission-e     bability of error.     asurement-attenuation measurement-dispersion measurement     surements     Optical Communication Systems And Networks :	rror sources-l	Front end a	mplifi Ieasu	e mul iers-d	tiplica igital nts- F	ation noise 9 receiver Fiber cut- of 9
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental re- performance-prob Optical power me Wave length Mea <b>Unit – V</b> System design co	he photo diodes-Photo detector noise-noise sources-SNR-d     tes-comparisons of photo detectors.     Optical Receiver and Measurements :     ceiver operation-preamplifiers-digital signal transmission-e     bability of error.     asurement-attenuation measurement-dispersion measurement     surements     Optical Communication Systems And Networks :     onsideration Point – to –Point link design –Link power budget	rror sources-l -rise time budg	Front end a cal Aperture M	mplifi Ieasu	e mul iers-d ireme	tiplica igital nts- F	ation noise 9 receiver iber cut- of 9 omponents
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental re- performance-prob Optical power me Wave length Mea <b>Unit – V</b> System design co Elements of optic	he photo diodes-Photo detector noise-noise sources-SNR-d     tes-comparisons of photo detectors.     Optical Receiver and Measurements :     ceiver operation-preamplifiers-digital signal transmission-e     bability of error.     asurement-attenuation measurement-dispersion measurement     surements     Optical Communication Systems And Networks :     onsideration Point – to –Point link design –Link power budget -     cal networks-SONET/SDH Optical Interfaces-SONET/SDH Ri	rror sources-l -rise time budg	Front end a cal Aperture M	mplifi Ieasu	e mul iers-d ireme	tiplica igital nts- F	ation noise 9 receiver iber cut- of 9 omponents
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental re- performance-prob Optical power me Wave length Mea <b>Unit – V</b> System design co Elements of optic	he photo diodes-Photo detector noise-noise sources-SNR-d     tes-comparisons of photo detectors.     Optical Receiver and Measurements :     ceiver operation-preamplifiers-digital signal transmission-e     bability of error.     asurement-attenuation measurement-dispersion measurement     surements     Optical Communication Systems And Networks :     onsideration Point – to –Point link design –Link power budget -	rror sources-l -rise time budg	Front end a cal Aperture M	mplifi Ieasu	e mul iers-d ireme	tiplica igital nts- F	ation noise 9 receiver iber cut- of 9 omponents
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental re- performance-prob Optical power me Wave length Mea <b>Unit – V</b> System design co Elements of optic	he photo diodes-Photo detector noise-noise sources-SNR-d     tes-comparisons of photo detectors.     Optical Receiver and Measurements :     ceiver operation-preamplifiers-digital signal transmission-e     bability of error.     asurement-attenuation measurement-dispersion measurement     surements     Optical Communication Systems And Networks :     onsideration Point – to –Point link design –Link power budget -     cal networks-SONET/SDH Optical Interfaces-SONET/SDH Ri	rror sources-l -rise time budg	Front end a cal Aperture M	mplifi Ieasu	e mul iers-d ireme	tiplica igital nts- F	ation noise 9 receiver iber cut- of 9 omponents
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental re- performance-prob Optical power me Wave length Mea <b>Unit – V</b> System design co Elements of optic	he photo diodes-Photo detector noise-noise sources-SNR-d     tes-comparisons of photo detectors.     Optical Receiver and Measurements :     ceiver operation-preamplifiers-digital signal transmission-e     bability of error.     asurement-attenuation measurement-dispersion measurement     surements     Optical Communication Systems And Networks :     onsideration Point – to –Point link design –Link power budget -     cal networks-SONET/SDH Optical Interfaces-SONET/SDH Ri	rror sources-l -rise time budg	Front end a cal Aperture M	mplifi Ieasu	e mul iers-d ireme	tiplica igital nts- F	ation noise 9 receiver Fiber cut- of 9 omponents inks-OADM
detector-Avalanch temperature effect <b>Unit – IV</b> Fundamental reperformance-prob Optical power me Wave length Mea <b>Unit – V</b> System design cc Elements of optic configuration-Opt	he photo diodes-Photo detector noise-noise sources-SNR-d     tes-comparisons of photo detectors.     Optical Receiver and Measurements :     ceiver operation-preamplifiers-digital signal transmission-e     bability of error.     asurement-attenuation measurement-dispersion measurement     surements     Optical Communication Systems And Networks :     onsideration Point – to –Point link design –Link power budget -     cal networks-SONET/SDH Optical Interfaces-SONET/SDH Ri	rror sources-l - Fiber Numeri -rise time budg	Front end a cal Aperture M get, WDM –Pa prks-High spe	mplifi leasu ssive ed lig	e mul iers-d ireme DWI ght wa	igital nts- F DM Co ave L	ation noise 9 receiver iber cut- of 9 omponents inks-OADM
detector-Avalanch temperature effect Unit – IV Fundamental re- performance-prob Optical power me Wave length Mea Unit – V System design cc Elements of optic configuration-Opt TEXT BOOK: 1. P Chakra	be photo diodes-Photo detector noise-noise sources-SNR-d     tes-comparisons of photo detectors.     Optical Receiver and Measurements :     ceiver operation-preamplifiers-digital signal transmission-e     bability of error.     asurement-attenuation measurement-dispersion measurement     surements     Optical Communication Systems And Networks :     onsideration Point – to –Point link design –Link power budget -     cal networks-SONET/SDH Optical Interfaces-SONET/SDH Ri     ical ETHERNET-Soliton.	rror sources-l -rise time budg ngs and Netwo	Front end a cal Aperture M get, WDM –Pa orks-High spe	mplifi leasu ssive ed lig	e mul iers-d ireme jht wa	igital nts- F DM Co ave L	ation noise 9 receiver iber cut- o 9 omponents inks-OADN Total:4
detector-Avalanch temperature effect Unit – IV Fundamental reperformance-prob Optical power me Wave length Mea Unit – V System design cc Elements of optic configuration-Opt TEXT BOOK: 1. P Chakra 2. GredKeis IV, V.	he photo diodes-Photo detector noise-noise sources-SNR-d tts-comparisons of photo detectors. Optical Receiver and Measurements : ceiver operation-preamplifiers-digital signal transmission-e bability of error. asurement-attenuation measurement-dispersion measurement surements Optical Communication Systems And Networks : onsideration Point – to –Point link design –Link power budget - cal networks-SONET/SDH Optical Interfaces-SONET/SDH Ri ical ETHERNET-Soliton.	rror sources-l -rise time budg ngs and Netwo	Front end a cal Aperture M get, WDM –Pa orks-High spe	mplifi leasu ssive ed lig	e mul iers-d ireme jht wa	igital nts- F DM Co ave L	ation noise 9 receiver iber cut- o 9 omponents inks-OADI Total:4
detector-Avalanch temperature effect Unit – IV Fundamental re- performance-prob Optical power me Wave length Mea Unit – V System design cc Elements of optic configuration-Opt TEXT BOOK: 1. P Chakra 2. GredKeis IV, V. REFERENCES:	he photo diodes-Photo detector noise-noise sources-SNR-d tts-comparisons of photo detectors. Optical Receiver and Measurements : ceiver operation-preamplifiers-digital signal transmission-e bability of error. asurement-attenuation measurement-dispersion measurement surements Optical Communication Systems And Networks : onsideration Point – to –Point link design –Link power budget - cal networks-SONET/SDH Optical Interfaces-SONET/SDH Ri ical ETHERNET-Soliton.	rror sources-l -rise time budg ngs and Netwo India) Private Lin	Front end a cal Aperture M get, WDM –Pa orks-High spe	mplifi leasu ssive ed lig	e mul iers-d ireme jht wa	igital nts- F DM Co ave L	ation noise 9 receiver iber cut- o 9 omponents inks-OADN Total:4



		UTCOM		se, the s	tudents	s will be a	able to							BT Map (Highest	-	
CO1	real	ize basi	c elemer	nts in opti	cal fibe	rs, differe	nt mode	s and co	onfigura	tions			U	nderstand	ling (K2)	
CO2	expl	lain the t	transmis	sion chai	racterist	ics assoc	iated wit	h dispei	rsion ar	nd polariz	zation te	echniques.	U	Understanding (		
CO3	app	ly optica	al source	s and det	tectors	with their	use in o	ptical co	mmuni	cation sy	stem.			Applying	ı (K3)	
CO4	con	struct fib	per optic	receiver	system	s, measui	rements	and cou	pling te	chniques	S			Applying	ı (K3)	
CO5	inte	rpret opt	tical com	municati	on syste	ems and i	ts netwo	rks.					U	nderstand	ling (K2)	
						Марр	oing of C	COs witl	h POs a	and PSO	)s					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	) PO11	PO12	PSO1	PSO2	
CO	1	2	2	3	2		2		2	2			2			
CO	2	3	2	2	1		2		2				2			
CO	3	2	2	3	2					2			2			
CO	4	2	2	3	2					2			2			
CO	5	2	2	3	2		2		2	2			2			
1 – Sli	ght, 2	– Mode	rate, 3 –	Substan	tial, BT·	Bloom's	Taxono	my		- IL					l	
						ASS	ESSMEN		FERN -	THEOR	Y					
	st / Bl Catego	oom's ory*	Re	member (K1) %	ing	Understa (K2)		Apply (K3)		Analyz (K4) 9	-	Evaluating (K	-	eating K6) %	Total %	
	CAT	1		40		60		-		-		-		-	100	
	CAT	2		20		50		30	)	-		-	1			

40

30

-

-

-

-

-

-

100

100

20 * ±3% may be varied (CAT 1,2,3 - 50 marks & ESE - 100 marks)

20

40

50

CAT3

ESE



machine.

# 22MAO01 - MATHEMATICAL FOUNDATIONS FOR MACHINE LEARNING

Programme & Branch	All Engineering and Technology branches except AIDS & AIML	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	5	OE	3	1	0	4

Preamble	To impart the basic knowledge in linear algebra, decomposition of matrices, continuous optimization regression and support vector machines which provide the foundations for machine learning and learning.	
Unit - I	Vector Spaces:	9+3
	or spaces – Subspaces – Linear dependence and independence – Basis and dimension – Row space, C Null Space – Rank and nullity.	Column
Unit - II	Linear Transformations:	9+3
Introduction	n – Kernel and range – Matrices of linear transformations – Change of basis – Rank and nullity.	
Unit - III	Inner Product Spaces:	9+3
	ner products – Length and Distance – Angle and Orthogonality – Orthonormal Basis – Gram-Schmidt P omposition – Orthogonal Projection.	rocess
Unit - IV	Matrix Decomposition and Continuous Optimization:	9+3
Matrix Dec	omposition: Cholesky decomposition – Singular Value Decomposition.	
	s Optimization: Introduction – Unconstrained Optimization – Gradient Descent method – Cons on – Lagrange Multipliers method – Convex Optimization.	trained
Unit - V	Linear regression and Support vector machines:	9+3
Linear Reg	ression: Parameter Estimation – Maximum Likelihood estimation – Bayesian linear regression.	
	ector Machines: Introduction – Linear and Non-linear Support vector machine – Margin and support ve Soft margins in Support vector machines – Kernels – Primal support vector machine – Dual support	

Lecture: 45, Tutorial: 15, Total: 60



# TEXT BOOK:

1		Howard Anton and Chris Rorres, "Elementary Linear Algebra", 11th Edition, John Wiley & Sons, New Delhi, 2014. <b>(Units</b>
	Ι,	,II,III)
2	2.  N	M. P. Deisenroth, A. A. Faisal, and C. S. Ong, "Mathematics for Machine Learning", 1 st Edition Cambridge University
	F	Press, 2019.(Units IV, V)

#### **REFERENCES:**

1.	David C. Lay, Steven R. Lay, Judith McDonald, "Linear Algebra and its Applications", 5 th Edition, Pearson Education, New Delhi, 2016.
2.	Ethem Alpaydin, "Introduction to Machine Learning(Adaptive Computation and Machine Learning series)", 4 th Edition, MIT Press,USA,2020.
3.	R. O. Duda, E. Hart, and D.G. Stork, "Pattern classification", 2 nd Edition, John Wiley & Sons, 2012.

COURS On com				ne stud	ents wil	l be ab	le to						BT Mappe ghest Le	
CO1	under	stand th	ne conc	epts of	vector	spaces						Unde	erstanding	g (K2)
CO2	apply	the con	cepts o	f linear	mappir	ngs in n	nachine	e learnir	ng.			A	pplying (ł	(3)
CO3		the cor s of orth				t space	e and o	decomp	ose the	e given r	natrix by	A	pplying (ł	(3)
CO4			-		torisation of data		atrices	and o	otimizat	ion techi	niques in	A	pplying (ł	(3)
CO5	descri	be the c	concept	s of pa	rameter	estima	ation an	d supp	ort vect	or machi	ne.	Unde	erstanding	g (K2)
					Марр	oing of	COs w	ith PO	s and F	SOs				
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1												
CO2	3	1												
CO3	3	2												
CO4	3	3	3											
CO5	3	2	3											
1 – Sligh	nt, 2 – M	loderate	e, 3 – S	ubstant	tial, BT-	Bloom	's Taxo	nomy						
					AS	SESSN	IENT P	ATTER	N - TH	EORY				
											_			

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	10	30	60				100
CAT2	10	20	70				100
CAT3	10	30	60				100
ESE	10	20	70				100

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)



#### 22MAO02 - NUMERICAL COMPUTING

Programme & Branch	Common to CSE, CSD, IT, AIDS, AIML, ECE, EEE and EIE Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	5	OE	3	1	0	4

Preamble To impart knowledge in interpolation, numerical differentiation and integration. Also develop skills to apply numerical algorithms to identify roots of algebraic and transcendental equations, finding eigen values and solve linear system of equations, ordinary differential equations. Unit - I Solution to Algebraic and Transcendental Equations and Eigen value problems: 9+3 Solution to Algebraic and Transcendental Equations: Bisection method - Iteration method – Method of false position Newton-Raphson method Iterative method for Eigen values: Power method – Jacobi's method. Unit - II Solution of Simultaneous Linear Algebraic equations: 9+3Introduction - Direct methods: Gauss elimination method - Gauss - Jordan method - LU decomposition method -Crout's method -Iterative methods: Gauss Jacobi and Gauss - Seidel methods - Inverse of a matrix by Gauss Elimination method. Unit - III Interpolation: 9+3Interpolation with equal intervals: Newton's forward and backward difference formulae - Central difference interpolation formulae: Gauss forward and backward interpolation formulae – Interpolation with unequal intervals: Lagrange's interpolation formula – Newton's divided difference formula. Unit - IV Numerical Differentiation and Integration: 9+3Differentiation using Newton's forward, backward and divided difference formulae - Numerical integration: Trapezoidal rule – Simpsons 1/3rd rule – Simpsons 3/8th rule – Double integrals using Trapezoidal and Simpson's rules. Unit - V Numerical Solution of First order Ordinary Differential Equations:: 9+3Single step methods: Taylor series method – Euler method – Modified Euler method – Fourth order Runge-Kutta method – Multi step methods: Milne's predictor corrector method – Adam's Bashforth method.

# Lecture: 45, Tutorial: 15, Total: 60

# TEXT BOOK:

 Veerarajan T, Ramachandran T., "Numerical Methods", 1st Edition, Tata McGraw Hill Publishing Company, New Delhi, 2018.



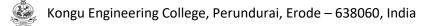
#### **REFERENCES:**

Kandasamy, P., Thilakavathy, K. and Gunavathy, K., "Numerical Methods", Reprint Edition, S.Chand & Co, New Delhi, 2016.
 Sankara Rao. K., "Numerical Methods for Scientists and Engineers", 3rd Edition, Prentice Hall of India Pvt. Ltd, , New Delhi, 2007.
 Steven C. Chapra, Raymond P. Canale., "Numerical Methods for Engineers", 7th Edition, McGraw-Hill Education, 2014.
 Sastry, S.S, "Introductory Methods of Numerical Analysis", 5th Edition, PHI Learning Pvt. Ltd, 2015.

COURSE On comple			urse, th	e stude	nts will	be able	e to						1	apped st Level)
CO1	apply v	arious r	numerio	cal tech	niques	to solve	e algeb	raic and	d transc	endenta	l equatio	ns.	Apply	ng (K3)
CO2	solve si	imultan	eous lir	near eq	uations	by nun	nerical	method	s.				Applyi	ng (K3)
CO3	comput	e intern	nediate	values	of give	en even	ly (or) u	inevenl	y space	ed data.			Applyi	ng (K3)
CO4	apply th	ne conc	epts of	numer	ical diffe	erentiat	ion and	l integra	ation in	real time	applicat	ions.	Applyi	ng (K3)
CO5	obtain t	he solu	tion of	first orc	linary d	ifferenti	ial equa	ations b	y nume	rical met	hods.		Applyi	ng (K3)
					Маррі	ng of C	Os wit	h POs	and PS	Os				
COs/POs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1											
CO2	3	2	2											
CO3	3	3	2											
CO4	3	2	1											
CO5	3	3	3											

	ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	10	15	75	-	-	-	100							
CAT2	10	15	75	-	-	-	100							
CAT3	10	15	75	-	-	-	100							
ESE	10	15	75	-	-	-	100							

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)



# 22MAO03 STOCHASTIC PROCESSES AND QUEUING THEORY

Programme & Branch	Common to CSE, IT, CSD, AIDS, AIML, EEE, EIE and MTS Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	5	OE	3	1	0	4

Preamble	To provide an in-depth knowledge in random variables, random process, correlation and promote the to apply suitable queuing models to real time applications.	ne ability
Unit - I	Random Variables:	9+3
	nd Continuous random variables – Probability Mass and Probability density functions – Math and Variance – Moments – Moment generating functions.	ematical
Unit - II	Random processes:	9+3
General co process.	ncepts and definitions – Classification – Stationary process – Markov chains – Transition probabilities –	Poisson
Unit - III	Correlation and Spectral densities:	9+3
	lation – Cross Correlation – Properties (Without Proof) – Power spectral density – Cross spectral of (Without Proof) – Wiener- Khintchine relation – Relationship between cross power spectrum ar function.	
Unit - IV	Queuing Theory:	9+3
queue moo model (M/N	stics of a queueing system – Kendall's notation – Queuing model I (Infinite capacity single server lel) (M/M/1) : (∞/FIFO) – Little's formulae – Queuing model II (Infinite capacity multiple server Poisso //C): (∞/FIFO) – Queuing model III (Finite capacity single server Poisson queue model) (M/M/1): (N nodel IV (Finite capacity multiple server Poisson model) (M/M/C) : (N/ FIFO).	n queue
Unit - V	Non-Markovian Queues and Queue Networks:	9+3
Introductio	n to Non-Markovian queues – M/G/1 queue – Pollaczek-Khintchine formula – Series queues – O puing networks.	

#### Lecture: 45, Tutorial: 15, Total: 60

# TEXT BOOK:

1.

Veerarajan, T, "Probability and Statistics, Random Processes and Queuing Theory", 1st edition, McGraw-Hill Education, Chennai, 2019.

# **REFERENCES:**



1.	Athanasios Papoulis, S. Unnikrishna Pillai., "Probability, Random Variables and Stochastic Processes", 4 th edition, McGraw Hill, New Delhi, 2017.
2.	Allen A.O., "Probability, Statistics and Queuing Theory", 2nd Edition, Academic Press, New Delhi, 1990.
3.	Roy D. Yates and David J. Goodman, "Probability and Stochastic Processes - A friendly Introduction for Electrical and Computer Engineers", 3 rd edition, John Wiley & Sons, 2014.
4.	John F. Shortle, James M. Thompson, Donald Gross and Carl M. Harris, "Fundamentals of Queuing Theory", 5 th edition, John Wiley and Sons, New York, 2018.

1	SE OUTCOMES: apletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	classify random variables and apply suitably in practical problems.	Applying (K3)
CO2	apply the concept of random process in communication problems.	Applying (K3)
CO3	understand the concepts and properties of Spectral Density Function and Cross Correlation function.	Understanding (K2)
CO4	use the appropriate queuing model for a given practical application.	Applying (K3)
CO5	identify the real time queue in computer networks and take decision accordingly.	Applying (K3)

Mapping of COs with POs and PSOs COs/ **PO1** PO3 PO4 PO5 **PO6** PO10 PO11 **PO2 PO7 PO8 PO9** PO12 **PSO1** PSO₂ POs CO1 3 1 CO2 3 2 CO3 3 2 CO4 3 3 3 2 CO5 3 3 3 3 1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

**ASSESSMENT PATTERN - THEORY** Test / Bloom's Remembering Understanding Applying Analyzing Evaluating Creating Total Category* (K1) % (K2) % (K3) % (K4) % (K5) % (K6) % % CAT1 10 20 70 100 CAT2 10 30 60 100 CAT3 10 20 70 100 ESE 10 20 70 100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



# 22MAO04 STATISTICS FOR ENGINEERS AND DATA SCIENTISTS

Programme & Branch	All Engineering and Technology Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	5	OE	3	1	0	4

Preamble	To impart the basic knowledge in presentation of data, descriptive statistical measures and provide apply correlation, suitable non- parametric tests and control charts to control the variations in reapplications.	
Unit - I	Organization and Presentation of Data:	9+3
quantitative of data – D	to Statistics – Collection of data – Classification and tabulation of data – Types of data: primary, sec and qualitative data – Types of Measurements: nominal, ordinal, discrete and continuous data – Prese iagrammatic and Graphical Representation: Histogram - Frequency curve - Frequency polygon - Cur distributions – Ogive curves – Stem and leaf chart.	entation
Unit - II	Descriptive Statistics:	9+3
	Ilues: Quartiles – Deciles and percentiles – Measures of dispersion: Mean deviation – Quartile develation – Coefficient of variation – Measures of skewness – Kurtosis.	iation – 9+3
	n <b>and Regression:</b> Scatter Diagram – Karl Pearson's Correlation Coefficient – Rank Correlation - Reg S – Fitting of Regression Lines.	ression
Properties	<b>prrelation and Regression:</b> Multiple and partial correlation – Method of least squares – Plane of regression of residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation artial correlations – Regression and partial correlations in terms of lower order coefficient.	
Unit - IV	Non-parametric tests:	9+3
	n – Sign test: One sample sign test – Sign test for paired samples – Signed rank test – Rank Sum tes test – Kruskal-Wallis test – One sample run test – Tests of randomness.	t: Mann
Unit - V	Statistical Quality Control:	9+3
	to Statistical quality control – Control charts – Control chart for variables: $\overline{X}$ -chart – R-chart – s-chart - s: np-chart – p-chart – c-chart.	- Charts

#### Lecture: 45, Tutorial: 15, Total: 60

# TEXT BOOK:

1. S.P.Gupta, "Statistical Methods", 44th Revised Edition, Sultan Chand & Sons, New Delhi, 2011 (Units I,II, V)



 S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 12th Edition, Sultan Chand & Sons, New Delhi, 2022. (Units III, IV)

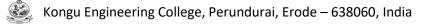
# **REFERENCES:**

- 1. Jay L. Devore., "Probability and Statistics for Engineering and the Sciences", 9th Edition, Cengage Learning, USA, 2016.
- 2. G.C.Beri, "Business Statistics", 3rd Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2011.
- 3. Johnson. R.A., Miller. I and Freund. J., "Miller and Freund's Probability and Statistics for Engineers", 9th Edition, Pearson Education, India, 2018.
- 4. Anthony Hayter, "Probability and Statistics for Engineers and Scientists", 4th Edition, Cengage Learning, USA, 2012.
- 5. J. K. Sharma, "Business Statistics", 5th Edition, Vikas Publishing House Pvt Ltd, Noida, 2020.

	E OUTCO		se, the	student	s will b	e able	to							BT Maj (Highest		
CO1	demonstrate the classification of data and present the data in various forms.												Understanding (K2)			
CO2	compute and interpret descriptive statistical measures using numerical and graphical techniques.											nical	Applying (K3)			
CO3	apply statistical methods like correlation, regression analysis in analysing and interpreting experimental data.										and	Applying (K3)				
CO4	use appropriate non-parametric test to analyze experimental data.											Applying (K3)				
CO5	identify s	suitable	control	charts	for mo	nitoring	) proce	sses					Applying (K3)			
					Марр	ing of (	COs w	ith PO	s and F	PSOs						
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	РО	12	PSO1	PSO2	
CO1	3	2														
CO2	3	2														
CO3	3	3	2													
CO4	3	3	1													
CO5	3	3	3													
1 – Sligh	nt, 2 – Mod	erate, 3	– Subs	stantial	, BT- B	loom's	Taxon	omy								

	ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	10	40	50				100						
CAT2	10	20	70				100						
CAT3	10	20	70				100						
ESE	10	20	70				100						

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



# 22MAO05 - GRAPH THEORY AND ITS APPLICATIONS

Programme & Branch	All Engineering and Technology branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	6	OE	3	1	0	4

Preamble	To develop rigorous logical thinking and analytical skills by graph theoretic concepts which helps for s real time engineering problems in networks, computer architecture, compiling techniques, model che artificial intelligence, software engineering, expert systems, software/hardware correctness problem.	-
Unit - I	Graphs:	9+3
	n – Definition – Types of graphs – Degree of vertex – Walk, path and cycle – Isomorphism – Connected ian graph – Euler graph – Digraph – Representations of graphs: Adjacency matrix – Incidence matrix	• •
Unit - II	Trees:	9+3
– Spanning	n – Properties of trees – Pendant vertices in a tree – Distances and centers in a tree – Rooted and binar g tree – Construction of spanning tree: BFS algorithm – DFS algorithm – Finding all spanning trees of a ental circuits.           Graph Coloring:	•
	pring – Chromatic number – Chromatic partitioning – Independent sets – Chromatic polynomial – Mate Four color problem (statement only) – Simple applications.	hing –
Unit - IV	Network Flows and Applications:	9+3
<ul> <li>Ford-Ful</li> </ul>	cuts in networks - Max-flow Min-cut Theorem – Transport networks –Residual capacity and Residual n kerson Algorithm – Edmonds-Karp Algorithm – Maximal Flow Applications: Multiple sources and s Bipartite matching.	
Unit - V	Graph Theoretic Algorithms:	9+3
Fleury's Al	Graph Theoretic Algorithms: aths – Shortest path algorithms: Dijkstra's algorithm – Warshall's algorithm – The Chinese Postman Pro gorithm – Travelling salesman problem – Minimum Spanning tree – Minimal spanning tree algorithms: Kruskal's algorithm.	blem

# Lecture: 45, Tutorial: 15, Total: 60

# TEXT BOOK:

- 1. Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", 1st Edition, Dover Publications, New York, 2016.(Units I,II,III)
- 2. S. Saha Ray, "Graph Theory with Algorithms and Its Applications in Applied Science and Technology", 1st Edition, Springer, London, 2013.(Units IV,V)



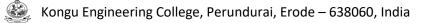
# **REFERENCES:**

1.	Douglas B West, "Introduction to Graph Theory", 2 nd Edition, Pearson Education, New Delhi, 2002.
2.	Jonathan L. Gross and Jay Yellen, "Graph Theory and its Applications", 2 nd Edition, CRC Press, New York, 2006.
3.	J.A.Bondy and U.S.R. Murty ,Graph Theory and Applications , 5 th Edition, Elsevier Science Publishing Co., Inc., New York, 1982.

COURSE On comple			irse, the	e studer	nts will	be able	to						BT Map Highest			
CO1	understand basic graph theoretic concepts.												Understanding (K2)			
CO2	intrepret the concepts the concepts of tress and its types.												Applying	(K3)		
CO3	compute the Chromatic partition, Chromatic polynomial and Matching of a give graph.											Applying (K3)				
CO4	identify the maximal flow in network by means of algorithms.												Applying	(K3)		
CO5	apply various graph theoretic algorithms to communication and network problems											Applying (K3)				
					Мар	oing of	COs w	vith PO	s and P	SOs						
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	3	2	1													
CO2	3	1														
CO3	3	1														
CO4	3	2	2													
CO5	3	2	3											-		
1 – Slight,	2 – Mo	derate,	3 – Sul	ostantia	al, BT- E	Bloom's	Taxon	omy								

	ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	10	40	50				100						
CAT2	10	20	70				100						
CAT3	10	20	70				100						
ESE	10	20	70				100						

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)



# 22MAX01 - DATA ANALYTICS USING R PROGRAMMING

Programme & Branch	All Engineering and Technology branches	Sem.	Category	L	т	Р	Cree
Prerequisites	Nil	6	OE	3	0	2	4

# Preamble To impart the basic knowledge in R and develop skills to apply the knowledge of R programming to statistic measures, data handling, probability, testing of hypothesis and design of experiments. Unit - I Introduction to R:

Overview of R programming – Need for R – Installing R – Environment setup with R Studio – Packages: Installing packages Running and manipulating packages – Basic objects: Vectors – Matrix – Array – Lists – Factors – Data frames.

# Unit - II R Programming Structures and Functions:

Basic expressions: Arithmetic expressions – Control Statements: if and if-else statements — switch statement – Loops: for lo – while loop – Function: Creating a function – calling a function – Default value for function arguments – Logical functions – Ma functions – Statistical functions – Apply-family functions – Getting started with strings – Formatting data and time.

#### Unit - III Descriptive Statistics:

Summary command – Summarizing samples – cumulative statistics – summary statistics for data frames – summary tables Linear Modeling: Simple linear regression – Multiple regression – Curvilinear regression – Plotting linear models and curve fittir

#### Unit - IV Working with data:

Reading and writing data: Text-format in a file – Excel worksheets – Native data files – built-in datasets. Visualizing data: Scatt plots – line plots – bar charts – pie charts – Cleveland dot charts – Histogram and density plots – Box-whisker plots.

#### Unit - V Probability Distributions, Testing of hypothesis and ANOVA:

Probability Distributions: Binomial Distribution – Poisson Distribution – Normal Distribution. Testing of Hypothesis and ANOVA: Student's t-test – Non-Parametric tests: Wilcoxon U-test – Paired t and U-tests – Correlati and covariance – Tests for association – Analysis of variance: One-way ANOVA – Two-way ANOVA.

# List of Exercises / Experiments:

- 1. Implementation of operations of data objects such as vector, list and matrix.
- 2. Implementation and use of array, factors and data frames in R.
- 3. Programs using decision making statements and looping structures.
- 4. Programs to demonstrate programming concepts using functions (Using built-in and user-defined functions)
- 5. Performing various basic statistical measures for the given data.
- 6. Calculate the regression coefficient and obtain the lines of regression for the given data.
- 7. Creating and reading various types of data files.
- 8. Create different charts for visualization of given set of data.
- 9. Computation of probability using Binomial, Poisson and Normal distributions.
- 10. Perform the t-test for testing significance of mean.
- 11. Perform various non-parametric tests for the given sample data.
- 12. Perform One way and two way ANOVA.

# Lecture: 45, Practical: 15, Total: 60

9

9

9

9



#### **TEXT BOOK:**

- 1. Kun Ren, "Learning R Programming", 1st Edition, Packt Publishing Ltd, UK, 2016. (Units I, II)
- 2. Mark Gardener, "Beginning R-The Statistical Programming Language",1st Edition, John Wiley & Sons,Inc, USA, 2012.(Units III,IV, V)

# **REFERENCES:**

- 1. Seema Acharya, "Data Analytics using R", 1st Edition, McGraw Hill Education, Chennai, 2018.
- 2. Norman Matloff, "The Art of R Programming", 1st Edition, No Starch Press, San Francisco, 2011.
- 3. Paul Teetor, "R Cookbook", 1st Edition, O'Reilly Media, USA, 2011.

# COURSE OUTCOMES:

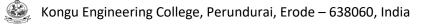
On co	mpletion of the course, the students will be able to	(Highest Level)		
CO1	understand the basics of fundamentals of R.	Understanding (K2)		
CO2	apply the concepts of decision, looping structures and functions in real time problems.	Applying (K3)		
CO3	apply R programming to descriptive statistics.	Applying (K3)		
CO4	apply the libraries for data manipulation and data visualization in R.	Applying (K3)		
CO5	use R studio to identify the probability and test statistical hypothesis.	Applying (K3)		

	Mapping of COs with POs and PSOs													
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1											
CO2	3	1	1		2									
CO3	3	2	2	2	2									
CO4	3	3	2	3	2									
CO5	3	2	2	3	2									
1 – Slight, 2 -	– Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

	ASSESSMENT PATTERN - THEORY										
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %				
CAT1	10	30	60				100				
CAT2	10	20	70				100				
CAT3	10	20	70				100				
ESE	10	20	70				100				

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)

**BT Mapped** 



# 22MAO06 OPERATIONS RESEARCH

Programme & Branch	All Engineering and Technology Branches	Sem.	Category	L	Т	Р	Credit
Prerequisites	Nil	6	OE	3	1	0	4

Preamble	To provide the skills for solving the real time engineering problems involving linear objective fu transportation models and also impart knowledge in finding optimal solutions to problems involving resources, project management techniques and game theoretic concepts.	
Unit - I	Linear Programming:	9+3
	n to Operations research – Applications of OR – Linear Programming – Formation of Linear Progra Solution of LPP: Basic concepts – Graphical Solution – Simplex method – Artificial techniques: Big M i	•
Unit - II	Transportation and Assignment Problems:	9+3
Assignme Unit - III	<ul> <li>Iution: North-West Corner Rule – Vogel's Approximation Method – Optimal Solution: MODI method.</li> <li><b>nt Problems</b>: Introduction – Mathematical Formulation – Hungarian Algorithm.</li> <li><b>Games Theory:</b></li> <li><b>Games:</b> Introduction – Basic Terminology – Two-Person zero sum games – Pure strategies (Games (Games))</li> </ul>	9+3
saddle poir	it) – Mixed Strategies (Games without saddle points) – Rule of Dominance – Solution of Mixed Strategy nethod – Arithmetic method – Graphical method.	
Unit - IV	Sequencing models:	9+3
-	n <b>g problems</b> : Introduction – Johnson's algorithm – Processing of n jobs through two machines – Pro Anrough three machines – Processing of 'n' jobs through 'm' machines - Processing of two jobs thro	-
Unit - V	Network and Project Management:	9+3
	n – Basic terminology – Rules of Network construction – Fulkerson's Rule for numbering of e on of network – Critical Path Method (CPM) – Programme Evaluation and Review Technique (PERT).	vents –

# Lecture: 45, Tutorial: 15, Total: 60

# TEXT BOOK:

1. Sharma J.K, "Operations Research – Theory and Applications", 6th Edition, Trinity Press, India, New Delhi, 2017.



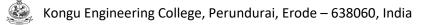
#### **REFERENCES:**

1.	Taha, Hamdy A., "Operation Research: An introduction", 9 th edition, Pearson Education, 2010.
2.	Hiller, Frederick. S. and Lieberman, Gerald. J., "An introduction to Operations research- concepts and cases", Tata McGraw Hill (SIE) 8 th edition, 2005.
3.	Ravindran, A., Phillips, D.J., and Solberg, J.J., "Operations Research- Principles and Practice", John Wiley & Sons, 2005.
4.	Kanti Swarup, P.K. Gupta, Man Mohan, "Operations Research", 15 th revised Edition, S. Chand & Sons Education Publications, New Delhi, 2017.
5.	Gupta P.K. and Hira D.S., "Operations Research: An Introduction", 7 th Revised Edition, S.Chand and Co. Ltd., New Delhi, 2014.

	RSE OUTCOMES: ompletion of the course, the students will be able to										BT Mapped (Highest Level)					
CO1	formulate	and sol	ve linea	ar progi	ammin	g probl	ems.					Applying (K3)				
CO2	apply tran	apply transportation and assignment algorithms in engineering problems.												<b>≺</b> 3)		
CO3	use game theory concepts in practical situations.												Applying (K3)			
CO4	identify th	identify the minimum processing times for sequencing problems												<b>&lt;</b> 3)		
CO5	apply the concepts of CPM and PERT in scheduling the project networks.											Applying (K3)				
				Ν	lappin	g of C	Os with	n POs a	and PS	Os						
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2		
CO1	3	2	3													
CO2	3	2	1													
CO3	3	2	1													
CO4	3	2	1													
CO5	3	2	3													
1 – Sligh	nt, 2 – Mode	erate, 3	– Subs	tantial,	BT- Blo	om's T	axonor	ny								

ASSESSMENT PATTERN - THEORY										
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %			
CAT1	10	20	70				100			
CAT2	10	20	70				100			
CAT3	10	20	70				100			
ESE	10	20	70				100			

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)



# 22MAO07 - NUMBER THEORY AND CRYPTOGRAPHY

Programme & Branch	All Engineering and Technology branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	6	OE	3	1	0	4

Preamble	To provide the skills for applying various number theoretic algorithms, congruences, primality te cryptography and network security and impart knowledge of basic cryptographic techniques.	sts in
Unit - I	Divisibility Theory:	9+3
	orithm – Base-b representations – Number patterns – Prime and composite numbers – Fibonacci and Fermat numbers – GCD – Euclidean Algorithm – Fundamental theorem of Arithmetic – LCM.	Lucas
Unit - II	Theory of Congruences:	9+3
	epts – Properties of congruences – Linear congruences – Solution of linear congruences – Fermat's Little the emainder theorem.	eorem
Unit - III	Number Theoretic Functions:	9+3
	$\sigma$ – Functions $\tau$ and $\sigma$ – Mobius function – Greatest integer function – Euler's Phi function – Euler's theo of Euler's function – Applications to Cryptography.	orem –
Unit - IV	Primality testing and Factorization:	9+3
•••••		этэ
Primality te	sting: Fermat's pseudo primality test – Solvay-Strassen test – Miller-Rabin test – Fibonacci test – Lucas orization: Trial division – Pollard's Rho method – Quadratic sieve method.	

# Lecture: 45, Tutorial: 15, Total: 60

# TEXT BOOK:

	Thomas Koshy, "Elementary Number Theory with Applications", 2 nd Edition, Academic Press, Elsevier, USA, 2007.(Units I,II,III)	
2	William Stallings "Cryptography and Network Security: Principles and Practice" 7th Edition, Pearson Education, New	

 William Stallings, "Cryptography and Network Security: Principles and Practice", 7th Edition, Pearson Education, New Delhi, 2019.(Units IV,V)

# **REFERENCES:**



1. Ivan Niven, Herbert S. Zukerman, Hugh L. Montgomery, "An Introduction to the Theory of Numbers", Reprint Edition, John Wiley & Sons, New Delhi, 2008.

2. Bernard Menezes, "Cryptography and Network Security", Cengage Learning India, 1st Edition, New Delhi, 2010.

	RSE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)		
CO1	understand the concepts of divisibility and canonical decompositions.	Understanding (K2)		
CO2	obtain the knowledge in theory of congruences and solution of linear congruences.	Understanding (K2)		
CO3	use different number theoretic function suitably in cryptography.	Applying (K3)		
CO4	apply Primality test and factorisation algorithms to network security problems.	Applying (K3)		
CO5	apply the suitable cryptographic techniques to handle real time security issues.	Applying (K3)		

	Mapping of COs with POs and PSOs													
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	3	1												
CO3	3	1												
CO4	3	2	1		2									
CO5	3	2	1		2									
1 – Slight, 2 -	- Mode	rate, 3	– Subs	tantial,	BT- Blo	om's T	axonor	ny						

	ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	10	30	60				100							
CAT2	10	20	70				100							
CAT3	10	20	70				100							
ESE	10	20	70				100							

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



# 22MAO08 NON-LINEAR OPTIMIZATION

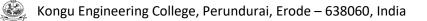
Preamble	The course focuses on the basic concepts, various techniques and applications of engineering optim	ization.
Unit - I	Classical Optimization Techniques:	9
	to Optimization – Statement of an Optimization problem – Mathematical formulation – Multi variable optivity constraints – Lagrange multipliers method – Multi variable optimization with inequality constraint – Kuh	
Unit - II	Non-Linear Programming: One-Dimensional Minimization Method:	9
	– Unimodal function – Elimination Methods: Unrestricted search – Exhaustive search – Dichotomou alving method – Fibonacci method – Golden section method – Direct root methods: Newton method	
Unit - III	Non-Linear Programming: Unconstrained Optimization Techniques:	9
	to Unconstrained optimization – Direct Search Methods: Grid search method – Univariate method - method – Powell's method.	- Hookes
Unit - IV	Unconstrained Optimization Techniques (Indirect Methods):	9
Gradient of – Marquard	a Function – Indirect Search Methods: Steepest descent method – Fletcher-Reeves method – Newton' method.	s method
Unit - V	Non-Linear Programming: Constrained Optimization Techniques:	9
	<ul> <li>Characteristics of a Constrained Problem – Direct Methods: Random search method – Sequening – Indirect methods: Transformation techniques – Exterior penalty function method – Interior penalty</li> </ul>	
1	Tota	l: 45

#### TEXT BOOK:

1. S.S.Rao, Engineering Optimization Theory and Practice, 1st Edition, John Wiley & Sons Ltd, USA, 2020.

#### **REFERENCES:**

1.	David Luenberger and Yinyu Ye, Linear and Nonlinear Programming, 4th edition, Springer-Verlag, 2015
2.	A.Ravindran, K.M.Ragsdell, G.V.Reklaitis, Engineering Optimization: Methods and applications, 2 nd Edition, Wiley India Pvt. Ltd., 2006.
3.	Yang, Xin-She. Optimization Techniques and Applications with Examples. 1 st Edition, John Wiley & Sons, United Kingdom, 2018.



	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	solve problems with equality and inequality constraints.	Applying (K3)
CO2	solve nonlinear programming problems of functions of single variable.	Applying (K3)
CO3	use methods of unconstrained optimization to solve non linear problems	Applying (K3)
CO4	solve nonlinear optimization problems in the presence of inequality and equality constraints.	Applying (K3)
CO5	apply several modern methods of optimization for solving engineering problems	Applying (K3)

	Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	3	2												
CO2	CO2 3 2														
CO3	3	3	1												
CO4	3	3	3												
CO5	3	2	3												
1 – Slight, 2 -	- Moder	ate, 3 -	- Subst	antial, I	BT- Blo	om's Ta	axonom	ıy							

	ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	10	10	80				100						
CAT2	10	10	80				100						
CAT3	10	10	80				100						
ESE	10	10	80				100						

* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)



# 22MA009 OPTIMIZATION FOR ENGINEERS

Programme & Branch	All Engineering and Technology Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	7	OE	3	0	0	3

Preamble	To provide the skills for solving the real time engineering problems involving linear and non-linear functions and also impart knowledge in finding optimal solutions to problems involving multi-leve making and analyzing queuing models.	•
Unit - I	Linear Programming:	9
	n to Operations research – Applications of OR – Linear Programming – Formation of Linear Pro Solution of LPP: Basic concepts – Graphical Solution – Simplex method – Artificial techniques: Big N	
Unit - II	Integer Programming:	9
	n – Types of Integer Programming Problems – Solution of Integer programming problems – Gomory's ne method - Gomory's Mixed-Integer Cutting Plane Method – Branch and Bound method.	all integer
Unit - III	Dynamic programming:	9
	n – Characteristics – Formulation of Dynamic programming problems –Dynamic programming Al Discrete Dynamic programming problem – Solution of LPP by Dynamic programming.	gorithm –
Unit - IV	Queueing Theory:	9
queue moo model (M/N	stics of a queueing system – Kendall's notation – Queuing model I (Infinite capacity single server lel) (M/M/1) : ( $\infty$ /FIFO) – Little's formulae – Queuing model II (Infinite capacity multiple server Poiss M/C): ( $\infty$ /FIFO) – Queuing model III (Finite capacity single server Poisson queue model) (M/M/1): ( $\infty$ /C): ( $\infty$ /FIFO) – Queuing model III (Finite capacity single server Poisson queue model) (M/M/1): ( $\infty$ /C): ( $\infty$ /FIFO) – Queuing model III (Finite capacity single server Poisson queue model) (M/M/1): ( $\infty$ /C): ( $\infty$ /FIFO) – Queuing model III (Finite capacity single server Poisson queue model) (M/M/1): ( $\infty$ /C): ( $\infty$ /FIFO) – Queuing model III (Finite capacity single server Poisson queue model) (M/M/2): ( $\infty$ /C): ( $\infty$ /FIFO).	son queue
Unit - V	Non-Linear Programming:	9
	n – Mathematical formulation of Non-linear programing problems – Non-linear programing problem wir – Lagrange multipliers method – Non-linear programing problem with inequality constraint – Kul	

Total: 45

# TEXT BOOK:

1.

Sharma J.K, "Operations Research – Theory and Applications", 6th Edition, Trinity Press, India, New Delhi, 2017.

# **REFERENCES:**



1. Taha, Hamdy A., "Operation Research: An introduction", 9th edition, Pearson Education, 2010.

- Hiller, Frederick. S. and Lieberman, Gerald. J., "An introduction to Operations research- concepts and cases", Tata McGraw Hill (SIE) 8th edition, 2005.
- 3. Ravindran, A., Phillips, D.J., and Solberg, J.J., "Operations Research- Principles and Practice", John Wiley & Sons, 2005.
- 4. Kanti Swarup, P.K. Gupta, Man Mohan, "Operations Research", 15th revised Edition, S. Chand & Sons Education Publications, New Delhi, 2017.
- Gupta P.K. and Hira D.S., "Operations Research: An Introduction", 7th Revised Edition, S.Chand and Co. Ltd., New Delhi, 2014.

	E OUTCON Diletion of th		e, the st	udents	will be	able to							T Mappe ghest Le			
CO1	formulate	and sol	ve linea	r progr	amming	g proble	ems.					Ap	oplying (k	(3)		
CO2	solve Inte	ger Pro	grammi	ng pro	blems t	hat exis	st in rea	I time a	applicati	ons.		Ap	oplying (k	(3)		
CO3	demonstr path for g			cal wor	kings of	f dynam	nic prog	rammir	ng meth	od to finc	l shortest	Ap	oplying (K	(3)		
CO4	use the a	ppropria	te queu	iing mo	del for	a given	practic	al appli	cation.			Ap	Applying (K3)			
CO5	apply the concept of non-linear programming for solving the problems involving n linear constraints and objectives.										/ing non-	Applying (K3)				
				ľ	Mappin	g of CO	Os with	POs a	nd PSC	Ds						
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	3	2	3													
CO2	3	2	1													
CO3	3	2	1													
CO4	3	2	1													
CO5	3	2	3													
1 – Sligh	t, 2 – Mode	erate, 3 -	- Subst	antial, I	BT- Blo	om's Ta	axonom	ıy								

	ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1	10	20	70				100							
CAT2	10	20	70				100							
CAT3	10	20	70				100							
ESE	10	20	70				100							

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)



# 22PHO01 - THIN FILM TECHNOLOGY

Programme Branch	& All BE/BTech Branches	Sem.	Category	L 3	т	Ρ	Credit	
Prerequisite	s Nil	5	OE		1	0	4	
Preamble	This course aims to impart the essential knowledg various engineering fields, and also provides motion			d app	licatio	on of	thin films ir	
Unit – I	Theories and models of thin film growth:						9+3	
	<ul> <li>Theories of thin film nucleation: Impingement, Adsorptio dels – Structural consequences of thin film nucleation – The</li> </ul>				-	-		
Unit – II	Vacuum technology:						9+3	
Ion pump, T	l working of vacuum pumps: Roots vacuum pump, Rotary p -sublimation pump – Measurement of Pressure: Bayet-Alb ation gauges – Pressure controlling system (qualitative).			-	-			
Unit – III	Deposition of thin films - Physical methods:						9+3	
	poration – Electron beam evaporation – Pulsed laser depos Reactive sputtering – Molecular beam epitaxy - Demonstrat					ing –	Magnetror	
Unit – IV	Deposition of thin films – Chemical methods:						9+3	
	por deposition – Sol-gel method – Chemical bath depos eposition – Spray Pyrolysis - Spin coating.	sition – Hydro therma	I methods – I	Electr	oplat	ing d	eposition -	
Unit – V	Characterization and Applications of thin films	:					9+3	
Photoemissi	tion: X-ray diffraction, Energy dispersive X-ray analysis, Ato on Spectroscopy, UV-vis spectroscopy and Four probe resi Thin films for information storage and Optical coatings.							
-	·		Lecture:	45, 1	lutori	ial: 1	5, Total: 60	
		, Poprint McCraw Hill	Inc. Now Yor	k 10	70 (1	loit I	11/1)	
TEXT BOOP	Maissel L.I. and Glang R, Hand book of Thin Film Technology, Reprint, McGraw Hill Inc., New York, 1970, (Unit I – I							
<b>TEXT BOOP</b> 1. M		-			<b>-</b>		0000	
<b>TEXT BOOP</b> 1. M 2 Sa	aissel L.I. and Glang R, Hand book of Thin Film Technology Im Zhang, Lin Li and Ashok Kumar, Materials Characterizati nit V)	-	tion, CRC Pre	ess, B	oca F	Raton	, 2008	
TEXT BOOP           1.         M           2.         Si           (L	m Zhang, Lin Li and Ashok Kumar, Materials Characterizati nit V)	-	tion, CRC Pre	ess, B	oca F	Raton	, 2008	
TEXT BOOP 1. M 2. Si (L REFERENC	m Zhang, Lin Li and Ashok Kumar, Materials Characterizati nit V)	ion Techniques, 1 st ed		ess, B	oca F	Raton,	, 2008	
TEXT BOOK           1.         M           2.         Si           REFERENC         1.           1.         O	m Zhang, Lin Li and Ashok Kumar, Materials Characterizati nit V) E <b>S:</b>	ion Techniques, 1 st ed mic Press, New Jersey	, 2001	ess, B	oca F	Raton,	, 2008	



	COURSE OUTCOMES: On completion of the course, the students will be able to						
CO1	utilize the appropriate theory and models to comprehend the thin film growth process.	Applying (K3)					
CO2	apply the principle of vacuum pump to explain select methods to create vacuum and to make use of the principle of vacuum gauge to explain the measurement of vacuum by select methods.	Applying (K3)					
CO3	describe the deposition of thin films by select physical methods using the principle of working of respective methods.	Applying (K3)					
CO4	explain the deposition of thin films by select chemical methods using the principle of working of respective methods.	Applying (K3)					
CO5	make use of select characterization techniques to comprehend the properties of thin films and also to illustrate the various device applications of thin films.	Applying (K3)					

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2						2	2		2		
CO2	3	2	2						2	2		2		
CO3	3	2	2						2	2		2		
CO4	3	2	2						2	2		2		
CO5	3	2	2						2	2		2		

# ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	25	35	40				100
CAT2	25	35	40				100
CAT3	20	40	40				100
ESE	20	40	40				100



#### 22PHO02- HIGH ENERGY STORAGE DEVICES

Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit			
Prerequisites	Nil	5	OE	3	1	0	4			
Preamble	This course aims to impart the essential knowledge on the fun technologies and materials for energy storage solutions, toge engineering field.	-	-							
Unit – I	Introduction to Energy Storage:						9+3			
electrical energy st storage – General o	ergy storage systems (qualitative): Thermal energy storage, me orage, electrochemical energy storage, electrostatic energy sto criteria of energy storage systems – Conventional batteries: fund- systems and requirements.	rage, mag	netic energy	storaç	ge an	d opt	ical energ			
Unit – II	Thermal storage and Mechanical Storage:						9+3			
Merits and demerit	hermal properties of materials, principle of operations, efficiency s of thermal storage system – Recent development in therma systems, principle of operations, emerging advances and techno	I storage	systems. Med	hanic	al St	orage	e: Types o			
Unit – III	Magnetic storage Electro ontio Ontical and Chemical Sto									
	Magnetic storage, Electro-optic, Optical and Chemical Sto	orage:					9+3			
Emerging devices a	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.	es and tecl					cal storage			
Emerging devices a Bio fuels – Aluminu	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe	es and tecl					cal storage			
Emerging devices a Bio fuels – Aluminu <b>Unit – IV</b> Materials, Principle operation, battery c	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.	es and tech r to gas – materials, Building b	Hydrogen and electrolytes. L ock cells – Ba	Meth i-ion	batte	Powe ries: ıles a	cal storage er to liquid 9+3 Principle o ind packs			
Emerging devices a Bio fuels – Aluminu <b>Unit – IV</b> Materials, Principle operation, battery c Li-polymer batteries	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc. Electrochemical Storage: of operation, positive electrode materials, negative electrode r components, design of electrodes, cell and battery fabrications –	es and tech r to gas – materials, Building b	Hydrogen and electrolytes. L ock cells – Ba	Meth i-ion	batte	Powe ries: ıles a	cal storage er to liquid 9+3 Principle o nd packs			
Emerging devices a Bio fuels – Aluminu Unit – IV Materials, Principle operation, battery o Li-polymer batteries Unit – V Fuel Cells: Introduc fuel cells and solid cryogenic hydroger	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc. Electrochemical Storage: of operation, positive electrode materials, negative electrode re components, design of electrodes, cell and battery fabrications – s – Applications – Future developments: Sodium-battery, magnes	es and tech r to gas – materials, Building b sium batter en PEM fu storage ta	Hydrogen and electrolytes. L lock cells – Ba y, aluminum b lel cell, direct anks, gas pha	Meth i-ion attery attery meth se hy	batte modu / and anol f	Powe ries: ules a silico fuel c en sto	er to liquid 9+3 Principle o Ind packs n battery. 9+3 ell, alkalin rage tanks			
Emerging devices a Bio fuels – Aluminu <b>Unit – IV</b> Materials, Principle operation, battery o Li-polymer batteries <b>Unit – V</b> Fuel Cells: Introduc fuel cells and solid cryogenic hydroger principle of operatio	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.         Electrochemical Storage:         of operation, positive electrode materials, negative electrode recomponents, design of electrodes, cell and battery fabrications – s – Applications – Future developments: Sodium-battery, magnes         Fuel Cells, Hydrogen storage and Super capacitors:         ction to fuel cells, PEM (polymer electrolyte membrane), Hydrog oxide fuel cells. Hydrogen storage systems: Solid state hydroger n storage tanks and liquid phase hydrogen storage tanks. Sup	es and tech r to gas – materials, Building b sium batter en PEM fu storage ta	Hydrogen and electrolytes. L lock cells – Ba y, aluminum b lel cell, direct anks, gas pha ors: Features	Meth i-ion attery attery meth se hy of su	batte modu / and anol f droge iper c	Powe ries: iles a silico fuel c en sto capac	er to liquid 9+3 Principle o Ind packs n battery. 9+3 ell, alkalin rage tanks			
Emerging devices a Bio fuels – Aluminu <b>Unit – IV</b> Materials, Principle operation, battery o Li-polymer batteries <b>Unit – V</b> Fuel Cells: Introduc fuel cells and solid cryogenic hydroger principle of operatio	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.         Electrochemical Storage:         of operation, positive electrode materials, negative electrode recomponents, design of electrodes, cell and battery fabrications – s – Applications – Future developments: Sodium-battery, magnes         Fuel Cells, Hydrogen storage and Super capacitors:         ction to fuel cells, PEM (polymer electrolyte membrane), Hydrog oxide fuel cells. Hydrogen storage systems: Solid state hydroger n storage tanks and liquid phase hydrogen storage tanks. Sup	es and tech r to gas – materials, Building b sium batter en PEM fu storage ta	Hydrogen and electrolytes. L lock cells – Ba y, aluminum b lel cell, direct anks, gas pha ors: Features	Meth i-ion attery attery meth se hy of su	batte modu / and anol f droge iper c	Powe ries: iles a silico fuel c en sto capac	cal storager to liquid 9+3 Principle of and packs n battery. 9+3 ell, alkalir rage tanks itors, bas			
Emerging devices a Bio fuels – Aluminu Unit – IV Materials, Principle operation, battery o Li-polymer batteries Unit – V Fuel Cells: Introduc fuel cells and solid cryogenic hydroger principle of operatio	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.         Electrochemical Storage:         of operation, positive electrode materials, negative electrode recomponents, design of electrodes, cell and battery fabrications – s – Applications – Future developments: Sodium-battery, magnes         Fuel Cells, Hydrogen storage and Super capacitors:         ction to fuel cells, PEM (polymer electrolyte membrane), Hydrog oxide fuel cells. Hydrogen storage systems: Solid state hydroger n storage tanks and liquid phase hydrogen storage tanks. Sup	es and tech r to gas – materials, Building b sium batter en PEM fu storage ta	Hydrogen and electrolytes. L lock cells – Ba y, aluminum b lel cell, direct anks, gas pha ors: Features	Meth i-ion attery attery meth se hy of su	batte modu / and anol f droge iper c	Powe ries: iles a silico fuel c en sto capac	cal storage er to liquid 9+3 Principle of ind packs n battery. 9+3 ell, alkalin rage tanks itors, bas			
Emerging devices a Bio fuels – Aluminu Unit – IV Materials, Principle operation, battery o Li-polymer batteries Unit – V Fuel Cells: Introduc fuel cells and solid cryogenic hydroger principle of operatio	<ul> <li>Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.</li> <li>Electrochemical Storage: <ul> <li>of operation, positive electrode materials, negative electrode reomponents, design of electrodes, cell and battery fabrications – s – Applications – Future developments: Sodium-battery, magnes</li> <li>Fuel Cells, Hydrogen storage and Super capacitors:</li> <li>ction to fuel cells, PEM (polymer electrolyte membrane), Hydrog oxide fuel cells. Hydrogen storage systems: Solid state hydroger nestorage tanks and liquid phase hydrogen storage tanks. Supon, performance and technologies of super capacitors.</li> </ul> </li> <li>Huggins, Energy Storage, Springer, 2010, (Unit I – V)</li> <li>Gao, S. Gay, A. Emadi, Modern Electric, Hybrid Electric and Fuel Cells and super capacitors.</li> </ul>	es and tecl r to gas – materials, Building b sium batter en PEM fu storage ta er capacit	Hydrogen and electrolytes. L lock cells – Ba y, aluminum b lel cell, direct anks, gas pha ors: Features Lecture:	Meth i-ion attery battery meth se hy of su <b>45, 1</b>	batte modu / and anol f droge iper c	Powe ries: ules a silico iuel c en sto capac <b>al: 1</b>	cal storage er to liquid 9+3 Principle of nd packs n battery. 9+3 ell, alkalin rage tanks itors, bas 5, Total: 6			
Emerging devices a Bio fuels – Aluminu Unit – IV Materials, Principle operation, battery o Li-polymer batteries Unit – V Fuel Cells: Introduc fuel cells and solid cryogenic hydroger principle of operatio TEXT BOOK: 1. Robert A 2. Ehsani, Y (Unit I - V	<ul> <li>Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.</li> <li>Electrochemical Storage: <ul> <li>of operation, positive electrode materials, negative electrode reomponents, design of electrodes, cell and battery fabrications – s – Applications – Future developments: Sodium-battery, magnes</li> <li>Fuel Cells, Hydrogen storage and Super capacitors:</li> <li>ction to fuel cells, PEM (polymer electrolyte membrane), Hydrog oxide fuel cells. Hydrogen storage systems: Solid state hydroger nestorage tanks and liquid phase hydrogen storage tanks. Supon, performance and technologies of super capacitors.</li> </ul> </li> <li>Huggins, Energy Storage, Springer, 2010, (Unit I – V)</li> <li>Gao, S. Gay, A. Emadi, Modern Electric, Hybrid Electric and Fuel Cells and super capacitors.</li> </ul>	es and tecl r to gas – materials, Building b sium batter en PEM fu storage ta er capacit	Hydrogen and electrolytes. L lock cells – Ba y, aluminum b lel cell, direct anks, gas pha ors: Features Lecture:	Meth i-ion attery battery meth se hy of su <b>45, 1</b>	batte modu / and anol f droge iper c	Powe ries: ules a silico iuel c en sto capac <b>al: 1</b>	cal storage er to liquid 9+3 Principle of nd packs n battery. 9+3 ell, alkalin rage tanks itors, bas 5, Total: 6			
Emerging devices a Bio fuels – Aluminu Unit – IV Materials, Principle operation, battery of Li-polymer batteries Unit – V Fuel Cells: Introduc fuel cells and solid cryogenic hydroger principle of operatio TEXT BOOK: 1. Robert A 2. Ehsani, Y (Unit I - V REFERENCES:	<ul> <li>Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.</li> <li>Electrochemical Storage: <ul> <li>of operation, positive electrode materials, negative electrode reomponents, design of electrodes, cell and battery fabrications – s – Applications – Future developments: Sodium-battery, magnes</li> <li>Fuel Cells, Hydrogen storage and Super capacitors:</li> <li>ction to fuel cells, PEM (polymer electrolyte membrane), Hydrog oxide fuel cells. Hydrogen storage systems: Solid state hydroger nestorage tanks and liquid phase hydrogen storage tanks. Supon, performance and technologies of super capacitors.</li> </ul> </li> <li>Huggins, Energy Storage, Springer, 2010, (Unit I – V)</li> <li>Gao, S. Gay, A. Emadi, Modern Electric, Hybrid Electric and Fuel Cells and super capacitors.</li> </ul>	es and tecl r to gas – materials, Building b sium batter en PEM fu storage ta er capacit	Hydrogen and electrolytes. L lock cells – Ba y, aluminum b lel cell, direct anks, gas pha ors: Features <b>Lecture:</b> hicles, CRC P	Meth i-ion attery battery of su <b>45, 1</b> rress,	batte modu / and anol 1 droge iper c	Powe ries: ules a silico fuel c en sto capac <b>al: 1</b> !	cal storag er to liquid 9+3 Principle ind packs n battery. 9+3 ell, alkalir rage tank itors, bas 5, Total: 6			
Emerging devices a         Bio fuels – Aluminu         Unit – IV         Materials, Principle         operation, battery of         Li-polymer batteries         Unit – V         Fuel Cells: Introduce         fuel cells and solid         cryogenic hydroger         principle of operation         TEXT BOOK:         1.       Robert A         2.       Ehsani, N         (Unit I - V)         REFERENCES:         1.       Yuping V         Press, Unit	Principle of operation, emerging challenges and a review on device and upcoming technologies (qualitative). Chemical storage: Powe m-Boron, silicon, and zinc.          Electrochemical Storage:         of operation, positive electrode materials, negative electrode recomponents, design of electrodes, cell and battery fabrications – s – Applications – Future developments: Sodium-battery, magness         Fuel Cells, Hydrogen storage and Super capacitors:         ction to fuel cells, PEM (polymer electrolyte membrane), Hydrog         oxide fuel cells. Hydrogen storage systems: Solid state hydroger         n storage tanks and liquid phase hydrogen storage tanks. Supon, performance and technologies of super capacitors.         . Huggins, Energy Storage, Springer, 2010, (Unit I – V)         //         . Huggins, Energy Storage, Springer, 2010, (Unit I – V)         //         . Huggins, Energy Storage, Springer, 2010, (Unit I – V)         //	es and tecl r to gas – materials, Building b sium batter en PEM fu storage ta er capacit uel Cell Ve	Hydrogen and electrolytes. L lock cells – Ba y, aluminum b lel cell, direct anks, gas pha ors: Features Lecture: hicles, CRC P	Meth i.i.ion attery battery meth se hy of su <b>45, 1</b> ress,	batte modu / and anol f droge iper c <b>Futori</b> New	Powe ries: ules a silico iuel c n sto capac <b>al: 1</b> York,	cal storag er to liquid 9+3 Principle ind packs n battery. 9+3 ell, alkalir rage tank itors, bas 5, Total: 6 2005			



	COURSE OUTCOMES: On completion of the course, the students will be able to						
CO1	utilize the appropriate concepts and models to comprehend the basics of energy storage systems.	Applying (K3)					
CO2	apply the principle of thermal and mechanical storage systems to explain the working and the recent advancements in thermal and mechanical storage systems.	Applying (K3)					
CO3	ultilize the principle of operation of magnetic storage systems, electro-optic, optical and chemical storage systems to illustrate the respective process under gone in these techniques.	Applying (K3)					
CO4	explain the principle of operation of electrochemical storage device and materials used and to elucidate the construction and working of various types of high energy storage batteries.	Applying (K3)					
CO5	make use of various techniques to construct different types of fuel cells and to explain the advanced techniques involved in hydrogen storage systems and also to explain the principle and working of super capacitors.	Applying (K3)					

Mapping of COs with POs and PSOs
----------------------------------

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2						2	2		2		
CO2	3	2	2						2	2		2		
CO3	3	2	2						2	2		2		
CO4	3	2	2						2	2		2		
CO5	3	2	2						2	2		2		
1 – Slight, 2	2 – Mode	erate, 3 – S	Substantia	l, BT- Blo	oom's Ta	axonom	у У	<u> </u>						

# ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	25	35	40				100
CAT2	25	35	40				100
CAT3	20	40	40				100
ESE	20	40	40				100



# 22PH003- STRUCTURAL AND OPTICAL CHARACTERIZATION OF MATERIALS

Programme& Branch	All BE/BTech Branches	Sem.	Category	L	LT	Р	Credit		
Prerequisites	Prerequisites Nil 5 OE 3 1								
Preamble	This course aims to impart the essential knowled Raman spectroscopy, UV-visible spectroscopy, Ele application in various engineering fields, and also	ectron microscopy and	Scanning tun	neling	-	-			
Unit – I	Introduction to Characterization Techniques ar	nd X-Ray Diffraction:					9+3		
Theory of X-ray di	terials characterization – Classification of characteriz ffraction – Powder and Single crystal X-ray diffraction: I mination (qualitative), crystallite size determination (Sc	nstrumentation (qualit	ative), XRD pa	ttern,	syste	matio			
Unit – II	Electron Microscopy:						9+3		
microscope: Sche	d electrons, specimen interaction volume – Resolution matic diagram and working – Different types of filament nalysis – Three parameter equation for quantitative con	ts – Field emission sc							
Unit – III	Scanning Tunneling Microscopy:						9+3		
Introduction to qu	Scanning Tunneling Microscopy: antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working -		copy – Two m	odes	of sc	annin			
Introduction to qua height mode and	antum mechanical tunneling – Basic principles of scan		copy – Two m	odes	of sc	annin			
height mode and o Unit – IV Introduction – Pu	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working -	– Applications. spectra – Polarization	of light and				g: constant 9+3		
Introduction to qui height mode and o <b>Unit – IV</b> Introduction – Pu	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working - Raman Spectroscopy: Ire rotational Raman spectra – Vibrational Raman s	– Applications. spectra – Polarization	of light and				g: constant 9+3		
Introduction to qui height mode and o Unit – IV Introduction – Pu determination – In Unit – V Regions of UV-Vi	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working - <b>Raman Spectroscopy:</b> Irre rotational Raman spectra – Vibrational Raman s Istrumentation and working – Near-Infra-Red Raman S	– Applications. spectra – Polarization spectroscopy – Applica omophore concept –	of light and tions.	Rama	an ef	fect -	9+3 - Structure 9+3		
Introduction to qua height mode and o <b>Unit – IV</b> Introduction – Pu determination – In <b>Unit – V</b> Regions of UV-Vi	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working - Raman Spectroscopy: are rotational Raman spectra – Vibrational Raman s istrumentation and working – Near-Infra-Red Raman S Ultra Violet &Visible Spectroscopy: sible radiation – Colour and light absorption – Chro	– Applications. spectra – Polarization spectroscopy – Applica omophore concept –	of light and tions. Beer's and L	Rama	an ef ert's la	fect -	9+3 - Structure 9+3		
Introduction to qui height mode and o Unit – IV Introduction – Pu determination – In Unit – V Regions of UV-Vi	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working - Raman Spectroscopy: are rotational Raman spectra – Vibrational Raman s istrumentation and working – Near-Infra-Red Raman S Ultra Violet &Visible Spectroscopy: sible radiation – Colour and light absorption – Chro	– Applications. spectra – Polarization spectroscopy – Applica omophore concept –	of light and tions. Beer's and L	Rama	an ef ert's la	fect -	9+3 - Structure 9+3 - Theory of		
Introduction to qui height mode and o Unit – IV Introduction – Pu determination – In Unit – V Regions of UV-Vi electronic transitic	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working - Raman Spectroscopy: are rotational Raman spectra – Vibrational Raman s istrumentation and working – Near-Infra-Red Raman S Ultra Violet &Visible Spectroscopy: sible radiation – Colour and light absorption – Chro	– Applications. spectra – Polarization spectroscopy – Applica omophore concept – king – Applications.	of light and tions. Beer's and L Lecture:	Rama ambe <b>45, T</b>	an ef ert's la <b>`utori</b>	fect - aws - al: 1	9+3 - Structure 9+3 - Theory o		
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Introduction to qua height mode and o Unit – IV Introduction – Pu determination – In Unit – V Regions of UV-Vi electronic transitio TEXT BOOK: 1. Cullity E 2. Banwel New De	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working - Raman Spectroscopy: are rotational Raman spectra – Vibrational Raman s istrumentation and working – Near-Infra-Red Raman S Ultra Violet &Visible Spectroscopy: sible radiation – Colour and light absorption – Chro on – Frank-Condon principle – Instrumentation and wor B. D. and Stock S. R, Elements of X-ray diffraction, 3 rd I C. N, McCash E. M, Choudhury H. K, Fundamentals of	– Applications. spectra – Polarization pectroscopy – Applica omophore concept – king – Applications. Edition, Pearson Edu	of light and tions. Beer's and L Lecture: cation, India, 2	Rama ambe <b>45, T</b>	an ef ert's la <b>'utori</b> Unit I	fect - aws - <b>al: 1</b> {	9+3 - Structure 9+3 - Theory o 5, Total: 60		
Introduction to qua height mode and o Unit – IV Introduction – Pu determination – In Unit – V Regions of UV-Vi electronic transitio TEXT BOOK: 1. Cullity E 2. Banwel New De REFERENCES:	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working - Raman Spectroscopy: are rotational Raman spectra – Vibrational Raman s istrumentation and working – Near-Infra-Red Raman S Ultra Violet &Visible Spectroscopy: sible radiation – Colour and light absorption – Chro on – Frank-Condon principle – Instrumentation and wor B. D. and Stock S. R, Elements of X-ray diffraction, 3 rd I C. N, McCash E. M, Choudhury H. K, Fundamentals of	– Applications. spectra – Polarization pectroscopy – Application omophore concept – king – Applications. Edition, Pearson Edu- of Molecular Spectrosc	of light and tions. Beer's and L Lecture: cation, India, 2 copy, 5 th Editio	Rama ambe <b>45, T</b> :003 ( n, Ta	an ef rt's la Unit I ta Mc	fect - aws - al: 1!	9+3 - Structure 9+3 - Theory o 5, Total: 60		
Introduction to qui height mode and o Unit – IV Introduction – Pu determination – In Unit – V Regions of UV-Vi electronic transitio TEXT BOOK: 1. Cullity E 2. Banwel New De REFERENCES: 1. Holt D. 2 Willard	antum mechanical tunneling – Basic principles of scan constant voltage mode – Instrumentation and working – Raman Spectroscopy: are rotational Raman spectra – Vibrational Raman s istrumentation and working – Near-Infra-Red Raman S Ultra Violet &Visible Spectroscopy: sible radiation – Colour and light absorption – Chro on – Frank-Condon principle – Instrumentation and wor B. D. and Stock S. R, Elements of X-ray diffraction, 3 rd I C. N, McCash E. M, Choudhury H. K, Fundamentals of alhi, 2013 (Unit II-V)	<ul> <li>Applications.</li> <li>spectra – Polarization spectroscopy – Application</li> <li>omophore concept – king – Applications.</li> <li>Edition, Pearson Eductor</li> <li>of Molecular Spectrosco</li> <li>conductors, 1st Edition,</li> </ul>	of light and tions. Beer's and L Lecture: cation, India, 2 copy, 5 th Editio	Rama ambe <b>45, T</b> 2003 ( n, Ta ess, N	an ef rt's la Unit I Unit I ta Mc	fect - aws - <b>al: 1!</b> ) Graw	9+3 - Structure 9+3 - Theory o 5, Total: 60 7-Hill Publ., 1989		



	COURSE OUTCOMES: On completion of the course, the students will be able to						
CO1	apply the concept of X-ray diffraction to determine the crystal structure and related structural parameters of materials.	Applying (K3)					
CO2	determine the micro-structural parameters of materials and to perform surface analysis of materials using the concept of matter waves and electron microscopy.	Applying (K3)					
CO3	utilize the concept and phenomenon of quantum mechanical tunneling to interpret the surface image recorded at atomic level using scanning tunneling microscopy.	Applying (K3)					
CO4	make use of the concept of Raman effect and Raman spectroscopy to determine the crystal structure and related structural parameters of materials.	Applying (K3)					
CO5	apply the theory of UV-Vis spectroscopy to comprehend the working of UV-Vis spectrophotometer.	Applying (K3)					

Mapping of COs	s with POs and PSOs
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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2						2	2		2		
CO2	3	2	2						2	2		2		
CO3	3	2	2						2	2		2		
CO4	3	2	2						2	2		2		
CO5	3	2	2						2	2		2		
1 – Slight, 2	2 – Mode	erate, 3 – S	Substantia	l, BT- Blo	oom's Ta	axonom	у							
ASSESSM	-NT PAT	ITERN - T	HEORY											

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	40	40				100
CAT2	25	35	40				100
CAT3	30	30	40				100
ESE	20	40	40				100



#### 22PH004 – SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL APPLICATIONS OF NANOMATERIALS Programme & Ρ All BE/BTech Branches Sem. Category L т Credit Branch Prerequisites Nil 6 OE 3 0 4 1 Preamble This course aims to impart the knowledge on the fundamentals of nanomaterials, synthesis of nanomaterials, analysis of nanomaterials, carbon tubes and biological applications of nanomaterials. Unit – I Introduction to nanomaterials 9+3 Nanoscience and nanotechnology - Scientific revolution - Nanoscale - Nanosized effects - Surface-to-volume ratio - Quantum confinement effect - Classification of nanomaterials based on dimension - Properties of nanomaterials - Metal nanoparticles - Ceramic nanoparticles - Semiconductor nanoparticles - Polymer nanomaterials. Unit – II Synthesis of nanomaterials 9+3Physical, chemical and mechanical methods of preparation - Top down approaches and bottom up approaches - Physical Vapor Deposition method - Colloidal precipitation method - Sol-Gel method - Chemical precipitation method - Green synthesis method of nanomaterials. Unit – III Characterization of nanomaterials 9+3 X-ray diffraction analysis - Grain size calculation - Lattice parameters - Cell volume - Photoluminescence analysis - Emission peak analysis - UV visible spectroscopy analysis - Bandgap estimation - HRTEM & AFM analysis (qualitative) - particle size analysis - BET (qualitative). Unit – IV **Carbon nanotubes** 9+3 Allotropes of carbon - Diamond - Graphite - Graphene - Fullerenes - Carbon nanotubes - Properties - SWCNT - MWCNT - Structure of Carbon nanotubes - Preparation: Laser ablation method - CVD - Applications. Unit – V **Biological applications** 9+3 Antibacterial activity - Mechanism - Antifungal activity - Microorganism - Gram positive bacteria - Gram negative bacteria - Disc diffusion method – Antioxidant activity – DPPH method – Anticancer activity – Cytotoxity – MTT method – Toxicity of nanoparticles. Lecture: 45, Tutorial: 15, Total: 60 TEXT BOOK: 1. Charles P Poole Jr., and Frank J. Ownes,. "Introduction to Nanotechnology", John Wiley Sons, Inc., 2003 (Unit I - V). **REFERENCES:** C. Kittel., "Introduction to Solid State Physics", Wiley Eastern Ltd., (2005). 1. 2. Tamilarasan K. and Prabu K., "Materials Science", 1st Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2018.



	E OUTCOMES:	BT Mapped (Highest Level)
On con	ipletion of the course, the students will be able to	
CO1	describe the properties of nanomaterials using concepts such as surface to volume ratio and quantum confinement and also able to classify nanomaterials.	Applying (K3)
CO2	explain the synthesis of nanomaterials using select physical and chemical methods.	Applying (K3)
CO3	explain the characterization of nanomaterials using XRD, UV-vis, HRTEM & AFM and BET.	Applying (K3)
CO4	Illustrate the preparation of CNT and their applications.	Applying (K3)
CO5	explore the biological applications of nanomaterials such as antibacterial activity, antifungal activity, antioxidant activity and anticancer activity.	Applying (K3)

# Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2						2	2		2		
CO2	3	2	2						2	2		2		
CO3	3	2	2						2	2		2		
CO4	3	2	2						2	2		2		
CO5	3	2	2						2	2		2		

1 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy

# ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	50	30				100
CAT2	20	50	30				100
CAT3	20	50	30				100
ESE	20	50	30				100



#### 22PHO05 - TECHNIQUES OF CRYSTAL GROWTH **All BE/BTech Branches** Programme& Branch Sem. Category L т Ρ Credit Prerequisites Nil 6 OE 4 3 1 0 Preamble This course aims to impart the knowledge on crystals, physics of crystal growth and crystal growth methods. Unit – I Introduction to Crystals 9+3 Classification of solids - Crystalline and amorphous - Single and polycrystalline materials - Space lattice - Bravais lattice - Lattice planes - Miller indices - Indices of crystal direction - Symmetry - Symmetry elements in cubic crystal - Physical properties. Unit – II **Theories of Crystal Growth** 9+3 Phase rule – Phase diagrams – Binary phase diagrams – Alloy and compounds – Binary system with complete solid solution and no solid solution (eutectic) - Invariant reactions - Eutectic, peritectic and peritectoid (qualitative) - Nucleation concept - Homogeneous, heterogeneous nucleation - Classical theory - Energy of formation of nucleus - Kinetic theory of nucleation (qualitative) - Atmospheric nucleation. Unit – III Melt growth 9+3 Bulk crystal growth methods - Melt growth methods - Bridgman (vertical and horizontal) and Czochralski methods - Liquid encapsulated technique (LEC) for semiconductors - Vermeil growth technique for growing gem crystals - Zone melting. Unit – IV Solution growth 9+3 Low temperature solution growth - High temperature solution growth - Electro crystallization - Crystal growth in gel - Growth of biological crystals - Hydrothermal technique. Unit – V Vapour growth 9+3 Physical vapour transport – chemical vapour transport. Epitaxial growth techniques – Liquid phase epitaxy – Vapour phase epitaxy: chloride, hydride, metalorganic - Molecular beam epitaxy - Chemical beam epitaxy. Lecture: 45, Tutorial: 15, Total: 60 **TEXT BOOK:** Boardman A. D., O'Conner D. E. and Young D. A., Symmetry and its Applications in Science, London McGraw Hill, 1973. (Unit I 1. – V) 2. Introduction to Crystallography Philips, Read Books (9 June 2011), India. (Unit I – V) **REFERENCES:** 1. B. D. Cullity Addison, Elements of X-ray diffraction, Wesley Publishers, 1977. 2. Santhana Raghavan and Dr. P. Ramasamy, Crystal growth processes and methods, KRU publications, 1999. 3. Leonid V. Azaroff, Introduction to Solids, Tata McGraw Hill Publishing Company. 4. C. Kittel Wiley, Introduction to Solid State Physics, Eastern University Edition.



	RSE OUTCOMES:	BT Mapped (Highest Level)
CO1	describe the physical properties of crystals using the concepts of crystalline materials, amorphous material, space lattice, unit cell, Miller indices and crystal symmetry.	Applying (K3)
CO2	explain nucleation in crystal growth using the concepts of phase diagrams and formation energy.	Applying (K3)
CO3	demonstrate the growth of bulk crystals using melt growth techniques.	Applying (K3)
CO4	demonstrate the growth of crystals using solution growth techniques.	Applying (K3)
CO5	comprehend the growth of epitaxy crystal using vapour growth techniques.	Applying (K3)

# Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	2	2						2	2		2		
CO2	3	2	2						2	2		2		
CO3	3	2	2						2	2		2		
CO4	3	2	2						2	2		2		
CO5	3	2	2						2	2		2		

# ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	50	30				100
CAT2	20	50	30				100
CAT3	20	50	30				100
ESE	20	50	30				100



# 22CYO01 - INSTRUMENTAL METHODS OF ANALYSIS

Programr	ne &	&       All BE / BTech Branches       Sem.       Category       L       T       P       C								
Branch			Com	outogory	-	-	•	Credit		
Prerequis	sites	Nil	5	OE	3	1	0	4		
Preamble		Instrumental methods of analysis aim to prepare methods in order to identify the molecules and towards the industries.		-	-		-	-		
Unit – I		Absorption and Emission Spectroscopy						9+3		
signal to n	noise ratio – basic p	osorption and Emission Spectroscopy – represer - techniques for signal to noise enhancement – r rinciples, instrumentation and applications of At	esolving power – Fou	rier transform	spect	rosco	ору –	evaluation		
Unit – II		IR, Raman and NMR Spectroscopy						9+3		
Infrared S analysis.	pectrosco	by – correlation of IR Spectra with molecular str	ucture, instrumentatio	n, samplings t	echn	ique	and q	uantitative		
Raman Sp	pectroscop	y – Classical and Quantum theory instrumentation	on, Structural analysis	and quantitativ	re an	alysis	6.			
	-	sonance Spectroscopy – basic principles – pulse IR spectra and quantitative analysis.	d Fourier transform N	MR spectrome	ter –	Strue	ctural			
Unit – III		Surface Studies						9+3		
(AES) - Tr	ansmissio	Ray Emission Spectroscopy (XES), X- Ray Photo n Electron Microscopy (TEM) - Scanning Electron scopy (AFM).					-			
Unit – IV		Mass Spectroscopy						9+3		
spectra wi	ith molecul	<ul> <li>Ionization methods in mass spectroscopy – ma ar structure - Instrumentation design and applica s Analyzer (IMMA).</li> </ul>	•	•						
Unit - V		Thermal Analysis						9+3		
		inciples and instrumentations and applications of canning Calorimetry (DSC), evolved gas detection								
				Lecture: 4	I5, T	utoria	al: 15	, Total: 60		
TEXT BO	OK:									
	hatwal. G. 019.	R., Anand, Sham K., "Instrumental Methods of C	Chemical Analysis" 5th	Edition, Himal	aya I	Publis	shing	House,		
REFEREN	NCES:									
1. B.	K Sharma	a, Instrumental Method of Chemical Analysis, Kri	ahna Brakaahan Madi							



2.	200				,J.A, al	iu Sellie,	т. <b>д</b> , Ш	SUUITE			analysis	s" CBS Pub		มาจนามนใบ	ns, / ⊏u
3.	Kau	r. H, "In	strument	al Methoo	ls of Cl	nemical A	nalysis'	', XII Ed	ition, F	Pragati pi	akashar	n, Meerat, 2	2018.		
COUR	SE O	UTCOM	IES:											ВТ Мар	
On co	mplet	ion of t	he cour	se, the st	udents	s will be a	able to							Highest L	.evel)
CO1		trate the iniques.		of spectro	scopy t	to unders	tand the	e instrun	nentati	on of var	ious spe	ectral	Unc	lerstanding	g (K2)
CO2	app	ly the IR	R, Ramar	and NMI	R for qu	lantitative	analys	is of the	samp	le.			Арр	lying (K3)	
CO3	app	ly the va	arious teo	chniques f	or the b	petter und	derstand	ling of s	urface	morpho	logy.		Арр	lying (K3)	
CO4	exp	lain the	principle	, instrume	ntation	of mass	spectro	scopy fo	or the a	analysis (	of organi	ic sample.	Unc	lerstanding	g (K2)
CO5	illus	trate the	e thermal	analysis	for the	identifica	tion of t	hermals	stabilit	y of the c	ompoun	ıds.	Unc	lerstanding	g (K2)
						Mappin	g of CC	s with	POs a	nd PSOs	5				
COs/	Pos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO	)1	3	1												
CO	)2	3	2	1	1										
CO	)3	3	2	1	1										
CO	)4	3	1												
CO	)5	3	1												
1 – Sli	ight, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	my	I						
						ASSES	SMENT	PATTE	RN – 1	THEORY	,				
	st / Bl Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)	-	Apply (K3)	_	Analyzi (K4) %	-	Evaluating (K5) %		reating (K6) %	Tota %
	CAT	1		25		35		40	)						100
	CAT	2		25		35		40	)						100
	CAT	3		25		35		40	)						100
			1					1			1				

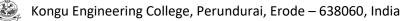


# 22CYO02 - CHEMISTRY CONCEPTS FOR COMPETITIVE EXAMINATIONS

Programme & Branch	All BE / BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	5	OE	3	1	0	4
Preamble	This course aims to refresh the knowledge of chem students with a capacity to solve the problems in che including TNFUSRC-FORESTER (paper-II: General chemistry), GATE (thermodynamics concept for che	mistry while partic science-chemistr	ipating variou y), UPSC-IAS	s cor (pre	mpeti	tive e	kaminations
Unit – I	Periodic Classification of Elements						9+3
-	odic table-Law and classification of elements- Modern p es – important aspects of s, p & d block elements -React oxides.		-				
Unit – II	Chemical Equations and Bonding						9+3
Chemical Equat	ions: Types of ions and radicals- oxidation and reductio	n-redox reactions	- balancing ic	onic e	equat	ions.	
covalent compou	ing: Octet rule -types of chemical bond -formation of inds- differences between ionic and covalent compound			-	-		
nomenciature and	d isomerism - application in analytical chemistry.						
	Acids, Bases, Salts and Metallurgy						9+3
Unit – III Acid- base theor		concept- HSAB-	applications-	pH s	cale-	Impoi	
Unit – III Acid- base theor in everyday life-s Metallurgy: intro	Acids, Bases, Salts and Metallurgy ry – Bronsted- Lowry theory- conjugate acid-base- Lewis alts-classification of salts-uses of salts.						tance of pH
Unit – III Acid- base theor in everyday life-s Metallurgy: intro aluminum, coppe	Acids, Bases, Salts and Metallurgy ry – Bronsted- Lowry theory- conjugate acid-base- Lewis alts-classification of salts-uses of salts.						tance of pH
Unit – III Acid- base theor in everyday life-sa Metallurgy: intro aluminum, coppe Unit – IV Introduction-comp nature of carbon	Acids, Bases, Salts and Metallurgy ry – Bronsted- Lowry theory- conjugate acid-base- Lewis alts-classification of salts-uses of salts. duction-terminologies in metallurgy-differences betwee r and iron.	n minerals and o y- bonding in carb pounds-homologo	res-occurrenc on and its cor ous series-hyc	ce of	meta	als- m	tance of pH etallurgy of 9+3 ppy-physical
Unit – III Acid- base theor in everyday life-s. Metallurgy: intro aluminum, coppe Unit – IV Introduction-comp nature of carbon functional groups	Acids, Bases, Salts and Metallurgy         ry – Bronsted- Lowry theory- conjugate acid-base- Lewis         alts-classification of salts-uses of salts.         oduction-terminologies in metallurgy-differences between r and iron.         Carbon and its Compounds         pounds of carbon-modern definition of organic chemistry and its compounds-chemical properties of carbon compounds	n minerals and o y- bonding in carb pounds-homologo	res-occurrenc on and its cor ous series-hyc	ce of	meta	als- m	etallurgy of 9+3 ppy-physical
Unit – III Acid- base theor in everyday life-s. Metallurgy: intro aluminum, coppe Unit – IV Introduction-comp nature of carbon functional groups Unit – V Introduction- son thermodynamics: reversible isother in ideal gases- so	Acids, Bases, Salts and Metallurgy         ry – Bronsted- Lowry theory- conjugate acid-base- Lewis         alts-classification of salts-uses of salts.         oduction-terminologies in metallurgy-differences between r and iron.         Carbon and its Compounds         pounds of carbon-modern definition of organic chemistry and its compounds-chemical properties of carbon compounds based on function         Thermodynamics         ne important terms in thermodynamics-thermodynamic mathematical expression and interpretation- applicati mal expansion/compression of an ideal gas-adiabatic e econd laws of thermodynamics: entropy- entropy change m only (ideal gas)- entropy change for mixing of ideal	n minerals and o y- bonding in carb pounds-homologo al group-ethanol-e c system, proces ons of first law o xpansion of an ide ie for isolated sys	res-occurrence on and its cor- bus series-hyce ethanoic acid. ss, properties of thermodyna eal gas-isobar tem (system a	mpou mpou droca	unds- urbon: d end s-mol nd isc	als- m allotro s and ergy- ar he ochorio unding	tance of pH etallurgy of 9+3 opy-physical their types- 9+3 first law of at capacity- processes gs)- entropy
Unit – III Acid- base theor in everyday life-s: Metallurgy: intro aluminum, coppe Unit – IV Introduction-comp nature of carbon functional groups Unit – V Introduction- son thermodynamics: reversible isother in ideal gases- so change for syste	Acids, Bases, Salts and Metallurgy         ry – Bronsted- Lowry theory- conjugate acid-base- Lewis         alts-classification of salts-uses of salts.         oduction-terminologies in metallurgy-differences between r and iron.         Carbon and its Compounds         pounds of carbon-modern definition of organic chemistry and its compounds-chemical properties of carbon compounds based on function         Thermodynamics         ne important terms in thermodynamics-thermodynamic mathematical expression and interpretation- applicati mal expansion/compression of an ideal gas-adiabatic e econd laws of thermodynamics: entropy- entropy change m only (ideal gas)- entropy change for mixing of ideal	n minerals and o y- bonding in carb pounds-homologo al group-ethanol-e c system, proces ons of first law o xpansion of an ide ie for isolated sys	res-occurrence on and its cor- ous series-hyde ethanoic acid. ss, properties of thermodyna eal gas-isobar tem (system a f physical cha	mpou mpou droca	i meta unds- arbona s-mol nd isc surro s- en	als- m allotro s and ergy- ar he ochorio unding tropy	tance of pH etallurgy of 9+3 ppy-physical their types- 9+3 first law of at capacity- c processes gs)- entropy of chemical
Unit – III Acid- base theor in everyday life-s: Metallurgy: intro aluminum, coppe Unit – IV Introduction-comp nature of carbon functional groups Unit – V Introduction- son thermodynamics: reversible isother in ideal gases- so change for syste	Acids, Bases, Salts and Metallurgy         ry – Bronsted- Lowry theory- conjugate acid-base- Lewis         alts-classification of salts-uses of salts.         oduction-terminologies in metallurgy-differences between r and iron.         Carbon and its Compounds         pounds of carbon-modern definition of organic chemistry and its compounds-chemical properties of carbon compounds based on function         Thermodynamics         ne important terms in thermodynamics-thermodynamic mathematical expression and interpretation- applicati mal expansion/compression of an ideal gas-adiabatic e econd laws of thermodynamics: entropy- entropy change m only (ideal gas)- entropy change for mixing of ideal	n minerals and o y- bonding in carb pounds-homologo al group-ethanol-e c system, proces ons of first law o xpansion of an ide ie for isolated sys	res-occurrence on and its cor- ous series-hyde ethanoic acid. ss, properties of thermodyna eal gas-isobar tem (system a f physical cha	mpou mpou droca	i meta unds- arbona s-mol nd isc surro s- en	als- m allotro s and ergy- ar he ochorio unding tropy	tance of pH etallurgy of 9+3 opy-physical their types- 9+3 first law of at capacity- processes gs)- entropy
Unit – III Acid- base theor in everyday life-si Metallurgy: intro aluminum, coppe Unit – IV Introduction-comp nature of carbon functional groups Unit – V Introduction- son thermodynamics: reversible isother in ideal gases- se change for syste change for syste changes-Maxwell	Acids, Bases, Salts and Metallurgy         ry – Bronsted- Lowry theory- conjugate acid-base- Lewis         alts-classification of salts-uses of salts.         rduction-terminologies in metallurgy-differences between         r and iron.         Carbon and its Compounds         pounds of carbon-modern definition of organic chemistry         and its compounds-chemical properties of carbon compounds based on function         Thermodynamics         ne important terms in thermodynamics-thermodynamic mathematical expression and interpretation- application         mal expansion/compression of an ideal gas-adiabatic e         econd laws of thermodynamics: entropy- entropy change for mixing of ideal         I relations.	n minerals and o y- bonding in carb pounds-homologo al group-ethanol-e ons of first law o xpansion of an ide le for isolated sys gases-entropy of	res-occurrend on and its cor- bus series-hyde ethanoic acid. ss, properties of thermodyna eal gas-isobar tem (system a f physical cha Lecture:	mpou Iroca amics and s anges <b>45</b> ,	d end s-mol nd isc surro s- en	als- m allotro s and ergy- ar he ochorio unding tropy rial: 1	tance of pH etallurgy of 9+3 ppy-physical their types- 9+3 first law of at capacity- processes gs)- entropy of chemical 5, Total: 60



REFE	RENC	ES:													
1.	B.R	. Puri, l	L.R. Sha	rma, Prin	ciples o	f Inorgar	nic Cher	nistry, 3	3 rd Edi	tion, Vis	hal Publ	ishing Co.,	2020.		
2.	Pau	ila Brui	se, "Orga	anic Cher	nistry", a	8 th Editic	n, Pears	son Edu	ucation,	2020.					
COUR	SE O	UTCOI	MES:											BT Ma	-
On co	mplet	ion of	the cour	rse, the s	student	s will be	e able to	)						(Highest	Level)
CO1		-		ncept of p s of s, p &				elemer	nts to e	xplain th	ne perioo	lic properti	es	Applying	g (K3)
CO2				of chem					olve the	e proble	ms in ba	alancing ior	lic	Applying	g (K3)
CO3				of acid, ba classifica							ncepts, I	mportance	of	Applying	g (K3)
CO4	mak	ke use	-	ncept of							g and cla	ssification	of	Applying	g (K3)
CO5	utiliz	ze the i	importan				thermod	ynamic	s to exp	plain the	e first lav	and secor	nd	Applying	g (K3)
	aw		modynan		слатр										
						Маррі	ng of C	Os with	n POs a	and PSC	Os				
COs/F	Pos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1											
CO	2	3	2	1											
CO	3	3	2	1											
CO	4	3	2	1											
CO	5	3	2	1											
1 – Sli	ght, 2	– Mod	erate, 3 -	- Substar	ntial, BT	- Bloom	's Taxon	nomy							
			1				SSMEN	1					1		1
	t / Blo atego	oom's ory*	Re	memberi (K1) %	ing l	Jndersta (K2)	-	Apply (K3)		Analyz (K4) S	-	Evaluating (K5) %		reating K6) %	Total %
	CAT	1		25		35		40	)						100
	CAT	2		25		35		40	)						100
	CAT	3		25		35		40	)						100
	ESE	-		25		35		4(	)						100
* ±3%	may t	be varie	ed (CAT	1,2&3-	- 50 ma	rks & ES	SE – 100	marks)	)						



# 22CYO03 – ORGANIC CHEMISTRY FOR INDUSTRY

Programme & Branch	All BE / BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	5	OE	3	1	0	4
Preamble	Organic Chemistry for Industry aims to equip the st in order to meet the industrial needs.	tudents to have wid	e-range know	ledg	e on	organ	ic chemistry
Unit – I	Basic aspects of Organic Chemistry						9+3
synthetic applica Saytzeff's rule).	ediates: carbocations, carbanions, free radicals, carber ations- Nucleophilic uni- and bimolecular reactions (SN						•
Unit – II	Molecular Rearrangements						9+3
Migration of cart	ving electron deficient, carbon, nitrogen, oxygen center bon: Wagner-Meerwein, Pinacol-pinacolone, benzyl-ben Hofmann, Curtius, Lossen rearrangements- Migration of Synthetic Reagents & Applications	zilic acid rearrange	ment – Migra	tion			
	m hydride- sodium borohydride- selenium-di-oxide- osm	nium totrovida sta	out in othic our	nota	NF	roman	
(NBS)- lead te toluenesulphony	etraacetate - dicyclohexylcarbodiimide (DCC) – pyr I chloride – trifluoroacetic acid- lithium diisopropylamide	ridinium chlorochro	mate (PCC)	_	Swe	rn ox	idation –p own ethers
Trimethyl silyl io	dide - dichlorodicyanobenzoquinone (DDQ) – Gilman re						alysts.
<b>Unit – IV</b> Extraction: Liqu filtration- pressu	dide - dichlorodicyanobenzoquinone (DDQ) – Gilman re Unit Operations uid equilibria-extraction with reflux-extraction with agitation re and vacuum filtration-centrifugal filtration.	eagent– phase trans	sfer catalysts- extraction. <b>Fi</b> l	Wilk trati	insoi on: 1	n's cat	<b>9+3</b> of
Unit – IV Extraction: Liqu filtration- pressu Distillation: Aze Crystallization fr	Unit Operations uid equilibria-extraction with reflux-extraction with agitation re and vacuum filtration-centrifugal filtration. eotropic and steam distillation. Evaporation: Types of evo om aqueous-non- aqueous solutions factors affecting cr	on-counter current	sfer catalysts- extraction. <b>Fil</b> affecting evap	Wilk trati	insoi on: 1	n's cat	9+3 of Ilization:
Unit – IV Extraction: Liqu filtration- pressu Distillation: Aze Crystallization fr Unit – V	Unit Operations           uid equilibria-extraction with reflux-extraction with agitation           re and vacuum filtration-centrifugal filtration.           eotropic and steam distillation.           Evaporation: Types of evolutions factors affecting cr           Unit Processes	on-counter current vaporators-factors	sfer catalysts- extraction. <b>Fi</b> l affecting evap tion.	Wilk trati	insoi on: 1 ion. (	n's cat heory	9+3 7 of Illization: 9+3
Unit – IV Extraction: Liqu filtration- pressu Distillation: Aze Crystallization fr Unit – V Nitration: Nitrat nitration-mixed a Halogenation: I process. Fermentation: /	Unit Operations           uid equilibria-extraction with reflux-extraction with agitation           re and vacuum filtration-centrifugal filtration.           eotropic and steam distillation.           eotropic and steam distillation.	eagent– phase trans on-counter current vaporators-factors rystallization-nuclea f aromatic nitration- ic halogenations-Ca	sfer catalysts- extraction. <b>Fil</b> affecting evap tion. process equi	Wilk trati	on: 1	h's cat heory <b>Crysta</b> techr	9+3 r of Illization: 9+3 nical enation
Unit – IV Extraction: Liqu filtration- pressu Distillation: Aze Crystallization fr Unit – V Nitration: Nitrat nitration-mixed a Halogenation: I process. Fermentation: /	Unit Operations           uid equilibria-extraction with reflux-extraction with agitation           re and vacuum filtration-centrifugal filtration.           eotropic and steam distillation.           eotropic and steam distillation.           evaporation: Types of evon aqueous-non- aqueous solutions factors affecting cr           Unit Processes           ing agents-aromatic nitration-kinetics and mechanism of acid for nitration.           Kinetics of halogenations-types of halogenations-catalytic	eagent– phase trans on-counter current vaporators-factors rystallization-nuclea f aromatic nitration- ic halogenations-Ca	extraction. <b>Fi</b> affecting evap ition. process equi ase study on d Streptomyci	Wilk trati porati pme ndus n-Pr	insoi on: 1 on. ( nt for strial	h's cat Theory Crysta Techr haloge	9+3 of Illization: 9+3 nical enation Vitamins:
Unit – IV Extraction: Liqu filtration- pressu Distillation: Aze Crystallization fr Unit – V Nitration: Nitrat nitration-mixed a Halogenation: I process. Fermentation: / B2 and B12.	Unit Operations           uid equilibria-extraction with reflux-extraction with agitation           re and vacuum filtration-centrifugal filtration.           eotropic and steam distillation.           eotropic and steam distillation.           evaporation: Types of evon aqueous-non- aqueous solutions factors affecting cr           Unit Processes           ing agents-aromatic nitration-kinetics and mechanism of acid for nitration.           Kinetics of halogenations-types of halogenations-catalytic	eagent– phase trans on-counter current vaporators-factors rystallization-nuclea f aromatic nitration- ic halogenations-Ca	extraction. <b>Fi</b> affecting evap ition. process equi ase study on d Streptomyci	Wilk trati porati pme ndus n-Pr	insoi on: 1 on. ( nt for strial	h's cat Theory Crysta Techr haloge	9+3 of Illization: 9+3 nical enation Vitamins:
Unit – IV Extraction: Liqu filtration- pressu Distillation: Aze Crystallization fr Unit – V Nitration: Nitrat nitration-mixed a Halogenation: I process. Fermentation: / B2 and B12.	Unit Operations           uid equilibria-extraction with reflux-extraction with agitation           re and vacuum filtration-centrifugal filtration.           eotropic and steam distillation. Evaporation: Types of evon aqueous-non- aqueous solutions factors affecting cr           Unit Processes           ing agents-aromatic nitration-kinetics and mechanism of acid for nitration.           Kinetics of halogenations-types of halogenations-catalytic	eagent– phase trans on-counter current vaporators-factors rystallization-nuclea f aromatic nitration- ic halogenations-Ca biotics: Penicillin and	extraction. <b>Fi</b> l affecting evap tion. process equi ase study on d Streptomyci <b>Lecture:</b>	Wilk trati porati ndus n-Pr 45,	on: ↑ on: ↑ on. ( on. for strial oduc	rial: 1	9+3 of Illization: 9+3 nical enation Vitamins: 5, Total: 60
Unit – IV         Extraction: Liqu         filtration- pressu         Distillation: Aze         Crystallization fr         Unit – V         Nitration: Nitrat         nitration-mixed a         Halogenation: I         process.         Fermentation: A         B2 and B12.         TEXT BOOK:         1.       P.S.Kals         V.	Unit Operations         uid equilibria-extraction with reflux-extraction with agitation         re and vacuum filtration-centrifugal filtration.         eotropic and steam distillation. Evaporation: Types of evon aqueous-non- aqueous solutions factors affecting cr         Unit Processes         ing agents-aromatic nitration-kinetics and mechanism of acid for nitration.         Kinetics of halogenations-types of halogenations-catalytic         Aerobic and anaerobic fermentation. Production of Antib	eagent- phase trans on-counter current vaporators-factors rystallization-nuclea f aromatic nitration- ic halogenations-Ca biotics: Penicillin and	extraction. <b>Fi</b> affecting evap ition. process equi ase study on d Streptomyci <b>Lecture:</b>	Wilk trati porati ndus n-Pr 45,	on: ↑ on: ↑ on. ( on. for strial oduc	rial: 1	9+3 of Illization: 9+3 nical enation Vitamins: 5, Total: 6
Unit – IV         Extraction: Liqu         filtration- pressu         Distillation: Aze         Crystallization fr         Unit – V         Nitration: Nitrat         nitration-mixed a         Halogenation: I         process.         Fermentation: A         B2 and B12.         TEXT BOOK:         1.       V.         2.       Arun Ba	Unit Operations         uid equilibria-extraction with reflux-extraction with agitation         re and vacuum filtration-centrifugal filtration.         eotropic and steam distillation. Evaporation: Types of erom aqueous-non- aqueous solutions factors affecting cr         Unit Processes         ing agents-aromatic nitration-kinetics and mechanism of acid for nitration.         Kinetics of halogenations-types of halogenations-catalytic         Aerobic and anaerobic fermentation. Production of Antib         si," Organic Reactions and their Mechanisms", 5 th Edition         ahl, B.S.Bahl, "Advanced Organic Chemistry", 6 th Edition	eagent- phase trans on-counter current vaporators-factors rystallization-nuclea f aromatic nitration- ic halogenations-Ca biotics: Penicillin and	extraction. <b>Fi</b> affecting evap ition. process equi ase study on d Streptomyci <b>Lecture:</b>	Wilk trati porati ndus n-Pr 45,	on: ↑ on: ↑ on. ( on. for strial oduc	rial: 1	9+3 of Illization: 9+3 nical enation Vitamins: 5, Total: 60
Unit – IV         Extraction: Liqu         filtration- pressu         Distillation: Aze         Crystallization fr         Unit – V         Nitration: Nitrat         nitration-mixed a         Halogenation: I         process.         Fermentation: A         B2 and B12.         TEXT BOOK:         1.       P.S.Kals         V.         2.       Arun Ba         REFERENCES:	Unit Operations         uid equilibria-extraction with reflux-extraction with agitation         re and vacuum filtration-centrifugal filtration.         eotropic and steam distillation. Evaporation: Types of erom aqueous-non- aqueous solutions factors affecting cr         Unit Processes         ing agents-aromatic nitration-kinetics and mechanism of acid for nitration.         Kinetics of halogenations-types of halogenations-catalytic         Aerobic and anaerobic fermentation. Production of Antib         si," Organic Reactions and their Mechanisms", 5 th Edition         ahl, B.S.Bahl, "Advanced Organic Chemistry", 6 th Edition	eagent- phase trans on-counter current vaporators-factors rystallization-nuclea f aromatic nitration- ic halogenations-Ca biotics: Penicillin and on, New Age Interna	sfer catalysts- extraction. <b>Fil</b> affecting evap tion. process equi ase study on d Streptomyci <b>Lecture:</b> ational publish or Unit-IV, V.	Wilk trati porati ndus n-Pr 45,	on: ↑ on: ↑ on. ( on. for strial oduc	rial: 1	9+3 of Illization: 9+3 nical enation Vitamins: 5, Total: 6
Unit – IV         Extraction: Liqu         filtration- pressu         Distillation: Aze         Crystallization fr         Unit – V         Nitration: Nitrat         nitration-mixed a         Halogenation: I         process.         Fermentation: A         B2 and B12.         TEXT BOOK:         1.       P.S.Kals         V.         2.       Arun Ba         REFERENCES:         1.       V.K.Ahlu	Unit Operations         uid equilibria-extraction with reflux-extraction with agitation         re and vacuum filtration-centrifugal filtration.         eotropic and steam distillation. Evaporation: Types of erom aqueous-non- aqueous solutions factors affecting cr         Unit Processes         ing agents-aromatic nitration-kinetics and mechanism of acid for nitration.         Kinetics of halogenations-types of halogenations-catalytic         Aerobic and anaerobic fermentation. Production of Antib         si," Organic Reactions and their Mechanisms", 5 th Edition         ahl, B.S.Bahl, "Advanced Organic Chemistry", 6 th Edition	eagent- phase trans on-counter current vaporators-factors rystallization-nuclea f aromatic nitration- ic halogenations-Ca biotics: Penicillin and on, New Age Interna h, S Chand, 2022, for ms" Fourth Edition,	sfer catalysts- extraction. <b>Fil</b> affecting evan tion. process equi ase study on d Streptomyci <b>Lecture:</b> ational publish or Unit-IV, V.	Wilk trati porati nous n-Pr 45,	insol on: 1 on. ( nt for strial oduc 2020	rial: 1	9+3 of Illization: 9+3 nical enation Vitamins: 5, Total: 6 Init-I, II, III,



		UTCON		rse, the s	student	s will be	e able to	)						BT Map (Highest	-
CO1	illus								explain	the SN	1, SN2,	E1 and	E2 U	Inderstand	ling (K2)
CO2			concepts	of molec	ular rea	rrangem	nent to e	xplain r	eaction	ns involv	ring elect	ron deficie	ent,	Applying	ı (K3)
<u> </u>			-	kygen ce										منامع	(1/2)
CO3	Sele	ectines	suitable s	ynthetic i	egenis	IOI VAIIO	us iuncu	onargro	Sup cor	iversion	sinorgai	nic synthes	515.	Applying	j (N3)
CO4				oncept of hic compo		ion, filtra	ation, dis	stillatior	n, evap	oration,	crystalliz	ation for t	he	Applying	ı (K3)
CO5	app					ogenatic	ons and	fermer	ntation	to expla	ain the ii	ndustrial u	ınit	Applying	ı (K3)
						Маррі	ing of C	Os with	h POs	and PS	Os				
COs/I	Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	1												
CO	2	3	2	1	1										
СО	3	3	2	1	1										
CO	4	3	2	1	1										
СО	5	3	2	1	1										
1 – Sli	ight, 2	– Mode	erate, 3 -	- Substar	ntial, BT	- Bloom	's Taxon	iomy							
						ASSE	SSMEN	Τ ΡΑΤΤ	ERN -	- THEOF	RY				
	st / Ble Catego	oom's ory*	Re	member (K1) %	ing l	Jndersta (K2)	-	Apply (K3)		Analyz (K4)	-	Evaluating (K5) %	-	reating (K6) %	Total %
	CAT	1		25		35		40	)						100
	CAT	2		25		35		40	)						100
	CAI				1										1
	CAT	3		25		35		40	)						100



## 22CYO04 - CORROSION SCIENCE AND ENGINEERING

Programme & Branch	All BE / BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	6	OE	3	1	0	4
Preamble	Corrosion science and engineering aims to equip the	students to have	a wide-range	ofk	nowle	adae	
reamble	and prevention methods in order to meet the industria		a wide-range	, 01 K		suger	
Unit – I	Corrosion and its Units						9+3
effect in anodic a consequences (Pi and mpy (mils per	tro chemical mechanism Vs chemical mechanism - em and cathodic metal coatings – prediction using emf ser roblems) – units of corrosion rate: mdd (milligrams per year) –- importance of corrosion prevention in various inc s method, weight gain method and chemical analysis of s	ries and galvanic square decimete dustries: direct and	: series - Pill r per day), m	ing E mpy	Bedw (milli	orth's ie mile	ratio and i es per year
Unit – II	Thermodynamics of Corrosion						9+3
-	Is, Electrical double layer, Gouy–Chapman model, Stern ential - criterion of corrosion (Problems) - basis of Pourb n - limitations.						
Electrochemical p and Traud) – app effect of cathodic	Kinetics of Corrosion olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po	id solution - cath	odic protection	on of	iron	in aci	d solution -
Electrochemical p and Traud) – app effect of cathodic film theory – film s	olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po	id solution - cath	odic protection	on of	iron	in aci	ory(Wagne
Electrochemical p and Traud) – app effect of cathodic film theory – film s <b>Unit – IV</b> Introduction - (i) C theory, weld deca	olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po sequence theory.	id solution – cath tential – theories	odic protection of passivity - rs (iii) intergra	on of ads	iron sorpti	in aci on the	ory(Wagne d solution eory – oxide <b>9+3</b> m depletion
and Traud) – app effect of cathodic film theory – film s <b>Unit – IV</b> Introduction - (i) C theory, weld deca	olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po sequence theory. Types of Corrosion Crevice - differential aeration corrosion (ii) pitting – mech y and knife line attack (iv) stress - SCC mechanism an	id solution – cath tential – theories	odic protection of passivity - rs (iii) intergra	on of ads	iron sorpti	in aci on the	ory(Wagne d solution - eory – oxide <b>9+3</b> m depletior
Electrochemical p and Traud) – app effect of cathodic film theory – film s <b>Unit – IV</b> Introduction - (i) C theory, weld deca current corrosion - <b>Unit - V</b> Inhibitors – types inhibitors – prever disease – Langeli	olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po sequence theory.           Types of Corrosion           Crevice - differential aeration corrosion (ii) pitting – mech y and knife line attack (iv) stress - SCC mechanism an - causes and its control.	id solution – cath itential – theories hanism and facto id fatique- Cavita ncentration, effect nditions – control by surface coating	odic protection of passivity - rs (iii) intergra tion damage - to f molecula of catastrop gs – phosphat ssion- paintin	anula anula – fre ar sti hic o ting a ng, vi	i iron sorpti ar- ch tting ructu xidat and it treou	in aci on the romiu damag re, va ion an s uses s enar	ory(Wagne d solution - eory – oxide <b>9+3</b> m depletion ge (v) stray <b>9+3</b> pour phase ad hydroger s -principles mels, plastic
Electrochemical p and Traud) – app effect of cathodic film theory – film s <b>Unit – IV</b> Introduction - (i) C theory, weld deca current corrosion - <b>Unit - V</b> Inhibitors – types inhibitors – prever disease – Langelia and procedures of lining.	olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po- sequence theory. Types of Corrosion Crevice - differential aeration corrosion (ii) pitting – mech y and knife line attack (iv) stress - SCC mechanism an - causes and its control. Prevention of Corrosion of inhibitors, chemisorption of inhibitors, effect of cor- ntion of corrosion at the design stage and in service col- er saturation index and its uses - corrosion prevention b	id solution – cath itential – theories hanism and facto id fatique- Cavita ncentration, effect nditions – control by surface coating	odic protection of passivity - rs (iii) intergra tion damage - to f molecula of catastrop gs – phosphat ssion- paintin	anula anula – fre ar sti hic o ting a ng, vi	i iron sorpti ar- ch tting ructu xidat and it treou	in aci on the romiu damag re, va ion an s uses s enar	ory(Wagned d solution eory – oxide 9+3 m depletion ge (v) stra 9+3 pour phase ad hydrogen s -principle mels, plasti
Electrochemical p and Traud) – app effect of cathodic film theory – film s <b>Unit – IV</b> Introduction - (i) C theory, weld deca current corrosion - <b>Unit - V</b> Inhibitors – types inhibitors – prever disease – Langelia and procedures of lining.	olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po- sequence theory. Types of Corrosion Crevice - differential aeration corrosion (ii) pitting – mech y and knife line attack (iv) stress - SCC mechanism an - causes and its control. Prevention of Corrosion of inhibitors, chemisorption of inhibitors, effect of cor- ntion of corrosion at the design stage and in service col- er saturation index and its uses - corrosion prevention b	id solution – cath otential – theories nanism and facto id fatique- Cavitar ncentration, effect nditions – control by surface coating polic current impre	odic protection of passivity - rs (iii) intergra tion damage - to f molecula of catastrop gs – phosphat ssion- paintin	anula anula – fre ar sti hic o ting a ng, vi	i iron sorpti ar- ch tting ructu xidat and it treou	in aci on the romiu damag re, va ion an s uses s enar	ory(Wagne d solution - eory – oxide 9+3 m depletion ge (v) strat 9+3 pour phase ad hydroger s -principlet
Electrochemical p and Traud) – app effect of cathodic film theory – film s Unit – IV Introduction - (i) C theory, weld deca current corrosion - Unit - V Inhibitors – types inhibitors – prever disease – Langeli and procedures of lining. TEXT BOOK: 1. E. McCaff	olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po- sequence theory. Types of Corrosion Crevice - differential aeration corrosion (ii) pitting – mech y and knife line attack (iv) stress - SCC mechanism an - causes and its control. Prevention of Corrosion of inhibitors, chemisorption of inhibitors, effect of cor- ntion of corrosion at the design stage and in service col- er saturation index and its uses - corrosion prevention b i cathodic protection: sacrificial anodes and external catho	id solution – cath otential – theories nanism and facto id fatique- Cavitar ncentration, effect nditions – control by surface coating polic current impre	odic protection of passivity - rs (iii) intergra tion damage - to f molecula of catastrop gs – phosphat ssion- paintin	anula anula – fre ar sti hic o ting a ng, vi	i iron sorpti ar- ch tting ructu xidat and it treou	in aci on the romiu damag re, va ion an s uses s enar	ory(Wagne d solution - eory – oxide 9+3 m depletion ge (v) strat 9+3 pour phase ad hydroger s -principle mels, plasti
Electrochemical p and Traud) – app effect of cathodic film theory – film s Unit – IV Introduction - (i) C theory, weld deca current corrosion - Unit - V Inhibitors – types inhibitors – prever disease – Langelia and procedures of lining. TEXT BOOK: 1. E. McCaff REFERENCES: 1. R. Winsto	olarization – Evan's diagram – activation polarization – c lication of mixed potential theory – effect of metal in ac reaction – effect of cathodic area – passivity – Flade po- sequence theory. Types of Corrosion Crevice - differential aeration corrosion (ii) pitting – mech y and knife line attack (iv) stress - SCC mechanism an - causes and its control. Prevention of Corrosion of inhibitors, chemisorption of inhibitors, effect of cor- ntion of corrosion at the design stage and in service col- er saturation index and its uses - corrosion prevention b i cathodic protection: sacrificial anodes and external catho	id solution – cath tential – theories hanism and facto id fatique- Cavitat incentration, effect nditions – control by surface coating pdic current impre- inger, 2017.	odic protection of passivity - rs (iii) intergra tion damage - tt of molecula of catastrophanission-paintin Lecture:	anula anula – fre ar sti hic o ting a ig, vi	i iron sorpti ar- ch tting ructu xidat and it treou <b>Tuto</b>	in aci on the romiu damag re, va ion an s uses s enar <b>rial: 1</b>	ory(Wagned d solution eory – oxid 9+3 m depletio ge (v) stra 9+3 pour phas ad hydroget s -principle mels, plasti 5, Total: 6

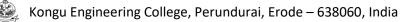


COURS	SE OU	JTCON	NES:											BT Map	-
On con	npleti	on of	the cour	rse, the s	students	s will be	able to	)						(Highest	Level)
CO1				anism, ex trial need	•	n of rate	of corro	sion an	d impo	rtance o	of corrosi	on studies	to U	nderstand	ing (K2)
CO2		onstrat onmer		rmodyna	amics ar	nd kinetic	s of diffe	erent m	odels c	of corrosi	ion with r	espect to th	ie	Applying	(K3)
CO3	utilize	e the t	heories c	of corrosi	on to int	erpret w	ith the r	eal time	) applic	ations.				Applying	(K3)
CO4	orgai	nize th	e various	s types o	f corros	ion to un	derstan	d the co	orrosior	n probler	ms.			Applying	(K3)
CO5	sumr	marize	the corre	osion pre	vention	method	s to avo	id corro	sion re	lated iss	ues.		U	nderstand	ing (K2)
											-				
						Маррі	ng of C	Os with	ו POs a	and PSC	Ds				
COs/P	os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	1												
CO2		3	2	1	1										
CO3		3	2	1	1										
CO4		3	2	1	1										
CO5		3	1			-									
1 – Slig	ht, 2 -	– Mode	erate, 3 -	- Substar	ntial, BT	- Bloom'	s Taxon	iomy							
						ASSE	SSMEN	Τ ΡΑΤΤ	ERN –	- THEOR	RY				
	/ Blo ategoi		Rei	memberi (K1) %	ing L	Jndersta (K2)	-	Apply (K3)		Analyzi (K4) %	-	Evaluating (K5) %		reating K6) %	Total %
	CAT1			25		35		40	)						100
	CAT2	2		25		35		40	)						100
	CAT3	3		25		35		40	)						100
	ESE			25		35		40	)						100
* ±3% n	nay be	e varie	d (CAT 1	1, 2 & 3 -	- 50 mai	rks & ES	E – 100	marks)	)		I		I		



# 22CYO05 - CHEMISTRY OF COSMETICS IN DAILY LIFE

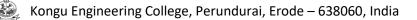
Branch	All BE / BTech Branches	Sem.	Category	L	т	Ρ	Credit			
Prerequisites	Nil	6	OE	3	1	0	4			
Preamble										
	This course aims to provide knowledge on chemis	stry of cosmetics for	engineering	stude	nts.					
Unit 1	Formulation of Cosmetic Product						9+3			
and foam (foam t	ic sciences of cleansing – surfactant and adsorption formation, stability, drainage, rupture and collapse infaces and barriers – basics of emulsion (stability, O	and defoaming) - ba	asics of dispe	ersio	ns - (	electri	cal charges			
Unit 2	Structuring Materials and Regulation for Cosn	netics					9+3			
functions and effe and personal care	er/hydrophilic base materials, oleaginous/hydrophobi cts - materials that add or improve functional value, e product safety – potential contaminants in cosmetics enges in cosmetics material development.	motional value and	materials for	quali	ty co	ntrol –	- cosmetic			
Unit 3	Polymers in Cosmetic Products						9+3			
polymers in cosm	netics - polymer solubility and compatibility, polymer etics and personal care products - hair-conditioning matrices - dendritic polymers - polymeric antimicrob	polymers - polymer	s for the treat	-			-			
Unit 4	Natural Products and Fragrance in Cosmetics						9+3			
	ural products – extraction methods - encapsulation chemicals - fragrance creation and duplication - f		-				-			
Unit 5	Preparation of Cosmetics						9+3			
-	to day life – characteristics, types, formulation, prepans, toothpaste and hair dye.	ration and evaluatio	n methods of	lipsti	ck, s	hampo	oo, powder,			
Lecture: 45, Tutorial: 15										
TEXT BOOK:										
1. Kazutami	Sakamoto, Robert Y. Lochhead, Howard I. Maibach al Principles and Applications, Elsevier, 2017, for Ur		smetic Sciend	ce ar	nd Te	chnolo	ogy:			
1. Kazutami Theoretic		its- I, II, III, IV, V.								
1. Kazutami Theoretic	al Principles and Applications, Elsevier, 2017 , for Ur	its- I, II, III, IV, V.								
1.   Kazutami     Theoretic     2.   Gaurav K <b>REFERENCES:</b>	al Principles and Applications, Elsevier, 2017 , for Ur	its- I, II, III, IV, V. t A text book of cosn	netic formulat	ion, 2	2018,					



COUR	SE O	UTCO	MES:											BT Map	-
On co	mplet	tion of	the cou	rse, the s	student	s will be	e able to	)						(Highest	Level)
CO1	outli	ine the	formulat	ion of co	smetics	products	S.						U	nderstanc	ling (K2)
CO2	iden	ntify the	structur	ing mate	rials and	regulat	ion invo	lved in d	cosmeti	ics deve	lopment.			Applying	J (K3)
CO3	inter	rpret th	e polym	ers and it	s role in	cosmet	ics.						U	nderstand	ling (K2)
CO4	deve	elop kn	owledge	about na	atural pr	oducts a	and Frag	rance ii	n Cosm	etics.				Applying	J (K3)
CO5				ge of cos							tion, pre	paration an	d	Applying	J (K3)
	qua				Sinelic F	JIOUUCIS		uay to	uay ine	•					
						Маррі	ing of C	Os witl	n POs a	and PS	Ds				
COs/P	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	1												
CO2	2	3	2	1											
COS	3	3	1												
CO4	1	3	2	1											
COS	5	3	2	1											
1 – Slię	ght, 2	– Mod	erate, 3 -	- Substa	ntial, BT	- Bloom	's Taxor	iomy							
						ASSE	SSMEN	Τ ΡΑΤΊ	ERN –	THEOF	RY				
	t / Blo atego	oom's ory*	Re	member (K1) %	ing U	Indersta (K2)	-	Apply (K3)		Analyz (K4) 9	-	Evaluating (K5) %		reating K6) %	Total %
	CAT	1		25		35	;	4(	)						100
	CAT	2		25		35	;	4(	)						100
	CAT	3		25		35	;	4(	)						100
	ESE	Ξ		25		35	i	4(	)						100
* ±3%	may b	be varie	ed (CAT	1, 2 & 3 -	- 50 mai	ks & ES	SE – 100	) marks)	)				<u> </u>		1



#### 22CYO06 - NANOCOMPOSITE MATERIALS Programme& All BE / BTech Branches Sem. Category т Ρ Credit L Branch Nil OE 4 Prerequisites 6 0 3 1 Preamble This course aims to equip the students to have knowledge on processing, characterization, properties, features and applications of nanocomposites. Unit – I Introduction of nanocomposites 9+3Introduction - nanocomposites - nanocomposites past and present - nomenclature - composite materials: introduction to solids atomic and molecular solids - role of statistics in materials - primary, secondary and tertiary structure - transitions. Unit - II Properties and features of nanocomposites 9+3 Properties: physics of modulus - continuum measurements - yield - fracture - rubbery elasticity and viscoelasticity - composites and nanocomposites - surface mechanical properties - diffusion and permeability - features of nanocomposites: basics of polymer nanocomposites - nano reinforcements - matrix materials - hazards of particles. Unit - III 9+3 **Processing of nanocomposites** Viscosity: types of flow, experimental viscosity, non-newtonian flow -low-viscosity processing: solvent processing, particle behavior, in situ polymerization, post-forming, hazards of solvent processing - melt, high shear and direct processing: melting and softening, melt processes with small shears or low-shear rates flow, meltprocesses with large deformations or high-shear rates, thermo-kinetic processes. Unit - IV Characterization of nanocomposites 9+3Introduction to characterization - experiment design - sample preparation - imaging -structural characterization - scales in nanocomposites - texture - electromagnetic energy -visualization - physicochemical analysis - characterization of physical properties. Unit - V Applications of nanocomposites 9+3 Nanocomposites - optical, structural applications - nanoparticulate systems with organic matrices - applications - biodegradable protein nanocomposites - applications-polypropylene nanocomposites - application as exterior automatic components - hybrid nanocomposite materials - application for corrosion protection. Lecture: 45, Tutorial: 15, Total: 60 TEXT BOOK: Thomas E. Twardowski, "Introduction to Nanocomposite Materials - Properties, Processing, Characterization", DesTech 1. Publications, April 2007, for Units-I, II, III, IV. Klaus Friedrich, Stoyko Fakivov, Zhony Shang, "Polymer Composites from Nano – to Macro – scale", Springer USA, 2005, 2. for Units-I, II, V. **REFERENCES:** 1. Pulickel M. A, Linda S. S, Paul V.B, "Nanocomposite Science and Technology", Wiley-VCH, 2006. 2. Vikas Mittal, Characterization techniques for polymer nonocomposites, Wiley-VCH, 2012.



COUR	SE C	UTCOI	MES:											BT Map	-
On co	mple	tion of	the cou	rse, the s	studen	ts will be	e able to	)						(Highest	Level)
CO1	ide	entify th	e knowle	dge of na	anocom	posites a	and to e	xplain it	s struc	ure.				Applying	J (K3)
CO2	ар	ply the	knowled	ge on vai	rious pr	operties	and feat	ures of	nanoco	omposite	es.			Applying	J (K3)
CO3	ch	oose th	e various	s concep	ts involv	/ing in th	e proces	ssing of	nanoc	omposite	es.			Applying	J (K3)
CO4	ap	olv the	acquired	knowled	lae on a	haracter	ization o	of nanoc	compos	ites.				Applying	1 (K3)
			-												
CO5	or	ganize t	the applic	cations of	r nanoc	omposite	es in var	ious fiel	ds.					Applying	j (K3)
											-				
							-			and PS		-	-		
COs/F	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3	2	1	1										
CO	2	3	2	1	1										
CO	3	3	2	1	1										
CO	4	3	2	1	1										
CO	5	3	2	1	1										
1 – Sli	ght, 2	2 – Mod	erate, 3 -	- Substa	ntial, B	Γ- Bloom	's Taxor	iomy				1	1	1	1
						ASSE	SSMEN	Τ ΡΑΤΤ	ERN -	THEOF	RY				
	t / Bl ateg	oom's ory*	Re	member (K1) %	ing	Understa (K2)		Apply (K3)		Analyz (K4) 9	-	Evaluating (K5) %		reating (K6) %	Total %
	CAT	[1		25		35		40	)						100
	CAT	2		25		35		40	)						100
	CAT	[3		25		35		40	)						100
	ES	E		25		35		40	)						100
* ±3%	may	be varie	ed (CAT	1, 2 & 3 -	- 50 ma	irks & ES	SE – 100	marks)	)		I				



# 22CYO07 - WASTE AND HAZARDOUS WASTE MANAGEMENT

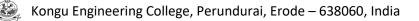
Credi	ГР	L	Category	•	Sem.		All BE / BTech Branches	me &	Programme Branch
3	0 0	3	OE		7		Nil	sites	Prerequisite
									Preamble
nowledge	ige of kn	de-ra	s to have a wi	nts	e student	management aims to equip th	Waste and Hazardous waste managemen waste management.		Preamble
							Solid Waste Management		Unit – I
classificatio	andfill-cl	ysis,	posting, pyro	omp	vermicor	mbustion, aerobic composting,	finition, sources, types, composition of soli ansformation of solid waste – combustion, ac and control of leachate in landfills - recycling ang of plastics, recycling of glass.	g and tra thods an	processing a types, metho
						ent	Hazardous Waste Management		Unit – II
ion, recycli sis, chemic	nimizatio ectrolysia	ste m is, e	reduction, wa tion, hydrolys	te ro ucti	sal: waste tion/redue thods: ine	gregation, treatment and dispo chemical precipitation, oxida eaction- thermal treatment me ons - land treatment and compo	es: definition, nature and sources of hazard nazardous waste, generation, segregation, tre- nent: acid base neutralization, chemical p ching, ion exchange, photolytic reaction- the aerobic, reductive dehalogenations - land tre	class of h al treatm and leac	chemical clas - chemical extraction an waste: aerob
						te Management	E- Waste & Biomedical Waste Manager		Unit – III
						-			
						ication, collection, segregation	ment: definition, sources, classification, colle	-	
		ation	e-waste gene	ste	dical was ortation-w	ication, collection, segregation finition –components of biome or coding-handling and transp	ment: definition, sources, classification, colle e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar	al Waste	Biomedical and waste c
		ation	e-waste gene	ste	dical was ortation-w	fication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la	e Management : Introduction-definition -con -waste storage-labeling and color coding-ha	al Waste	Biomedical and waste c
al- autoclav	disposal	ation and	e-waste gene aste treatmen	ste was	dical was ortation-w andfill.	ication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la tries And Management te treatment flow sheets for	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar	e control- e , microv	Biomedical and waste c hydroclave , Unit – IV Introduction-
al- autoclav	disposal	ation and	e-waste gene aste treatmen	ste was	dical was ortation-w andfill.	ication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la tries And Management e treatment flow sheets for er and dairy industries.	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And Ma ces and characteristics - waste treatment	e control- e , microv	Biomedical and waste c hydroclave , Unit – IV Introduction-
al- autoclav s, tannerie ndling) rule	disposal textiles and han	ation and ch as	e-waste gene aste treatmen industries su vaste (manag	ste was d ir	dical was ortation-w andfill. selected	ication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la tries And Management the treatment flow sheets for er and dairy industries. Ind Legislation gement and handling) rules - bio ement rules - hazardous and	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And Ma ces and characteristics - waste treatment sugar, petroleum refinery, fertilizer and dairy i	cal Waste e control- e , microv	Biomedical and waste c hydroclave , Unit – IV Introduction- pharmaceuti Unit – V Solid waste r plastic waste
al- autoclav s, tannerie ndling) rule	disposal textiles and han	ation and ch as	e-waste gene aste treatmen industries su vaste (manag	ste was d ir	dical was ortation-w andfill. selected	ication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la tries And Management the treatment flow sheets for er and dairy industries. Ind Legislation gement and handling) rules - bio ement rules - hazardous and	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And M ces and characteristics - waste treatment sugar, petroleum refinery, fertilizer and dairy i Solid Waste Management and Legislati gement plan - solid waste (management and la agement rules - e-waste management rules	cal Waste e control- e , microv	Biomedical and waste c hydroclave , Unit – IV Introduction- pharmaceuti Unit – V Solid waste r plastic waste
al- autoclav s, tannerie ndling) rule ansbounda <b>Total:</b>	textiles and han t and tra	ation and ch as emen emer	e-waste gene aste treatmen industries su vaste (manag astes (manag	ste- was d ir	dical was ortation-w andfill. selected	ication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la tries And Management the treatment flow sheets for er and dairy industries. Ind Legislation gement and handling) rules - bio ement rules - hazardous and ste management rules.	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And Ma ces and characteristics - waste treatment sugar, petroleum refinery, fertilizer and dairy i Solid Waste Management and Legislati gement plan - solid waste (management and H agement rules - e-waste management rules construction and demolition waste managen	cal Waste e control- e , microv on- source euticals, s te manag uste manag t) rules -	Biomedical and waste c hydroclave , Unit – IV Introduction- pharmaceutie Unit – V Solid waste r plastic waste movement) r
al- autoclav s, tannerie ndling) rule ansbounda <b>Total:</b>	textiles and han t and tra	ation and ch as emen emer	e-waste gene aste treatmen industries su vaste (manag astes (manag	ste- was d ir	dical was prtation-w andfill. selected omedical other w waste ma	ication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la tries And Management the treatment flow sheets for er and dairy industries. Ind Legislation gement and handling) rules - bio ement rules - hazardous and ste management rules.	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And M ces and characteristics - waste treatment sugar, petroleum refinery, fertilizer and dairy i Solid Waste Management and Legislati gement plan - solid waste (management and la agement rules - e-waste management rules	cal Waste e control- e , microv on- source euticals, s te manage tste manage t) rules - <b>OK:</b> ieorge Tc	Biomedical and waste c hydroclave , Unit – IV Introduction- pharmaceutie Unit – V Solid waste r plastic waste movement) r TEXT BOOK 1. Geo
al- autoclav s, tannerie ndling) rule ansbounda <b>Total:</b>	textiles and han t and tra	ation and ch as emen emer	e-waste gene aste treatmen industries su vaste (manag astes (manag	ste was d ir ll wa wa	dical was prtation-w andfill. selected omedical other w waste ma nit-I, II, V	ication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la tries And Management the treatment flow sheets for er and dairy industries. Ind Legislation gement and handling) rules - bio ement rules - hazardous and ste management rules.	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And Ma ces and characteristics - waste treatment sugar, petroleum refinery, fertilizer and dairy i Solid Waste Management and Legislati gement plan - solid waste (management and H agement rules - e-waste management rules construction and demolition waste managen chobanoglous, Hillary Theisen, Samuel a Vig ent issues) McGraw hill Education (India) Pv , Handbook of Industrial pollution and contro	cal Waste e control- e , microv on- source euticals, s te manage (ste manage t) rules - <b>OK:</b> eorge Tc nanageme	Biomedical and waste c hydroclave , Unit – IV Introduction- pharmaceutie Unit – V Solid waste r plastic waste movement) r TEXT BOOK 1. Geo man 2 SC F
al- autoclav s, tannerie ndling) rule ansbounda <b>Total:</b>	textiles and han t and tra	ation and ch as emen emer	e-waste gene aste treatmen industries su vaste (manag astes (manag	ste was d ir ll wa wa	dical was prtation-w andfill. selected omedical other w waste ma nit-I, II, V	ication, collection, segregation finition –components of biome or coding-handling and transp fection – sanitary and secure la tries And Management the treatment flow sheets for er and dairy industries. Ind Legislation gement and handling) rules - bio ement rules - hazardous and ste management rules.	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And Ma ces and characteristics - waste treatment sugar, petroleum refinery, fertilizer and dairy i Solid Waste Management and Legislati gement plan - solid waste (management and H agement rules - e-waste management rules construction and demolition waste managen chobanoglous, Hillary Theisen, Samuel a Vig ent issues) McGraw hill Education (India) Pv , Handbook of Industrial pollution and contro	cal Waste e control- e , microv on- source on- source euticals, s te manag iste manag iste manag t) rules - <b>OK:</b> George Tc nanageme C Bhatia, nit-II, III,	Biomedical and waste c hydroclave , Unit – IV Introduction- pharmaceutie Unit – V Solid waste r plastic waste movement) r TEXT BOOK 1. Geo man 2. SC I
al- autoclav s, tannerie ndling) rule ansbounda <b>Total:</b> nciple and ni, 2002, fo	textiles and han t and tra ring princ	ation and ch as emen emer	e-waste gene aste treatmen industries su vaste (manag astes (manag nagement (Er and Distribut	ste- was d ir ll wa mana /. er a	dical was prtation-w andfill. selected omedical other w waste ma nit-I, II, V. Publishe	ication, collection, segregation ifinition –components of biome pr coding-handling and transp fection – sanitary and secure la tries And Management the treatment flow sheets for er and dairy industries. Ind Legislation gement and handling) rules - bio ement rules - hazardous and ste management rules. isamuel a Vigil, Integrated solid on (India) Pvt. Ltd., 2015, for U in and control (Volume-1), CBS	e Management : Introduction-definition –con -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And Ma ces and characteristics - waste treatment sugar, petroleum refinery, fertilizer and dairy i Solid Waste Management and Legislati gement plan - solid waste (management and H agement rules - e-waste management rules construction and demolition waste managen chobanoglous, Hillary Theisen, Samuel a Vig ent issues) McGraw hill Education (India) Pv , Handbook of Industrial pollution and contro	al Waste e control- e , microv on- source on- source euticals, s te manag iste manag t) rules - <b>OK:</b> George Tc hanageme C Bhatia, nit-II, III, <b>VCES:</b> lanual on	Biomedical and waste c hydroclave , Unit – IV Introduction- pharmaceutie Unit – V Solid waste r plastic waste movement) r TEXT BOOK 1. Geo man 2. SC F Unit- REFERENC
al- autoclav s, tannerie ndling) rule ansbounda <b>Total:</b> nciple and ni, 2002, fo	disposal textiles and han t and tra ring princ ew Delhi Organiza	ation and ch as emen emer ginee ers, N	e-waste gene aste treatmen industries su vaste (manag astes (manag nagement (Er and Distribut	stewas was d ir ll wa mana /. er a	dical was prtation-w andfill. selected omedical other w waste ma nit-I, II, V. Publishe	ication, collection, segregation ifinition –components of biome pr coding-handling and transp fection – sanitary and secure la tries And Management the treatment flow sheets for er and dairy industries. Ind Legislation gement and handling) rules - bio ement rules - hazardous and ste management rules. Famuel a Vigil, Integrated solid on (India) Pvt. Ltd., 2015, for U in and control (Volume-1), CBS ment, Central public Health an	e Management : Introduction-definition –com -waste storage-labeling and color coding-ha wave treatments- chemical disinfection – sar Pollution From Major Industries And Ma ces and characteristics - waste treatment sugar, petroleum refinery, fertilizer and dairy in Solid Waste Management and Legislati gement plan - solid waste (management and Ha agement rules - e-waste management rules construction and demolition waste managen chobanoglous, Hillary Theisen, Samuel a Vig ent issues) McGraw hill Education (India) Pv Handbook of Industrial pollution and contro IV, V.	al Waste e control- e , microv on- source on- source on- source cuticals, s te manage iste manage t) rules - <b>OK:</b> George Tc hanageme C Bhatia, nit-II, III, <b>VCES:</b> lanual on CPHEEO	Biomedical and waste c hydroclave , Unit – IV Introduction- pharmaceutie Unit – V Solid waste r plastic waste movement) r TEXT BOOK 1. Geo man 2. SC F Unit REFERENC



		UTCON		rse, the s	students	s will be	able to							BT Map (Highest	-				
	-																		
CO1	app	ly the te	echnical	points the	at are re	quired to	o set up	a solid	waste	manage	ment sys	stem.		Applying	(K3)				
CO2	exp	lain the	various	disposal	and trea	atment m	nethods	of haza	rdous	wastes.			U	nderstand	ing (K2)				
CO3	org	anize th	ie approp	oriate me	thod for	managi	ng e-wa	ste and	biome	dical wa	ste.			Applying	(K3)				
CO4		ntify the atment.	hazards	s from va	rious ind	lustries a	and app	ly the w	aste m	anagem	nent tech	niques for i	ts	Applying	(K3)				
CO5	rela	ate the le	egal legi:	slation to	solid wa	aste mar	nagemei	nt.					U	nderstand	ing (K2)				
						Маррі	ng of C	Os witl	n POs a	and PS	Ds								
COs/F	Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2				
CO	1	3	2	1	1			3											
CO	2	2	1					3											
CO	3	3	2	1	1			3											
CO	4	3	2	1	1			3											
CO	5	2	1					3											
1 – Sli	ght, 2	– Mode	erate, 3 -	- Substar	ntial, BT	- Bloom'	s Taxon	iomy						I					
						ASSE	SSMEN	Τ ΡΑΤΊ	ERN -	THEOF	RY								
		oom's	Re	member	ing U	Indersta	-	Appl	_	Analyz	-	Evaluating		reating	Total %				
C	ateg	ory*		(K1) %		(K2)	%	(K3)	%	(K4) '	%	(K5) %	(	K6) %					
	CAT	1		25		35		4(	)						100				
	CAT	2		25		35		4(	)				100						
	CAT	3		25		35		4(	)						100				
	ESI	E		25		35		4(	)						100				
	mov	ho vorio		1,2&3-	50 mar	ke & ES	E 100	marke											



#### 22CYO08 - CHEMISTRY IN EVERY DAY LIFE Programme& All BE / BTech Branches Sem. Category Т Ρ Credit L Branch Prerequisites Nil 7 OE 3 0 0 3 Preamble This course aims to prepare the students to have the knowledge on oils, fats, sugar, adulterants in food, creams, milk powder, soil, fertilizer, pesticides, insecticides, fungicides and herbicides in order to know its chemistry in our everyday activities. Unit – I **Oils, Fats and Sugar** 9 Distinction between oils and fats - properties - classification - edible oils - vegetable oils - animal oils - manufacture of oils by solvent extraction - refining of crude vegetable oils - processing of animal fats - manufacture of cane sugar - manufacture of sucrose from beet root. Unit – II Adulterants in food g Food Adulteration and prevention - common food adulterants - food additives - food colorants - preservatives - flavourants - food poisoning - analysis of adulterants in edible oils, coffee powder, chilli powder, turmeric powder, meat, fish, ghee and milk - harmful effects of food adulterants Unit – III **Creams and Milk powder** 9 Creams: Composition-chemistry of creaming process- Factors influencing cream separation (Mention the factors only) - Estimation of fat in cream - Milk powder: Need for making powder-drying process- spraying, drum drying, jet drying and foam drying-principles involved in each. Unit – IV Soil and Fertilizers g Soil analysis: Composition of soil - Organic and Inorganic constituents-Soil acidity - buffering capacity of soils -Liming of soil -Fertilizers: primary nutrients -role of Nitrogen, potassium and phosphorous on plant growth -Complex fertilizers and mixed fertilizers and its composition - Secondary nutrients - micronutrients and their functions in plants -optimal addition of Fertilizers to obtain estimated yield. Unit – V Pesticides, Insecticides, Fungicides and Herbicides 9 Pesticides - Classification - general methods of application and toxicity, Safety measures when using pesticides-Insecticides: Inorganic pesticides - borates - Organic pesticides - D.D.T. and BHC-Plant derivatives: pyrethrin and Nicotine - Synthetic organic pesticides: Endrin and Aldrin (Chemical name - Structure- functions and uses)-Fungicides: Inorganic (Bordeaux mixture) and organic (dithiocarbamate) fungicides - Industrial fungicides: Creosote fractions - Herbicides: Selective and non-selective - 2, 4dicholorophenoxyacetic acid and 2,4,5-tricholorophenoxyaceticacid (structure and function). Total: 45 TEXT BOOK: Sharma B K, Industrial Chemistry, Goel publishing house, New Delhi, 2011, for Units- I, II, IV 1. Alex V Ramani, Food Chemistry, MJP Publishers, Chennai, 2009, for Units -II, III, V. 2. **REFERENCES:** Dilip Kumar Das, Introductory Soil Science, 1st Edition, Kalyani Publishers, Reprint 2002. 1. K. Bagavathi Sundari- "Applied Chemistry", MJP Publishers, Chennai, 2006. 2. Ashutosh Kar, Medicinal Chemistry, Wiley Eastern limited, New Delhi, 1993. 3.



COUR: On cor				rse, the s	student	s will be	e able to	)						BT Map (Highest	-
CO1	outli	ine the	importar	nce of oils	s, fats a	nd sugai	r.						Unc	lerstandin	g (K2)
CO2	iden	itify the	harmful	effects o	of adulte	rants in t	food.						Арр	lying (K3)	
CO3	deve	elop the	e knowle	edge on c	reams a	and milk	powder.						Арр	lying (K3)	
CO4	inter	rpret th	e nature	and com	positior	n of soil a	and fertil	izers.					Unc	lerstandin	g (K2)
CO5	illust	trate th	e differe	nce of pe	esticides	, insectio	cides, fu	ngicide	s and h	erbicide	s.		Unc	lerstandin	g (K2)
						Маррі	ing of C	Os witl	h POs a	and PSC	Ds				
COs/P	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	I	3	1												
CO2	2	3	2	1	1										
CO3	3	3	2	1	1										
CO4	1	3	1												
CO5	5	3	1												
1 – Slig	ght, 2	– Mode	erate, 3 ·	- Substa	ntial, BT	- Bloom	's Taxor	iomy			1			I	I
						ASSE	SSMEN	Τ ΡΑΤΊ	ERN -	THEOF	RY				
	t / Blo atego	oom's ory*	Re	member (K1) %	ing l	Jndersta (K2)	-	Apply (K3)		Analyz (K4) (		Evaluating (K5) %		reating K6) %	Total %
	CAT	1		25		35		4(	)						100
	CAT	2		25		35		4(	)						100
	CAT	3		25		35		4(	)						100
	ESE			25		35		4(	)						100
* ±3% ı	may b	e varie	ed (CAT	1, 2 & 3 -	- 50 ma	rks & ES	SE – 100	marks	)		I		I		



### 22CY009 - CHEMISTRY OF NUTRITION FOR WOMEN HEALTH Programme & All BE / BTech Branches Sem. Category т Ρ Credit L Branch Nil 8 OE 3 Prerequisites 3 0 0 Preamble This course aims to provide knowledge for engineering students on components of health, fitness and also the role of nutrition for women health. Unit 1 Nutrition 9 Energy-functions, sources and concept of energy balance - recommended dietary allowances, dietary sources - effects of deficiency and/ or excess consumption on health of the following nutrients: carbohydrates and dietary fibre - lipids - proteins - fat soluble vitamins: A, D,E and K - water soluble vitamins: Thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C - minerals: calcium, iron, zinc and iodine. Unit 2 Women Health 9 Disease pattern and reproductive health- menopause - hypothyroid- PCOD-diabetes - policies and programs for promoting maternal and child nutrition and health - concept of small family - methods of family planning - merits and demerits. Unit 3 **Nutrition for Nursing Mother and Infants** 9 Physiology and psychology of lactation, hormonal control, composition of colostrums and breast milk, nutritional requirements of a nursing mother, advantages of breast feeding, food and nutritional requirements for infants, weaning and supplementary foods for infants and immunization. Unit 4 **Nutrition for Physical Fitness** 9 Significance of physical fitness and nutrition in the prevention and management of weight control, obesity, diabetes mellitus, CV disorders, bone health and cancer - nutrition and exercise regimes for pre and postnatal fitness - nutritional and exercise regimes for management of obesity - critical review of various dietary regimes for weight and fat reduction - prevention of weight cycling. Unit 5 **Role of Women in National Development** 9 Women in family and community: Demographic changes menarche, marriage, fertility, morbidity, mortality, life expectancy, sex ratio, aging, widowhood. Women in society: Women's role, their resources, and contribution to family, and effect of nutritional status. Total: 45 **TEXT BOOK:** 1. Srilakshmi, B., Nutrition Science, New Age International (P) Ltd., New Delhi, 2017, for Units- I, IV, V. Arpita Verma, Women's Health and Nutrition: Role of State and Voluntary Organizations, Rawat Publishers, 2017, for 2. Units - II, III, IV. **REFERENCES:**



1.	Shut	bhangi	ni A Josl	hi , Nutriti	on and	Dietetics	s, TataM	acGrav	v Hill, 2	010.					
2.	Ruju	ıta Diw	ekar, Wo	omen and	d The W	eight Lo	ss Tama	asha, W	/estland	d ltd, 20 ⁻	10.				
3.			nan, M., A angalore		I Textbo	ok on Fo	ood and	Nutritic	on, Vol.	1, Seco	nd Editio	n, Bangalo	re Printii	ng and Pu	blishing
	SE OU			rse, the s	student	s will be	able to	)						BT Map (Highest	-
CO1	-			owledge					life.					Applying	ı (K3)
CO2	expla	ain the	disease	pattern a	and poli	cies towa	ards wor	men he	alth.				U	nderstand	ling (K2)
CO3	deve	elop kn	owledge	about nu	itrition d	uring lac	tation a	nd for i	nfants.					Applying	ı (K3)
CO4	utiliz	e the k	nowledg	ge of phys	sical fitn	ess and	nutrition	toward	ds good	l health.				Applying	ı (K3)
CO5	inter	pret th	e various	s role of v	vomen i	n society	/.						U	nderstand	ling (K2)
						Маррі	ng of C	Os witl	h POs a	and PS(	Ds				
COs/F	Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3	2	1											
CO	2	3	1												
CO	3	3	2	1											
	4	3	2	1											
CO	4		1												
CO CO		3	1												
CO	5			– Substar	ntial, BT	- Bloom'	s Taxon	lomy							
CO	5			- Substar	ntial, BT				FERN -	·THEOF	RY				
CO: 1 – Slii Tes	5	– Mode	erate, 3 -	– Substar member (K1) %			SSMEN [®]		ying	THEOF Analyz (K4) 9	ing E	Evaluating (K5) %		reating K6) %	Total %
CO: 1 – Sli Tes	ight, 2 - st / Blo	– Mode	erate, 3 -	member		ASSE	SSMEN Inding %	T PATI	ying ) %	Analyz	ing E			•	<b>Total %</b>
CO: 1 – Sli Tes	ight, 2 -	– Mode pom's ry*	erate, 3 -	member (K1) %		ASSES Indersta (K2)	SSMEN anding %	T PATT Apply (K3)	ying )%	Analyz	ing E			•	
CO: 1 – Sli Tes	ight, 2 - st / Blo CAT1	- Mode	erate, 3 -	memberi (K1) % 25		ASSES Indersta (K2) 35	SSMEN Inding %	T PATT Appl (K3)	ying )%	Analyz	ing E			•	100



		22GEO01 - GERMAN LANGUAGE LEVE	EL 1					
		(Common to All Engineering and Technology B	Branches)					
Progra Branc	amme& h	All BE/BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerec	luisites	Nil	All	OE	4	0	0	4
				I	1		I	
Pream		This course serves as an introduction to the German language a cultural aspects of Germany and German speaking countries. Or the basic day to day vocabulary. On keen learning one would be be able to reciprocate to basic questions	ne can lea	arn to introduce	one	self a	nd ab	le to gain ure and
		Good Day (Guten Tag)						9
	-	duction and introducing others, Numbers, Alphabets, Countries a erb conjugation and personal pronoun.	nd langua	ages spoken.	Gram	mar	– W (	questions,
Unit –	II	Friends & Colleague ( Freund und Kollegen):						9
Hobbie	es, Profession,	Week, Months, Season and Generate Profile. Grammar – Articles,	Plural, Ve	erbs – have and	d to b	e, Ye	s/No (	questions.
Unit –	111	n the City (In der Stadt):						9
	of places/build on articles and	lings in the city, asking for directions, Understanding means of tran	nsport. Gi	rammar – defir	nite ai	nd ind	definit	e articles,
Unit –	IV	Food and Appointment (Essen und Termin):						9
Unders	standing time	tiate conversations to understand and do shopping. Gramma and reciprocating, Appointments, Asking excuse, Family. Gramm Modal verbs- <i>müssen, können, wollen</i>						
Unit –	V	Socializing ( Zeit mit Freunden):						9
	• •	rthday, Invitation, Restaurant, looking for specific information in tex st tense of have and to be, Personal pronoun with Accusative.	ts. Gramn	nar – Separabl	e ver	os, P	repos	itions with
								Total:45
TEXT	BOOK:							
1.		ngler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deutsch 2 CDs", Goyal Publishers, Delhi, 2015.	n als Frem	ndsprache A1-	ursbu	ich, A	vrbeit	sbuch und
REFE	RENCES:							
1.	https://ocw.n	nit.edu – Massachusetts Institute of Technology Open Courseware	•					
2.	https://www.	dw.com/en/learn-german - Deutsche Welle, Geramany's Internatio	nal Broad	lcaster				
COUR	SE OUTCOM	ES:				B	T Maj	oped
On co	mpletion of th	e course, the students will be able to						Level)
CO1	understand	structure of language and introducing each other				Reme	embe	ring (K1)



CO2	unde	erstand	vocabula	iry on sea	asons ar	nd basic \	/erbs						Un	derstandii	ng (K2)
CO3	ask	for direc	tions in a	a new pla	ice and a	avail tran	sport as	required					Un	derstandi	ng (K2)
CO4	unde	erstand	food hab	its of Ger	rman and	d ask for	appointm	nents.					Un	derstandi	ng (K2)
CO5	learr	n to soci	alize in a	German	ı speakir	ng countr	у						Un	derstandiı	ng (K2)
	1					Маррі	ing of C(	Os with	POs ar	nd PSOs					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	) PO11	PO12	PSO1	PSO
со	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
1 – Slig	ght, 2 ·	– Modei	rate, 3 –	Substant	ial, BT- I	Bloom's ⁻	Taxonom	y							
						ASSE	SSMEN	ΓΡΑΤΤΕ	ERN - T	HEORY					
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ing l	Jndersta (K2)	-	Apply (K3)	-	Analyzi (K4) %	-	Evaluating (K %	-	reating K6) %	Tota %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
					1			1			1		1		1



	22GEO02 - JAPANESE LANG	UAGE LEVEL 1					
	(Common to All Engineering and Te	chnology Branches)	)				
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	All	OE	4	0	0	4
Preamble	The basic level of Japanese which provides understar to greet, introduce oneself and other person and conversations				•		
Unit – I	Introduction to Hiragana and Katakana:						9
Chart 1, Chart 2, C	hart 3, Annexures 1 and 2 and basic Japanese rules alon	g with similar sound	led vocabularie	es for	each	chart	•
Unit – II	Introduction to Nouns, various particles and usage	es:					9
Forming simple se	ntences, asking questions, positioning differentiation and	owning fundamenta	ls – new partic	les an	d usa	ages	
Unit – III	Introduction of Verbs, time and place markers:						9
Usage of action w particles in a sente	ords in sentences and framing them – place and time mence.	arkers usages – gi	ving and receiv	ving –	- omi	ssion	of certain
Unit – IV	Introduction of Adjectives, Adverbs and usages:						9
Describing nouns a of the likes and dis	and verbs and framing them to relate day to day conversat likes expressions	ions- positive and ne	egative ending	of the	sam	e – in	troduction
Unit – V	Introduction to Counters and Kanji:						9
	ers-How to use quantifiers-Present form of adjectives and	Nouns-Other neces	ssary particles	-How	to us	e nur	nbers and
quantifiers – 55 ka	nji characters						
							Total:45
TEXT BOOK:							
1. "MINNA N	O NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal	Publishers & Distrik	outors Pvt. Ltd.	, New	Dell	ni, 201	17.
REFERENCES:							
1. Margherita	a Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover, .	lapan, 2017.					
2. Sayaka Ku	urashina, "Japanese Word Speedmaster", 2 nd Edition, Tar	kobon Softcover, Ja	apan, 2018.				
COURSE OUTCO	MES: the course, the students will be able to					T Maµ ghest	oped Level)
	understand typical expression in Hiragana and Katakana				Rem	emhei	ring (K1)
	introduce oneself and other						ding (K2)
							• • •
CO3 communic	ate day to day conversations – basic level				Juae	istanc	ding (K2)



CO4	unde	erstand	the Kanj	is in Japa	inese So	cript							Un	derstandi	ng (K2)
CO5	com	prehend	d concep	t of numb	ers, day	/s, month	s, time a	nd coun	ters				Un	derstandi	ng (K2)
	1					Маррі	ing of C	Os with	POs an	d PSOs			I		
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
I – Slię	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's ⁻	Taxonom	ıy							
						ASSE	SSMEN	Τ ΡΑΤΤΙ	ERN - T	HEORY					
Tos	t/Bl	oom's	Po	memberi	ina	Understa		Apply		Analyzi		Evaluating		reating	Tota
	Catego		Re	(K1) %	ing	(K2)	-	(K3)		(K4) %	-	(K5) %		eating K6) %	%
U U				75		25									100
	CAT	1													100
	CAT			25		75									
		2		25 25		75									100
	CAT	2 3													



	(Common to All Engineering and T	echnology Branche	2)				
Programme&							
Branch	All BE/BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	German Language Level 1	All	OE	4	0	0	4
Preamble	This course aims to help the learner to acquire the version of the degree of the second secon	will help to assimilate situations on a broad	te the basic gr ader sense. A	amm thoro	ar str ugh le	ucture earne	es and gair r will be
Unit – I	Contacts(Kontakte):						9
•	etters, simple instructions, speaking about language lear standing conversations, Making appointments. Grammar es.	•					
Unit – II	Accomodation(Die Wohnung):						9
	ccommodation advertisements, describing accommodat Grammar – Adjective with to be verb, Adjective with sehr						
Unit – III	Are you Working?(Arbeiten Sie):						9
-	peaking about past, understanding Job openings advertis Perfect tense, Participle II – regular and irregular verbs, (	•		versa	itions	, Spea	aking abou
Jobs. Grammar -		•		versa	itions	, Spea	aking abou 9
Jobs. Grammar – Unit – IV Clothes, Chats c	Perfect tense, Participle II – regular and irregular verbs, ( Clothes and Style(Kleidung und mode): on shopping clothes, reporting on past, Orienting onese rogative articles and Demonstrative articles, Partizip II –	Conjunctions - und,	oder, aber Information a	and re	esear	rch al	9 Dout Berlin
Jobs. Grammar – <b>Unit – IV</b> Clothes, Chats c Grammar – Inter Dative, Verbs with	Perfect tense, Participle II – regular and irregular verbs, ( Clothes and Style(Kleidung und mode): on shopping clothes, reporting on past, Orienting onese rogative articles and Demonstrative articles, Partizip II –	Conjunctions - und,	oder, aber Information a	and re	esear	rch al	9 pout Berlin
Jobs. Grammar – Unit – IV Clothes, Chats of Grammar – Inter Dative, Verbs with Unit – V Personal informat Modal verbs – so	Perfect tense, Participle II – regular and irregular verbs, ( Clothes and Style(Kleidung und mode): on shopping clothes, reporting on past, Orienting onese rogative articles and Demonstrative articles, Partizip II – h Dative	Conjunctions – und, elf in Supermarkets - separable and no hs and prompts, hea l, Path, Postcards, w	oder, aber Information a n-separable ve Ith tips. Gramn reather, Travel	and re erbs, nar – I repo	eseal Perso Impe rts, P	rch al onal p rative proble	9 pout Berlin pronouns in 9 with <i>du/lh</i> ms in hote
Jobs. Grammar – Unit – IV Clothes, Chats of Grammar – Inter Dative, Verbs with Unit – V Personal informat Modal verbs – so	Perfect tense, Participle II – regular and irregular verbs, ( Clothes and Style(Kleidung und mode): on shopping clothes, reporting on past, Orienting onese rogative articles and Demonstrative articles, Partizip II – h Dative Health and Vacation(Gesundheit und Urlaub): tion, Human Body parts, Sports, Understanding instruction Ilen, müssen, nicht dürfen, dürfen. Suggestions for travel	Conjunctions – und, elf in Supermarkets - separable and no hs and prompts, hea l, Path, Postcards, w	oder, aber Information a n-separable ve Ith tips. Gramn reather, Travel	and re erbs, nar – I repo	eseal Perso Impe rts, P	rch al onal p rative proble	9 pout Berlin pronouns i 9 with <i>du/lh</i> ms in hote um Schl
Jobs. Grammar – Unit – IV Clothes, Chats of Grammar – Inter Dative, Verbs with Unit – V Personal informa Modal verbs – so	Perfect tense, Participle II – regular and irregular verbs, ( Clothes and Style(Kleidung und mode): on shopping clothes, reporting on past, Orienting onese rogative articles and Demonstrative articles, Partizip II – h Dative Health and Vacation(Gesundheit und Urlaub): tion, Human Body parts, Sports, Understanding instruction Ilen, müssen, nicht dürfen, dürfen. Suggestions for travel	Conjunctions – und, elf in Supermarkets - separable and no hs and prompts, hea l, Path, Postcards, w	oder, aber Information a n-separable ve Ith tips. Gramn reather, Travel	and re erbs, nar – I repo	eseal Perso Impe rts, P	rch al onal p rative proble	9 pout Berlin pronouns i 9 with <i>du/lh</i> ms in hote um Schl
Jobs. Grammar – Unit – IV Clothes, Chats of Grammar – Inter Dative, Verbs with Unit – V Personal informat Modal verbs – so Tourist destinatio TEXT BOOK: 1	Perfect tense, Participle II – regular and irregular verbs, ( Clothes and Style(Kleidung und mode): on shopping clothes, reporting on past, Orienting onese rogative articles and Demonstrative articles, Partizip II – h Dative Health and Vacation(Gesundheit und Urlaub): tion, Human Body parts, Sports, Understanding instruction Ilen, müssen, nicht dürfen, dürfen. Suggestions for travel	Conjunctions – <i>und,</i> elf in Supermarkets, - separable and no hs and prompts, hea l, Path, Postcards, w <i>en, Was, Wem</i> , Adve	oder, aber Information a n-separable ve Ith tips. Gramn /eather, Travel erbs – <i>Zuerst</i> ,	and re erbs, nar – I repo <i>dann</i> ,	Impe rts, P	rch al onal p rative roble <i>ter, Zt</i>	9 poout Berlir pronouns i 9 with <i>du/lh</i> ms in hote um Schl Total:4
Jobs. Grammar – Unit – IV Clothes, Chats of Grammar – Inter Dative, Verbs with Unit – V Personal informat Modal verbs – so Tourist destinatio TEXT BOOK: 1	Perfect tense, Participle II – regular and irregular verbs, (         Clothes and Style(Kleidung und mode):         on shopping clothes, reporting on past, Orienting onese         rogative articles and Demonstrative articles, Partizip II –         h Dative         Health and Vacation(Gesundheit und Urlaub):         tion, Human Body parts, Sports, Understanding instruction         Ilen, müssen, nicht dürfen, dürfen. Suggestions for travel         ns. Grammar – Pronoun: man, Question words – Wer, Weiter         Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwork	Conjunctions – <i>und,</i> elf in Supermarkets, - separable and no hs and prompts, hea l, Path, Postcards, w <i>en, Was, Wem</i> , Adve	oder, aber Information a n-separable ve Ith tips. Gramn /eather, Travel erbs – <i>Zuerst</i> ,	and re erbs, nar – I repo <i>dann</i> ,	Impe rts, P	rch al onal p rative roble <i>ter, Zt</i>	9 poout Berlin pronouns in 9 with <i>du/lh</i> ms in hote um Schl Total:4
Jobs. Grammar – Unit – IV Clothes, Chats of Grammar – Inter Dative, Verbs with Unit – V Personal informat Modal verbs – so Tourist destinatio TEXT BOOK: 1. Stefanie Glossar v 2.	Perfect tense, Participle II – regular and irregular verbs, (         Clothes and Style(Kleidung und mode):         on shopping clothes, reporting on past, Orienting onese         rogative articles and Demonstrative articles, Partizip II –         h Dative         Health and Vacation(Gesundheit und Urlaub):         tion, Human Body parts, Sports, Understanding instruction         Ilen, müssen, nicht dürfen, dürfen. Suggestions for travel         ns. Grammar – Pronoun: man, Question words – Wer, Weiter         Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwork	Conjunctions – <i>und,</i> elf in Supermarkets, - separable and no hs and prompts, hea l, Path, Postcards, w <i>en, Was, Wem</i> , Adve	oder, aber Information a n-separable ve Ith tips. Gramn /eather, Travel erbs – <i>Zuerst</i> ,	and re erbs, nar – I repo <i>dann</i> ,	Impe rts, P	rch al onal p rative roble <i>ter, Zt</i>	9 poout Berlir pronouns i 9 with <i>du/lh</i> ms in hote um Schl Total:4
Jobs. Grammar – Unit – IV Clothes, Chats of Grammar – Inter Dative, Verbs with Unit – V Personal informat Modal verbs – so Tourist destinatio TEXT BOOK: 1. Stefanie Glossar v 2. REFERENCES:	Perfect tense, Participle II – regular and irregular verbs, (         Clothes and Style(Kleidung und mode):         on shopping clothes, reporting on past, Orienting onese         rogative articles and Demonstrative articles, Partizip II –         h Dative         Health and Vacation(Gesundheit und Urlaub):         tion, Human Body parts, Sports, Understanding instruction         Ilen, müssen, nicht dürfen, dürfen. Suggestions for travel         ns. Grammar – Pronoun: man, Question words – Wer, Weiter         Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwork	Conjunctions – <i>und</i> , elf in Supermarkets - separable and not ns and prompts, hea l, Path, Postcards, v <i>en, Was, Wem</i> , Advo	oder, aber Information a n-separable ve Ith tips. Gramn /eather, Travel erbs – <i>Zuerst</i> ,	and re erbs, nar – I repo <i>dann</i> ,	Impe rts, P	rch al onal p rative roble <i>ter, Zt</i>	9 poout Berlir pronouns i 9 with <i>du/lh</i> ms in hote um Schl Total:4



	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
	inpletion of the course, the students will be able to	
CO1	understand letters and simple texts	Remembering (K1)
CO2	assimilate vocabulary on Accommodation and invitation	Understanding (K2)
CO3	comprehend concept of time, telephonic conversation and job-related information	Understanding (K2)
CO4	understand how to do shopping in a German store	Understanding (K2)
CO5	understand body parts and how to plan personal travel	Understanding (K2)
		I
	Mapping of COs with POs and PSOs	

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								1	2	3		3		
CO2								1	2	3		3		
CO3								1	2	3		3		
CO4								1	2	3		3		
CO5								1	2	3		3		

# **ASSESSMENT PATTERN - THEORY**

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	75	25					100
CAT2	25	75					100
CAT3	25	75					100
ESE	25	75					100



		22GEO06-GERMAN LANGUAGE LEVE	L 3					
		(Common to All Engineering and Technology B	Franches)					
Progra Branch		All BE/BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prereq	uisites	German Language Level 2	All	OE	3	0	0	3
Pream	ble	This course provides enriching information about various everyda enhances the vocabulary and speaking ability to respond to and equips one to express opinions and negotiate appointments. With grammatical structure to answer confidently in everyday situation	also seek h diligent	information in	those	e situ	ations	s. It also
Unit –	l	All about food (Rund Ums Essen):						9
someth	ing, To speak	on about person, Speak about food, Introduce self and others, Unde about feelings, To express opinions, To answer questions on a text s/No questions, Reflexive verbs, Sentence with 'weil'					•	
Unit –	I	School days ( Nach der Schulzeit):						9
Unders		eports, Speak and write comments about schooldays, To speak about schooldays, To speak about it. Grammar: Modal verbs in Pa v.					-	
Unit –	11	Media in everyday life (Medien in Alltag):						9
Unders		vantages and disadvantages of Media, formulate comparisons, e Movie reviews. Grammar: Comparative degree, Comparative Se ve degree.						
Unit –	V	Feelings and expressions (Gefühle):						9
Expres	s joy and reg	congratulations, Talk about feelings, To understand information aborets, Understand and write Blog entries, Write appropriate heading along with definite articles.						•
Unit – '	V	Profession and Travel (Beruf und Reisen):						9
career   Expres Describ	oreferences, les s uncertainty, be a statistic, l itions, verb –	ion at ticket counter, To talk about leisure activities, To gather in deate the dream job, To prepare and make telephone calls, To unde Understand and give directions, Understand a newspaper article, S Jnderstand information about a trip, Talk about travel. Grammar: <i>i</i> 'werden', Subordinate clause – indirect questions, All units will inc	erstand tex Say your c Adjective	t about Workp own opinion, Ta to be used alo	lace. alk ab ng wi	Ask out th th ind	for in ne wa definit	formation, y to work, e articles, aking and
								Total:45
TEXT E	BOOK:							
1.		ngler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deutsch 2 CDs", Goyal Publishers, Delhi, 2015	n als Frem	idsprache A1–	ursbu	ich, A	vrbeits	sbuch und
2.								
REFER	ENCES:							
1.	Rosa-Maria	Dallapiazza , Eduard von Jan, Till Schonherr, "Tangram 2 (Germar	n)" , Goya	l Publishers, D	elhi,	2011	•	



2.	https	s://www.	.dw.com/	/en/learn-	german	- Deutsc	he Welle	, Geran	nany's I	nternatic	onal Bro	oadcaster			
		JTCOM	E6.												
				se, the st	udents	will be a	ble to							BT Map (Highest	-
CO1	unde	erstand	German	food style	e, restau	Irant and	be able	express	oneself	·				Rememberi	ng (K1)
CO2	unde	erstand	German	n school s	ystem a	nd discus	s about	habits a	nd prov	ide City-	Tipps			Understand	ing (K2)
CO3	anal	yze and	l compar	e media i	n everyo	day life.								Understand	ing (K2)
CO4	expr	ess fee	lings, de	scribe a c	ity and v	write blog	entries.							Understand	ing (K2)
CO5	seeł	k and pr	ovide inf	ormation	in a pro	fessional	setup, gi	ive direc	tions to	others a	nd talk	about travel		Understand	ing (K2)
						Маррі	ing of C	Os with	POs ar	nd PSOs	;				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	D PO11	PO	12 PSO1	PSO
CO	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
1 – Sliç	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-		Taxonom SSMEN		ERN - T	HEORY					
	st / Blo Catego	oom's ory*	Re	member (K1) %	ing	Understa (K2)	-	Apply (K3)		Analyz (K4) 9		Evaluating ( %	K5)	Creating (K6) %	Tota %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
				25		75		1							100



	(Common to All Engineering and	Technology Branches)	1				
Programmo				1			
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	German Language Level 3	All	OE	3	0	0	3
Preamble	This course imparts knowledge about interacting w behaviour and addressing relationships in persona various media and at work. Enhance learner's grar concepts which would lay the foundation to have a be able to read and respond to reports, write simpl engage in simple conversations in known situation	Il and professional front mmatical exposure and I better hold of the langu le formal and informal le	. It helps one to cover the core uage. With focu	o und basio used l	ersta c grar earni	nd rep mmati ng on	oorts from cal e should
Unit – I	Learning (Lernen):						9
everyday work life	nd describing learning problems, Understanding and e, Talking about everyday working life, Understanding actions- denn,weil, Konjuntiv II: Sollte( suggestions), Ge	a radio report, Underst	anding and ma	aking	a mii	ni-pre	sentation.
Unit – II	Athletic (Sportlich):						9
and reacting, Ma	siasm, hope, disappointment, Understanding and writir king an appointment, Understanding a report about ar nar: Conjunctions – deshalb, trotzdem, Verbs with Dativ	n excursion, Understan	-	-		-	
Unit – III	Living Together (Zusammen Leben):						9
	ogize & give in, As for something, Understand experien and correct a story. Grammatik: Konjunctiv II- könnte,		-		pets,	Resp	ond to
Unit – IV	Good Entertainment (Gute Unterhaltung):						9
	style, Buy concert tickets, Introduce a musician / band, nderstand information about painting, Understand descr eine?, Pronouns – man/jemand/niemand and alles/etw	iption of a picture, Desc	ribe a picture.	Grai	mmat		
				ninati	•		
	Passage of time and Culture (Zeitablauf & Kultu			ninati	• 		9
Articles: Was fuer <b>Unit – V</b> Talk about wishes Understand a text behavior, Express information, Discu Grammatik: Konju		<b>Ir):</b> nversation, Plan somet ory. Understand informa tips in a text, Talk abou include elements for r	hing together, ation about oth ut forms of add eading, writing	To as er cul ressir g, spe	sk oth tures ng oth eaking	, Disc ners, ( g and	omething, uss about Give more listening.
Articles: Was fuer <b>Unit – V</b> Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju	Passage of time and Culture (Zeitablauf & Kultures, Express wishes, Give Suggestions, Understand a construction, Exchange information, Talk about proverbs, write a structure structure intentions, Use the appropriate salutation, Understand uses about clichés and write about them. All units will unctiv II (Wishes, Suggestions), Verbs with prepositions,	<b>Ir):</b> nversation, Plan somet ory. Understand informa tips in a text, Talk abou include elements for r	hing together, ation about oth ut forms of add eading, writing	To as er cul ressir g, spe	sk oth tures ng oth eaking	, Disc ners, ( g and	omething uss abou Give more listening Akkusativ
Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju Subordinate claus	Passage of time and Culture (Zeitablauf & Kultures, Express wishes, Give Suggestions, Understand a construction, Exchange information, Talk about proverbs, write a structure structure intentions, Use the appropriate salutation, Understand uses about clichés and write about them. All units will unctiv II (Wishes, Suggestions), Verbs with prepositions,	<b>Ir):</b> nversation, Plan somet ory. Understand informa tips in a text, Talk abou include elements for r	hing together, ation about oth ut forms of add eading, writing	To as er cul ressir g, spe	sk oth tures ng oth eaking	, Disc ners, ( g and	omething uss about Give more listening
Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju Subordinate claus TEXT BOOK: 1	Passage of time and Culture (Zeitablauf & Kultures, Express wishes, Give Suggestions, Understand a construction, Exchange information, Talk about proverbs, write a structure structure intentions, Use the appropriate salutation, Understand uses about clichés and write about them. All units will unctiv II (Wishes, Suggestions), Verbs with prepositions,	<b>Ir):</b> nversation, Plan somet ory. Understand informa tips in a text, Talk abou include elements for r W- questions with prepo	hing together, ation about oth ut forms of add eading, writing ositions, Relati	To as er cul ressir g, spe ve ser	sk oth tures ng oth eaking ntenc	, Disc hers, ( g and es in /	omething Juss abour Give more listening Akkusativ <b>Total:45</b>
Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju Subordinate claus TEXT BOOK: 1. Stefanie Goyal Pu	Passage of time and Culture (Zeitablauf & Kultures, Express wishes, Give Suggestions, Understand a construction, Exchange information, Talk about proverbs, write a store intentions, Use the appropriate salutation, Understand use about clichés and write about them. All units will unctiv II (Wishes, Suggestions), Verbs with prepositions, sees with damit and UmZu.	<b>Ir):</b> nversation, Plan somet ory. Understand informa tips in a text, Talk abou include elements for r W- questions with prepo	hing together, ation about oth ut forms of add eading, writing ositions, Relati	To as er cul ressir g, spe ve ser	sk oth tures ng oth eaking ntenc	, Disc hers, ( g and es in /	omething ouss abour Give more listening Akkusativ Total:45
Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Discr Grammatik: Konju Subordinate claus TEXT BOOK: 1. Stefanie Goyal Pu REFERENCES:	Passage of time and Culture (Zeitablauf & Kultures, Express wishes, Give Suggestions, Understand a construction, Exchange information, Talk about proverbs, write a store intentions, Use the appropriate salutation, Understand use about clichés and write about them. All units will unctiv II (Wishes, Suggestions), Verbs with prepositions, sees with damit and UmZu.	<b>Ir):</b> nversation, Plan somet ory. Understand informa tips in a text, Talk abou include elements for r W- questions with prepo etzwerk Deutsch als Fr	hing together, ation about oth ut forms of add eading, writing ositions, Relations remdsprache A	To as er cul ressir g, spe ve ser	sk oth tures ng oth aaking ntenc	, Disc hers, ( g and es in /	omething ouss abour Give more listening Akkusativ Total:45



		UTCOM		se, the st	udents	will be a	ble to						(	BT Map Highest L	
CO1	leve	rage lea	arning in	Workplac	e, unde	rstanding	reports a	and mak	ke prese	entation.			Re	ememberii	ng (K1)
CO2	reci	procate	to differe	ent situatio	ons, ma	ke appoin	itment an	nd under	rstand t	exts.			Un	derstandi	ng (K2)
CO3	han	dle relat	ionships	and resp	ond app	propriately	to excha	ange inf	ormatio	n			Un	derstandi	ng (K2)
CO4			-	-		ertainmen		0						Iderstandi	
							-		haa						
CO5	KNO	w about	various	cultural a	spects,	usage of	proverbs	and clic	cnes.				Un	iderstandi	ng (K2)
						Маррі	ing of CO	Os with	POs ai	nd PSOs					
COs/F	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P01	0 PO11	PO12	PSO1	PSO2
CO	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
1 – Slic	aht 2	– Mode	rate 3-	Substant	ial BT-	Bloom's ⁻	Taxonom	v							
	g, <u>-</u>	meae	iato, o	Cubotant		Bioomo		. <b>y</b>							
							001151								
							SSMEN	1							
	st / Blo Catego	oom's ory*	Re	member (K1) %	ing	Understa (K2)	-	Apply (K3)		Analyzi (K4) 9		Evaluating (K5 %		reating K6) %	Tota %
	CAT	1		75		25									100
	CAT	2		25		75									100
															1

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

25

ESE

75

100



	(Common to All Engineering and	Fechnology Branches)					
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credi
Prerequisites	Japanese Language Level 1	All	OE	4	0	0	4
Preamble	The basic level of Japanese which provides unders						
Unit – I	the ability to understand basic conversations and al Casual form Introduction to groups of verbs:	so enables one to requ	lest other pers	ion ar	nd als	io und	erstand
tai farm Varb ara	pups-te form-Give and ask permission to do an action-Pres	ant continuous form D	actrict other pa	raan	from	doina	on action
nouns-Basic Que			estrict other pe	15011		Joing	anaction
Unit – II	Introduction to Casual Form:						9
nai form-Dictiona Casual style	ary form-ta form-Polite style and Casual style differences	-Conversation in plain	style-Place of	usag	je of	Polite	style an
Unit – III	Express opinions and thoughts:						9
Introduction to n	ew particle-Express someone one's thought-Convey the m	nessage of one person	to another-As	k son	neone	e if sor	mething
right -Noun mod	ifications						
Unit – IV	Introduction to If clause and remaining Kanjis:						9
	m-Express gratitude for an action done by other person-h	Hypothetical situation-I	Particles to use	e in c	ase c	of Mot	ion verbs
50 Kanjis	m-Express gratitude for an action done by other person-h			e in c	ase c	of Moti	ion verbs
50 Kanjis <b>Unit – V</b>		and "when, even if"	usages:				
50 Kanjis <b>Unit – V</b>	Introduction to giving and receiving with te form	and "when, even if"	usages:				9
50 Kanjis <b>Unit – V</b> Providing to and	Introduction to giving and receiving with te form	and "when, even if"	usages:				9
50 Kanjis <b>Unit – V</b> Providing to and <b>TEXT BOOK</b> :	Introduction to giving and receiving with te form getting from differences - Understanding of situations and	and "when, even if"	usages: sing when and	even	ifet	C.	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK:	Introduction to giving and receiving with te form	and "when, even if"	usages: sing when and	even	ifet	C.	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA	Introduction to giving and receiving with te form getting from differences - Understanding of situations and NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy	and "when, even if"	usages: sing when and	even	ifet	C.	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK: 1. (MINNA REFERENCES:	Introduction to giving and receiving with te form getting from differences - Understanding of situations and NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy	and "when, even if" I framing sentences us ral Publishers & Distrik	usages: sing when and	even	ifet	C.	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA REFERENCES: 1. Margher	Introduction to giving and receiving with te form getting from differences - Understanding of situations and NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy rita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover	and "when, even if" I framing sentences us val Publishers & Distrik	usages: sing when and outors Pvt. Ltd.	even	ifet	C.	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA REFERENCES: 1. Margher	Introduction to giving and receiving with te form getting from differences - Understanding of situations and NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy	and "when, even if" I framing sentences us val Publishers & Distrik	usages: sing when and outors Pvt. Ltd.	even	ifet	C.	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA REFERENCES: 1. Margher	Introduction to giving and receiving with te form getting from differences - Understanding of situations and NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy rita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover Kurashina, "Japanese Word Speedmaster", 2 nd Edition, T	and "when, even if" I framing sentences us val Publishers & Distrik	usages: sing when and outors Pvt. Ltd.	even	ifetd	C.	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA REFERENCES: 1. Marghei 2. Sayaka COURSE OUTC	Introduction to giving and receiving with te form getting from differences - Understanding of situations and NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy rita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover Kurashina, "Japanese Word Speedmaster", 2 nd Edition, T	and "when, even if" I framing sentences us val Publishers & Distrik	usages: sing when and outors Pvt. Ltd.	even	ifetc	c. ni, 201	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA REFERENCES: 1. Margher 2. Sayaka COURSE OUTC On completion	Introduction to giving and receiving with te form getting from differences - Understanding of situations and NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy rita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover Kurashina, "Japanese Word Speedmaster", 2 nd Edition, T	and "when, even if" I framing sentences us val Publishers & Distrik	usages: sing when and outors Pvt. Ltd.	even	ifeta / Delł B (Hig	ni, 201 T Map	9 Total:4
50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA REFERENCES: 1. Marghen 2. Sayaka COURSE OUTC On completion CO1 different	Introduction to giving and receiving with te form getting from differences - Understanding of situations and NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy rita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover Kurashina, "Japanese Word Speedmaster", 2 nd Edition, T SOMES: of the course, the students will be able to	and "when, even if" I framing sentences us val Publishers & Distrik	usages: sing when and outors Pvt. Ltd.	even	ifeta / Delł B (Hig	r. ni, 201 T Map ghest ember	9 Total:4



05	0000	nrohond		t of "even	if" "who	n" and it	ob rolata	dinform	otion					derstandi	og (K2)
505	COIII	iprenend			III, WIE		JD-Telate		allon				UI	uerstantun	iig (KZ)
						Маррі	ing of C(	Os with	POs an	nd PSOs					
COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO	1								1	2	3		3		
CO2	2								1	2	3		3		
CO	3								1	2	3		3		
	4								1	2	3		3		
CO4	•														
CO	5	NA- da		O de ata at			<b>F</b>		1	2	3		3		
CO	5	– Mode	rate, 3 –	Substant	ial, BT- E		Taxonom	-					3		
CO: I – Slig Tes	5 ght, 2	oom's		Substant memberi (K1) %			SSMEN [®]	-	ERN - T ⁄ing		ng	Evaluating (K5) %	Cı	reating K6) %	Tota %
CO: I – Slig Tes	5 ght, 2 st / Blo	oom's ory*		memberi		ASSE	SSMEN anding %	T PATTE Apply	ERN - T ⁄ing	HEORY	ng	-	Cı		
CO:	5 ght, 2 st / Blo Catego	oom's ory* ⁻ 1		memberi (K1) %		ASSE Jndersta (K2)	SSMEN anding %	T PATTE Apply	ERN - T ⁄ing	HEORY	ng	-	Cı		% 100
CO:	5 ght, 2 st / Blo Catego CAT	oom's ory* ⁻ 1		memberi (K1) % 75		ASSE Jndersta (K2) 25	SSMEN anding %	T PATTE Apply	ERN - T ⁄ing	HEORY	ng	-	Cı		%



	(Common to All Engineering and	Technology Branches)					
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Japanese Language Level 2	All	OE	3	0	0	3
Fielequisites	Japanese Language Level 2			5	U	U	5
Preamble	The intermediate level of Japanese which provides	understanding of all fo	rms ofverbs. a	dverb	s. co	niunc	tions. etc
Unit – I	which includes 150 Kanji's and provides the ability t Introduction to Potential verbs:						
Causes and Rea	sons-Favouring Expressions-Expressing a State-Potentia	I Verb Sentences-Sim	ultaneous actio	ons-V	erb G	iroups	s-te Form
	ns-Nouns-Basic Questions and Kanji's.					. o op o	
Unit – II	Introduction to Transitive and Intransitive verbs:	-					9
Consequence of Basic Questions	verbs- Embarrassment about Facts- Consequence of	erbs with an Intentior	ns-Affirmative	Sente	nces	- Con	junctions
Unit – III	Introduction to Volitional forms:						9
	peakers Intention-Expressing Suggestion or Advice-Usag	e of Adverbs and Qua	ntifiers-Basic (	Quest	ions	and k	_
·				guool			-
Unit – IV	Introduction to Imperative and Prohibitive verbs						9
	rson- Interrogatives-Expressions of Third Person-Action estions and Kanji's.	s and its Occurrence	- Possibilities	of an	Acti	on-Ch	anging c
Unit – V	Introduction to Conditional form and Passive ve	rbs:					9
						of Ve	rbe Baci
	equirement and Speaker's Judgement, HabitualActions	s, Directions and sug	gestions-Pass	ive fo	orms		ins-pasi
		s, Directions and sug	gestions-Pass	ive fo	orms		IDS-Dasi
		s, Directions and sug	gestions-Pass	ive fo	orms		
Questions and K		s, Directions and sug	gestions-Pass	ive fo	orms		
Questions and K							Total:4
Questions and K	anji's.						Total:4
Questions and K TEXT BOOK: 1. "MINNA 2.	anji's.						Total:4
Questions and K TEXT BOOK: 1. "MINNA 2. REFERENCES:	anji's.	ral Publishers & Distrib					Total:4
Questions and K TEXT BOOK: 1. "MINNA 2. REFERENCES: 1. Margher	anji's. NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy	val Publishers & Distrib , Japan, 2017.	butors Pvt. Ltd.				Total:4
Questions and K TEXT BOOK: 1. "MINNA 2. REFERENCES: 1. Margher	anji's. NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy ita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover	val Publishers & Distrib , Japan, 2017.	butors Pvt. Ltd.				Total:4
Questions and K TEXT BOOK:          1.       "MINNA         2.       "MINNA         2.       Nargher         2.       Sayaka	anji's. NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy ita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover Kurashina, "Japanese Word Speedmaster", 2 nd Edition, T	val Publishers & Distrib , Japan, 2017.	butors Pvt. Ltd.		r Delł	ni, 201	<b>Total:4</b>
Questions and K TEXT BOOK: 1. "MINNA 2. REFERENCES: 1. Margher 2. Sayaka COURSE OUTC On completion	NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goy ita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover Kurashina, "Japanese Word Speedmaster", 2 nd Edition, T	val Publishers & Distrib	butors Pvt. Ltd.	, New	, Delł B (Hig	ni, 201 T Map	Total:4



	com	prehenc	d persona	al commu	inication	and expi	ress gree	etings.					Un	derstandi	ng (K2)
CO4	und	erstand	the Kanji	's in Japa	anese Sc	cript.							Un	derstandi	ng (K2)
CO5	com	prehend	d Cohere	nt conver	sations i	n everyd	ay situat	ions.					Un	derstandi	ng (K2)
						Маррі	ng of CO	Ds with	POs an	d PSOs					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
СО	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
		– Mode	rate, 3 –	Substant	ial, BT- E	Bloom's T	Faxonom	у	1	2	3		3		
		– Mode	rate, 3 –	Substant	ial, BT- E	Bloom's ⊺	Гахопот	у	1	2	3		3		
		– Mode	rate, 3 –	Substant	ial, BT- E		Faxonom SSMEN	-			3		3		
1 – Slię Tes	ght, 2	oom's		Substant memberi (K1) %			SSMEN	-	ERN - T		ng E	valuating (K %	5) C	reating K6) %	Tota %
1 — Slię Tes	ght, 2	oom's ory*		memberi		ASSE Jndersta	SSMEN Inding %	Γ ΡΑΤΤΕ Αρριγ	ERN - T	HEORY	ng E		5) C	-	
1 — Slię Tes	ght, 2 st / Bl Catego	oom's ory* ⁻ 1		memberi (K1) %		ASSE Jndersta (K2)	SSMEN Inding %	Γ ΡΑΤΤΕ Αρριγ	ERN - T	HEORY	ng E		5) C	-	% 100
1 — Slię Tes	ght, 2 st / Bl Catego CAT	oom's ory* ⁻ 1 ⁻ 2		memberi (K1) % 75		ASSE Jndersta (K2) 25	SSMEN Inding %	Γ ΡΑΤΤΕ Αρριγ	ERN - T	HEORY	ng E		5) C	-	%



		22GEO10 - JAPANESE LANGUAGE LEV	/EL 4					
		(Common to All Engineering and Technology E	Branches)					
Progra Branch		All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prereq	uisites	JAPANESE LANGUAGE LEVEL 3	All	OE	3	0	0	3
Preaml Unit – I Causes		The intermediate level of Japanese provides understanding of ex which also includes 150 Kanji's and also provides the ability to u Introduction to Reasoning: ces-Causes and Effects-Interrogative Patterns-Adjective as a Nou	nderstanc	l relationship a	mong	the		
Unit – I		Introduction to Exchanging of things:						9
-	sions for Givi ons and kanji'	ng and Receiving of Things-Polite Expression of Request-Indicat s.	ing a Pur	pose of Action	s-Bas	sic Q	uantifi	iers-Basic
Unit – I	11	Introduction to States of an Action:						9
Senten kanji's.	ce Pattern to	Indicate Appearance-Degree of Action and State-Adjectives as Ad	dverbs- Co	onvey informat	ion -I	Basic	Ques	stions and
Unit – I	V	Introduction to Causative Verbs:						9
	ive Forms of ons and Kanji'	Verbs-Asking Opportunity to do something-Hypothetical Questi s.	ons-Judge	ement and Co	urse	of ai	n acti	ons-Basic
Unit – V	V	Introduction to Relationship in Social Status:						9
Honorif	ic expression	s- Respectful expressions- Humble expressions-Polite expressions	s-Basic Q	uestions and K	anji's			
								Total:45
TEXT E	BOOK:							
1.	"MINNA NO	NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publishers	s & Distrib	utors Pvt. Ltd.,	New	Delh	ni, 201	7.
2.								
REFER	ENCES:							
1.	Margherita F	Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover, Japan, 201	7.					
2.	Sayaka Kura	ashina, "Japanese Word Speedmaster", 2 nd Edition, Tankobon Sof	tcover, Ja	pan, 2018.				
COURS	SE OUTCOM	ES:					T Map	-
On con	npletion of th	ne course, the students will be able to				(HIQ	jnest	Level)
CO1	read and Un	derstand Relationship of a Person.				Reme	ember	ing (K1)
CO2	understand	Conversations Used in Everyday Activities.			l	Jnde	rstanc	ling (K2)



CO3	com	prehenc	d Conten	ts at Nea	r Natura	l Speed.							Un	derstandi	ng (K2)
CO4	unde	erstand	the Kanji	i's in Japa	anese S	cript							Un	derstandi	ng (K2)
CO5	com	prehend	d Orally F	Presented	d Materia	als.							Un	derstandi	ng (K2)
						Manni	ing of C(	)s with	POs ar	d PSOs					
				1			-					I	T		1
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	0 PO11	PO12	PSO1	PSO
CO	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
1 – Slig	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's ⁻	Taxonom	ly							
						ASSE	SSMEN	ΓΡΑΤΤΕ	ERN - T	HEORY					
		oom's	Re	memberi	ing	Understa	-	Apply	-	Analyzi		Evaluating (K		reating	Tota
C	Catego	ory*		(K1) %		(K2)	%	(K3)	%	(K4) %	6	%	(	K6) %	%
	CAT	1		75		25									100
	CAT	2		25		75									100
		3		25		75									100
	CAT	•			1								1		1
	CAT			25		75									100

	(Common to All Engineering and Te	chnology Branches)					
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credi
Prerequisite	Fundamentals of French Language	All	OE	4	0	0	4
Preamble	This course provides a foundation of the French langu- lifestyle of France and other French-speaking nations and acquire basic everyday vocabulary. By following t learning process, one can comprehend the structure of	The student will be he structured curricu	learning how tube learning how the learning hear the learning teacher learning hear the learning hear thear the learning hear the learning	to inti icing	oduc the s	e him ame a	herself s per the
Unit – I	Introduction			00111	<u>Indinic</u>	anone	9
French and F	ench culture, alphabets, pronunciation, accents, rules, and ter	ms for pronunciatior	ı (mas-fem), S	alutat	tions,	numb	ers.
Unit – II	Daily Life						9
Subject Pron	un, Francophonie's, adjectives – colors, week, months, seaso	ns.					I
Unit – III	Articles and Verbs						9
Articles - Inde	finite, definite, partitive, and contracted, (examples), introduction	ons to verbs, 1 st grou	up of verb				
Jnit – IV	In the City						9
2 nd group of v	erbs, irregular verbs (avoir, etre, faire) present yourself & ne	gative sentences. (fa	aire and Jouer	verb	with t	ne exp	pressions
Jnit – V	Food and Culture						9
Prepositions -	preposition of places (country, cities and etc), Imperative mode	e, invitations, culture	– food (wine,	chee	se	) Futu	re (recer
future)							
							Total:4
ТЕХТ ВООК							
1. A1 –	saison						
REFERENCE	S:						
1. Appr	nons les francais – 0 and 1						
2. Gram	maire – langue et de civilization francaises – Mauger G, Les id	ees – 0 and 1					
	ICOMES:					T Map	oped Level)
COURSE OU					(רוונ	Jiest	Level)
	on of the course, the students will be able to				-	ombo	
On completi	on of the course, the students will be able to	e self to others.			Rem	ennbei	ing (K1)
Dn completi		e self to others.					
Dn completion CO1 Unde CO2 Unde	rstand the grammatical structure of the language and introduce	e self to others.			Unde	rstand	ing (K1) ling (K2) ling (K2)



CO5 Lea	arn to soo	cialize in	French-s	peaking	countries	8						Un	derstandi	ng (K2)
					Маррі	ing of CO	Os with	POs an	d PSOs	i				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO1								1	2	3		3		2
CO2								1	2	3		3		2
CO3								1	2	3		3		2
CO4								1	2	3		3		2
CO5	2 – Mode	rate, 3 –	Substant	ial, BT- E	Bloom's ⊺	Taxonom	ıy	1	2	3		3		2
CO5	2 – Mode	rate, 3 –	Substant	ial, BT- E		Taxonom	-					3		2
	loom's		Substant memberi (K1) %			SSMEN ⁻ anding	-	ERN - T /ing		ing	Evaluating (K5) %		reating K6) %	2 Tota %
CO5 – Slight, 2	loom's gory*		memberi		ASSE	SSMEN ⁻ anding %	T PATTI Apply	ERN - T /ing	HEORY	ing	-		-	Tota
CO5 – Slight, 2 Test / B Categ	loom's jory*		memberi (K1) %		ASSE Jndersta (K2)	SSMEN ⁻ anding %	T PATTI Apply	ERN - T /ing	HEORY	ing	-		-	Tota %
CO5 – Slight, 2 Test / B Categ	loom's gory* T1 T2		memberi (K1) % 75		ASSE Jndersta (K2) 25	SSMEN ⁻ anding %	T PATTI Apply	ERN - T /ing	HEORY	ing	-		-	<b>Tota</b> %

	(Common to All Engineering and Techn						
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Fundamentals of French Language	all	OE	4	0	0	4
Preamble	This course is designed to assist students in developing vo Framework of Reference for Languages at the A2 level. Th structures as well as the acquisition of vocabulary necessa circumstances. The learner will be able to develop a thorous express themselves in everyday circumstances.	his course will aid ary to comprehen	l in the integrat d and respond	ion o in e\	f basi /eryda	ic graı ay	mmar
Unit – I	French and You						9
-	& Weakness, Recommendations, Sentiments, Motivations, abo and irregulars), Reflexive Verbs, Prepositions	out favorite films a	and Types of so	creen	s in th	ne mo	vie world
Unit – II	Eat and Repeat						9
	Recopies, Types of meals, Describing House and Kitchen, nt continuous tense, Simple conditional form	Presentation of	the recipe, C	ompa	arative	es, Po	ossessive
Unit – III	Vacation						9
nvitations, prese	ntation, Greetings, Goodbyes, Activities on vacation, past expe	riences, Describi	ng favorite pla	ce, R	ecom	mend	lations or
arious tours, Pa	st perfect, Past imperfect tense						
Jnit – IV	Likes and Views						9
	& things, Giving advice, Experience, Moods, Illness, Discon sist & Patient), Past perfect, Past indefinite, Imperative	nforts, Symptoms	s, Roleplay (D	octor	& Pa	atient,	Guide &
Tourist, Pharmac		nforts, Symptoms	s, Roleplay (D	octor	& Pa	atient,	Guide &
Tourist, Pharmac Unit – V Habits, customs,	sist & Patient), Past perfect, Past indefinite, Imperative						9
Tourist, Pharmac Unit – V Habits, customs,	circumstances of the past and present, Debates on past and p						<b>9</b> nse, Pas
Tourist, Pharmac Unit – V Habits, customs, perfect and Pres	circumstances of the past and present, Debates on past and p						9
Fourist, Pharmac Jnit – V Habits, customs, perfect and Pres	cist & Patient), Past perfect, Past indefinite, Imperative Then and Now circumstances of the past and present, Debates on past and present comparatives.						<b>9</b> nse, Pas
Tourist, Pharmac Unit – V Habits, customs, perfect and Prese TEXT BOOK: 1. A2 – Sai	cist & Patient), Past perfect, Past indefinite, Imperative Then and Now circumstances of the past and present, Debates on past and present comparatives.						<b>9</b> nse, Pas
Tourist, Pharmac Unit – V Habits, customs, perfect and Prese TEXT BOOK: 1. A2 – Sai REFERENCES:	cist & Patient), Past perfect, Past indefinite, Imperative Then and Now circumstances of the past and present, Debates on past and present comparatives.						<b>9</b> nse, Pas
Tourist, Pharmac Unit – V Habits, customs, perfect and Prese TEXT BOOK: 1. A2 – Sai REFERENCES: 1. Appreno	circumstances of the past and present, Debates on past and present comparatives.	resent situations					<b>9</b> nse, Pas
Tourist, Pharmac Unit – V Habits, customs, perfect and Prese TEXT BOOK: 1. A2 – Sai REFERENCES: 1. Appreno	tist & Patient), Past perfect, Past indefinite, Imperative Then and Now circumstances of the past and present, Debates on past and present comparatives. son ns les francais – 0 and 1 nire – langue et de civilization francaises – Mauger G .Les idees	resent situations			mperf	ect te	9 nse, Pas Total:4
Tourist, Pharmac         Jnit – V         Habits, customs, perfect and Prese         TEXT BOOK:         1.       A2 – Sai         REFERENCES:         1.       Appreno         2.       Gramma         COURSE OUTC	tist & Patient), Past perfect, Past indefinite, Imperative Then and Now circumstances of the past and present, Debates on past and present comparatives. son ns les francais – 0 and 1 nire – langue et de civilization francaises – Mauger G .Les idees	resent situations			mperf	Fect te	9 nse, Pas Total:4
Tourist, Pharmad Unit – V Habits, customs, berfect and Prese TEXT BOOK: 1. A2 – Sai REFERENCES: 1. Appreno 2. Gramma COURSE OUTC On completion of	Cist & Patient), Past perfect, Past indefinite, Imperative          Then and Now         circumstances of the past and present, Debates on past and present comparatives.         ison         ison         ins les francais – 0 and 1         hire – langue et de civilization francaises – Mauger G .Les idees         OMES:	resent situations		Past in	mperf	T Map	9 nse, Pas Total:4
Tourist, Pharmad Unit – V Habits, customs, berfect and Prese TEXT BOOK: 1. A2 – Sai REFERENCES: 1. Appreno 2. Gramma COURSE OUTC On completion of CO1 Understa	Sist & Patient), Past perfect, Past indefinite, Imperative          Then and Now         circumstances of the past and present, Debates on past and present comparatives.         son         ns les francais – 0 and 1         nire – langue et de civilization francaises – Mauger G .Les idees         OMES:         of the course, the students will be able to	resent situations		Past in	B ⁻ BReme	T Map phest	9 nse, Pas Total:4



CO4	Understand	complex	verbs and	be able	e to comr	nunicate	about th	neir pas	t experie	ences		Un	derstandii	ng (K2)
CO5	Know the d	ifference	between F	Past and	Present	and Cor	npare th	em.				Un	derstandii	ng (K2)
					Mappir	ng of CC	s with I	POs an	d PSOs					
COs/P	Os PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO
CO1	1							1	2	3		3		2
COI								I	2	3		3		2
CO2	2							1	2	3		3		2
CO3	3							1	2	3		3		2
CO4	1							1	2	3		3		2
CO5	5							1	2	3		3		2
– Slig	ght, 2 – Mode	erate, 3 –	Substantia	al, BT- B	Bloom's T	axonomy	/							
					ASSES	SMENT	PATTE	RN - TI	HEORY					
				ing I	Understa	ndina					Evaluating	Cr	eating	
	st / Bloom's Category*	Re	ememberi (K1) %		(K2)	-	Apply (K3)		Analyzi (K4) %	ng	(K5) %		<b>(6)</b> %	Tota %
		R				%				ng	(K5) %		-	
	Category*	R	(K1) %		(K2)	%				ng	(K5) %		-	100
	Category*	R(	<b>(K1) %</b> 75		<b>(K2)</b> 25	%				ng	(K5) %		-	%
	CAT1 CAT2	R(	(K1) % 75 25		<b>(К2)</b> 25 75	%				ng	(K5) %		-	100



	(Common to All Engineering and T	echnology Branches)					
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Fundamentals of French Language	All	OE	3	0	0	3
Preamble	This course gives knowledge regarding a variety of p improving vocabulary and speaking abilities to reply the ability to articulate yourself and arrange appointn grammatical structures needed to respond confident how Natives communicate.	to and seek informatinents. With persevera	on in those set ance, one can i	tings naste	. It als er all o	so giv of the	es you essential
Unit – I	Start Over						9
	rases, Discuss a day in life, work, problems in the world, Prec perfect and future tense.	lictions about the futu	ire (actions and	d situ	ation	s), Hy	pothetical
Unit – II	Prohibitions and More						9
	Dbligations, Habits to change, social customs, Use of the subjutions was a social custom of the subjution of the subjuting subjuting subjution of the subjution of the subjution		opsis of Movie	and i	ts rela	ation	o real life.
Unit – III	Let's be Creative						9
	by describing the problem, talk about desires and Necessit vertisement, Give Instructions, Imperative negative, Use of Ot			datio	ns an	d Su	gestions,
Unit – IV	Travel and Communication						9
	urs, Types of tourism and communication, Send messages,				• D•	leplay	(Tourists
	purists and Travel agents), Past Pluscumperfect, All Past tens	-	ple on the tele	pnon	е, ко		,
		-	ple on the tele		е, ко		9
and Guide, To <b>Unit – V</b> Expression o	purists and Travel agents), Past Pluscumperfect, All Past tens	es.					9
and Guide, To <b>Unit – V</b> Expression o	Let's Talk f Interests, Sentiments, Feelings, Sensations, Manias etc.	es.					9
and Guide, To <b>Unit – V</b> Expression o	Let's Talk f Interests, Sentiments, Feelings, Sensations, Manias etc. Exclamatory phrases, subjunctives.	es.					9 ne use of
and Guide, To Unit – V Expression o superlatives, TEXT BOOK	Let's Talk f Interests, Sentiments, Feelings, Sensations, Manias etc. Exclamatory phrases, subjunctives.	es.					9 ne use o
and Guide, To Unit – V Expression of superlatives, TEXT BOOK 1. B1 –	Let's Talk f Interests, Sentiments, Feelings, Sensations, Manias etc. Exclamatory phrases, subjunctives.	es.					9 ne use o
and Guide, To Unit – V Expression o superlatives, TEXT BOOK 1. B1 – REFERENCE	Let's Talk f Interests, Sentiments, Feelings, Sensations, Manias etc. Exclamatory phrases, subjunctives.	es.					9 ne use of
and Guide, To Unit – V Expression of superlatives, TEXT BOOK 1. B1 – REFERENCE 1. Approx	Let's Talk f Interests, Sentiments, Feelings, Sensations, Manias etc. Exclamatory phrases, subjunctives.	es. Certain suggestion					9 ne use o



CO1	Learn on	Futu	ire tens	e.									Re	memberir	ng (K1)
CO2	Understa	nd P	ermissi	ions and	Prohibiti	ons.							Un	derstandi	ng (K2)
CO3	Knowing	abou	ut Lette	r writing,	Creating	g Ads, Ex	pressing	Desires	s, and Ir	structing	d Others.		Un	derstandi	ng (K2)
CO4	Understa	nding	g rules	for travel	and En	hancing	communi	cations.					Un	derstandi	ng (K2)
CO5	Expressir	ng th	e feelin	gs and e	motions	using ad	lvanced g	gramma	r				Un	derstandi	ng (K2)
						Маррі	ing of CO	Os with	POs ai	nd PSOs					
COs/F	POs PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1								1	2	3		3		2
CO	2								1	2	3		3		2
CO	3								1	2	3		3		2
CO	4								1	2	3		3		2
CO	5								1	2	3		3		2
1 – Slię	ght, 2 – Mo	dera	te, 3 –	Substant	ial, BT- I	Bloom's ⁻	Taxonom	iy			<u> </u>		<u> </u>	<u> </u>	1
						ASSE	SSMEN	T PATT	ERN - 1	HEORY					
	st / Bloom' Category*	S	Rei	memberi (K1) %	ng l	Understa (K2)		Apply (K3)	-	Analyzi (K4) %	-	Evaluating (K5) %		reating K6) %	Total %
	CAT1			75		25									100
	CAT2			25		75									100
	CAT3			25		75									100
	ESE			25		75									100
* ±3%	may be vai	ried (	CAT 1,	2,3 – 50	marks &	ESE – 1	100 mark	s)					<u> </u>		



	22GEO15 - SPANISH LANGUAGE LEV	EL 2					
	(Common to All Engineering and Technology E	Branches)					
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Fundamentals of Spanish Language	All	OE	4	0	0	4
Preamble	This course aims to help the Learner to acquire the vocabulary a level competence. This course will help to assimilate the basicgr understand and reciprocate in daily life situations on a broader s comprehensive understanding of the Spanish grammar and conf	ammar sti ense. A th	ructures and g horough learne	ain vo r will	be al	lary t	o gain a
Unit – I	Spanish and You (El Español y tú)						9
-	Veakness, Recommendations, Sentiments, Motivations, About favo irregulars), Reflexive Verbs, Prepositions	orite films a	and Types of s	creen	s in t	he mo	ovie world,
Unit – II	Eat and Repeat (Comer y repetir)						9
	pies, Types of meals, Describing House and Kitchen, Presentation ense, Simple conditional form	n of recipe	e, Comparative	es, Po	osses	sive	pronouns,
Unit – III	Its Vacation Time (Tiempo de vacaciones)						9
-	ion, Greetings, Goodbyes, Activities on vacation, past experiences erfect, Past imperfect tense, Usage of Todavia or No	, Describi	ng favorite pla	ce, R	econ	meno	dations on
Unit – IV	Likes and Views (Gustasyvistas)						9
-	hings, Giving advices, Experience, Moods, Illness, Discomforts, & Patient), Past perfect, Past indefinite, Imperative	Symptom	s, Roleplay (D	octor	& P	atient	, Guide &
Unit – V	Then and Now( Antes y Ahora)						9
Habits, customs, circ perfect and Present of	umstances of the past and present, Debates on past and present s comparatives.	situations	and feelings. F	Past in	nper	fect te	ense, Past
							Total:45
TEXT BOOK:							
-	RNACIONAL 2 (A2) Jaime Corpas, AgusinGarmendia, Nuria S Pvt LTD, 86, UB Jawahar Nagar, Kamla Nagar, Delhi-110007.	anchez, (	Carmen Soriar	no Go	oyal	Publis	shers and
REFERENCES:							
1. <u>https://nueva</u>	adelhi.cervantes.es/en/spanish_courses/students/spanish_general	courses/	spanish_cours	ses_le	evel_	a1.htr	<u>n</u>
COURSE OUTCOM	ES: ne course, the students will be able to					T Map Jhest	oped Level)
				I			



	unde	erstand	the Spar	nish langu	uage in c	leep and	its usage	Ð					Re	memberir	ng (K1)
CO2	prep	are for	their Fav	orite recij	pes, Kno	w the Ob	ojects use	ed in Kite	chen an	d house	•		Un	derstandi	ng (K2)
CO3	conv	verse ab	out their	vacation	, their Fa	avorite D	estinatior	า					Un	derstandi	ng (K2)
CO4	unde	erstand	complex	verbs an	d be abl	e to com	municate	e about t	heir pas	t experie	ences		Un	derstandi	ng (K2)
CO5	knov	v the dif	ference	between	Past and	l Present	t and Cor	nparing	them.				Un	derstandi	ng (K2)
						Маррі	ing of C	Os with	POs an	d PSOs					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
СО	1								1	2	3		3		2
CO	2								1	2	3		3		2
CO	3								1	2	3		3		2
CO	4								1	2	3		3		2
CO	5								1	2	3		2		2
	0								1	2	3		3		2
		– Mode	rate, 3 –	Substant	ial, BT-	Bloom's ⁻	Taxonom	ly	•	2	3		3		2
		– Mode	rate, 3 –	Substant	ial, BT-			-					3		
		– Mode	rate, 3 –	Substant	ial, BT-		Taxonom	-					3		
I — Slių Tes		oom's		Substant memberi (K1) %			SSMEN [®]	-	ERN - T ⁄ing		ng	Evaluating (K5) %	Cr	reating K6) %	Tota
I – Slių Tes	ght, 2 -	oom's ory*		member		ASSE	SSMEN anding %	T PATTI Apply	ERN - T ⁄ing	HEORY	ng	-	Cr	-	Tota %
– Sli	ght, 2 - st / Blo Catego	pom's pry* 1		memberi (K1) %		ASSE Jndersta (K2)	SSMEN anding %	T PATTI Apply	ERN - T ⁄ing	HEORY	ng	-	Cr	-	Tota
I – Slių Tes	ght, 2 - st / Blo Catego	oom's ory* 1		memberi (K1) % 75		ASSE Jndersta (K2) 25	SSMEN anding %	T PATTI Apply	ERN - T ⁄ing	HEORY	ng	-	Cr	-	<b>Tota</b> %

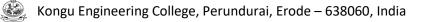


		/EL 3					
	(Common to All Engineering and Technology	Branches)					
Programme& Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Fundamentals of Spanish Language	All	OE	3	0	0	3
Preamble	This course provides enriching information about various everydarenhances the vocabulary and speaking ability to respond to and equips one to express opinions and negotiate appointments. Wit grammatical structure to answer confidently in everyday situation speak.	also seek h diligent l	information in earning one ca	those in caj	e situa pture	ations all ba	. It also sic
Unit – I	Start Over( Volver a Empezar)						9
	ses, Discuss a day in life, work, problems in the world, Predictions fect and future tense.	about futu	re (actions an	d situ	uatior	ns),Hy	pothetica
Unit – II	Prohibitions and More(Prohibiciones y mas)						9
	igations, Habits to change, social customs, Use of subjunctive, Desc s vs movies, usage of connectors, Object Direct and Indirect.	ribe synop	osis of Movie a	ind its	s rela	ition t	o real life
Unit – III	Let's be Creative (Seamoscreatives)						9
-	describing the problem,talk about desires and Necessities, propos tisement, Give Instructions, Imperative negative, Use of Object Direct			datior	ns an	d Su	ggestions
			01.				
Unit – IV	Travel and Communication (Viajar y comunicar)						9
Talk about Tours	Travel and Communication (Viajar y comunicar)         s, Types of tourism and communication, Send messages, petitions, Ta         and Travel agents), Past Pluscumperfect, All Past tenses.			e, Ro	ole pla	ay(To	
Talk about Tours Guide, Tourists a	s, Types of tourism and communication, Send messages, petitions, Ta			e, Ro	ole pla	ay(To	
Talk about Tours Guide, Tourists a <b>Unit – V</b> Expression of In	s, Types of tourism and communication, Send messages, petitions, Ta and Travel agents), Past Pluscumperfect, All Past tenses.	alk to peop	le on telephor	·			urists and 9 perlatives
Guide, Tourists a <b>Unit – V</b> Expression of In Exclamatory phr	s, Types of tourism and communication, Send messages, petitions, Ta and Travel agents), Past Pluscumperfect, All Past tenses. Let's Talk(Hablemos) terests, Sentiments, Feelings, Sensations, Manias etc. Certain sugges	alk to peop	le on telephor	·			urists and 9
Talk about Tours Guide, Tourists a Unit – V Expression of In Exclamatory phr TEXT BOOK:	s, Types of tourism and communication, Send messages, petitions, Ta and Travel agents), Past Pluscumperfect, All Past tenses. Let's Talk(Hablemos) terests, Sentiments, Feelings, Sensations, Manias etc. Certain sugges	alk to peop	nle on telephor	uture,	, use	of su	urists and 9 Derlatives Total:4
Talk about Tours Guide, Tourists a Unit – V Expression of In Exclamatory phr TEXT BOOK: 1. Aula Inte Distribut	s, Types of tourism and communication, Send messages, petitions, Ta and Travel agents), Past Pluscumperfect, All Past tenses. Let's Talk(Hablemos) terests, Sentiments, Feelings, Sensations, Manias etc. Certain sugger ases, subjunctive.	alk to peop	nle on telephor	uture,	, use	of su	urists and 9 Derlatives Total:4
Talk about Tours Guide, Tourists a Unit – V Expression of In Exclamatory phr TEXT BOOK: 1. Aula Inte Distribut REFERENCES:	s, Types of tourism and communication, Send messages, petitions, Ta and Travel agents), Past Pluscumperfect, All Past tenses. Let's Talk(Hablemos) terests, Sentiments, Feelings, Sensations, Manias etc. Certain sugger ases, subjunctive.	alk to peop stions to n	nake a better fi	uture,	, use	of su Publi	9 perlatives Total:4
Talk about Tours Guide, Tourists a Unit – V Expression of In Exclamatory phr TEXT BOOK: 1. Aula Inte Distribut REFERENCES:	s, Types of tourism and communication, Send messages, petitions, Ta and Travel agents), Past Pluscumperfect, All Past tenses. Let's Talk(Hablemos) terests, Sentiments, Feelings, Sensations, Manias etc. Certain sugger ases, subjunctive. ernational 3 (B1) [Paperback] Jaime Corpas, Agusin Garmendia, Nuria ors Pvt LTD, 86, UB Jawahar Nagar, Kamla Nagar, Delhi-110007. uevadelhi.cervantes.es/en/spanish_courses/students/spanish_genera	alk to peop stions to n	nake a better fi	uture,	Goyal	of su Publi a1.htr	urists an 9 perlatives Total:4 shers and <u>n</u>
Talk about Tours         Guide, Tourists a         Unit – V         Expression of In         Exclamatory phr         TEXT BOOK:         1.         Aula Inte         Distribut         REFERENCES:         1.         https://n         COURSE OUTC	s, Types of tourism and communication, Send messages, petitions, Ta and Travel agents), Past Pluscumperfect, All Past tenses. Let's Talk(Hablemos) terests, Sentiments, Feelings, Sensations, Manias etc. Certain sugger ases, subjunctive. ernational 3 (B1) [Paperback] Jaime Corpas, Agusin Garmendia, Nuria ors Pvt LTD, 86, UB Jawahar Nagar, Kamla Nagar, Delhi-110007. uevadelhi.cervantes.es/en/spanish_courses/students/spanish_genera	alk to peop stions to n	nake a better fi	uture,	Goyal	of su Publi a1.htr	urists an 9 perlatives Total:4 shers an <u>n</u>



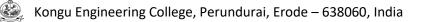
CO2	unde	erstand	about Pe	rmissions	and Pro	hibitions	•						Un	derstandir	וg (K2)
CO3	knov	ving abo	out Letter	writing, C	reating	Ads, Exp	ressing [	Desires	and Ins	tructing	Others.		Un	derstandir	רק (K2)
CO4	unde	erstandii	ng rules f	or travel a	and Enh	ance con	nmunicat	ions.					Un	derstandir	ng (K2)
CO5	expr	essing t	he feeling	gs and em	lotions ι	using adv	anced gr	ammar					Un	derstandir	וק (K2)
						Марріі	ng of CO	s with I	POs an	d PSOs					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
СО	1								1	2	3		3		2
CO	2								1	2	3		3		2
CO	3								1	2	3		3		2
CO	4								1	2	3		3		2
CO	5			-	-				1	2	3		3		2
1 – Slig	ght, 2	– Modei	ate, 3 – 3	Substantia	al, BT- B	loom's T	axonomy	/	·						
						ASSES	SSMENT	PATTE	RN - TI	HEORY					
	est / B Categ	loom's Jory*	Re	emember (K1) %	ing (	ASSES Understa (K2)	anding	PATTE Apply (K3)	ving	HEORY Analyzi (K4) %	ing	Evaluating (K5) %		eating K6) %	Tota %
		jory*	Re		ing l	Understa	anding %	Apply	ving	Analyzi	ing	•		-	
	Categ	j <b>ory</b> * T1	Re	(K1) %	ing (	Understa (K2)	anding %	Apply	ving	Analyzi	ing	•		-	%
	Categ	<b>jory*</b> T1 T2	Re	<b>(K1) %</b> 75	ing (	Understa (K2) 25	anding %	Apply	ving	Analyzi	ing	•		-	% 100

	(Offered by Department of Electronics and Commur	nication Engi	neerina)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	All	OE	4	0	0	4
Preamble	This course serves as an introduction to the German languag cultural aspects of Germany and German speaking countries. the basic day to day vocabulary. On keen learning one would be able to reciprocate to basic questions	One can lea	arn to introduce	e one	self a	ind ab	le to gair
Unit – I	Good Day (Guten Tag)						12
	troduction and introducing others, Numbers, Alphabets, Countrie , Verb conjugation and personal pronoun.	s and langu	ages spoken.	Gram	nmar	– W (	questions
Unit – II	Friends & Colleague ( Freund und Kollegen):						12
Hobbies, Professi	on, Week, Months, Season and Generate Profile. Grammar – Articl	es, Plural, Ve	erbs – have an	d to b	e, Ye	s/No (	questions
Unit – III	n the City (In der Stadt):						12
Name of places/b Negation articles	uildings in the city, asking for directions, Understanding means of and Imperative	transport. G	rammar – defi	nite a	nd in	definit	te articles
Unit – IV	Food and Appointment (Essen und Termin):						12
Understanding tir	initiate conversations to understand and do shopping. Gran ne and reciprocating, Appointments, Asking excuse, Family. Gran n., Modal verbs- müssen, können, wollen						
Unit – V	Socializing (Zeit mit Freunden):						12
	, Birthday, Invitation, Restaurant, looking for specific information in Past tense of have and to be, Personal pronoun with Accusative.	texts. Gramr	nar – Separab	le ver	bs, P	repos	itions witl
							Total:60
TEXT BOOK:					uch /	Arheite	sbuch un
1 Stefanie	Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deut vith 2 CDs", Goyal Publishers, Delhi, 2015.	tsch als Fren	ndsprache A1-	-ursb	uch, P		
1 Stefanie		tsch als Fren	ndsprache A1-	-ursb			
1. Stefanie Glossar v REFERENCES:			ndsprache A1-	-ursb			



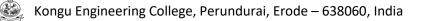
	UTCOM		se, the st	udents	will be a	ble to						(	BT Mapı Highest L	
und	erstand	structure	e of langu	age and	introduci	ng each	other					Ren	nembering	g (K1)
und	erstand	vocabula	ary on sea	asons ai	nd basic v	verbs						Und	erstanding	g (K2)
ask	for direc	ctions in	a new pla	ce and	avail trans	sport as	required					Und	erstanding	g (K2)
und	erstand	food hab	oits of Gei	rman an	d ask for	appointn	nents.					Und	erstandin	g (K2)
lear	n to soc	ialize in a	a Germar	i speaki	ng countr	у						Und	erstandin	g (K2)
					Маррі	ing of C	Os with	POs ar	nd PSOs	;				
<b>'</b> Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	) PO11	PO12	PSO1	PSO2
1								1	2	3		3		
2								1	2	3		3		
3								1	2	3		3		
4								1	2	3		3		
5								1	2	3		3		
ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's T	Taxonom	ıy							
					ASSE	SSMEN	Γ ΡΑΤΤΙ	ERN - T	HEORY					
		Re	memberi (K1) %	ing		-			-	-	Evaluating (K %			Total %
CAT	1		75		25									100
CAT	2		25		75									100
CAT	3		25		75									100
ESI	-		25		75								-	100
	und und ask und lear POs 1 2 3 4 5 5 9 ht, 2 3 4 5 5 9 ht, 2 5 9 ht, 2	understand understand ask for direc understand learn to soc POs PO1 1 2 3 4 5	understand structure understand vocabula ask for directions in a understand food hab learn to socialize in a <b>POS PO1 PO2</b> 1 2 3 4 5 5 9 6 4 5 5 9 6 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 8 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 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and basic values and intervention of the seasons and basic values and transmunderstand food habits of German and ask for learn to socialize in a German speaking countret in the socialize in the socialize in a German speaking countret in the socialize in the socialized in the s	understand vocabulary on seasons and basic verbs         ask for directions in a new place and avail transport as         understand food habits of German and ask for appoint         learn to socialize in a German speaking country         Mapping of Co         Mapping of Co         OS       PO1       PO2       PO3       PO4       PO5       PO6         1	understand structure of language and introducing each other understand vocabulary on seasons and basic verbs ask for directions in a new place and avail transport as required understand food habits of German and ask for appointments. learn to socialize in a German speaking country Mapping of COs with POS PO1 PO2 PO3 PO4 PO5 PO6 PO7 1 PO2 PO3 PO4 PO5 PO6 PO7 1 PO2 PO3 PO4 I PO5 PO6 PO7 1 PO2 PO3 PO4 I PO5 PO6 PO7 1 PO2 PO3 PO4 I PO5 PO6 PO7 1 PO5	understand structure of language and introducing each other         understand vocabulary on seasons and basic verbs         ask for directions in a new place and avail transport as required         understand food habits of German and ask for appointments.         learn to socialize in a German speaking country         Mapping of COs with POs ar         POS       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8         1	understand structure of language and introducing each other         understand vocabulary on seasons and basic verbs         ask for directions in a new place and avail transport as required         understand food habits of German and ask for appointments.         learn to socialize in a German speaking country         Mapping of COs with POs and PSOs         PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9         1       1       2         2       1       2         3       1       1       2         3       1       1       2         4       1       1       2         5       1       1       2         6       1       2       1       2         9       1       1       2       1       2         6       1       1       2       1       2         7       1       2       1       2       1       2         6       1       1       2       1       2       1       2         7       1       2       1       2       1       2       1       2         9       1       1	understand structure of language and introducing each other         understand vocabulary on seasons and basic verbs         ask for directions in a new place and avail transport as required         understand food habits of German and ask for appointments.         learn to socialize in a German speaking country         Mapping of COs with POs and PSOs         POs       PO6       PO7       PO8       PO9       PO10         1       2       3       1       2       3         2       2       2       2       1       2       3         3       3       3       1       2       3         4       2       3       1       2       3         5       3       1       2       3       3         4       2       3       1       2       3         5       3       1       2       3       3         6       1       2       3       3       1       2       3         7       2       1       2       3       3       1       2       3         6       1       1       2       3       1<	understand structure of language and introducing each other understand vocabulary on seasons and basic verbs ask for directions in a new place and avail transport as required understand food habits of German and ask for appointments. learn to socialize in a German speaking country Mapping of COs with POs and PSOs           POs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           1         2         2         1         2         3         2         3         2         3         2         3         2         3         2         3         2         3         2         3         2         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3         3	understand structure of language and introducing each other       Ren         understand vocabulary on seasons and basic verbs       Und         ask for directions in a new place and avail transport as required       Und         understand food habits of German and ask for appointments.       Und         learn to socialize in a German speaking country       Und         Mapping of COs with POs and PSOs         PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12         1         Nos       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12         1       2       3       3         3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12         1       2       3       3       3         3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12         1       2       3       3       3       3	(Highest L         (Highest L         (Highest L         understand structure of language and introducing each other         Understanding         understand structure of language and introducing each other         understand structure of language and value structure of language and va

	(Offered by Department of Electronics and Commur	nication Eng	gineering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	All	OE	4	0	0	4
Preamble	The basic level of Japanese which provides understanding one to greet, introduce oneself and other person and also conversations						
Unit – I	Introduction to Hiragana and Katakana:						12
Chart 1, Chart 2	, Chart 3, Annexures 1 and 2 and basic Japanese rules along with	n similar sou	unded vocabul	aries	for ea	ach ch	art.
Unit – II	Introduction to Nouns, various particles and usages:						12
Forming simple	sentences, asking questions, positioning differentiation and owning	g fundamer	ntals – new pa	rticles	s and	usage	es
	Introduction of Verbs, time and place markers:				i		12
Usage of action	words in sentences and framing them - place and time markers u	usages – gi	ving and recei	ving -	– omi	ssion	
Usage of action particles in a se	words in sentences and framing them - place and time markers u	usages – gi	ving and recei	ving -	– omi	ssion	
Usage of action particles in a se <b>Unit – IV</b> Describing nou	words in sentences and framing them – place and time markers untence. Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversation						of certai
Usage of actior particles in a se <b>Unit – IV</b> Describing nou introduction of t	words in sentences and framing them – place and time markers untence. Introduction of Adjectives, Adverbs and usages:						of certai
particles in a se Unit – IV Describing nou introduction of t Unit – V How to use nu	words in sentences and framing them – place and time markers untence.  Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversatione likes and dislikes expressions Introduction to Counters and Kanji: nbers-How to use quantifiers-Present form of adjectives and Nou	ons- positiv	ve and negati	ve en	iding	of the	of certain 12 e same 12
Usage of actior particles in a se Unit – IV Describing nou introduction of t Unit – V How to use nu	words in sentences and framing them – place and time markers untence. Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversatione likes and dislikes expressions Introduction to Counters and Kanji:	ons- positiv	ve and negati	ve en	iding	of the	of certain <b>12</b> same - <b>12</b>
Usage of actior particles in a se Unit – IV Describing nou introduction of t Unit – V How to use nu	words in sentences and framing them – place and time markers untence.  Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversatione likes and dislikes expressions Introduction to Counters and Kanji: nbers-How to use quantifiers-Present form of adjectives and Nou	ons- positiv	ve and negati	ve en	iding	of the	of certain 12 e same 12
Usage of actior particles in a se <b>Unit – IV</b> Describing nou introduction of t <b>Unit – V</b> How to use nu and quantifiers	words in sentences and framing them – place and time markers untence.  Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversatione likes and dislikes expressions Introduction to Counters and Kanji: nbers-How to use quantifiers-Present form of adjectives and Nou	ons- positiv	ve and negati	ve en	iding	of the	of certai
Usage of action particles in a se Unit – IV Describing nou introduction of t Unit – V How to use nu and quantifiers TEXT BOOK:	words in sentences and framing them – place and time markers untence.  Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversatione likes and dislikes expressions Introduction to Counters and Kanji: Inbers-How to use quantifiers-Present form of adjectives and Nou 55 kanji characters	ons- positiv	ve and negative	ve en	iding How t	of the	of certai 12 e same 12 number Total:6
Usage of actior particles in a se Unit – IV Describing nou introduction of t Unit – V How to use nu and quantifiers TEXT BOOK:	words in sentences and framing them – place and time markers untence.  Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversatione likes and dislikes expressions Introduction to Counters and Kanji: nbers-How to use quantifiers-Present form of adjectives and Nou	ons- positiv	ve and negative	ve en	iding How t	of the	of certai 12 e same 12 number Total:6
Usage of action particles in a se Unit – IV Describing nou introduction of t Unit – V How to use nui and quantifiers TEXT BOOK:	words in sentences and framing them – place and time markers untence.  Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversatione likes and dislikes expressions Introduction to Counters and Kanji: Inbers-How to use quantifiers-Present form of adjectives and Nou 55 kanji characters NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publi	ons- positiv	ve and negative	ve en	iding How t	of the	of certai 12 e same 12 number Total:6
Usage of actior particles in a se Unit – IV Describing nou introduction of t Unit – V How to use nur and quantifiers TEXT BOOK: 1. "MINN/ REFERENCES	words in sentences and framing them – place and time markers untence.  Introduction of Adjectives, Adverbs and usages: Ins and verbs and framing them to relate day to day conversatione likes and dislikes expressions Introduction to Counters and Kanji: Inbers-How to use quantifiers-Present form of adjectives and Nou 55 kanji characters NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publi	ons- positiv	ve and negative	ve en	iding How t	of the	of certai 12 e same 12 number Total:6



		UTCON tion of t		se, the s	tudents	s will be a	able to						(	BT Mapp Highest L	
CO1	read	d and ur	nderstan	d typical	express	ion in Hir	agana a	nd Katal	kana				Ren	nembering	g (K1)
CO2	gree	et and ir	ntroduce	oneself a	and othe	er							Und	erstandin	g (K2)
CO3	con	nmunica	ite day to	day con	versatio	ons – basi	ic level						Und	erstandin	g (K2)
CO4	und	erstand	the Kan	jis in Jap	anese S	Script							Und	erstandin	g (K2)
CO5	con	nprehen	d conce	ot of num	bers, da	ays, mont	hs, time	and cou	nters				Und	erstandin	g (K2)
						Марріі	ng of CC	Os with	POs an	d PSOs					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
СО	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
1 – Sli	ght, 2	– Mode	erate, 3 -	Substan	itial, BT	- Bloom's	Taxono	my							
						ASSE	SSMENT		ERN - T	HEORY					
	st / Bl Categ	oom's ory*	Re	member (K1) %	ing	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		eating K6) %	Tota %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
	ES	E		25		75									100

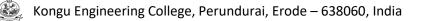
	22GEO05 - GERMAN LANGUAGE L	EVEL 2					
	(Offered by Department of Electronics and Commu	nication Eng	ineering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	German Language Level 1	All	OE	4	0	0	4
Preamble	This course aims to help the learner to acquire the vocabular German language A1 level competence. This course will help vocabulary to understand and reciprocate in daily life situatio able to gain a comprehensive understanding of the German situations	to assimilans on a broa	te the basic grader sense. A	ramm thoro	ar str ugh le	ucture earnei	es and gaiı r will be
Unit – I	Contacts(Kontakte):						12
	tters, simple instructions, speaking about language learning, fir standing conversations, Making appointments. Grammar – Prep s.						
Unit – II	Accomodation(Die Wohnung):						12
	ccommodation advertisements, describing accommodation and Grammar – Adjective with to be verb, Adjective with sehr/zu, Adjecti						
Unit – III	Are you Working?(Arbeiten Sie):						12
Daily Schedule, s Jobs. Grammar –	peaking about past, understanding Job openings advertisements, Perfect tense, Participle II – regular and irregular verbs, Conjunct	Opinions, T tions – <i>und,</i>	elephonic con oder, aber	iversa	ations	, Spe	aking abou
Unit – IV	Clothes and Style(Kleidung und mode):						12
Clothes, Chats of Grammar – Interr Dative, Verbs with	n shopping clothes, reporting on past, Orienting oneself in Su ogative articles and Demonstrative articles, Partizip II – separa	permarkets, ble and no	Information n-separable v	and r erbs,	esea Pers	rch al onal p	pout Berlin pronouns ir
,	Health and Vacation(Gesundheit und Urlaub):						12
Unit – V							with du/lb
Personal informati Modal verbs – sol	ion, Human Body parts, Sports, Understanding instructions and pl len, müssen, nicht dürfen, dürfen. Suggestions for travel, Path, F ns. Grammar – Pronoun: <i>man</i> , Question words – <i>Wer, Wen, Was</i> ,	Postcards, w	eather, Trave	l repo	orts, F	roble	ms in hotel
Personal informati Modal verbs – sol	len, müssen, nicht dürfen, dürfen. Suggestions for travel, Path, F	Postcards, w	eather, Trave	l repo	orts, F	roble	ms in hotel
Personal informati Modal verbs – sol	len, müssen, nicht dürfen, dürfen. Suggestions for travel, Path, F	Postcards, w	eather, Trave	l repo	orts, F	roble	ms in hotel um Schl
Personal informati Modal verbs – sol Tourist destination TEXT BOOK:	len, müssen, nicht dürfen, dürfen. Suggestions for travel, Path, F	Postcards, w , <i>Wem</i> , Adve	eather, Trave erbs <i>– Zuerst,</i>	l repo <i>dann</i>	orts, F , Spä	Proble ter, Zu	ms in hotel <u>um Schl</u> Total:60
Personal informati Modal verbs – sol Tourist destination TEXT BOOK:	len, müssen, nicht dürfen, dürfen. Suggestions for travel, Path, F ns. Grammar – Pronoun: <i>man</i> , Question words – <i>Wer, Wen, Was</i> Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deu	Postcards, w , <i>Wem</i> , Adve	eather, Trave erbs <i>– Zuerst,</i>	l repo <i>dann</i>	orts, F , Spä	Proble ter, Zu	ms in hotel <u>um Schl</u> Total:60
Personal informati Modal verbs – sol Tourist destination TEXT BOOK: 1. Stefanie I Glossar w	len, müssen, nicht dürfen, dürfen. Suggestions for travel, Path, F ns. Grammar – Pronoun: <i>man</i> , Question words – <i>Wer, Wen, Was</i> Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deu	Postcards, w , <i>Wem</i> , Adve	eather, Trave erbs <i>– Zuerst,</i>	l repo <i>dann</i>	orts, F , Spä	Proble ter, Zu	ms in hote um Schl Total:60
Personal informati Modal verbs – sol Tourist destination TEXT BOOK: 1. Stefanie I Glossar w 2. REFERENCES:	len, müssen, nicht dürfen, dürfen. Suggestions for travel, Path, F ns. Grammar – Pronoun: <i>man</i> , Question words – <i>Wer, Wen, Was</i> Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deu	Postcards, w , <i>Wem</i> , Adve	eather, Trave erbs <i>– Zuerst,</i>	l repo <i>dann</i>	orts, F , Spä	Proble ter, Zu	ms in hotel <u>um Schl</u> Total:60



		JTCOM on of t		se, the s	tudent	s will be a	able to							BT Map (Highest	
CO1	unde	erstand	letters a	nd simple	e texts								R	emember	ing (K1)
CO2	assir	nilate v	ocabular	y on Acc	ommo	dation and	l invitatio	on					U	nderstand	ing (K2)
CO3	com	preheno	d concep	t of time,	teleph	onic conv	ersation	and job-	related	informa	tion		U	nderstand	ing (K2)
CO4	unde	erstand	how to d	o shoppi	ng in a	German	store						U	nderstand	ing (K2)
CO5	unde	erstand	body pa	rts and h	ow to p	lan perso	nal trave	I					U	nderstand	ing (K2)
						Марр	oing of C	COs with	n POs a	and PSO	s				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
1 – Slig	ght, 2 -	– Mode	rate, 3 –	Substan	tial, BT	- Bloom's	Taxonoi	my	1		1			1	
						ASS	ESSMEN		ERN -	THEOR	Y				
	st / Blo Catego		Re	memberi (K1) %	ing	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		eating K6) %	Total %

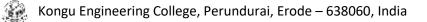
Category*	(K1) %	(K2) %	(K3) %	(K4) %	(K5) %	(K6) %	
CAT1	75	25					100
CAT2	25	75					100
CAT3	25	75					100
ESE	25	75					100
* ±3% may be varied (	(CAT 1,2,3 – 50 mar	ks & ESE – 100 ma	arks)				

	22GEO06-GERMAN LANGUAGE LE						
	(Offered by Department of Electronics and Commun	nication Engir	neering)	T	r	r	
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	German Language Level 2	All	OE	3	0	0	3
Preamble	This course provides enriching information about various eve enhances the vocabulary and speaking ability to respond to a equips one to express opinions and negotiate appointments. grammatical structure to answer confidently in everyday situa	and also seek With diligent	information in	thos	e situ	ations	s. It also
Unit – I	All about food (Rund Ums Essen):						9
something, To spe	nation about person, Speak about food, Introduce self and others, L eak about feelings, To express opinions, To answer questions on a Yes/No questions, Reflexive verbs, Sentence with 'weil'						
Unit – II	School days (Nach der Schulzeit):						9
	ol reports, Speak and write comments about schooldays, To speak ol types in Germany and speak about it. Grammar: Modal verbs ir						
Unit – III	Media in everyday life (Medien in Alltag):						9
	Vrite Movie reviews. Grammar: Comparative degree, Comparative	e Sentences	with 'Als' and	wie,	Sub	ordina	ate claus
with 'dass', Super <b>Unit – IV</b> Express thanks an Express joy and	Iative degree.         Feelings and expressions (Gefühle):         nd congratulations, Talk about feelings, To understand information         regrets, Understand and write Blog entries, Write appropriate he	about festiva	lls and speak a	about	it, To	descr	<b>9</b> ibe a city
with 'dass', Super Unit – IV Express thanks an Express joy and Adjectives to be u	Intervention       Intervention         Intervention       Feelings and expressions (Gefühle):         Intervention       Intervention         Intervention       Intervention </td <td>about festiva</td> <td>lls and speak a</td> <td>about</td> <td>it, To</td> <td>descr</td> <td><b>9</b> ibe a city h <i>'</i>Wenn</td>	about festiva	lls and speak a	about	it, To	descr	<b>9</b> ibe a city h <i>'</i> Wenn
with 'dass', Super Unit – IV Express thanks an Express joy and Adjectives to be u Unit – V	Itative degree.         Feelings and expressions (Gefühle):         nd congratulations, Talk about feelings, To understand information         regrets, Understand and write Blog entries, Write appropriate he         sed along with definite articles.         Profession and Travel (Beruf und Reisen):	about festiva ading. Grar	lls and speak a nmar: Subordi	about nate	it, To Claus	descr se wit	9 ibe a city h 'Wenn 9
with 'dass', Super Unit – IV Express thanks an Express joy and Adjectives to be u Unit – V To have a conver career preference Express uncertair Describe a statist	Intervention       Intervention         Intervention       Feelings and expressions (Gefühle):         Intervention       Intervention         Intervention       Intervention </td <td>about festiva ading. Grar r information nderstand te le, Say your o ar: Adjective</td> <td>Is and speak a nmar: Subordi from Texts, In xt about Workp own opinion, T to be used alc</td> <td>about nate ntrodu place. alk ab</td> <td>it, To Claus uce p Ask pout th</td> <td>descr se wit eople for inf ne wa definit</td> <td>9 ibe a city h 'Wenn 9 , Expres formation y to work e articles</td>	about festiva ading. Grar r information nderstand te le, Say your o ar: Adjective	Is and speak a nmar: Subordi from Texts, In xt about Workp own opinion, T to be used alc	about nate ntrodu place. alk ab	it, To Claus uce p Ask pout th	descr se wit eople for inf ne wa definit	9 ibe a city h 'Wenn 9 , Expres formation y to work e articles
with 'dass', Super Unit – IV Express thanks an Express joy and Adjectives to be u Unit – V To have a conver career preference Express uncertair Describe a statist Prepositions, vert	Introduction of the second constraints of the second constrated constraints of the second constraints of	about festiva ading. Grar r information nderstand te le, Say your o ar: Adjective	Is and speak a nmar: Subordi from Texts, In xt about Workp own opinion, T to be used alc	about nate ntrodu place. alk ab	it, To Claus uce p Ask pout th	descr se wit eople for inf ne wa definit	9 ibe a city h 'Wenn 9 , Expres formation y to work e articles
with 'dass', Super Unit – IV Express thanks an Express joy and Adjectives to be u Unit – V To have a convel career preference Express uncertair Describe a statist Prepositions, vert listening.	Introduction of the second constraints of the second constrated constraints of the second constraints of	about festiva ading. Grar r information nderstand te le, Say your o ar: Adjective	Is and speak a nmar: Subordi from Texts, In xt about Workp own opinion, T to be used alc	about nate ntrodu place. alk ab	it, To Claus uce p Ask pout th	descr se wit eople for inf ne wa definit	9 ibe a city h 'Wenn 9 , Expres formation y to worl e articles aking an
with 'dass', Super Unit – IV Express thanks an Express joy and Adjectives to be u Unit – V To have a conver- career preference Express uncertair Describe a statist Prepositions, vert listening. TEXT BOOK: 1 Stefanie	Introduction of the second constraints of the second constrated constraints of the second constraints of	about festiva eading. Grar r information nderstand te le, Say your o ar: Adjective I include eler	Is and speak a nmar: Subordi from Texts, li xt about Workp own opinion, T to be used alo ments for read	about nate ntrodu lace. alk ab ong wi ing, w	it, To Claus Jce p Ask pout th ith ind vriting	descr se wit eople for inf ne wa definit i, spea	9 ibe a city h 'Wenn s, Expres formation y to worl e articles aking an <b>Total:4</b>
with 'dass', Super Unit – IV Express thanks an Express joy and Adjectives to be u Unit – V To have a conver- career preference Express uncertair Describe a statist Prepositions, vert listening. TEXT BOOK: 1 Stefanie	Itative degree.         Feelings and expressions (Gefühle):         Ind congratulations, Talk about feelings, To understand information regrets, Understand and write Blog entries, Write appropriate he ised along with definite articles.         Profession and Travel (Beruf und Reisen):         rsation at ticket counter, To talk about leisure activities, To gathers, Ideate the dream job, To prepare and make telephone calls, To unity, Understand and give directions, Understand a newspaper article, Understand information about a trip, Talk about travel. Gramma o – 'werden', Subordinate clause – indirect questions, All units will         Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deur"	about festiva eading. Grar r information nderstand te le, Say your o ar: Adjective I include eler	Is and speak a nmar: Subordi from Texts, li xt about Workp own opinion, T to be used alo ments for read	about nate ntrodu lace. alk ab ong wi ing, w	it, To Claus Jce p Ask pout th ith ind vriting	descr se wit eople for inf ne wa definit i, spea	9 ibe a city h 'Wenn s, Expres formation y to work e articles aking an Total:4
with 'dass', Super         Unit – IV         Express thanks at         Express joy and         Adjectives to be u         Unit – V         To have a convel         career preference         Express uncertair         Describe a statist         Prepositions, verb         listening.         TEXT BOOK:         1.       Stefanie I         Glossar v	Itative degree.         Feelings and expressions (Gefühle):         Ind congratulations, Talk about feelings, To understand information regrets, Understand and write Blog entries, Write appropriate he ised along with definite articles.         Profession and Travel (Beruf und Reisen):         rsation at ticket counter, To talk about leisure activities, To gathers, Ideate the dream job, To prepare and make telephone calls, To unity, Understand and give directions, Understand a newspaper article, Understand information about a trip, Talk about travel. Gramma o – 'werden', Subordinate clause – indirect questions, All units will         Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deur"	about festiva eading. Grar r information nderstand te le, Say your o ar: Adjective I include eler	Is and speak a nmar: Subordi from Texts, li xt about Workp own opinion, T to be used alo ments for read	about nate ntrodu lace. alk ab ong wi ing, w	it, To Claus Jce p Ask pout th ith ind vriting	descr se wit eople for inf ne wa definit i, spea	9 ibe a city h 'Wenn s, Expres formation y to worl e articles aking an <b>Total:4</b>
with 'dass', Super Unit – IV Express thanks an Express joy and Adjectives to be u Unit – V To have a conver career preference Express uncertain Describe a statist Prepositions, verther listening. TEXT BOOK: 1. Stefanie Glossar v 2. REFERENCES:	Itative degree.         Feelings and expressions (Gefühle):         Ind congratulations, Talk about feelings, To understand information regrets, Understand and write Blog entries, Write appropriate he ised along with definite articles.         Profession and Travel (Beruf und Reisen):         rsation at ticket counter, To talk about leisure activities, To gathers, Ideate the dream job, To prepare and make telephone calls, To unity, Understand and give directions, Understand a newspaper article, Understand information about a trip, Talk about travel. Gramma o – 'werden', Subordinate clause – indirect questions, All units will         Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deur"	about festiva ading. Grar r information nderstand te le, Say your o ar: Adjective l include eler tsch als Fren	Ils and speak a nmar: Subordi from Texts, li xt about Workp own opinion, T to be used alc ments for read	about nate place. alk ab ong wi ing, w	it, To Claus Juce p Ask pout th ith inc rriting	descr se wit eople for inf ne wa definit I, spea	9 ibe a city h 'Wenn s, Expres formation y to work e articles aking an Total:4



understar analyze a	d Germa	n food styl an school s	e, restau	irant and	ha ahla							Highest L	.evel)
analyze a		an school s			be able	express	oneself	•			Rem	nembering	g (K1)
-	nd comp		system a	nd discus	ss about	habits a	nd prov	ide City-	Tipps		Und	erstanding	g (K2)
overees fr	ia compe	are media i	n every	day life.							Und	erstanding	g (K2)
express re	elings, d	escribe a d	ity and	write blog	entries.						Und	erstanding	g (K2)
seek and	provide in	nformation	in a pro	fessional	setup, gi	ive direc	tions to	others a	nd talk	about travel	Und	erstanding	g (K2)
				Маррі	ing of C	Os with	POs ar	nd PSOs					
Ds PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
							1	2	3		3		
							1	2	3		3		
							1	2	3		3		
							1	2	3		3		
							1	2	3		3		
nt, 2 – Moo	lerate, 3	- Substan	ial, BT-	Bloom's	Taxonom	iy				·			
				ASSE	SSMEN		ERN - T	HEORY					
/ Bloom's itegory*	R	emember (K1) %	ing		•					Evaluating (K %			Tota %
CAT1		75		25									100
CAT2		25		75									100
CAT3		25		75									100
ESE		25		75									100
	PS         PO1           Image: state	PO1         PO2           Image: state	PO1         PO2         PO3           Image: Second state s	PO1         PO2         PO3         PO4           Image: Second state stat	Mapping           vs         PO1         PO2         PO3         PO4         PO5           Indication         Indication	Mapping of Constraints           PO1         PO2         PO3         PO4         PO5         PO6           Image:	Mapping of COs with           Is         PO1         PO2         PO3         PO4         PO5         PO6         PO7           In         I	Mapping of COs with POs ar           vs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1           1         1         1         1         1         1         1         1           1         1         1         1 <td>Mapping of COs with POs and PSOs           Image: second s</td> <td>Mapping of COs with POs and PSOs           Po1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         2         3         1         2         3           1         2         3         1         2         3           1         2         3         1         2         3           1         2         3         1         2         3     <td>PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I<td>Mapping of COs with POs and PSOs           is         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12           i         i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         i         1         2         3         3           i         i         i         i         1         2         3         3           i         i         i         i         i         1         2         3         3           i         i         i         i         i         i         1         2         3         3           i         i         i         i         i         i         i         i</td><td>Mapping of COs with POs and PSOs           Po1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01           I         I         I         I         I         I         I         I         I       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PO10           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         1         2         3         1         2         3           1         2         3         1         2         3           1         2         3         1         2         3           1         2         3         1         2         3           1         2         3         1         2         3 <td>PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I<td>Mapping of COs with POs and PSOs           is         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12           i         i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         i         1         2         3         3           i         i         i         i         1         2         3         3           i         i         i         i         i         1         2         3         3           i         i         i         i         i         i         1         2         3         3           i         i         i         i         i         i         i         i</td><td>Mapping of COs with POs and PSOs           Po1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01           I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I</td></td>	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I      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i         i         i         i         i         i         i</td> <td>Mapping of COs with POs and PSOs           Po1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01           I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I</td>	Mapping of COs with POs and PSOs           is         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12           i         i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         1         2         3         3           i         i         i         i         1         2         3         3           i         i         i         i         1         2         3         3           i         i         i         i         i         1         2         3         3           i         i         i         i         i         i         1         2         3         3           i         i         i         i         i         i         i         i	Mapping of COs with POs and PSOs           Po1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01           I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I 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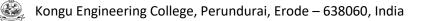
	(Offered by Department of Electronics and Commun	ication Engir	neering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	German Language Level 3	All	OE	3	0	0	3
Preamble	This course imparts knowledge about interacting with external behaviour and addressing relationships in personal and profe various media and at work. Enhance learner's grammatical ex concepts which would lay the foundation to have a better hold be able to read and respond to reports, write simple formal ar engage in simple conversations in known situations.	ssional front posure and l of the langu	It helps one to cover the core lage. With focu	b und basio used l	ersta c grar earni	nd rep nmati ng on	oorts fron cal e should
Unit – I	Learning (Lernen):						9
everyday work life	nd describing learning problems, Understanding and giving adv e, Talking about everyday working life, Understanding a radio rep actions- denn,weil, Konjuntiv II: Sollte( suggestions), Genitive, Tem	ort, Underst	anding and ma	aking	a mii	ni-pre	sentation
Unit – II	Athletic (Sportlich):						9
and reacting, Ma	siasm, hope, disappointment, Understanding and writing fan com king an appointment, Understanding a report about an excursior nar: Conjunctions – deshalb, trotzdem, Verbs with Dativ and Akkus	i, Understan					
Unit – III	Living Together (Zusammen Leben):						9
	leaving 9 since in Action consthing. Understand constrained and						
	logize & give in, As for something, Understand experience reports, and correct a story. Grammatik: Konjunctiv II- könnte, Subordinat				oets,	Resp	ond to
information, Write					oets,	Resp	ond to
information, Write Unit – IV Talk about music about a person, U	and correct a story. Grammatik: Konjunctiv II- könnte, Subordinat Good Entertainment (Gute Unterhaltung): style, Buy concert tickets, Introduce a musician / band, Understand nderstand information about painting, Understand description of a p	e clauses – d newspaper icture, Desc	als and Wenn. reports, Give ribe a picture.	more Grar	detai nmat	led ir	9 Information
information, Write Unit – IV Talk about music about a person, U Articles: Was fuer Unit – V	and correct a story. Grammatik: Konjunctiv II- könnte, Subordinat Good Entertainment (Gute Unterhaltung): style, Buy concert tickets, Introduce a musician / band, Understand nderstand information about painting, Understand description of a p eine?, Pronouns – man/jemand/niemand and alles/etwas/nichts, Passage of time and Culture (Zeitablauf & Kultur):	e clauses – d newspaper icture, Desc Relative ser	als and Wenn. reports, Give ribe a picture. htences in Non	more Grar hinativ	detai nmat /	iled ir ik: Inte	9 Iformatior errogative 9
information, Write Unit – IV Talk about music about a person, U Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju	and correct a story. Grammatik: Konjunctiv II- könnte, Subordinat Good Entertainment (Gute Unterhaltung): style, Buy concert tickets, Introduce a musician / band, Understand nderstand information about painting, Understand description of a p eine?, Pronouns – man/jemand/niemand and alles/etwas/nichts,	e clauses – d newspaper icture, Desc Relative ser Plan somet tand informa xt, Talk about ements for m	als and Wenn. reports, Give ribe a picture. ntences in Non ning together, tion about other t forms of add eading, writing	more Grar ninativ To as er cult ressin , spe	detainmat / k oth tures ig oth aking	iled ir ik: Inte ers se , Disc ers, ( g and	9 Iformation errogative 9 omething uss abou Give more listening Akkusativ
information, Write <b>Unit – IV</b> Talk about music about a person, U Articles: Was fuen <b>Unit – V</b> Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju Subordinate claus	and correct a story. Grammatik: Konjunctiv II- könnte, Subordinat Good Entertainment (Gute Unterhaltung): style, Buy concert tickets, Introduce a musician / band, Understand nderstand information about painting, Understand description of a p eine?, Pronouns – man/jemand/niemand and alles/etwas/nichts, Passage of time and Culture (Zeitablauf & Kultur): s, Express wishes, Give Suggestions, Understand a conversation, t, Exchange information, Talk about proverbs, write a story. Unders intentions, Use the appropriate salutation, Understand tips in a terus uss about clichés and write about them. All units will include ele- unctiv II (Wishes, Suggestions), Verbs with prepositions, W- question	e clauses – d newspaper icture, Desc Relative ser Plan somet tand informa xt, Talk about ements for m	als and Wenn. reports, Give ribe a picture. ntences in Non ning together, tion about other t forms of add eading, writing	more Grar ninativ To as er cult ressin I, spe	detainmat / k oth tures ig oth aking	iled ir ik: Inte ers se , Disc ers, ( g and	9 iformation errogative 9 omething uss abou Give more listening
information, Write Unit – IV Talk about music about a person, U Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju Subordinate claus TEXT BOOK:	and correct a story. Grammatik: Konjunctiv II- könnte, Subordinat Good Entertainment (Gute Unterhaltung): style, Buy concert tickets, Introduce a musician / band, Understand inderstand information about painting, Understand description of a p eine?, Pronouns – man/jemand/niemand and alles/etwas/nichts, Passage of time and Culture (Zeitablauf & Kultur): s, Express wishes, Give Suggestions, Understand a conversation, t, Exchange information, Talk about proverbs, write a story. Unders intentions, Use the appropriate salutation, Understand tips in a terus uss about clichés and write about them. All units will include ele- unctiv II (Wishes, Suggestions), Verbs with prepositions, W- question ses with damit and UmZu.	e clauses – d newspaper icture, Desc Relative ser Plan someti tand informa xt, Talk abou ements for ro ns with prepo	als and Wenn. reports, Give ribe a picture. ntences in Non ning together, tion about oth t forms of add eading, writing ositions, Relativ	more Grar To as er cult ressin , spe /e ser	detainmat / k oth tures g oth aking ntenc	ers so , Disc ers, ( g and es in /	9 iformation errogative 9 omething uss abou Give more listening Akkusativ Total:4
information, Write Unit – IV Talk about music about a person, U Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju Subordinate claus TEXT BOOK: 1	and correct a story. Grammatik: Konjunctiv II- könnte, Subordinat Good Entertainment (Gute Unterhaltung): style, Buy concert tickets, Introduce a musician / band, Understand nderstand information about painting, Understand description of a p eine?, Pronouns – man/jemand/niemand and alles/etwas/nichts, Passage of time and Culture (Zeitablauf & Kultur): s, Express wishes, Give Suggestions, Understand a conversation, t, Exchange information, Talk about proverbs, write a story. Unders intentions, Use the appropriate salutation, Understand tips in a terus uss about clichés and write about them. All units will include ele- unctiv II (Wishes, Suggestions), Verbs with prepositions, W- question	e clauses – d newspaper icture, Desc Relative ser Plan someti tand informa xt, Talk abou ements for ro ns with prepo	als and Wenn. reports, Give ribe a picture. ntences in Non ning together, tion about oth t forms of add eading, writing ositions, Relativ	more Grar To as er cult ressin , spe /e ser	detainmat / k oth tures ag oth aking ntenc	ers so , Disc ers, ( g and es in /	9 iformation errogative 9 omething uss abou Give more listening Akkusativ Total:4
information, Write Unit – IV Talk about music about a person, U Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju Subordinate claus TEXT BOOK: 1. Stefanie Goyal Pu REFERENCES:	and correct a story. Grammatik: Konjunctiv II- könnte, Subordinate         Good Entertainment (Gute Unterhaltung):         style, Buy concert tickets, Introduce a musician / band, Understand         nderstand information about painting, Understand description of a preine?, Pronouns – man/jemand/niemand and alles/etwas/nichts,         Passage of time and Culture (Zeitablauf & Kultur):         s, Express wishes, Give Suggestions, Understand a conversation,         t, Exchange information, Talk about proverbs, write a story. Understand tips in a terus         uss about clichés and write about them. All units will include ele         unctiv II (Wishes, Suggestions), Verbs with prepositions, W- question         ses with damit and UmZu.         Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deblishers, Delhi, 2015.	e clauses – d newspaper icture, Desc Relative ser Plan someti tand informa xt, Talk abou ements for r ns with prepo	als and Wenn. reports, Give ribe a picture. itences in Non hing together, tion about othe t forms of add eading, writing ositions, Relative emdsprache A	more Grar To as er cult ressin , spe /e ser	deta nmat / k oth tures g oth aking ttenc	ers so , Disc ers, ( g and es in /	9 iformation errogative 9 omething uss abou Give more listening Akkusativ Total:4
information, Write Unit – IV Talk about music about a person, U Articles: Was fuer Unit – V Talk about wishes Understand a text behavior, Express information, Disc Grammatik: Konju Subordinate claus TEXT BOOK: 1. Stefanie Goyal Pu REFERENCES:	and correct a story. Grammatik: Konjunctiv II- könnte, Subordinat         Good Entertainment (Gute Unterhaltung):         style, Buy concert tickets, Introduce a musician / band, Understand         nderstand information about painting, Understand description of a p         eine?, Pronouns – man/jemand/niemand and alles/etwas/nichts,         Passage of time and Culture (Zeitablauf & Kultur):         s, Express wishes, Give Suggestions, Understand a conversation,         t, Exchange information, Talk about proverbs, write a story. Understand tips in a terus         uss about clichés and write about them. All units will include elementive II (Wishes, Suggestions), Verbs with prepositions, W- question         ses with damit and UmZu.	e clauses – d newspaper icture, Desc Relative ser Plan someti tand informa xt, Talk abou ements for r ns with prepo	als and Wenn. reports, Give ribe a picture. itences in Non hing together, tion about othe t forms of add eading, writing ositions, Relative emdsprache A	more Grar To as er cult ressin , spe /e ser	deta nmat / k oth tures g oth aking ttenc	ers so , Disc ers, ( g and es in /	9 iformation errogative 9 omething uss abou Give more listening Akkusativ Total:4



		UTCOM ion of t	-	se, the st	udents	will be a	ble to						(	BT Mapı Highest L	
CO1	leve	rage lea	arning in	Workplac	e, unde	rstanding	reports	and mak	ke prese	entation.			Ren	nembering	, (K1)
CO2	reci	procate	to differe	ent situatio	ons, ma	ke appoin	itment ar	nd under	stand te	exts.			Und	lerstanding	g (K2)
CO3	han	dle relat	ionships	and resp	ond app	propriately	to exch	ange inf	ormatio	n			Und	lerstanding	g (K2)
CO4	fam	iliarize t	o various	channels	s of ente	ertainmen	t						Und	lerstanding	g (K2)
CO5	kno	w about	various	cultural a	spects,	usage of	proverbs	and clic	hes.				Und	lerstanding	g (K2)
						Маррі	ing of C	Os with	POs ar	nd PSOs	5				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P01	0 PO11	PO12	PSO1	PSO2
CO	1								1	2	3		3		
CO	2								1	2	3		3		
CO	3								1	2	3		3		
CO	4								1	2	3		3		
CO	5								1	2	3		3		
1 – Sli	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's ⁻	Taxonom	ıy							
						ASSE	SSMEN		ERN - T	HEORY					
	st / Bl Categ	oom's ory*	Re	memberi (K1) %	ing	Understa (K2)	-	Apply (K3)		Analyz (K4) 9	-	Evaluating (I %		reating K6) %	Tota %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
	ESI	Ξ		25		75									100
* ±3%	ESI	=	d (CAT 1		marks &	75		s)							



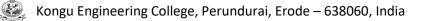
	22GEO08 - JAPANESE LANGUAGE L	EVEL 2					
	(Offered by Department of Electronics and Commun	ication Engir	neering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credi
Prerequisites	Japanese Language Level 1	All	OE	4	0	0	4
Preamble	The basic level of Japanese which provides understanding of the ability to understand basic conversations and also enables Casual form						
Unit – I	Introduction to groups of verbs:						12
	Introduction to Casual Form: ary form-ta form-Polite style and Casual style differences-Conversa	tion in plain	style-Place of	usag	ge of	Polite	12 style an
Casual style	Express opinions and thoughts:						12
	ew particle-Express someone one's thought-Convey the message of fications	one person	to another-As	k son	neone	e if sor	mething i
right -Noun modi	fications	one person	to another-As	k son	neone	e if sor	mething
right -Noun modi <b>Unit – IV</b> If clause tara for							12
right -Noun modi Unit – IV If clause tara for 50 Kanjis	fications Introduction to If clause and remaining Kanjis:	al situation-F	Particles to use				12
right -Noun modi Unit – IV If clause tara for 50 Kanjis Unit – V	fications Introduction to If clause and remaining Kanjis: m-Express gratitude for an action done by other person-Hypothetic	al situation-f	Particles to use	e in c	ase o	of Mot	12 ion verbs
right -Noun modi Unit – IV If clause tara for 50 Kanjis Unit – V	fications Introduction to If clause and remaining Kanjis: m-Express gratitude for an action done by other person-Hypothetic Introduction to giving and receiving with te form and "who	al situation-f	Particles to use	e in c	ase o	of Mot	12 ion verbs
right -Noun modi Unit – IV If clause tara for 50 Kanjis Unit – V	fications Introduction to If clause and remaining Kanjis: m-Express gratitude for an action done by other person-Hypothetic Introduction to giving and receiving with te form and "who	al situation-f	Particles to use	e in c	ase o	of Mot	12 ion verbs
right -Noun modi Unit – IV If clause tara for 50 Kanjis Unit – V Providing to and TEXT BOOK:	fications Introduction to If clause and remaining Kanjis: m-Express gratitude for an action done by other person-Hypothetic Introduction to giving and receiving with te form and "who	al situation-F en, even if" sentences us	Particles to use <b>usages:</b> sing when and	e in c even	ase o	f Moti	12 ion verbs 12 Total:6
right -Noun modi Unit – IV If clause tara for 50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA	fications Introduction to If clause and remaining Kanjis: m-Express gratitude for an action done by other person-Hypothetic Introduction to giving and receiving with te form and "who getting from differences - Understanding of situations and framing s	al situation-F en, even if" sentences us	Particles to use <b>usages:</b> sing when and	e in c even	ase o	f Moti	12 ion verb 12 Total:6
right -Noun modi Unit – IV If clause tara for 50 Kanjis Unit – V Providing to and TEXT BOOK: 1. "MINNA REFERENCES:	fications Introduction to If clause and remaining Kanjis: m-Express gratitude for an action done by other person-Hypothetic Introduction to giving and receiving with te form and "who getting from differences - Understanding of situations and framing s	al situation-F en, even if" sentences us ers & Distrib	Particles to use <b>usages:</b> sing when and	e in c even	ase o	f Moti	12 ion verb 12 Total:6



			se, the st	udents	will be a	ble to						(	BT Mapp Highest L		
diffe	rentiate	groups	of verbs a	and its fo	rms							Rem	nembering	(K1)	
und	erstand	Polite fo	rm and C	asual fo	rm of Jap	anese						Und	erstanding	g (K2)	
com	preheno	d person	al commu	inication	and exp	ress gree	etings					Und	erstanding	g (K2)	
und	erstand	the Kanj	is in Japa	inese Sc	ript and I	f clause						Und	erstanding	g (K2)	
com	preheno	d concep	t of "even	ı if", "whe	en" and jo	ob-relate	d inform	ation				Und	erstanding	g (K2)	
					Маррі	ing of CO	Os with	POs ar	d PSOs						
os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
1								1	2	3		3			
2								1	2	3		3			
3								1	2	3		3			
4								1	2	3		3			
5								1	2	3		3			
ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's T	Taxonom	у						·		
					ASSE	SSMEN	Γ ΡΑΤΤΙ	ERN - T	HEORY						
		Re	memberi (K1) %	ing l							Evaluating (K5) %			Tota %	
CAT	1		75		25									100	
CAT	2		25		75									100	
CAT	3		25		75									100	
ESE	=		25		75									100	
	mplet diffe und com und com com POs 1 2 3 4 5 5 4 5 5 4 5 5 5 5 4 5 5 5 5 5 6 7 7 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	mpletion of t         differentiate         understand         comprehend         understand         comprehend         understand         comprehend         POs       PO1         1       2         2       3         4       5         5       9ht, 2 – Mode         et / Bloom's         category*         CAT1         CAT2         CAT3	differentiate groups of understand Polite for comprehend persona understand the Kanj comprehend concep POS PO1 PO2 1 2 3 4 5 3 4 5 5 9 t, 2 – Moderate, 3 – 5 6 t / Bloom's Re category* CAT1 CAT2 CAT3	mpletion of the course, the st         differentiate groups of verbs a         understand Polite form and C         comprehend personal commu         understand the Kanjis in Japa         comprehend concept of "even         POS       PO1         PO2       PO3         1       -         2       -         3       -         4       -         5       -         ght, 2 – Moderate, 3 – Substant         cAT1       75         CAT2       25         CAT3       25	mpletion of the course, the students         differentiate groups of verbs and its for         understand Polite form and Casual for         comprehend personal communication         understand the Kanjis in Japanese Sc         comprehend concept of "even if", "who         POS       PO1       PO2       PO3       PO4         1	mpletion of the course, the students will be a         differentiate groups of verbs and its forms         understand Polite form and Casual form of Jap         comprehend personal communication and expl         understand the Kanjis in Japanese Script and I         comprehend concept of "even if", "when" and jo         Comprehend concept of "even if", "when" and jo         Mappin         PO3       PO4       PO5         1	mpletion of the course, the students will be able to         differentiate groups of verbs and its forms         understand Polite form and Casual form of Japanese         comprehend personal communication and express gree         understand the Kanjis in Japanese Script and If clause         comprehend concept of "even if", "when" and job-relate         Mapping of CC         Mapping of CC         POS       PO1       PO2       PO3       PO4       PO5       PO6         1	mpletion of the course, the students will be able to         differentiate groups of verbs and its forms       understand Polite form and Casual form of Japanese         comprehend personal communication and express greetings         understand the Kanjis in Japanese Script and If clause         comprehend concept of "even if", "when" and job-related inform         Mapping of COs with         POs       PO1       PO2       PO3       PO4       PO5       PO6       PO7         1	mpletion of the course, the students will be able to         differentiate groups of verbs and its forms         understand Polite form and Casual form of Japanese         comprehend personal communication and express greetings         understand the Kanjis in Japanese Script and If clause         comprehend concept of "even if", "when" and job-related information         Mapping of COs with POs an         Cos PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8         1	mpletion of the course, the students will be able to         differentiate groups of verbs and its forms         understand Polite form and Casual form of Japanese         comprehend personal communication and express greetings         understand the Kanjis in Japanese Script and If clause         comprehend concept of "even if", "when" and job-related information         Mapping of COs with POs and PSOs         Mapping of PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9         1	mpletion of the course, the students will be able to         differentiate groups of verbs and its forms         understand Polite form and Casual form of Japanese         comprehend personal communication and express greetings         understand the Kanjis in Japanese Script and If clause         comprehend concept of "even if", "when" and job-related information         Mapping of COS with POS and PSOS         POS       PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10         1       1       2       3       3       3       1       2       3         2       1       1       2       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3       3	mpletion of the course, the students will be able to         differentiate groups of verbs and its forms         understand Polite form and Casual form of Japanese         comprehend personal communication and express greetings         understand the Kanjis in Japanese Script and If clause         comprehend the Kanjis in Japanese Script and If clause         comprehend concept of "even if", "when" and job-related information         Mapping of COs with POs and PSOs         POS       PO1       PO10       PO11         1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1       2       3       1	mpletion of the course, the students will be able to       (()         differentiate groups of verbs and its forms       Rem         understand Polite form and Casual form of Japanese       Understand personal communication and express greetings       Understand the Kanjis in Japanese Script and If clause       Understand the Kanjis in Japanese Script and If clause       Understand the Kanjis in Japanese Script and If clause       Understand the Kanjis in Japanese Script and If clause       Understand the Kanjis in Japanese Script and If clause       Understand the Kanjis in Japanese Script and If clause       Understand the Kanjis in Japanese Script and Job-related information       Understand the Kanjis in Japanese Script and Job-related information         Vote State Script and If clause       Understand Polite PO12         Mapping of COs with POs and PSOs         PO1       PO12         1       2       3         Image: Script and Job-related information       Understand Polite PO12         Os PO1       PO8       PO12       3         Image: Script and Job Pols       PO1       PO12         Image: Script and Job Pols       PO1 <th c<="" td=""><td>mpletion of the course, the students will be able to       (Highest L         differentiate groups of verbs and its forms       Remembering         understand Polite form and Casual form of Japanese       Understanding         comprehend personal communication and express greetings       Understanding         understand the Kanjis in Japanese Script and If clause       Understanding         comprehend concept of "even if", "when" and job-related information       Understanding         Note PO1       PO11       PO12       PO10         PO11       PO12       PO12       PO12       PO12       PO12       PO12</td></th>	<td>mpletion of the course, the students will be able to       (Highest L         differentiate groups of verbs and its forms       Remembering         understand Polite form and Casual form of Japanese       Understanding         comprehend personal communication and express greetings       Understanding         understand the Kanjis in Japanese Script and If clause       Understanding         comprehend concept of "even if", "when" and job-related information       Understanding         Note PO1       PO11       PO12       PO10         PO11       PO12       PO12       PO12       PO12       PO12       PO12</td>	mpletion of the course, the students will be able to       (Highest L         differentiate groups of verbs and its forms       Remembering         understand Polite form and Casual form of Japanese       Understanding         comprehend personal communication and express greetings       Understanding         understand the Kanjis in Japanese Script and If clause       Understanding         comprehend concept of "even if", "when" and job-related information       Understanding         Note PO1       PO11       PO12       PO10         PO11       PO12       PO12       PO12       PO12       PO12       PO12



	22GEO09 - JAPANESE LANGUAGE I	LEVEL 3					
	(Offered by Department of Electronics and Commur	ication Engir	neering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Japanese Language Level 2	All	OE	3	0	0	3
Preamble	The intermediate level of Japanese which provides understar which includes 150 Kanji's and provides the ability to compre						
Unit – I	Introduction to Potential verbs:						9
	sons-Favouring Expressions-Expressing a State-Potential Verb Sens-Nouns-Basic Questions and Kanji's.	ntences-Sim	ultaneous actio	ons-V	erb G	foups	s-te Form
Unit – II	Introduction to Transitive and Intransitive verbs:						9
Consequence of Basic Questions	verbs- Embarrassment about Facts- Consequence of Verbs with and kanji's.	an Intentior	s-Affirmative	Sente	ences	- Con	junctions
Unit – III	Introduction to Volitional forms:						9
Unit – IV	peakers Intention-Expressing Suggestion or Advice-Usage of Adve	and Qua	nullers-dasic	Quesi			ariji S.
<b>•</b> ····•	Introduction to Imperative and Prohibitive verbs:						•
( 'ommonding no	rean Interrogatives Expressions of Third Person Actions and its	Occurronco	Dossibilitios	of an	Activ	on Ch	9
	rson- Interrogatives-Expressions of Third Person-Actions and its estions and Kanii's.	Occurrence	- Possibilities	of an	Actio	on-Ch	-
	rson- Interrogatives-Expressions of Third Person-Actions and its estions and Kanji's. Introduction to Conditional form and Passive verbs:	Occurrence	- Possibilities	of an	Actio	on-Ch	-
States Basic Que	estions and Kanji's. Introduction to Conditional form and Passive verbs: equirement and Speaker's Judgement, HabitualActions, Direction						anging c
States Basic Que <b>Unit – V</b> Description of R	estions and Kanji's. Introduction to Conditional form and Passive verbs: equirement and Speaker's Judgement, HabitualActions, Direction						anging o 9 rbs-Basi
States Basic Que <b>Unit – V</b> Description of R	estions and Kanji's. Introduction to Conditional form and Passive verbs: equirement and Speaker's Judgement, HabitualActions, Direction						anging c
States Basic Que Unit – V Description of R Questions and K TEXT BOOK:	estions and Kanji's. Introduction to Conditional form and Passive verbs: equirement and Speaker's Judgement, HabitualActions, Direction	ns and sug	gestions-Pass	ive fo	orms	of Ve	anging o 9 erbs-Basi Total:4
States Basic Que Unit – V Description of R Questions and K TEXT BOOK:	estions and Kanji's. Introduction to Conditional form and Passive verbs: equirement and Speaker's Judgement, HabitualActions, Directic anji's.	ns and sug	gestions-Pass	ive fo	orms	of Ve	anging o 9 erbs-Basi Total:4
States Basic Que Unit – V Description of R Questions and K TEXT BOOK: 1. "MINNA REFERENCES:	estions and Kanji's. Introduction to Conditional form and Passive verbs: equirement and Speaker's Judgement, HabitualActions, Directic anji's.	ns and sug	gestions-Pass	ive fo	orms	of Ve	anging o 9 erbs-Bas Total:4



	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	read and understand BasicVocabularies.	Remembering (K1)
CO2	understand Conversations used in daily life.	Understanding (K2)
CO3	comprehend personal communication and express greetings.	Understanding (K2)
CO4	understand the Kanji's in Japanese Script.	Understanding (K2)
CO5	comprehend Coherent conversations in everyday situations.	Understanding (K2)

					Маррі	ng of CO	Os with	POs an	d PSOs					
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								1	2	3		3		
CO2								1	2	3		3		
CO3								1	2	3		3		
CO4								1	2	3		3		
CO5								1	2	3		3		
1 – Slight, 2	z – wode	rate, 3 –	Substant	ai, B1-1			ly							
Test / B					AUOL	SSMEN	ΓΡΑΤΤΕ	ERN - T	HEORY					
Categ	loom's jory*	Re	memberi (K1) %	ng l	Jndersta (K2)	inding	F PATTE Apply (K3)	/ing	HEORY Analyzi (K4) %		Evaluating (K %		eating K6) %	Total %
	jory*	Re		ng l	Jndersta	nding %	Apply	/ing	Analyzi		• •		•	
Categ	<b>jory*</b> T1	Re	(K1) %	ng l	Jndersta (K2)	nding %	Apply	/ing	Analyzi		• •		•	%
Categ CA	<b>Jory*</b> T1 T2	Re	<b>(K1) %</b> 75	ng l	<b>Jndersta</b> (K2) 25	nding %	Apply	/ing	Analyzi		• •		•	1

75

25 * ±3% may be varied (CAT 1,2,3 - 50 marks & ESE - 100 marks)

ESE

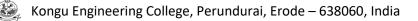
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	22GEO10 - JAPANESE LANGUAGE	LEVEL 4					
	(Offered by Department of Electronics and Commu	inication Engir	neering)				
Programme Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisite	s JAPANESE LANGUAGE LEVEL 3	All	OE	3	0	0	3
Preamble	The intermediate level of Japanese provides understanding which also includes 150 Kanji's and also provides the ability						
Unit – I	Introduction to Reasoning:		•				9
Causes and	Sequences-Causes and Effects-Interrogative Patterns-Adjective as a	Noun -Basic C	Questions and	Kanji	's		
Unit – II	Introduction to Exchanging of things:						9
Expressions Questions ar	for Giving and Receiving of Things-Polite Expression of Request-Inc d kanji's.	dicating a Pur	pose of Actior	ns-Ba	sic Q	uantif	iers-Basi
Unit – III	Introduction to States of an Action:						9
Sentence Pa kanji's.	ttern to Indicate Appearance-Degree of Action and State-Adjectives a	as Adverbs- C	onvey informa	tion -	Basic	Que	stions and
Unit – IV	Introduction to Causative Verbs:						1
							9
Questions ar	orms of Verbs-Asking Opportunity to do something-Hypothetical Qu d Kanji's.	lestions-Judg	ement and Co	ourse	of a	n acti	-
Questions ar Unit – V		lestions-Judg	ement and Co	ourse	of a	n acti	-
Unit – V	d Kanji's.					n acti	ons-Basi
Unit – V	d Kanji's. Introduction to Relationship in Social Status:					n acti	ons-Basi
Unit – V	d Kanji's. Introduction to Relationship in Social Status: ressions- Respectful expressions- Humble expressions-Polite expressions					n acti	ons-Basio
Unit – V Honorific exp TEXT BOOK	d Kanji's. Introduction to Relationship in Social Status: ressions- Respectful expressions- Humble expressions-Polite expressions	sions-Basic Q	uestions and F	۲anji's	S.		9 Total:4
Unit – V Honorific exp TEXT BOOK 1. "MIN	d Kanji's. Introduction to Relationship in Social Status: ressions- Respectful expressions- Humble expressions-Polite express : NA NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publis	sions-Basic Q	uestions and F	۲anji's	S.		9 Total:4
Unit – V Honorific exp TEXT BOOK 1. "MIN REFERENC	d Kanji's. Introduction to Relationship in Social Status: ressions- Respectful expressions- Humble expressions-Polite express : NA NO NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publis	sions-Basic Q shers & Distrib	uestions and F	۲anji's	S.		ons-Basi 9 Total:4



		UTCOM		se, the st	udents	will be a	ble to						(	BT Mapı Highest L	
CO1	read	d and Ur	nderstan	d Relatior	nship of	a Person							Ren	nembering	g (K1)
CO2	und	erstand	Convers	ations Us	ed in Ev	veryday A	ctivities.						Und	erstanding	g (K2)
CO3	com	prehend	d Conten	its at Nea	r Natura	l Speed.							Und	erstanding	g (K2)
CO4	und	erstand	the Kanj	i's in Japa	anese S	cript							Und	erstanding	g (K2)
CO5	com	prehend	d Orally I	Presented	I Materia	als.							Und	erstanding	g (K2)
						Маррі	ng of C	Os with	POs ar	nd PSOs	;				
COs/P	<b>'</b> Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	D PO11	PO12	PSO1	PSO2
CO1	1								1	2	3		3		
CO2	2								1	2	3		3		
COS	3								1	2	3		3		
CO4	4								1	2	3		3		
COS	5								1	2	3		3		
1 – Sliç	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's ⁻	Faxonom	ıy							
						ASSE	SSMEN	Τ ΡΑΤΤΙ	ERN - T	HEORY					
	st / Bl Categ	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)	-	Apply (K3)		Analyz (K4) 9	-	Evaluating (ł %		reating K6) %	Total %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
	ESI	Ξ		25		75									100



	22GE011 - FRENCH LANGUAGE LE	VEL 1					
	(Offered by Department of Electronics and Communi	cation Engir	neering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	Т	Ρ	Credi
Prerequisites	Fundamentals of French Language	All	OE	4	0	0	4
Preamble	This course provides a foundation of the French language as lifestyle of France and other French-speaking nations. The stu and acquire basic everyday vocabulary. By following the struc learning process, one can comprehend the structure of senter	dent will be tured curricu	learning how to a learning how to a learning how to a learning the learning to a learning to a learning to a learning how to a learning ho	to intr ticing	oduce the s	e him/ ame a	herself as per th
Unit – I	Introduction						12
French and French	h culture, alphabets, pronunciation, accents, rules, and terms for pr	onunciation	(mas-fem), S	alutat	ions,	numb	ers.
Unit – II	Daily Life						12
Subject Pronoun,	Francophonie's, adjectives – colors, week, months, seasons.						
Unit – III	Articles and Verbs						12
	e, definite, partitive, and contracted, (examples), introductions to ve	rbs, 1 st grou	ip of verb				
Unit – IV	In the City		•				12
Unit – IV			•	verb	with th	ne exp	
<b>Unit – IV</b> 2 nd group of verbs,	In the City irregular verbs (avoir, etre, faire) present yourself & negative se		•	verb	with th	ne exp	
Unit – IV 2 nd group of verbs, Unit – V	In the City irregular verbs (avoir, etre, faire) present yourself & negative se Food and Culture	entences. (fa	aire and Jouer				pression:
Unit – IV 2 nd group of verbs, Unit – V	In the City irregular verbs (avoir, etre, faire) present yourself & negative se	entences. (fa	aire and Jouer				pressions
Unit – IV 2 nd group of verbs, Unit – V Prepositions – pre	In the City irregular verbs (avoir, etre, faire) present yourself & negative se Food and Culture	entences. (fa	aire and Jouer				pression: 12 Ire (rece
Unit – IV 2 nd group of verbs, Unit – V Prepositions – pre future)	In the City irregular verbs (avoir, etre, faire) present yourself & negative se Food and Culture	entences. (fa	aire and Jouer				bressions 12 Ire (recei
Unit – IV 2 nd group of verbs, Unit – V Prepositions – pre	In the City irregular verbs (avoir, etre, faire) present yourself & negative se Food and Culture	entences. (fa	aire and Jouer				pressions
Unit – IV 2 nd group of verbs, Unit – V Prepositions – pre future)	In the City irregular verbs (avoir, etre, faire) present yourself & negative se Food and Culture position of places (country, cities and etc), Imperative mode, invitation	entences. (fa	aire and Jouer				bressions 12 Ire (recei
Unit – IV 2 nd group of verbs, Unit – V Prepositions – pre future) TEXT BOOK:	In the City irregular verbs (avoir, etre, faire) present yourself & negative se Food and Culture position of places (country, cities and etc), Imperative mode, invitation	entences. (fa	aire and Jouer				pression: 12 Ire (rece
Unit – IV 2 nd group of verbs, Unit – V Prepositions – pre future) TEXT BOOK: 1. A1 – saiso REFERENCES:	In the City irregular verbs (avoir, etre, faire) present yourself & negative se Food and Culture position of places (country, cities and etc), Imperative mode, invitation	entences. (fa	aire and Jouer				pression 12 are (rece



		UTCOM ion of t		se, the st	udents	will be a	ble to						(	BT Mapp Highest L	
CO1	Und	lerstand	the gran	nmatical s	structure	of the la	nguage a	and intro	duce se	elf to othe	ers.		Rem	nembering	J (K1)
CO2	Und	lerstand	basic ve	erbs and a	appropria	ate vocab	ulary.						Und	erstanding	g (K2)
CO3	Ask	for dire	ctions an	d arrange	e for trar	sportatio	n, etc, as	s needeo	d.				Und	erstanding	g (K2)
CO4	Und	lerstand	the food	I habits of	France	and ask	for appoi	ntments	i				Und	erstanding	g (K2)
CO5	Lea	rn to soo	cialize in	French-s	peaking	countries	6						Und	erstanding	g (K2)
						Маррі	ing of C	Os with	POs ar	nd PSOs	;				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1								1	2	3		3		2
CO	2								1	2	3		3		2
CO	3								1	2	3		3		2
CO	4								1	2	3		3		2
CO	5								1	2	3		3		2
1 – Slię	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's T	Taxonom	iy							
						ASSE	SSMEN		ERN - T	HEORY					
	st / Bl Catego	oom's ory*	Re	memberi (K1) %	ing	Understa (K2)	•	Apply (K3)		Analyzi (K4) %		Evaluating (K5) %		eating K6) %	Tota %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
	ESE	=		25		75									100

	22GEO12 -FRENCH LANGUAGE LE	VEL 2					
	(Offered by Department of Electronics and Commur	nication Engi	neering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Fundamentals of French Language	All	OE	4	0	0	4
Preamble	This course is designed to assist students in developing voca Framework of Reference for Languages at the A2 level. This structures as well as the acquisition of vocabulary necessary circumstances. The learner will be able to develop a thorough confidently express themselves in everyday circumstances.	course will a to comprehe	aid in the integ end and respo	ration and in	n of b evei	asic g yday	
Unit – I	French and You						12
	s & Weakness, Recommendations, Sentiments, Motivations, abo egulars and irregulars), Reflexive Verbs, Prepositions	ut favorite fil	Ims and Type	s of s	creer	ns in t	he movie
Unit – II	Eat and Repeat						12
	Recopies, Types of meals, Describing House and Kitchen, Present continuous tense, Simple conditional form	sentation of	the recipe, C	ompa	rative	es, Po	ossessiv
Unit – III	Vacation						12
	entation, Greetings, Goodbyes, Activities on vacation, past experie , Past perfect, Past imperfect tense	nces, Descr	ibing favorite	blace	, Rec	omme	endation
Unit – IV	Likes and Views						12
	s & things, Giving advice, Experience, Moods, Illness, Discomfort cist & Patient), Past perfect, Past indefinite, Imperative	s, Symptom	s, Roleplay (D	octor	* & Pa	atient	Guide
Unit – V	Then and Now						12
	Then and Now , circumstances of the past and present, Debates on past and pre- Present comparatives.	esent situatio	ons and feelin	gs. P	ast ir	nperfe	•
Habits, customs	, circumstances of the past and present, Debates on past and pre-	esent situatio	ons and feelin	gs. P	ast ir	nperfe	•
Habits, customs	, circumstances of the past and present, Debates on past and pre-	esent situatio	ons and feelin	gs. P	ast ir	nperfe	ect tense
Habits, customs Past perfect and	, circumstances of the past and present, Debates on past and pre Present comparatives.	esent situatio	ons and feelin	gs. P	ast ir	nperfe	ect tense
Habits, customs Past perfect and TEXT BOOK:	, circumstances of the past and present, Debates on past and pre Present comparatives.	esent situatio	ons and feelin	gs. P	ast ir	nperfe	ect tense
Habits, customs Past perfect and TEXT BOOK: 1. A2 – Sa REFERENCES:	, circumstances of the past and present, Debates on past and pre Present comparatives.	esent situatio	ons and feelin	gs. P	ast ir	nperfe	ect tense

		UTCON tion of t		urse, the st	udents	will be a	able to						(ዞ	BT Map lighest L	
CO1	Unc	derstand	the F	rench langu	age in c	leep and	its usag	е					Rem	nembering	g (K1)
CO2	Pre	paration	of the	ir Favorite r	ecipes,	Know the	e Object	s used i	n Kitche	en and h	ouse.		Und	erstandin	g (K2)
CO3	Cor	nverse a	bout th	neir vacatior	n, their I	avorite [	Destinati	on					Und	erstandin	g (K2)
CO4	Unc	derstanc	l comp	lex verbs ar	nd be al	ole to con	nmunica	te about	t their p	ast expe	eriences		Und	erstandin	g (K2)
CO5	Knc	ow the d	ifferen	ce between	Past ar	nd Preser	nt and C	ompare	them.				Und	erstandin	g (K2)
						Mappir	ng of CC	Ds with	POs ar	nd PSOs	;				
COs/P	<b>POs</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1								1	2	3		3		
CO2	2								1	2	3		3		
COS	3								1	2	3		3		
CO4	4								1	2	3		3		
COS	5								1	2	3		3		
1 – Slię	ght, 2	– Mode	erate, 3	8 – Substan	tial, BT-	Bloom's	Taxono	my							
						ASSES	SMENT		ERN - T	HEORY					
	st / B Categ	loom's jory*		Remember (K1) %	ing	Understa (K2)		Apply (K3)	-	Analyz (K4) 9		Evaluating (K5) %		eating <6) %	Total %
	CA	T1		75		25									100
	CA	T2		25		75									100
	CA	Т3		25		75									100
-	ES	F		25		75									100



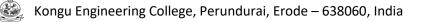
	22GE013- FRENCH LANGUAGE LE	-	• 、				
	(Offered by Department of Electronics and Commun	ication Engli	neering)	-	1		1
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Fundamentals of French Language	All	OE	3	0	0	3
Preamble	This course gives knowledge regarding a variety of personal a improving vocabulary and speaking abilities to reply to and see the ability to articulate yourself and arrange appointments. Wi grammatical structures needed to respond confidently in ever how Natives communicate.	ek information the perseveration of the perseverati	on in those set ince, one can i	tings. maste	. It als er all o	o give of the	essentia
Unit – I	Start Over						9
	es, Discuss a day in life, work, problems in the world, Predictions a ect and future tense.	bout the futu	re (actions an	d situ	ations	s), Hy	pothetica
Unit – II	Prohibitions and More						9
	gations, Habits to change, social customs, Use of the subjunctive, D	Describe syn	opsis of Movie	and i	ts rela	ation t	o real life
Debate on books	vs movies, usage of connectors, Object Direct and Indirect.						
Debate on books	vs movies, usage of connectors, Object Direct and Indirect.  Let's be Creative						9
<b>Unit – III</b> Write a letter by				datio	ns an	d Suç	-
Unit – III Write a letter by Create an Adverti	Let's be Creative describing the problem, talk about desires and Necessities, prop			datio	ns an	d Suç	-
Unit – III Write a letter by Create an Adverti Unit – IV Talk about Tours,	Let's be Creative           describing the problem, talk about desires and Necessities, prop           sement, Give Instructions, Imperative negative, Use of Object Dire           Travel and Communication           Types of tourism and communication, Send messages, petitions,	ct, and Indire	ect				gestions 9
Unit – III Write a letter by Create an Adverti Unit – IV Talk about Tours,	Let's be Creative           describing the problem, talk about desires and Necessities, prop           sement, Give Instructions, Imperative negative, Use of Object Dire           Travel and Communication	ct, and Indire	ect				gestions
Unit – III Write a letter by Create an Adverti Unit – IV Talk about Tours, and Guide, Touris Unit – V Expression of In	Let's be Creative           describing the problem, talk about desires and Necessities, prop           sement, Give Instructions, Imperative negative, Use of Object Dire           Travel and Communication           Types of tourism and communication, Send messages, petitions, its and Travel agents), Past Pluscumperfect, All Past tenses.	ct, and Indire Talk to peo	ect ble on the tele	phone	e, Ro	eplay	ggestions 9 (Tourist 9
Unit – III Write a letter by Create an Adverti Unit – IV Talk about Tours, and Guide, Touris Unit – V Expression of In	Let's be Creative         describing the problem, talk about desires and Necessities, prop         sement, Give Instructions, Imperative negative, Use of Object Dire         Travel and Communication         Types of tourism and communication, Send messages, petitions, ets and Travel agents), Past Pluscumperfect, All Past tenses.         Let's Talk         terests, Sentiments, Feelings, Sensations, Manias etc. Certain	ct, and Indire Talk to peo	ect ble on the tele	phone	e, Ro	eplay	ggestions 9 (Tourist 9
Unit – III Write a letter by Create an Adverti Unit – IV Talk about Tours, and Guide, Touris Unit – V Expression of In	Let's be Creative         describing the problem, talk about desires and Necessities, prop         sement, Give Instructions, Imperative negative, Use of Object Dire         Travel and Communication         Types of tourism and communication, Send messages, petitions, ets and Travel agents), Past Pluscumperfect, All Past tenses.         Let's Talk         terests, Sentiments, Feelings, Sensations, Manias etc. Certain	ct, and Indire Talk to peo	ect ble on the tele	phone	e, Ro	eplay	ggestions 9 (Tourist 9 ne use c
Unit – III Write a letter by Create an Adverti Unit – IV Talk about Tours, and Guide, Touris Unit – V Expression of In superlatives, Excl	Let's be Creative         describing the problem, talk about desires and Necessities, prop         sement, Give Instructions, Imperative negative, Use of Object Dire         Travel and Communication         Types of tourism and communication, Send messages, petitions, its and Travel agents), Past Pluscumperfect, All Past tenses.         Let's Talk         terests, Sentiments, Feelings, Sensations, Manias etc. Certain amatory phrases, subjunctives.	ct, and Indire Talk to peo	ect ble on the tele	phone	e, Ro	eplay	ggestions 9 (Tourist 9 ne use c
Unit – III Write a letter by Create an Adverti Unit – IV Talk about Tours, and Guide, Touris Unit – V Expression of In superlatives, Excl	Let's be Creative         describing the problem, talk about desires and Necessities, prop         sement, Give Instructions, Imperative negative, Use of Object Dire         Travel and Communication         Types of tourism and communication, Send messages, petitions, its and Travel agents), Past Pluscumperfect, All Past tenses.         Let's Talk         terests, Sentiments, Feelings, Sensations, Manias etc. Certain amatory phrases, subjunctives.	ct, and Indire Talk to peo	ect ble on the tele	phone	e, Ro	eplay	ggestions 9 (Tourist 9 ne use c
Unit – III Write a letter by Create an Adverti Unit – IV Talk about Tours, and Guide, Touris Unit – V Expression of In superlatives, Excl TEXT BOOK: 1. B1 – Sais REFERENCES:	Let's be Creative         describing the problem, talk about desires and Necessities, prop         sement, Give Instructions, Imperative negative, Use of Object Dire         Travel and Communication         Types of tourism and communication, Send messages, petitions, its and Travel agents), Past Pluscumperfect, All Past tenses.         Let's Talk         terests, Sentiments, Feelings, Sensations, Manias etc. Certain amatory phrases, subjunctives.	ct, and Indire Talk to peo	ect ble on the tele	phone	e, Ro	eplay	ggestions 9 (Tourist 9 ne use c



		JTCOM on of t		se, the st	udents	will be al	ble to						(	BT Mapp Highest L	
CO1	Lear	n on Fu	iture ten	se.									Rem	embering	J (K1)
CO2	Unde	erstand	Permiss	sions and	Prohibiti	ions.							Und	erstanding	g (K2)
CO3	Knov	wing ab	out Lette	er writing,	Creating	g Ads, Ex	pressing	Desires	s, and Ir	structing	g Others.		Und	erstanding	g (K2)
CO4	Unde	erstandi	ing rules	for travel	and En	hancing c	ommuni	cations.					Und	erstanding	g (K2)
CO5	Expr	essing	the feeli	ngs and e	motions	using ad	vanced g	gramma	r				Und	erstanding	g (K2)
						Маррі	ng of C(	Os with	POs ar	nd PSOs	i				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1								1	2	3		3		2
CO	2								1	2	3		3		2
CO	3								1	2	3		3		2
CO	4								1	2	3		3		2
CO	5								1	2	3		3		2
1 – Slię	ght, 2 -	- Mode	rate, 3 –	Substant	ial, BT-	Bloom's 1	Faxonom	iy							
						ASSE	SSMEN	Γ ΡΑΤΤΙ	ERN - T	HEORY					
	st / Blo Catego		Re	ememberi (K1) %	ing	Understa (K2)	•	Apply (K3)	-	Analyzi (K4) %	•	Evaluating (K5) %		eating K6) %	Total %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
	ESE			25	-	75	-								100

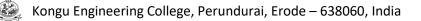


	22GEO14 - SPANISH LANGUAGE LE	EVEL 1					
	(Offered by Department of Electronics and Commun	ication Engir	neering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Fundamentals of Spanish Language	All	OE	4	0	0	4
Preamble	This course provides a foundation of the Spanish language as lifestyle of Spain and other Spanish-speaking nations. The s and acquire basic everyday vocabulary. By following the struct learning process, one can comprehend the structure of senter	student will b	e learning hou	w to i ticing	ntrod the s	uce h ame a	im/herse as per th
Unit – I	Greetings and Good byes (Los Saludos y Despidirse):		•				12
	oduction , Formal and Informal ways of introducing oneself and oth rammar – Noun, Personal Pronoun, Describe surroundings and it			Cour	itries	and L	anguage
Unit – II	Vida Cotidiana (Daily Life):						12
	ays of the week, Months of the year, Seasons, Verb (To be, To n, simple sentences	Have), Adve	rbs, Likes and	l Disli	kes,	Perso	nality an
Unit – III	Friends and Family (Amigos y La Familia):						12
Vocabulary of fam Regular and Irregu	ily, Animals, Professions, Parts of the body, Opinions on family lar verbs.	cultures, Art	icles – Definit	e and	l Inde	efinite,	Hobbies
Unit – IV	In the City (En la Cuidad):						12
	y, Name of the places, asking for directions, Helping each other, ar - Possessive articles, prepositions	Description	of house and	its co	mpor	nents,	Modes of
Unit – V	Food and Culture( La comida y cultura):						12
	varieties), shopping, ordering at a restaurant, inviting to parties ast tense (all three tenses-Past Participle, Indefinite past and past				omer,	sales	sman an
							Total:6
TEXT BOOK:							
	icas Libro de Alumno nivel 1, Ma Angeles Palomino , edelsa, G DRID(ESPANA).	RUPO DIDA	SCALIA, S.A.	, plaz	a cui	dad c	le salta,3
REFERENCES:							

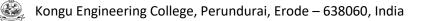


		UTCOM ion of t		rse, the s	udents	will be a	ble to						(	BT Mapp Highest L	
CO1	unde	erstand	the gra	mmatical s	structure	of the lar	nguage a	and intro	duce se	elf to othe	ers.		Rem	nembering	J (K1)
CO2	unde	erstand	basic v	erbs and a	ppropria	ate vocab	ulary.						Und	erstanding	g (K2)
CO3	ask	for dire	ctions a	nd arrange	e for trar	nsportation	n, etc, as	s needeo	ł.				Und	erstanding	g (K2)
CO4	unde	erstand	the foo	d habits of	Spain a	and Latin of	countries	and asl	k for ap	pointme	nts		Und	erstanding	g (K2)
CO5	lean	n to soc	ialize ir	Spanish s	speaking	g countries	S						Und	erstanding	g (K2)
						Маррі	ing of C	Os with	POs a	nd PSOs	5				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1								1	2	3		3		2
CO	2								1	2	3		3		2
CO	3								1	2	3		3		2
CO	4								1	2	3		3		2
CO	5								1	2	3		3		2
1 – Slig	ght, 2	– Mode	erate, 3	– Substan	tial, BT-	Bloom's T	Taxonom	ıy							
						ASSE	SSMEN	Τ ΡΑΤΤΙ	ERN - 1	THEORY					
	st / Blo Catego	oom's ory*	R	emember (K1) %	ing	Understa (K2)	-	Apply (K3)		Analyz (K4) ^c	-	Evaluating (K5) %		reating K6) %	Total %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
	ESE	1		25		75									100

* ±3% may be varied (CAT 1,2,3 - 50 marks & ESE - 100 marks)

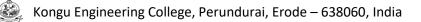


	22GEO15 - SPANISH LANGUAGE L	EVEL 2					
	(Offered by Department of Electronics and Commur	ication Engir	neering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Fundamentals of Spanish Language	All	OE	4	0	0	4
Preamble	This course aims to help the Learner to acquire the vocabular level competence. This course will help to assimilate the basi understand and reciprocate in daily life situations on a broade comprehensive understanding of the Spanish grammar and c	cgrammar st er sense. A th	ructures and g norough learne	ain vo er will	bcabu be al	ulary to	o gain a
Unit – I	Spanish and You (El Español y tú)	,	,				12
	& Weakness, Recommendations, Sentiments, Motivations, About f nd irregulars), Reflexive Verbs, Prepositions		and Types Of S	cieer	15 II I I		
Unit – II	Eat and Repeat (Comer y repetir)						12
	ecipies, Types of meals, Describing House and Kitchen, Presentaus tense, Simple conditional form	ation of recip	e, Comparativ	es, P	osses	ssive	oronouns
Unit – III	Its Vacation Time (Tiempo de vacaciones)						12
Invitations proco	at a time. One of the second	ces Describ	ing favorite pla				
	ntation, Greetings, Goodbyes, Activities on vacation, past experien st perfect, Past imperfect tense, Usage of Todavia or No				econ	imeno	ations o
various tours, Pa					econ	imeno	12
various tours, Pa <b>Unit – IV</b> Favorite persons	st perfect, Past imperfect tense, Usage of Todavia or No	·	· · ·				12
various tours, Pas <b>Unit – IV</b> Favorite persons Tourist, Pharmac	st perfect, Past imperfect tense, Usage of Todavia or No Likes and Views (Gustasyvistas) & things, Giving advices, Experience, Moods, Illness, Discomfor	·	· · ·				12
various tours, Par Unit – IV Favorite persons Tourist, Pharmac Unit – V Habits, customs,	st perfect, Past imperfect tense, Usage of Todavia or No     Likes and Views (Gustasyvistas)     & things, Giving advices, Experience, Moods, Illness, Discomfor     ist & Patient), Past perfect, Past indefinite, Imperative     Then and Now( Antes y Ahora)     circumstances of the past and present, Debates on past and prese	ts, Symptom	s, Roleplay ([	Doctor	r & P	atient	12 , Guide (
various tours, Par Unit – IV Favorite persons Tourist, Pharmac Unit – V Habits, customs,	st perfect, Past imperfect tense, Usage of Todavia or No     Likes and Views (Gustasyvistas)     & things, Giving advices, Experience, Moods, Illness, Discomfor     ist & Patient), Past perfect, Past indefinite, Imperative     Then and Now( Antes y Ahora)     circumstances of the past and present, Debates on past and prese	ts, Symptom	s, Roleplay ([	Doctor	r & P	atient	12 , Guide 12 ense, Pas
various tours, Par Unit – IV Favorite persons Tourist, Pharmac Unit – V Habits, customs, perfect and Prese	st perfect, Past imperfect tense, Usage of Todavia or No     Likes and Views (Gustasyvistas)     & things, Giving advices, Experience, Moods, Illness, Discomfor     ist & Patient), Past perfect, Past indefinite, Imperative     Then and Now( Antes y Ahora)     circumstances of the past and present, Debates on past and prese	ts, Symptom	s, Roleplay ([	Doctor	r & P	atient	12 , Guide (
various tours, Par Unit – IV Favorite persons Tourist, Pharmac Unit – V Habits, customs, perfect and Prese TEXT BOOK: 1 AULA IN	st perfect, Past imperfect tense, Usage of Todavia or No     Likes and Views (Gustasyvistas)     & things, Giving advices, Experience, Moods, Illness, Discomfor     ist & Patient), Past perfect, Past indefinite, Imperative     Then and Now( Antes y Ahora)     circumstances of the past and present, Debates on past and prese	ts, Symptom ent situations	s, Roleplay (I and feelings. I	Doctor Past i	r & P mper	atient fect te	12 , Guide d 12 ense, Pas Total:6
Various tours, Par Unit – IV Favorite persons Tourist, Pharmac Unit – V Habits, customs, perfect and Prese TEXT BOOK: AULA IN	st perfect, Past imperfect tense, Usage of Todavia or No         Likes and Views (Gustasyvistas)         & things, Giving advices, Experience, Moods, Illness, Discomfor         ist & Patient), Past perfect, Past indefinite, Imperative         Then and Now( Antes y Ahora)         circumstances of the past and present, Debates on past and present comparatives.         ITERNACIONAL 2 (A2) Jaime Corpas, AgusinGarmendia, Nuria	ts, Symptom ent situations	s, Roleplay (I and feelings. I	Doctor Past i	r & P mper	atient fect te	12 , Guide d 12 ense, Pas Total:6



		UTCOM ion of t	-	se, the st	udents	will be al	ble to						(1	BT Mapp Highest L	
CO1	und	erstand	the Spai	nish langu	iage in c	leep and	its usage	Э					Rem	nembering	J (K1)
CO2	prep	pare for	their Fav	orite recip	oes, Kno	w the Ob	jects us	ed in Kit	chen ar	id house			Und	erstanding	g (K2)
CO3	con	verse at	out their	vacation	, their Fa	avorite De	estination	า					Und	erstanding	g (K2)
CO4	und	erstand	complex	verbs an	d be abl	e to comi	municate	e about t	heir pas	st experie	ences		Und	erstanding	g (K2)
CO5	kno	w the di	fference	between	Past and	Present	and Cor	mparing	them.				Und	erstanding	g (K2)
						Маррі	ng of C	Os with	POs ar	nd PSOs					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1								1	2	3		3		2
CO	2								1	2	3		3		2
CO	3								1	2	3		3		2
CO	4								1	2	3		3		2
CO	5								1	2	3		3		2
1 – Sli	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's T	Faxonom	iy						·	·
						ASSE	SSMEN		ERN - T	HEORY					
	st / Bl Categ	oom's ory*	Re	ememberi (K1) %	ing	Jndersta (K2)		Apply (K3)		Analyzi (K4) 9		Evaluating (K5) %		reating K6) %	Total %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT	3		25		75									100
	ESI	Ξ		25		75									100
* ±3%	may t	be varied	d (CAT 1	,2,3 – 50	marks 8	ESE – 1	00 mark	s)	<u> </u>						

	22GEO16 - SPANISH LANGUAGE	LEVEL 3					
	(Offered by Department of Electronics and Comm	unication Engin	eering)				
Programme& Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Fundamentals of Spanish Language	All	OE	3	0	0	3
Preamble	This course provides enriching information about various every enhances the vocabulary and speaking ability to respond to and equips one to express opinions and negotiate appointments. Wi grammatical structure to answer confidently in everyday situatio	d also seek info ith diligent learr	rmation in tho ning one can c	se situ aptur	uatior e all b	is. It a basic	Ilso
Unit – I	Start Over( Volver a Empezar)	· · · · · · · · · · · · · · · · ·			-		9
Use of periphra	ses, Discuss a day in life, work, problems in the world, Prediction	ons about futu	re (actions an	d situ	ation	s),Hy	pothetica
situations, Impe	rfect and future tense.						
Unit – II	Prohibitions and More(Prohibiciones y mas)						9
	ligations, Habits to change, social customs, Use of subjunctive, I	Describe synop	sis of Movie a	and its	s rela	tion to	real life
Debate on book	s vs movies, usage of connectors, Object Direct and Indirect.						
Unit – III	Let's be Creative (Seamoscreatives)						9
	y describing the problem, talk about desires and Necessities, pro			dation	s an	d Sug	gestions
Create an Adve	rtisement, Give Instructions, Imperative negative, Use of Object Di	irect and Indired	ct.				
Unit – IV	Travel and Communication (Viajar y comunicar)						9
Talk about Tour	s, Types of tourism and communication, Send messages, petition	s, Talk to peop	le on telephor	e, Ro	le pla	αγ(Τοι	urists and
	and Travel agents), Past Pluscumperfect, All Past tenses.	, i i		,			
Unit – V	Let's Talk(Hablemos)						9
	terests, Sentiments, Feelings, Sensations, Manias etc. Certain su	uggestions to m	ake a better f	uture,	use	of sup	erlatives
Exclamatory ph	rases, subjunctive.						
							Total:4
TEXT BOOK:							
	ernational 3 (B1) [Paperback] Jaime Corpas, Agusin Garmendia, I tors Pvt LTD, 86, UB Jawahar Nagar, Kamla Nagar, Delhi-110007		, Carmen Soria	ano G	oyal	Publis	shers and
REFERENCES							
	uevadelhi.cervantes.es/en/spanish_courses/students/spanish_ge	neral_courses/s	spanish_cours	es_le	vel_a	1.htm	<u>1</u>



		UTCOM		e, the stu	dents v	vill be ab	le to						(†	BT Map lighest L	
CO1	lear	n on Fut	ure tense	Э.									Rem	nembering	g (K1)
CO2	und	erstand	about Pe	rmissions a	and Pro	hibitions.							Und	erstandin	g (K2)
CO3	knov	wing abo	out Letter	writing, Cr	eating	Ads, Expr	ressing E	Desires a	and Inst	ructing (	Others.		Und	erstandin	g (K2)
CO4	und	erstandi	ng rules f	or travel a	nd Enha	ance com	municati	ons.					Und	erstandin	g (K2)
CO5	expi	ressing t	the feeling	gs and em	otions ι	ising adva	anced gr	ammar					Und	erstandin	g (K2)
						Mappin	g of CO	s with F	POs and	d PSOs					
COs/P	<b>POs</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1								1	2	3		3		2
CO2	2								1	2	3		3		2
CO	3								1	2	3		3		2
CO4	4								1	2	3		3		2
CO	5								1	2	3		3		2
1 – Slię	ght, 2	– Mode	rate, 3 –	Substantia	I, BT- E	lloom's Ta	axonomy	,							
						ASSES	SMENT	PATTE	RN - Tł	IEORY					
	est / B Categ	Bloom's gory*	R	emember (K1) %	ing	Understa (K2)	•	Apply (K3)	-	Analyz (K4) 9	•	Evaluating (K5) %		eating (6) %	Total %
	CA	.T1		75		25									100
	CA	T2		25		75									100
	CA	Т3		25		75									100
	-	SE		25		75		1							100



#### KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE-638060

## (AUTONOMOUS)

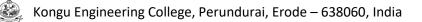
## BOARD OF ELECTRONICS AND COMMUNICATION ENGINEERING

## DEGREE & PROGRAMME : BE Degree in Electronics and Communication Engineering

HONOURS DEGREE TITLE : System on Chip Design

The following courses are identified to earn additional 18 credits to get a Honors degree with specialization in System on Chip Design.

S.No	Course Title	Credits	Prerequisites	Semester
1.	22ECH01- VLSI Design Flow: Front end	4	Digital Electronics	5
2.	22ECH02 -C based VLSI Design	3	VLSI design	5
3.	22ECJ01-VLSI Design Flow: Back end	4	VLSI design	6
4.	22ECJ02-VLSI Technology	4	Semiconductor Physics	6
5.	22ECH03-Hardware Security	3	VLSI Design	7
	TOTAL	18		



Programme & Branch	BE & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Digital Electronics	V	PC	3	1	0	4
Preamble	To develop skills in front end design flow of mode	ern chip design					
Unit – I	Overview of Design Flow						9
RTL to GDS Imp	blementation: Logic Synthesis, Physical Design; Ver	ification and Te	sting; Post-GI	DS Pr	ocess	es	
Unit – II	Synthesis and Logic Optimization						9
Verilog Constru FSM Optimizatio	cts to Hardware, Logic Optimization: Definitions, Tw	vo-level logic op	timization-Mu	lti-leve	el logio	c optii	mization
Unit – III	Formal Verification						9
	tion: Introduction, Formal Engines: BDD - SAT S			mbina	ationa	l Equ	ivalence
	nology Library: Delay models of Combinational and	Sequential Cell	S				
I Init _ IV	Statia Timing Analysis						
Unit – IV	Static Timing Analysis			a -1 - A -		De	9
Synchronous E	Sehavior, Timing Requirements, Timing Graph, D	elay Calculatio	n, Graph-bas	ed Ar	nalysis	s, Pa	-
Synchronous E		elay Calculatio	n, Graph-bas	ed Ai	nalysis	s, Pa	-
Synchronous E Analysis, Accou <b>Unit – V</b> Clock, I/O, Ti	Behavior, Timing Requirements, Timing Graph, D nting for Variations	•	•		•	-	th-based
Synchronous E Analysis, Accou <b>Unit – V</b>	Behavior, Timing Requirements, Timing Graph, D nting for Variations Constraints	•	tions- Power	Ana	lysis,	Powe	th-based 9 er-driver
Synchronous E Analysis, Accou <b>Unit – V</b> Clock, I/O, Ti	Behavior, Timing Requirements, Timing Graph, D nting for Variations Constraints	•	•	Ana	lysis,	Powe	th-based 9 er-driver
Synchronous E Analysis, Accou <b>Unit – V</b> Clock, I/O, Ti	Behavior, Timing Requirements, Timing Graph, D nting for Variations Constraints	•	tions- Power	Ana	lysis,	Powe	th-based 9 er-driver
Synchronous E Analysis, Accou <b>Unit – V</b> Clock, I/O, Tii Optimizations <b>TEXT BOOK:</b>	Behavior, Timing Requirements, Timing Graph, D nting for Variations Constraints	riven Optimiza	tions- Power	Ana 5, Tu	lysis,	Powe	th-based 9 er-driver
Synchronous E Analysis, Accou Unit – V Clock, I/O, Ti Optimizations TEXT BOOK: 1. Saura 2. J. Bh	Behavior, Timing Requirements, Timing Graph, D nting for Variations Constraints ming Exceptions Technology Mapping Timing-d	riven Optimiza pridge Universit	tions- Power Lecture:4 y Press, 2023	Ana <b>5, Tu</b>	lysis, torials	Powe s:15,	9 er-driver
Synchronous E Analysis, Accou Unit – V Clock, I/O, Ti Optimizations TEXT BOOK: 1. Saura 2. J. Br Scier	Behavior, Timing Requirements, Timing Graph, D nting for Variations <b>Constraints</b> ming Exceptions Technology Mapping Timing-d abh Sneh, "Introduction to VLSI Design Flow", Camb	riven Optimiza pridge Universit nanometer de	tions- Power Lecture:4 y Press, 2023 signs: A prac	Ana <b>5, Tu</b>	lysis, torials	Powe s:15,	9 er-driver
Synchronous E Analysis, Accou Unit – V Clock, I/O, Ti Optimizations TEXT BOOK: 1. Saura 2. J. Br Scier 3. G. D.	Achavior, Timing Requirements, Timing Graph, D nting for Variations Constraints ming Exceptions Technology Mapping Timing-d abh Sneh, "Introduction to VLSI Design Flow", Camb asker and R. Chadha, "Static timing analysis for ace Business Media, 2009	riven Optimiza pridge Universit nanometer de	tions- Power Lecture:4 y Press, 2023 signs: A prac	Ana <b>5, Tu</b>	lysis, torials	Powe s:15,	9 er-driver
Synchronous E Analysis, Accou Unit – V Clock, I/O, Ti Optimizations TEXT BOOK: 1. Saura 2. J. Bh Scier 3. G. D.	Abhavior, Timing Requirements, Timing Graph, D nting for Variations Constraints ming Exceptions Technology Mapping Timing-d abh Sneh, "Introduction to VLSI Design Flow", Cambra asker and R. Chadha, "Static timing analysis for nce Business Media, 2009 Micheli, "Synthesis and optimization of digital circui //onlinecourses.nptel.ac.in/noc23_ee137	riven Optimiza pridge Universit nanometer de	tions- Power Lecture:4 y Press, 2023 signs: A prac	Ana <b>5, Tu</b>	lysis, torials	Powe s:15,	9 er-driver
Synchronous E Analysis, Accou Unit – V Clock, I/O, Tii Optimizations TEXT BOOK: 1. Saura 2. J. Bh Scier 3. G. D. 4. https: REFERENCES:	Abhavior, Timing Requirements, Timing Graph, D nting for Variations Constraints ming Exceptions Technology Mapping Timing-d abh Sneh, "Introduction to VLSI Design Flow", Cambra asker and R. Chadha, "Static timing analysis for nce Business Media, 2009 Micheli, "Synthesis and optimization of digital circui //onlinecourses.nptel.ac.in/noc23_ee137	riven Optimiza oridge Universit nanometer de ts", McGraw-Hi	tions- Power Lecture:4 y Press, 2023 signs: A prac Il Higher Educ	Ana <b>5, Tu</b>	lysis, torials	Powe s:15,	9 er-driver



	E OUTCOMES: pletion of the course, the students will be able to	BT Mapped (Highest Level		
CO1	Understand various steps involved in VLSI design flow	Understanding (K2)		
CO2	infer the role of synthesis and logic optimization formal verification	Understanding (K2)		
CO3	comprehend the need of formal verification	Understanding (K2)		
CO4	explain the need of timing analysis	Understanding (K2)		
CO5	elucidate the role of timing and power constraints	Understanding (K2)		

					Mappin	g of CC	)s with	POs a	nd PSC	)s				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1				3				2	1	3
CO2	3	2	1	1				3				2	1	3
CO3	3	2	1	1				3				2	1	3
CO4	3	2	1	1				3				2	1	3
CO5	3	2	1	1				3				2	1	3
1 – Slight, 1	2 – Moo	derate, 3	3 – Subs	stantial,	BT- Bloo	om's Ta	xonomy	/	1	1 1		1	1	1

	ASSESSMENT PATTERN - THEORY										
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %				
CAT1	20	80		-	-	-	100				
CAT2	20	80		-	-	-	100				
CAT3	20	80		-	-	-	100				
ESE	15	85		-	-	-	100				
* ±3% may be varied	d (CAT 1,2,3 – 50 r	narks & ESE – 100	) marks)								



	22ECH02- C BASED V	LSI DESIGN					
Programme & Branch	BE & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credi
Prerequisites	VLSI Design	V	PC	3	0	0	3
Preamble	To infer the VLSI design using C						
Unit – I	Scheduling						9
based Schedulin Scheduling Algo	ation - ILP Formulation – MRLC and MLRC Schedung of MLRC – Advanced Scheduling – Forced Dir rithm- Path based Scheduling						d MLR
Unit – II Problem Formu	Allocation and binding lation – Left edge algorithm- ILP Based formulation	- Allocation and I	Binding of Hier	rarchio	al Gra	aph –	9 Registe
Allocation and B	inding- Multi port Binding Problem- Datapath and o					·	•
Unit – III	Efficient Synthesis of C code						9
	HLS for Loops-pipeline- Hardware efficient C Codi	• •	imization in H	LS			
	Impact of Compiler and Optimization in hardy						
Unit – IV	Impact of Compiler and Optimization in hardw			T			9
Front end optim	ization in C – HLS Optimization – Simulation base		RTL to C Reve	erse E	Ingine	ering	-
Front end optim wise verification	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL		RTL to C Rev	erse E	Ingine	ering	- Phase
Front end optim wise verification <b>Unit – V</b>	ization in C – HLS Optimization – Simulation base	ed Verification- I	RTL to C Rev	erse E	Ingine	ering	-
Front end optim wise verification <b>Unit – V</b>	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL Securing Design with HLS	ed Verification- I	RTL to C Reve	erse E	Engine		- Phase 9
Front end optim wise verification <b>Unit – V</b>	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL Securing Design with HLS	ed Verification- I	RTL to C Reve	erse E	Engine		- Phase
Front end optim wise verification Unit – V Hardware Secur TEXT BOOK:	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL Securing Design with HLS ity- HLS for security- Attacks on RTL Logic locking Gajski, N. D. Dutt, A.CH. Wu and S.YL. Lin,	ed Verification- F					- Phase 9 Total:4
Front end optim wise verification Unit – V Hardware Secur TEXT BOOK: 1. D. D. Desig	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL Securing Design with HLS ity- HLS for security- Attacks on RTL Logic locking	ed Verification- F	nesis: Introduc	ction t	o Chij		- Phase 9 Total:4
Front end optim wise verification Unit – V Hardware Secur TEXT BOOK: 1. D. D. Desig 2. G. De	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL Securing Design with HLS ity- HLS for security- Attacks on RTL Logic locking Gajski, N. D. Dutt, A.CH. Wu and S.YL. Lin, In, Springer, 1st edition, 1992	ed Verification- f I High-Level Syntl uits, McGraw Hill	nesis: Introduc , India Edition,	ction t	o Chij		- Phase 9 Total:4
Front end optim wise verification Unit – V Hardware Secur TEXT BOOK: 1. D. D. Desig 2. G. De 3. Mike	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL Securing Design with HLS ity- HLS for security- Attacks on RTL Logic locking Gajski, N. D. Dutt, A.CH. Wu and S.YL. Lin, I In, Springer, 1st edition, 1992 Micheli. Synthesis and optimization of digital circu	ed Verification- f I High-Level Syntl uits, McGraw Hill	nesis: Introduc , India Edition,	ction t	o Chij		- Phase 9 Total:4
Front end optim wise verification Unit – V Hardware Secur TEXT BOOK: 1. D. D. Desig 2. G. De 3. Mike	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL Securing Design with HLS ity- HLS for security- Attacks on RTL Logic locking Gajski, N. D. Dutt, A.CH. Wu and S.YL. Lin, I In, Springer, 1st edition, 1992 Micheli. Synthesis and optimization of digital circu Fingeroff, High-Level Synthesis Blue Book, Mentor //onlinecourses.nptel.ac.in/noc22_cs109/	ed Verification- f I High-Level Syntl uits, McGraw Hill	nesis: Introduc , India Edition,	ction t	o Chij		- Phase 9 Total:4
Front end optim wise verification Unit – V Hardware Secur TEXT BOOK: 1. D. D. Desig 2. G. De 3. Mike 4. https: REFERENCES:	ization in C – HLS Optimization – Simulation base of HLS- Equivalence between C and RTL Securing Design with HLS ity- HLS for security- Attacks on RTL Logic locking Gajski, N. D. Dutt, A.CH. Wu and S.YL. Lin, I In, Springer, 1st edition, 1992 Micheli. Synthesis and optimization of digital circu Fingeroff, High-Level Synthesis Blue Book, Mentor //onlinecourses.nptel.ac.in/noc22_cs109/	ed Verification- F High-Level Syntl uits, McGraw Hill r Graphics Corpo	nesis: Introduc , India Edition pration, 2010	ction t , 2003	o Chij	b and	- Phase 9 Total:4 Syster



	COURSE OUTCOMES:							
On con	On completion of the course, the students will be able to							
CO1	Understanding (K2)							
CO2	Infer how a C-code will be converted to its equivalent hardware	Understanding (K2)						
CO3	Comprehend c-code for efficient hardware generation	Understanding (K2)						
CO4	Learn how the common software compiler optimization help to improve the circuit performance.	Understanding (K2)						
CO5	Secure the design with HLS	Understanding (K2)						

	Mapping of COs with POs and PSOs													
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2	1	1				3				2	1	3
CO2	3	2	1	1				3				2	1	3
CO3	3	2	1	1				3				2	1	3
CO4	3	2	1	1				3				2	1	3
CO5	3	2	1	1				3				2	1	3
1 – Slight, 2	2 – Moo	derate, 3	3 – Subs	stantial,	BT- Blo	om's Ta	xonomy	/	1	1 1		1	1	

	ASSESSMENT PATTERN - THEORY										
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %				
CAT1	15	85		-	-	-	100				
CAT2	15	85		-	-	-	100				
CAT3	15	85		-	-	-	100				
ESE	15	85		-	-	-	100				
* ±3% may be varie	d (CAT 1.2.3 – 50 r	narks & ESE – 100	) marks)								



		I DESIGN FLOW: BA						
Programm		nication				_	_	•
Branch	Engineering		Sem.	Category	L	т	Р	Credi
Prerequisi	ites VLSI design		VI	PC	3	0	2	4
Preamble	To develop skills in back end desi	gn flow of modern ch	ip design					
Unit – I IC Fabricat	Introduction to Physical Design tion :FEOL, BEOL, Interconnect/Wires, Inte		itics, Signal	Integrity, Ant	enna	a Effe	ct, LE	<b>9</b> F files
Unit – II	Chip Planning							9
-	g, Budgeting, Block Implementation, Top-le	vel Assembly, Floorpl	anning, Pov	ver Planning				•
Unit – III Global Plac	Placement cement, Wire length Estimates, Legalization	Detailed Placement	Timina-driv	en Placemer	nt Sc	an Ce		9 ordering
	Placement		, mining and		п, ос			ordening
Unit – IV	Clock Tree Synthesis and Rout	•						9
Terminolo Optimizatio	gies, Clock Distribution Networks, Clock Ne	etwork Architectures,	Useful Skev	ws, Global ar	nd De	etailec	l, Pos	st-routing
Unit – V	Physical Verification							9
Layout Ext	raction, LVS, ERC, DRC, ECO and Sign-of	f						
	e the layout (Automatic) e the area, power, delay 16-bit Binary Counter							
2. 3. 4.	First In First Out Booth Multiplier GCD Processor							
3.	Booth Multiplier	nitter						
3. 4. 5.	Booth Multiplier GCD Processor Universal Asynchronous Receiver Transr	nitter		Lecture:45,	, Pra	ctical	: 15,	Total:6
3. 4. 5. TEXT BOC	Booth Multiplier GCD Processor Universal Asynchronous Receiver Transr					ctical	: 15,	Total:6
3. 4. 5.	Booth Multiplier GCD Processor Universal Asynchronous Receiver Transr <b>DK:</b> Saurabh Sneh, " <i>Introduction to VLSI Des</i>	<i>ign Flow</i> ", Cambridge	-	Press, 2023.				
3. 4. 5. TEXT BOC	Booth Multiplier         GCD Processor         Universal Asynchronous Receiver Transr <b>DK:</b> Saurabh Sneh, "Introduction to VLSI Des         J. Bhasker and R. Chadha, "Static timit Science Business Media, 2009	<i>ign Flow</i> ", Cambridge ng analysis for nano	meter desig	Press, 2023. Jns: A practi	cal a	approa	ach",	
3. 4. 5. <b>TEXT BOC</b> 1.	Booth Multiplier GCD Processor Universal Asynchronous Receiver Transr <b>DK:</b> Saurabh Sneh, " <i>Introduction to VLSI Des</i> J. Bhasker and R. Chadha, "Static timit	<i>ign Flow</i> ", Cambridge ng analysis for nano	meter desig	Press, 2023. Jns: A practi	cal a	approa	ach",	
3. 4. 5. TEXT BOO 1. 2.	Booth Multiplier         GCD Processor         Universal Asynchronous Receiver Transr <b>DK:</b> Saurabh Sneh, "Introduction to VLSI Des         J. Bhasker and R. Chadha, "Static timit Science Business Media, 2009	<i>ign Flow</i> ", Cambridge ng analysis for nano n of digital circuits", M	meter desig	Press, 2023. Jns: A practi	cal a	approa	ach",	
3. 4. 5. <b>TEXT BOO</b> 1. 2. 3. 4.	Booth Multiplier         GCD Processor         Universal Asynchronous Receiver Transmost <b>DK:</b> Saurabh Sneh, "Introduction to VLSI Des         J. Bhasker and R. Chadha, "Static timin Science Business Media, 2009         G. D. Micheli, "Synthesis and optimization	<i>ign Flow</i> ", Cambridge ng analysis for nano n of digital circuits", M	meter desig	Press, 2023. Jns: A practi	cal a	approa	ach",	
3. 4. 5. <b>TEXT BOO</b> 1. 2. 3. 4.	Booth Multiplier         GCD Processor         Universal Asynchronous Receiver Transr <b>DK:</b> Saurabh Sneh, "Introduction to VLSI Des         J. Bhasker and R. Chadha, "Static timit Science Business Media, 2009         G. D. Micheli, "Synthesis and optimization https://onlinecourses.nptel.ac.in/noc23_e	<i>ign Flow</i> ", Cambridge ng analysis for nanon n of digital circuits", M e137	meter desig	Press, 2023. jns: A practi Higher Educa	cal a	approa	ach",	



COURS	E OUTCOMES:	BT Mapped		
On com	pletion of the course, the students will be able to	(Highest Leve		
CO1	Understand various steps involved in Physical design flow	Understanding (K2)		
CO2	Infer the role of chip planning	Understanding (K2)		
CO3	Comprehend the various tasks involved in placement	Understanding (K2)		
CO4	demonstrate the various tasks involved in clock tree synthesis and routing	Understanding (K2)		
CO5	illustrate the various tasks involved in physical verification	Understanding (K2)		

					Mappir	ng of CO	Os with	POsa	and PSC	Os				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1				3				2	1	3
CO2	3	2	1	1				3				2	1	3
CO3	3	2	1	1				3				2	1	3
CO4	3	2	1	1				3				2	1	3
CO5	3	2	1	1				3				2	1	3
1 – Slight, 2	2 – Moo	derate, 3	3 – Subs	stantial,	BT- Blo	om's Ta	xonom	y		I	L	1	I	<u> </u>
					ASSES	SMEN	Γ ΡΑΤΤ	ERN -	THEOF	RY				
Test / Bl Categ		Rer	nembei (K1) %	-	Jndersta (K2)	•	Apply (K3)	-	Analyzi (K4) %		Evaluating (K5) %		eating (6) %	Total %

Category*	(K1) %	(K2) %	(K3) %	(K4) %	(K5) %	(K6) %	10tai %
CAT1	20	80					100
CAT2	20	80					100
CAT3	20	80					100
ESE	15	85					100
* ±3% may be varie	d (CAT 1,2,3 – 50 i	marks & ESE – 10	) marks)	11		1	



#### 22ECJ02- VLSI TECHNOLOGY Programme & **B.E. & Electronics and Communication** Branch Sem. Category Т Ρ Credit Engineering L **Semiconductor Physics** Prerequisites 8 PC 3 0 2 4 Preamble To infer the foundations in MOS and CMOS fabrication process. Unit – I **Crystal Growth and Epitaxy:** 9 Silicon Crystal Growth from the Melt- Silicon Float-Zone Process- GaAs Crystal-Growth Techniques -Material Characterization- Epitaxial-Growth Techniques - Structures and Defects in Epitaxial Layers Unit – II Film Formation: 9 Thermal Oxidation- Chemical Vapor Deposition of Dielectrics - Chemical Vapor Deposition of Polysilicon- Atom Layer **Deposition- Metallization** Unit – III Lithography and Etching: 9 Optical Lithography- Next-Generation Lithographic Methods- Wet Chemical Etching- Dry Etching Unit – IV Impurity Doping: 9 Basic Diffusion Process- Extrinsic Diffusion- Diffusion-Related Processes- Range of Implanted Ions- Implant Damage and Annealing- Implantation-Related Processes VLSI Process Integration: Unit – V 9 Integrated Devices – Passive Components- Bipolar Technology- MOSFET Technology- MESFET Technology- Challenges for Nanoelectronics. LIST OF EXPERIMENTS / EXERCISES: 1. Synthesis of 2-D materials using hummer's method 2. Structural and Electrochemical Characterization of 2-D materials 3. Study of Spin coater and CVD 4. Design and development of controlled thin film using spin coater 5. Design and development of transistor using spin coater 6. Analysis of transistor performance using CE configuration Lecture:60, Practical:15, Total:75 **TEXT BOOK:** Simon Sze, Ming-Kwei Lee "Semiconductor Devices Physics and Technology" 3rd Edition, Wiley, 2012, for Units I, 1. II, III, IV, V. Sze S.M "VLSI Technology", 2nd, McGraw-Hill New York, 2017. 2. **REFERENCES:** 1. Amar Mukherjee Introduction to NMOS and CMOS VLSI System Design, Ist, Prentice Hall India, New Delhi, 2000. Plummer, James D., Deal, Michael D. and Griffin, Peter B., "Silicon VLSI Technology: Fundamentals Practice and 2. Modeling", Prentice Hall India, New Delhi, 2000.



COUF	RSE OUTCOMES:	BT Mapped
On co	empletion of the course, the students will be able to	(Highest Level)
CO1	summarize the approach for wafer preparation- Epitaxy	Understanding (K2)
CO2	Infer the techniques of Oxidation	Understanding (K2)
CO3	distinguish the various methods for lithography and etching	Understanding (K2)
CO4	illustrate the various Deposition and implantation process	Understanding (K2)
CO5	realize the various IC technology	Understanding (K2)

Mapping of COs with POs and PSOs														
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1									2	2	2
CO2	3	2	1									2	2	2
CO3	3	2	1									2	2	2
CO4	3	2	1									2	2	2
CO5	3	2	1									2	2	2
1 – Slight, 2	2 – Moo	derate. 3	3 – Subs	tantial.	BT- Blo	om's Ta	xonom	v	1	ı – I		1	1	1

ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
CAT1	20	80	-	-	-	-	100					
CAT2	20	80	-	-	-	-	100					
CAT3	20	80	-	-	-	-	100					
ESE	20	80	-	-	-	-	100					
±3% may be varie	d (CAT 1,2,3 – 50 i		) marks)	1 1		J.						

# 22ECH03- HARDWARE SECURITY

Programme & Branch	BE & Electronics and Communication Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	VLSI Design	VII	PC	3	0	0	3
Preamble	To understand the basics of hardware security, has sidechannel attacks and hardware Trojan prevent		attacks in IPs	and F	FPGA	S,	
Unit – I	Introduction to Hardware Trojan and Hardware	e Trojan attack	S				9
	rdware Trojans- Trends, Tradeoffs and Threats of T ive Strategies- Defensive Strategies -Challenges						
Unit – II	Hardware IP Trust						9
	eristics – Inadequacies of existing testing and sec iques- Trojan Mitigation at IP Level	urity features-	Trojan classif	icatio	n – G	enera	al Trojar
Unit – III	Side-Channel Attacks						9
Taxonomy of S Attacks- Timing	ide-Channel Attacks – Power Analysis Attacks- E Attacks.	lectromagnetic	Side-Channe	l Atta	cks- I	ault	Injectior
Unit – IV	Hardware Trojan Prevention						9
	le of Obfuscation in Hardware Trojan Prevention- Ch			Obfus	scatior	n- Boa	ard Leve
	aluation Metrics for Hardware Obfuscation – Physica						-
Unit – V	Hardware Trojan Attacks in FPGA and Protect				_		9
against FPGA T	and Taxonomy- Trojans in FPGA Fabric- Trojans in I rojans.	-PGA Design-	Trojan in Bit s	tream	i- Cou	nterm	easures
							Total:45
TEXT BOOK:							
1. Swa	rup Bhunia, and M. Tehranipoor, "The Hardware Tro	jan War." <i>Sprir</i>	oger (2018).				
	up Bhunia, and Mark Tehranipoor, " <i>Hardware securi</i> nann, 2018.	ty: a hands-on	learning appr	oach",	Morg	an	
	, Domenic, Swarup Bhunia, and Mark M. Tehranipoo n/Heidelberg, Germany: Springer International Publis		protection thro	ough c	obfusc	ation"	,
REFERENCES							
	Maes, "Physically unclonable functions: Construction less Media, 2013.				•		
			P and SoC se				



	OURSE OUTCOMES: In completion of the course, the students will be able to						
CO1	CO1 Understand the offensive and defensive strategies of hardware Trojan						
CO2	Understand the classification of Trojan and mitigation techniques of hardware Trojan	Understanding (K2)					
CO3	Understand the various forms of side channel attacks	Understanding (K2)					
CO4	understand the various types of obfuscation techniques and physical unclonable function	Understanding (K2)					
CO5	understand the various types of FPGA Trojans	Understanding (K2)					

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1									2	2	2
CO2	3	2	1									2	2	2
CO3	3	2	1									2	2	2
CO4	3	2	1									2	2	2
CO5	3	2	1									2	2	2
1 – Slight, 2	2 – Moo	derate, 3	3 – Subs	stantial,	BT- Bloo	om's Ta	xonom	/ /	1	11		1	1	1

ASSESSMENT PATTERN - THEORY												
Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
15	85		-	-	-	100						
15	85		-	-	-	100						
15	85		-	-	-	100						
15	85		-	-	-	100						
	(K1) % 15 15 15 15	Remembering (K1) %         Understanding (K2) %           15         85           15         85           15         85           15         85	Remembering (K1) %         Understanding (K2) %         Applying (K3) %           15         85           15         85           15         85           15         85	Remembering (K1) %Understanding (K2) %Applying (K3) %Analyzing (K4) %1585-1585-1585-	Remembering (K1) %         Understanding (K2) %         Applying (K3) %         Analyzing (K4) %         Evaluating (K5) %           15         85         -         -           15         85         -         -           15         85         -         -           15         85         -         -           15         85         -         -           15         85         -         -	Remembering (K1)%         Understanding (K2)%         Applying (K3)%         Analyzing (K4)%         Evaluating (K5)%         Creating (K6)%           15         85         -         -         -         -           15         85         -         -         -         -           15         85         -         -         -         -           15         85         -         -         -         -           15         85         -         -         -         -						

*  $\pm$ 3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)