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 onwards)

BACHELOR OF TECHNOLOGY DEGREE IN INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY



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, 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:

Sl. 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	
7.	All other Courses	decided 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.

Sl. No.	Туре	Max. Marks	Remarks
1	Test - I	20	
1.	Test - II	20	Average of best 2 tests
	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)							
Zerotl	n Review	Review I (Max 20 N	vlarks)	Review II (Max. 30 Marks))	Report Evaluation (Max. 20 Marks)	Viva - V (Max. 30]	/oce Marks)			
Rv.	Super	Review	Super	Review	Super	Ext. Exr.	Super	Exr.1	Exr.2		
Com	visor	Committee	visor	Committee	visor		visor				
		(excluding		(excluding							
		supervisor		supervisor)							
)									
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 vivavoce 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)													
						Review III (Max. 50 Marks)								
Zeroth	Review	Review I (Max 20 M	larks)	Review II Max 30 Marks))	Report Evaluation (Max. 20 Marks)	Viva - Voce (Max. 30 Marks)							
Review	Super	Review	Super	Review	Super	Review	Super	Review						
Commi	visor	Committee	visor	Committee	visor	Committee	visor	Committee						
ttee		(excluding		(excluding										
		supervisor)		supervisor)										
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.

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.

9. **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
Based on the relative	A (Very Good)	8
grading	B+ (Good)	7
	B (Average)	6
	C (Satisfactory)	5
Less than 50	U (Reappearance)	0
Successfully Completed	SC	0
Withdrawal	W	-
Absent	AB	-
Shortage of Attendance in a course	SA	-

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

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

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

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

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

- 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 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.

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	PO11	PO12	PSO1	PSO2
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	✓	✓	✓			✓	✓		~	✓		✓		
5	22ECX01	Basics of Electronics in Automation Appliances	~	~	~	~		~	~	~			~	~		
5	22ECX02	Image Processing	1	✓	1	1	1				✓	✓		✓		
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	✓	✓	1	✓	1							✓		
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	✓			

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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	✓	✓	1	1	1	✓	✓	✓				✓		
5	22FTX01	Baking Technology	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		
5	22FTO01	Food Processing Technology	✓	✓	✓	✓		✓				✓		✓		
5	22MAO01	Mathematical Foundations for Machine Learning	~	~	~	~	~									
5	22MAO02	Numerical Computing	✓	~	1											
5	22MAO03	Stochastic Processes and Queuing Theory	~	~	~											
5	22MAO04	Statistics for Engineers	✓	~	1											
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	~	~	1	*										
5	22CYO02	Chemistry Concepts for Competitive Examinations	✓	~	~											
5	22CYO03	Organic Chemistry for Industry	✓	✓	✓	✓										
5	22MBO01	Cost Accounting for Engineers										✓	✓	✓		
6	22CEO01	Disaster Management	✓	~	1			~	✓					✓		
6	22MEX02	Design of Experiments	✓	✓	✓	✓	✓				✓					
6	22GEO04	Innovation and Business Model Development	~	~	~	~	~	~	~	~	~	~	~	~		
6	22MTO02	Robotics	✓	1	✓	✓	✓							✓		
6	22MTO03	3D Printing and Design	✓	✓			✓							✓		
6	22AUO01	Automotive Electronics	✓	✓	✓	✓								✓		
6	22ECX03	PCB Design and Fabrication	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
6	22EEO07	Energy Conservation and Management	~	~	~		~		1	~	~			~		
6	22EEO08	Microprocessors and Microcontrollers Interfacing	~	~	~	~	~	~	~	~		~	~	~		
6	22EEO09	Electrical Safety	✓	✓	1				✓	1			1	✓		
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	✓	~	~	~		~	~	~	~	1	~			
6	22ITO04	Mobile Application Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
6	22CDX01	Fundamentals of User Interactive Design	1	~	~	~										
6	22ADX01	Data Visualization	✓	✓	✓											
6	22ALX01	Data Exploration and Visualization Techniques	~	~	~											
6	22CHO04	Air Pollution Monitoring and Control	~	~	~			~	~							
6	22CHO05	Paints and Coatings	✓	✓	1				1							
6	22CHO06	Powder Technology	✓	✓	✓			✓	✓					✓		
6	22FTX02	Processing of milk and milk products	~	~	1		~	~		~	1	~		~		
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	✓	✓	✓											

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
6	22MAO07	Number Theory and Cryptography	✓	~	~		~									
6	22PHO04	Synthesis, Characterization and Biological Applications of Nanomaterials	~	~	~						~	~		~		
6	22PHO05	Techniques of Crystal Growth	✓	✓	✓						✓	✓		✓		
6	22CYO04	Corrosion Science and Engineering	1	~	~	~										
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	✓	~	~			~	~							
7	22MEO01	Fundamentals of Ergonomics	✓	✓	✓	✓	✓	✓	✓					✓		
7	22MEO02	Principles of Management and Industrial Psychology	✓					~				~	~			
7	22MEO03	Waste Heat Recovery System and Storage	✓	~	1	*			~							
7	22GEO05	Entrepreneurship Development	✓	1	1	✓	1	1	1	✓	1	✓	✓	✓		
7	22MTO04	Drone System Technology	✓	✓	✓	✓	✓							✓		
7	22AUO02	Vehicle Maintenance	1	✓			✓		✓					✓		
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	✓	1	~			1			1		~	~		
7	22EEO16	AI Techniques for Engineering Applications	✓	✓	✓	✓										
7	22EIO06	Introduction to Distributed Control Systems	✓	✓	~	~	✓			✓		~				
7	22EIO07	Instrumentation in Aircraft Navigation and Control	✓	~	~	✓	~									

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2
7	22EIO08	Industry 4.0 with Industrial IoT	✓	✓	✓	✓	✓			✓						
7	22EIO09	Industrial Data Communication	✓	✓	✓	✓	✓	✓								
7	22EIO10	Wireless Instrumentation	✓	✓	✓	✓	✓		✓							
7	22EIO11	Instrumentation Techniques in Agriculture	~	~	~	~	~									
7	22CSO03	Nature Inspired optimization techniques	~	~	*											
7	22ITO05	Fundamentals of Cloud Computing	~	1	✓	✓	✓	~	~	1	1	~	~			
7	22ITO06	Introduction to Ethical Hacking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7	22CDO02	Introduction to Mobile Game Design	~	1	✓	✓										
7	22CDO03	Introduction to Graphics Design	✓	✓	~	✓										
7	22ADO02	Neural Networks and Deep Learning	~	~	✓	✓										
7	22ALO02	Industrial Machine Learning	1	✓	✓											
7	22CHO07	Hydrogen Energy	✓	1										✓		
7	22CHO08	Rubber Technology	✓	✓				1	✓					✓		
7	22FTO02	Principles of Food safety	✓	✓	✓			✓	✓	✓		✓		✓		
7	22FTO03	Fundamentals of Food Packaging and Storage	~	~	~	~	~	~		~		~		~		
7	22MAO08	Non-Linear Optimization	1	✓	✓											
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	1	✓			✓									
8	22MEO04	Safety Measures for Engineers	✓					✓	✓	✓						
8	22MEO05	Energy Conservation in Thermal Equipments	✓		✓		✓	✓	✓					✓		
8	22MEO06	Climate Change and New Energy Technology	~		✓			✓	~	✓						

Sem.	Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
8	22MTO05	Micro and Nano Electromechanical Systems	✓	~	~	~								~		
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	1	✓	✓	✓	✓		✓							
8	22EIO13	Pollution Control and Management	~	~	~	~	~	~		~						
8	22CSO04	Machine Translation	✓	1	1											
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	✓	1	1	1										
8	22CHO09	Industrial Accident Prevention and Management	✓		1	~		1	~	~	~	~	~	~		
8	22CHO10	Electrochemical Engineering	✓	✓	✓											
8	22CHO11	Smart and Functional Materials	✓	1					✓	✓	1			✓		
8	22FTO04	Food Ingredients	✓	1	1			✓		✓		✓		✓		
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								✓	✓	✓		✓		
5	22GEO03	Design Thinking for Engineers	✓	✓	✓	✓										
6	22GEO04	Innovation and Business Model Development	✓	~	~	~	~	~	~	~	~	~	~	~		
ALL	22GEO05	German Language Level 2								✓	✓	✓		✓		

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

B.Tech - INFORMATION TECHNOLOGY CURRICULU	JM – R2022
(For the students admitted in the academic year	<mark>2022-23</mark>)

SEMESTER										
Course	Course Title	Hou We	urs / ek		Credit	Махіі	num I	Marks	Cate	
Code		L	т	Ρ	orean	СА	ES E	Total	gory	
Theory/Theo	ry 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	
22PHT18	Physics for Information Technology	3	0	0	3	40	60	100	BS	
22CSC12	Programming in C	3	0	2	4	50	50	100	PC	
22ITC11	Scientific Computing	2	0	2	3	50	50	100	ES	
22EET12	Basics of Electrical and Electronics Engineering	3	0	0	3	40	60	100	ES	
Practical / E	nployability Enhancement									
22EEL11	Basics of Electrical and Electronics Engineering Lab	0	0	2	1	60	40	100	ES	
22PHL18	Physics Laboratory for Information Technology	0	0	2	1	60	40	100	BS	
22MNT11	Student Induction Program				0	100	0	100	MC	
Total Credits	s to be earned		22							

SEMESTER	- 11								
Course	Course Title	Hou We	ırs / ek		Credit	Maxiı	mum l	Varks	Cate
Code		L	т	Р	e. our	CA	ES E	Total	gory
Theory/Theo	ory with Practical								
22EGT21	Communication Skills - II	3	0	0	3	40	60	100	HS
22MAC23	Probability and Statistics	3	1*	2*	4	50	50	100	BS
22CYT28	Chemistry for Information Technology	3	0	0	3	40	60	100	BS
22ITC21	Data Structures	3	0	2	4	50	50	100	PC
22ITC22	Object Oriented Programming	3	0	2	4	50	50	100	PC
22ITT21	Digital Logic Principles and Design	3	0	0	3	40	60	100	ES
22TAM01	Heritage of Tamils	1	0	0	1	100	0	100	HS
Practical / E	mployability Enhancement								
22MEL11	Engineering Practices Laboratory	0	0	2	1	60	40	100	ES
22CYL12	Chemistry Laboratory for Computer Systems	0	0	2	1	60	40	100	BS
22VEC11	Yoga and Values for Holistic Development	1	0	1	1	100	0	100	HS
Total Credits	s to be earned		25						

*Alternate weeks

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SEMESTER	- 111								
Course	Course Title	Hou We	urs / ek		Credit	Maxin	num Ma	rks	Cate
Code		L	Т	Ρ		СА	ESE	Total	gory
Theory/Th	ory with Practical								
22ITT31	Design and Analysis of Algorithms	3	0	0	3	40	60	100	PC
22ITT32	Python Programming and Frameworks	3	0	0	3	100	0	100	PC
22ITT33	Computer Organization	3	1	0	4	40	60	100	PC
22ITT34	Information Theory and Coding	3	1	0	4	40	60	100	ES
22EIT35	Microprocessors and Embedded Systems	3	0	0	3	40	60	100	ES
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 / E	mployability Enhancement								
22ITL31	Design and Analysis of Algorithms Laboratory	0	0	2	1	60	40	100	PC
22ITL32	Python Programming and Frameworks Laboratory	0	0	2	1	100	0	100	PC
22EIL33	22EIL33 Digital Logic and Microprocessors Laboratory			2	1	60	40	100	ES
Total Credit	al Credits to be earned								

SEMESTER	– IV								
Course	Course Title	Ηοι	urs / V	Veek	Credit	Maxi	mum M	arks	Cate
Code		L	Т	Р		CA	ESE	Total	gory
Theory/Th	ory with Practical								
22MAT43	Discrete Mathematics	3	1	0	4	40	60	100	BS
22ITT41	Database Management Systems	3	0	0	3	40	60	100	PC
22ITT42	Web Technology	3	0	0	3	40	60	100	PC
22ITT43	Formal Languages and Automata Theory	3	0	0	3	40	60	100	PC
22ITT44	Operating Systems	3	1	0	4	40	60	100	PC
Practical / E	mployability Enhancement								
22ITL41	Database Management Systems Laboratory	0	0	2	1	60	40	100	PC
22ITL42	Web Technology Laboratory	0	0	2	1	60	40	100	PC
22GEL41	Professional Skills Training - I	0	0	80	2	100	0	100	EC
22EGL31	22EGL31 Communication Skills Development Laboratory			2	1	60	40	100	HS
Total Credit	s to be earned				22				

SEMESTE	R–V								
Course	Course Title	Hou	rs/Week		Credit	Maxim	um Mark	S	Cate
Code		L	Т	Р		CA	ESE	Total	gory
Theory/Th	eory with Practical								
22ITT51	Computer Networks	3	0	0	3	40	60	100	PC
22ITT52	Machine Learning	3	0	0	3	40	60	100	PC
22ITC51	Software Engineering	3	0	2	4	50	50	100	PC
22ITC52	User Interface Design	3	0	2	4	50	50	100	PC
	Professional Elective - I	3	0	0	3	40	60	100	PE
	Open Elective - I	3	1/0	0/2	4	40/50	60/50	100	OE
Practical/E	mployability Enhancement								
22ITL51	Networks Laboratory	0	0	2	1	60	40	100	PC
22ITL52	Machine Learning Laboratory	0	0	2	1	60	40	100	PC
22GEL51	Professional Skills Training II	0	0	80	2	100	0	100	EC
Т	otal Credits to be earned				25				

SEMESTER	R–VI								
Course	Course Title	Hours	/Week		Credit	Maxim	um Mark	s	Cate
Code		L	Т	Р		CA	ESE	Total	gory
Theory/The	eory with Practical								
22ITT61	Devops	3	0	0	3	40	60	100	PC
22ITT62	Mobile Communication	3	0	0	3	40	60	100	ES
	Professional Elective - II	3	0	0	3	40	60	100	PE
	Open Elective - II	3	1/0	0/2	4	40/50	60/50	100	OE
Practical /	Employability Enhancement								
22ITL61	Cloud Computing Laboratory	0	0	2	1	60	40	100	PC
22ITL62	Internet of Things Laboratory	0	0	2	1	60	40	100	ES
22ITP61	Project Work I	0	0	8	4	100	0	100	EC
22MNT31	Environmental Science	2	0	0	0	100	0	100	MC
22GEP61	Comprehensive Test and Viva				2	100	0	100	EC
1	otal Credits to be earned				21				

SEMESTE	R–VII								
Course	Course Title	Hours/	Week		Credit	Maxim	um Ma	irks	Cate
Code		L	Т	Р		CA	ESE	Total	gory
Theory / T	heory with Practical								
22GET71	Engineering Economics and Management	3	0	0	3	40	60	100	HS
	Professional Elective-III	3	0	0	3	40	60	100	PE
	Professional Elective–IV	3	0	0	3	40	60	100	PE
	Professional Elective–V	3	0	0	3	40	60	100	PE
	Open Elective-III	3	0	0	3	40	60	100	OE
Practical/	Employability Enhancement								
22ITP71	Project Work II Phase I	0	0	10	5	50	50	100	EC
	Total Credits to be earned				20				

SEMESTE	R– VIII								
Course	Course Title	Hours/V	Veek		Credit	Maxim	um Ma	irks	Cate
Code		L	Т	Р		CA	ESE	Total	gory
Theory/Th	neory 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								
22ITP81	Project Work II Phase II	0	0	8	4	50	50	100	EC
	Total Credits to be earned				10				

Total Credits: 168

LIST OF PROFESSIONAL ELECTIVE COURSES

Course Code	Course Name L		т	Ρ	С	Domain/Stream			
	Semester V								
	Elective I								
22ITE01	Computer Graphics	3	0	0	3	AP			
22ITE02	Search Methods for Problem Solving	3	0	0	3	CI			
22ITE03	Game Design and Development	3	0	0	3	NW			
22ITE04	Big Data Analytics	3	0	0	3	CI			
22ITE05	Information Security Principles	3	0	0	3	GE			
22ITE06	Algorithmic Thinking in Bioinformatics	3	0	0	3	CI			
22ITE07	Design Thinking	3	0	0	3	GE			
22ITE08	Enterprise Application Development using Java	2	0	2	3	AP			
	Semester VI								
	Elective II								
22ITE09	3D Modelling and Mixed Reality Applications	3	0	0	3	AP			
22ITE10	Knowledge Representation	3	0	0	3	CI			
22ITE11	5G Wireless Networks	3	0	0	3	NW			
22ITE12	Cryptography and Network Security	3	0	0	3	NS			
22ITE13	Deep Learning	3	0	0	3	CI			
22ITE14	Coding and Security	3	0	0	3	AP			
	Semester VII								
	Elective III								
22ITE15	Digital Image Processing for Computer Vision	3	0	0	3	AP			
22ITE16	Software Testing	3	0	0	3	SD			
22ITE17	Native Mobile Application Development	3	0	0	3	SD			
22ITE18	Software Defined Networks	3	0	0	3	NW			
22ITE19	Video Analytics	3	0	0	3	CI			
22ITE20	Contemporary Cryptography	3	0	0	3	NS			
22GEE01	Fundamentals of Research	3	0	0	3	GE			
	Elective IV								
22ITE21	Ethical Hacking	3	0	0	3	NS			
22ITE22	Natural Language Processing	3	0	0	3	CI			
22ITE23	Social Network Analysis	3	0	0	3	CI			
22ITE24	Mobile and Wireless Security	3	0	0	3	NS			
	Elective V								
22ITE25	Cyber Forensics	3	0	0	3	NS			
22ITE26	Multicore Architecture	0	0	3	AP				

22ITE27	Business Intelligence and its Applications	3	0	0	3	CI
22ITE28	Constraint Satisfaction Problem	3	0	0	3	CI
22GEE02	Total Quality Management	3	0	0	3	GE
22ITE29	Computer Security Audit and Assurance	3	0	0	3	NS
	Semester VIII					
	Elective VI					
22ITE30	Building Enterprise Applications	3	0	0	3	SD
22ITE31	Web Application Security	3	0	0	3	NS
22ITE32	Wireless Sensor Networks	3	0	0	3	NW
22ITE33	Realtime Programming for Embedded Systems	3	0	0	3	AP
22ITE34	Information Storage and Management	3	0	0	3	AP
22ITE35	Software Project Management	3	0	0	3	SD
	Total credits to be earned				18	

SEMESTER – I											
Course Code	Course Title	Hours / Week			Credit	Maximum Marks			Cate		
			т	Ρ	orean	CA	ES E	Total	gory		
Theory/Theory with Practical											
22EGT11	Communication Skills - I	3	0	0	3	40	60	100	HS		
22MAC11	22MAC11 Matrices and Ordinary Differential Equations		1*	2*	4	50	50	100	BS		
22CYT28	Chemistry for Information Technology	3	0	0	3	40	60	100	BS		
22CSC12	Programming in C	3	0	2	4	50	50	100	PC		
22ITC11	Scientific Computing	2	0	2	3	50	50	100	ES		
22TAM01	Heritage of Tamils	1	0	0	1	100	0	100	HS		
Practical / Er	nployability Enhancement										
22GCL11	Foundation Laboratory – Manufacturing, Design and Robotics	0	0	6	3	100	0	100	ES		
22CYL12	Chemistry Laboratory for Computer Systems	0	0	2	1	60	40	100	BS		
22MNT11	Student Induction Program				0	100	0	100	MC		
Total Credits to be earned											

SEMESTER – II											
Course Code	Course Title	Hours / Week			Credit	Maximum Marks			Cate		
			т	Ρ	orean	СА	ES E	Total	gory		
Theory/Theory with Practical											
22EGT21	Communication Skills - II	3	0	0	3	40	60	100	HS		
22MAC23	22MAC23 Probability and Statistics		1*	2*	4	50	50	100	BS		
22PHT18	PHT18 Physics for Information Technology		0	0	3	40	60	100	BS		
22ITT21	1 Digital Logic Principles and Design		0	0	3	40	60	100	ES		
22ITC22	Object Oriented Programming	3	0	2	4	50	50	100	PC		
22TAM02	Tamils and Technology	1	0	0	1	100	0	100	HS		
Practical / E	mployability Enhancement										
22GCL12	Foundation Laboratory – Electrical, IoT and Web	0	0	6	3	100	0	100	ES		
22PHL18	Physics Laboratory for Information Technology	0	0	2	1	60	40	100	BS		
22VEC11	22VEC11 Yoga and Values for Holistic Development 1				1	100	0	100	HS		
	Total Credits to be earned										

*Alternate weeks

SEMESTER – III											
Course Code	Course Title	Hours / Week			Credit	Maxin	num Ma	Cate			
			Т	Ρ		CA	ESE	Total	gory		
Theory/Theory with Practical											
22ITC32	Data Structures using Java	3	0	2	4	50	50	100	PC		
22EIT35	Microprocessors and Embedded Systems	3	0	0	3	40	60	100	ES		
22ITT32	Python Programming and Frameworks	3	0	0	3	100	0	100	PC		
22ITT33	Computer Organization	3	1	0	4	40	60	100	PC		
22ITT34	Information Theory and Coding	3	1	0	4	40	60	100	ES		
22GET31	Universal Human Values	2	0	0	2	100	0	100	HS		
Practical / E	mployability Enhancement										
22ITL32	Python Programming and Frameworks Laboratory	0	0	2	1	100	0	100	PC		
22EIL33	Digital Logic and Microprocessors Laboratory	0	0	2	1	60	40	100	ES		
	Total Credits to be earned										

SEMESTER – IV											
Course Code	Course Title	Hours / Week			Credit	Maxi	mum M	Cate			
			Т	Р		CA	ESE	Total	gory		
Theory/Theory with Practical											
22MAT43	Discrete Mathematics	3	1	0	4	40	60	100	BS		
22ITT41	Database Management Systems	3	0	0	3	40	60	100	PC		
22ITT42	Web Technology	3	0	0	3	40	60	100	PC		
22ITT31	Design and Analysis of Algorithms	3	0	0	3	40	60	100	PC		
22ITT44	Operating Systems	3	1	0	4	40	60	100	PC		
Practical / E	mployability Enhancement										
22ITL41	Database Management Systems Laboratory	0	0	2	1	60	40	100	PC		
22ITL42	Web Technology Laboratory	0	0	2	1	60	40	100	PC		
22GEL41	Professional Skills Training - I	0	0	80	2	100	0	100	EC		
22EGL31	Communication Skills Development Laboratory	0	0	2	1	60	40	100	HS		
Total Credits to be earned					22						

SEMESTE	R–V								
Course	Course Title	Hours/	Veek		Credit	Maximun	Cate		
Code		L	Т	Р		CA	ESE	Total	gory
Theory/Th	eory with Practical								
22ITT51	Computer Networks	3	0	0	3	40	60	100	PC
22ITT52	Machine Learning	3	0	0	3	40	60	100	PC
22ITC51	Software Engineering	3	0	2	4	50	50	100	PC
22ITC52	User Interface Design	3	0	2	4	50	50	100	PC
	Professional Elective I	3	0	0	3	40	60	100	PE
	Open Elective - I	3	1/0	0/2	4	40/50	60/50	100	OE
Practical/E	mployability Enhancement								
22ITL51	Networks Laboratory	0	0	2	1	60	40	100	PC
22ITL52	Machine Learning Laboratory	0	0	2	1	60	40	100	PC
22GEL51	Professional Skills Training II	0	0	80	2	100	0	100	EC
· ·	Total Credits to be earned				25				

SEMESTER-VI												
Course	Course Title		/Week		Credit	Maxin	Cate					
Code		L	Т	Р		CA	ESE	Total	gory			
Theory/Theory with Practical												
22ITT61	Devops	3	0	0	3	40	60	100	PC			
22ITT62	Mobile Communication	3	0	0	3	40	60	100	ES			
	Professional Elective - II	3	0	0	3	40	60	100	PE			
	Open Elective - II	3	1/0	0/2	4	40/ 50	60/ 50	100	OE			
Practical /	Employability Enhancement											
22ITL61	Cloud Computing Laboratory	0	0	2	1	60	40	100	PC			
22ITL62	Internet of Things Laboratory	0	0	2	1	60	40	100	ES			
22ITP62	Project Work I	0	0	10	5	100	0	100	EC			
22MNT31	Environmental Science	2	0	0	0	100	0	100	MC			
22GEP61	Comprehensive Test and Viva				2	100	0	100	EC			
	Total Credits to be earned				22							
B.Tech - INFORMATION TECHNOLOGY CURRICULUM – R2022 (For the students admitted in the academic year 2023-24)

SEMESTE	R-VII								
Course	Course Title	Hours/Week			Credit	Maxim	Cate		
Code		L	Т	Р		CA	ESE	Total	gory
Theory / Theory with Practical									
22GET71	Engineering Economics and Management	3	0	0	3	40	60	100	HS
22ITT71	Blockchain Technology	3	1	0	4	40	60	100	PC
	Professional Elective-III	3	0	0	3	40	60	100	PE
	Professional Elective-IV	3	0	0	3	40	60	100	PE
	Open Elective-III	3	0	0	3	40	60	100	OE
Practical/Employability Enhancement									
22ITP72	Project Work II Phase I	0	0	12	6	50	50	100	EC
	Total Credits to be earned				22				

SEMESTE	SEMESTER-VIII										
Course	Course Title	Hours/V	Hours/Week			Maxim	Cate				
Code		L	Т	Р		CA	ESE	Total	gory		
Theory/Th	neory with Practical										
	Professional Elective-V	3	0	0	3	40	60	100	PE		
	Open Elective-IV	3	0	0	3	40	60	100	OE		
Practical/	Employability Enhancement										
22ITP81	Project Work II Phase II	0	0	8	4	50	50	100	EC		
	Total Credits to be earned				10						

Total Credits: 168

B.Tech - INFORMATION TECHNOLOGY CURRICULUM – R2022 (For the students admitted in the academic year 2023-24)

LIST OF PROFESSIONAL ELECTIVE COURSES

Course Code	Course Name	L	т	Р	С	Domain/Stream
	Semester V					
	Elective I					
22ITE01	Computer Graphics	3	0	0	3	AP
22ITE02	Search Methods for Problem Solving	3	0	0	3	CI
22ITE03	Game Design and Development	3	0	0	3	NW
22ITE04	Big Data Analytics	3	0	0	3	CI
22ITE05	Information Security Principles	3	0	0	3	GE
22ITE06	Algorithmic Thinking in Bioinformatics	3	0	0	3	CI
22ITE07	Design Thinking	3	0	0	3	GE
22ITE08	Enterprise Application Development using Java	2	0	2	3	AP
	Semester VI					
	Elective II					
22ITE09	3D Modelling and Mixed Reality Applications	3	0	0	3	AP
22ITE10	Knowledge Representation	3	0	0	3	CI
22ITE11	5G Wireless Networks	3	0	0	3	NW
22ITE12	Cryptography and Network Security	3	0	0	3	NS
22ITE13	Deep Learning	3	0	0	3	CI
22ITE14	Coding and Security	3	0	0	3	AP
	Semester VII					
	Elective III					
22ITE15	Digital Image Processing for Computer Vision	3	0	0	3	AP
22ITE16	Software Testing	3	0	0	3	SD
22ITE17	Native Mobile Application Development	3	0	0	3	SD
22ITE18	Software Defined Networks	3	0	0	3	NW
22ITE19	Video Analytics	3	0	0	3	CI
22ITE20	Contemporary Cryptography	3	0	0	3	NS
22GEE01	Fundamentals of Research	3	0	0	3	GE
	Elective IV					
22ITE21	Ethical Hacking	3	0	0	3	NS
22ITE22	Natural Language Processing	3	0	0	3	CI
22ITE23	Social Network Analysis	3	0	0	3	CI
22ITE24	Mobile and Wireless Security	3	0	0	3	NS
22ITE25	Cyber Forensics	3	0	0	3	NS
22ITE26	Multicore Architecture	3	0	0	3	AP
22ITE27	Business Intelligence and its Applications	3	0	0	3	CI

22ITE28	Constraint Satisfaction Problem	3	0	0	3	CI
22GEE02	Total Quality Management	3	0	0	3	GE
22ITE29	Computer Security Audit and Assurance	3	0	0	3	NS
	Semester VIII					
	Elective V					
22ITE30	Building Enterprise Applications	3	0	0	3	SD
22ITE31	Web Application Security	3	0	0	3	NS
22ITE32	Wireless Sensor Networks	3	0	0	3	NW
22ITE33	Realtime Programming for Embedded Systems	3	0	0	3	AP
22ITE34	Information Storage and Management	3	0	0	3	AP
22ITE35	Software Project Management	3	0	0	3	SD
	Total credits to be earned				15	

	OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS (OE)										
S. No.	Course Code	Course Name L T P C Sem									
1.	22ITO01	Artificial Intelligence	3	1	0	4	V				
2.	22ITX01	Next Generation Databases	3	0	2	4	V				
3.	22GEX02	NCC Studies (Air Wing) - 1	3	1	0	4	V				
4.	22ITX02	Advanced Java Programming	3	0	2	4	VI				
5.	22ITO02	Internet of Things	3	1	0	4	VI				
6.	22ITO03	Fundamentals of Software Development	3	1	0	4	VI				
7.	22ITO04	Mobile Application Development	3	1	0	4	VI				
8.	22ITO05	Fundamentals of Cloud Computing	3	0	0	3	VII				
9.	22ITO06	Introduction to Ethical Hacking	3	0	0	3	VII				
10.	22ITO07	Business Continuity Planning	3	0	0	3	VIII				
	Total Credits to be earned 14										

B.Tech - INFORMATION TECHNOLOGY CURRICULUM – R2022

	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.	22CDO01	Fundamentals of User Experience Design	3	1	0	4	CSD
24.	22ADO01	Data Warehousing and Data Mining	3	1	0	4	AIDS
25.	22ALO01	Business Intelligence	3	1	0	4	AIML
26.	22CHO01	Industrial Enzymology	3	1	0	4	CHEM
27.	22CHO02	Waste to Energy Conversion	3	1	0	4	CHEM
28.	22CHO03	Applied Nanotechnology	3	1	0	4	CHEM
29.	22FTX01	Baking Technology	3	0	2	4	FT
30.	22FTO01	Food Processing Technology	3	1	0	4	FT
31.	22MAO01	Mathematical Foundations for Machine Learning	3	1	0	4	MATHS
32.	22MAO02	Numerical Computing	3	1	0	4	MATHS
33.	22MAO03	Stochastic Processes and Queuing Theory	3	1	0	4	MATHS
34.	22MAO04	Statistics for Engineers	3	1	0	4	MATHS
35.	22PHO01	Thin Film Technology	3	1	0	4	PHYSICS
36.	22PHO02	High Energy Storage Devices	3	1	0	4	PHYSICS
37.	22PHO03	Structural and Optical Characterization of Materials	3	1	0	4	PHYSICS
38.	22CYO01	Instrumental Methods of Analysis	3	1	0	4	CHEMISTRY
39.	22CYO02	Chemistry Concepts for Competitive Examinations	3	1	0	4	CHEMISTRY
40.	22CYO03	Organic Chemistry for Industry	3	1	0	4	CHEMISTRY

		SEMESTER VI					
41.	22CEO01	Disaster Management	3	1	0	4	CIVIL
42.	22MEX02	Design of Experiments	3	0	2	4	MECH
43.	22MTO02	Robotics	3	1	0	4	MTS
44.	22MTO03	3D Printing and Design	3	1	0	4	MTS
45.	22AUO01	Automotive Electronics	3	1	0	4	ECE
46.	22ECX03	PCB Design and Fabrication	3	0	2	4	ECE
47.	22EEO07	Energy Conservation and Management	3	1	0	4	EEE
48.	22EEO08	Microprocessors and Microcontrollers Interfacing	3	1	0	4	EEE
49.	22EEO09	Electrical Safety	3	1	0	4	EEE
50.	22EEO10	VLSI System Design	3	1	0	4	EEE
51.	22EEO11	Automation for Industrial Applications	3	1	0	4	EEE
52.	22EIO04	PLC Programming with High Level Languages	3	1	0	4	EIE
53.	22EIO05	Virtual Instrumentation	3	1	0	4	EIE
54.	22CSX04	Foundations of Machine Learning	3	0	2	4	CSE
55.	22CSX05	Web Engineering	3	0	2	4	CSE
56.	22CDX01	Fundamentals of User Interactive Design	3	0	2	4	CSD
57.	22ADX01	Data Visualization	3	0	2	4	AIDS
58.	22ALX01	Data Exploration and Visualization Techniques	3	0	2	4	AIML
59.	22CHO04	Air Pollution Monitoring and Control	3	1	0	4	CHEM
60.	22CHO05	Paints and Coatings	3	1	0	4	CHEM
61.	22CHO06	Powder Technology	3	1	0	4	CHEM
	22FTX02	Processing of milk and milk products	3	0	2	4	FT
	22FTX03	Processing of Fruits and Vegetables	3	0	2	4	FT
62.	22MAO05	Graph Theory and its Applications	3	1	0	4	MATHS
63.	22MAX01	Data Analytics using R Programming	3	0	2	4	MATHS
64.	22MAO06	Operations Research	3	1	0	4	MATHS
65.	22MAO07	Number Theory and Cryptography	3	1	0	4	MATHS
66.	22PHO04	Synthesis, Characterization and Biological Applications of Nanomaterials	3	1	0	4	PHYSICS

67.	22PHO05	Techniques of Crystal Growth	3	1	0	4	PHYSICS
68.	22CYO04	Corrosion Science and Engineering	3	1	0	4	CHEMISTRY
69.	22CYO05	Chemistry of Cosmetics in Daily Life	3	1	0	4	CHEMISTRY
70.	22CYO06	Nanocomposite Materials	3	1	0	4	CHEMISTRY
		SEMESTER VII					
71.	22CEO02	Introduction to Smart Cities	3	0	0	3	CIVIL
72.	22CEO03	Environmental Health and Safety	3	0	0	3	CIVIL
73.	22MEO01	Fundamentals of Ergonomics	3	0	0	3	MECH
74.	22MEO02	Principles of Management and Industrial Psychology	3	0	0	3	MECH
75.	22MEO03	Waste Heat Recovery System and Storage	3	0	0	3	MECH
76.	22MTO04	Drone System Technology	3	0	0	3	MTS
77.	22AUO02	Vehicle Maintenance	3	0	0	3	AUTO
78.	22ECO01	Wearable Devices	3	0	0	3	ECE
79.	22ECX04	Electronic Hardware and Troubleshooting	2	0	2	3	ECE
80.	22EEO12	Electric Vehicle	3	0	0	3	EEE
81.	22EEO13	E-Waste Management	3	0	0	3	EEE
82.	22EEO14	Embedded System Design	3	0	0	3	EEE
83.	22EEO15	Energy Storage Systems and Controllers	3	0	0	3	EEE
84.	22EEO16	AI Techniques for Engineering Applications	3	0	0	3	EEE
85.	22EIO06	Introduction to Distributed Control Systems	3	0	0	3	EIE
86.	22EIO07	Instrumentation in Aircraft Navigation and Control	3	0	0	3	EIE
87.	22EIO08	Industry 4.0 with Industrial IoT	3	0	0	3	EIE
88.	22EIO09	Industrial Data Communication	3	0	0	3	EIE
89.	22EIO10	Wireless Instrumentation	3	0	0	3	EIE
90.	22EIO11	Instrumentation Techniques in Agriculture	3	0	0	3	EIE
91.	22CSO03	Nature Inspired optimization techniques	3	0	0	3	CSE
92.	22CDO02	Introduction to Mobile Game Design	3	0	0	3	CSD
93.	22CDO03	Introduction to Graphics Design	3	0	0	3	CSD

94.	22ADO02	Neural Networks and Deep Learning	3	0	0	3	AIDS
95.	22ALO02	Industrial Machine Learning	3	0	0	3	AIML
96.	22CHO07	Hydrogen Energy	3	0	0	3	CHEM
97.	22CHO08	Rubber Technology	3	0	0	3	CHEM
98.	22FTO02	Principles of Food safety	3	0	0	3	FT
99.	22FTO03	Fundamentals of Food Packaging and Storage	3	0	0	3	FT
100.	22MAO08	Non-Linear Optimization	3	0	0	3	MATHS
101.	22MAO09	Optimization for Engineers	3	0	0	3	MATHS
102.	22CYO07	Waste and Hazardous Waste Management	3	0	0	3	CHEMISTRY
103.	22CYO08	Chemistry in Every day Life	3	0	0	3	CHEMISTRY
		SEMESTER VIII					
104.	22CEO04	Infrastructure Planning and Management	3	0	0	3	CIVIL
105.	22CEO05	Environmental Laws and Policy	3	0	0	3	CIVIL
106.	22MEO04	Safety Measures for Engineers	3	0	0	3	MECH
107.	22MEO05	Energy Conservation in Thermal Equipments	3	0	0	3	MECH
108.	22MEO06	Climate Change and New Energy Technology	3	0	0	3	MECH
109.	22MTO05	Micro and Nano Electromechanical Systems	3	0	0	3	MTS
110.	22AUO03	Public Transport Management	3	0	0	3	ECE
111.	22AUO04	Autonomous Vehicles	3	0	0	3	ECE
112.	22ECO02	Optical Engineering	3	0	0	3	EEE
113.	22EEO17	Smart Grid Technologies	3	0	0	3	EEE
114.	22EEO18	Biomass Energy Systems	3	0	0	3	EEE
115.	22EIO12	Environmental Sensors	3	0	0	3	EIE
116.	22EIO13	Pollution Control and Management	3	0	0	3	EIE
117.	22CSO04	Machine Translation	3	0	0	3	CSE
118.	22CSO05	Fundamentals of Blockchain	3	0	0	3	CSE
119.	22CDX02	Virtual Reality and Augmented Reality	3	0	0	3	CSD
120.	22ADO03	Business Analytics	3	0	0	3	AIDS
121.	22ALO03	Machine Learning for Smart Cities	3	0	0	3	AIML
122.	22CHO09	Industrial Accident Prevention and Management	3	0	0	3	CHEM
123.	22CHO10	Electrochemical Engineering	3	0	0	3	CHEM

124.	22CHO11	Smart and Functional Materials	3	0	0	3	CHEM
125.	22FTO04	Food Ingredients	3	0	0	3	FT
126.	22FTO05	Food and Nutrition	3	0	0	3	FT
127.	22CYO09	Chemistry of Nutrition for Women Health	3	0	0	3	CHEMISTRY

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

SNo	Course Code	Course Title	L	Т	Р	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

22EGT11 - COMMUNICATION SKILLS I										
(Common to All Engineering and Technology Branches)										
Progran Branch	nme &	All B.E./B.Tech. Branches	Sem.	Category	L	т	Ρ	Credit		
Prerequ	uisites	Nil	I	HS	3	0	0	3		
Preamble This course is designed to impart required levels of Communication Skills and Proficiency in English language necessary for different professional contexts.										
Unit – I Grammar, Vocabulary, Listening, Speaking, Reading & Writing 9										
Grammar: Parts of speech - Tenses - Types of sentences: Assertive, Imperative, Interrogative & Exclamatory – Affirmative & Negative - Gerunds & Infinitives - Vocabulary: Affixes - Synonyms & Antonyms - Listening: Types of listening - Barriers to listening - Listening to short talks - TV shows - Speaking: Verbal & Non-verbal communication - Pair conversation - Role play - Reading: Types of Reading – Intensive: scanning, word by word, survey - Writing: Dialogue writing, Informal Letters - Paragraph writing										
Unit – II		Grammar, Vocabulary, Listening, Speaking, Reading & Writing	0 1 1		later			y topos st		
Grammar: Voices - Impersonal passives - Vocabulary: Homonyms, Homophones & Homographs - Listening: Importance of listening - Listening to announcements & radio broadcasts - Speaking: Persuasive & Impromptu talks - Narrating a story - Reading: Reading comprehension - Articles from Newspapers/Magazines - Cloze exercises - Writing: Essay writing, Jumbled sentences										
Unit – II		Grammar, Vocabulary, Listening, Speaking, Reading & Writing	l					9		
Grammar: Prepositions - Vocabulary: Compound Nouns - Listening: Listening to TED Talks, Commentaries - Speaking: Self Introduction - Reading: Extensive: speed, skimming - Identifying lexical & contextual meanings - Writing: Instructions & Warnings - Formal letters: Seeking permission for Industrial visits & Inviting guests										
Unit – IV Grammar, Vocabulary, Listening, Speaking, Reading & Writing 9										
Gramma Listenin Paraphra orders	ar: Article ng: Listenir asing & Su	s & Determiners - Vocabulary: Technical Vocabulary - Analogy ng to conversations - Speaking: Tongue twisters - Skill Sharing mmarizing - Writing: Recommendations & Suggestions - Business le	- Unscr - N etters: E	ambling word ote-taking - I nquiry, Callin	ls - L Readin g for qu	ogica I g: N Iotati	al rea lote r ons &	soning - naking - & placing		
Unit – V	1	Grammar, Vocabulary, Listening, Speaking, Reading & Writing	g					9		
Gramma persona - IELTS	ar: Cause lities - Sp type passa	and effect expressions - Vocabulary: Abbreviations & acronyms eaking: Commonly mispronounced words - Welcome address, Chie ages - Writing: Preparing transcript for a speech - Interpreting news	, Definit ef guest articles	ions Listenin address & Vo & advertisem	ng: Lis ote of ti ents	tenin hank	g to s - I	eminent Reading		
								Total:45		
TEXT B	OOK:									
1. Sanjay Kumar & Pushp Lata, "Communication Skills", 2 nd Edition, Oxford University Press, New Delhi, 2018.										
REFERENCES:										
1. Ashraf Rizvi, "Effective Technical Communication", 2 nd Edition, McGraw-Hill India, 2017.										
2. S. P. Dhanavel, "English and Communication Skills for Students of Science and Engineering", Orient BlackSwan Publishers, Hyderabad, 2009.										
3.	Jack C. Ri 2014.	chards and Chuck Sandy, "Passages" Student's Book 1, 3 rd Edition,	Cambrid	dge Universit	y Press	s, Ne	w Yo	rk,		

COURS On cor	COURSE OUTCOMES:BT MappedOn completion of the course, the students will be able to(Highest Level)															
CO1	use lan	iguage	e effectively	by ac	cquirin	g vocab	oulary	and s	syntax in o	context			Ap	plying (K	3)	
CO2	listen a	ind co	mprehend d	liffere	nt spo	ken diso	course	es fro	m a varie	ty of situatio	ons		Ap	plying (K	3)	
CO3	speak confidently in different professional contexts and with peers Creating (K6)															
CO4	comprehend different genres of texts by adopting various reading strategies Understanding (K2)															
CO5	CO5 write legibly and flawlessly at varied professional contexts proficiently with appropriate choice of words and structures Creating (K6)															
COs/P(001	PO2	PC	13		ping o					POQ	PO10	PO11	PO12	
CO3/F	JS F	01	FU2	FU	,3	FU4	FC	,,	F00	FUI	FUO	FU3		FUIT	1	
001									2			1	3	1	1	
CO2												2	3		1	
CO3												2	3		2	
CO4									1				3	1	1	
CO5													3		2	
1 – Slig	ht, 2 – N	Noder	ate, 3 – Sub	stant	ial, BT	- Bloom	n's Ta	xonor	ny							
						ASS	ESSN	IENT	PATTER	N – THEOF	RY					
/ Test Cat	t / Bloom's Remembering Understanding Applying Analyzing Evaluating (K1) % (K2) % (K3) % (K4) % (K5) % (K6) % Total %									tal %						
C	AT1					37			30				33	33 100		
C	AT2					30			30				40 100			
C	AT3					33			34				33			
I	ESE					17			63				20		100	
* ±3% r	* ±3% may be varied (CAT 1.2.3 – 50 marks & ESE – 100 marks)															

22MAC11 - MATRICES AND ORDINARY DIFFERENTIAL EQUATIONS										
(Common to all Engineering and Technology branches)										
Progra Branch	mme & N	All BE/BTech Branches	Sem.	Category	L	Т	Р	Credit		
Prereq	uisites	Nil	1	BS	3	1*	2 *	4		
Pream	ble	To provide the skills to the students for solving different ordinary differential equations.	nt real tim	e problems b	y ap	plyin	g ma	trices and		
Unit –	<u> </u>	Matrices:						9+3		
Introduction – Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) – Cayley – Hamilton theorem (Statement and applications only) - Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Nature of Quadratic forms - Reduction of quadratic form to canonical form by orthogonal transformation – Applications of Eigen values and Eigen vectors: Stretching of an elastic membrane. Unit – II Ordinary Differential Equations: 9 Introduction – Solutions of First order differential equations: Exact differential equations – Leibnitz's Linear Equation – Bernoulli's equation – Applications: Law of natural growth and decay.										
Unit –		Ordinary Differential Equations of Higher Order:						9		
Linear (– co coefficio	inear differential equations of second and higher order with constant coefficients - Particular Integrals for the types: e ^{ax} cosax / sinax - x ⁿ - e ^{ax} x ⁿ , e ^{ax} sinbx and e ^{ax} cosbx - x ⁿ sinax and x ⁿ cosax - Differential Equations with variable coefficients: Euler-Cauchy's equation - Legendre's equation.									
Method	- IV Applications of Ordinary Differential Equations: 9									
differen to be gi	Method of variation of parameters – Simultaneous first order linear equations with constant coefficients – Applications of differential equations: Simple harmonic motion – Electric circuits (Differential equations and associated conditions need to be given)									
Unit – V Laplace Transform: 9										
Laplace integral functior Convol	e Transforn Is of transforn ns. Inverse ution theore	n: Conditions for existence – Transform of elementary forms –Transforms of derivatives and integrals – Transfor Laplace transform: Inverse Laplace transform of element em (Statement only) – Applications: Solution of linear OL	unctions m of unit nentary fu DE of sec	 Basic prop step function unctions – P ond order wit 	ertie – T artia h co	es – E ransf Il frac onstar	Derivation	atives and of periodic method – efficients.		
LIST O	F EXPERI	MENTS / EXERCISES:								
1.	Introducti	on to MATLAB								
2.	Computat	tion of eigen values and eigen vectors								
3.	Plotting a	nd visualizing single variable functions								
4.	Solving fi	rst and second order ordinary differential equations								
5.	Solution of	of Simultaneous first order ODEs								
6.	Solving se	econd order ODE by variation of parameters								
7.	Determini	ing Laplace and inverse Laplace transform of basic function	tions							
8. Solution of Second order ODE by employing Laplace transforms										
Lecture:45, Tutorials and Practical:15, Total:60										
1.	Ramana E Delhi, 201	8 V, "Higher Engineering Mathematics", 1% Edition, Tata N 8.	vicGraw-F	Hill Publishing	J COI	mpan	iy Lin	nited, New		
REFERENCES/ MANUAL / SOFTWARE:										
1.	1. Kreyszig E, "Advanced Engineering Mathematics ", 10 th Edition, John Wiley, New Delhi, India, 2016.									
2.	Kandasar Edition 20	ny P., Thilagavathy K. and Gunavathy K., "Engineering M 14, S.Chand and Co., New Delhi.	athematio	cs For First Ye	ear E	3.E/B	.Tecl	h", Reprint		

3.	Duraisamy C., Vengataasalam S., Arun Prakash K. and Suresh M., "Engineering Mathematics - I", 2 nd Edition, Pearson India Education, New Delhi, 2018.														
4.	Grewal B.S., "Higher Engineering Mathematics" 44thEdition, Khanna Publishers, New Delhi, 2018.														
5. Matrices and Ordinary Differential Equations Laboratory Manual.															
COURS	OURSE OUTCOMES: BT Mapped														
On con	completion of the course, the students will be able to (Highest Level)														
CO1	solve engineering problems which needs matrix computations. Applying (K3), Manipulation (S2)														
CO2	identify the appropriate method for solving first order ordinary differential equations.														
CO3	solve higher order linear differential equations with constant and variable coefficients. Applying (K3), Manipulation (S2)														
CO4	app eng	oly the gineeri	concep ng prob	ot of ordin lems.	nary diff	erential	equatio	ns for n	nodelin	g and fi	nding so	olutions to	o A Ma	pplying (nipulatio	K3), n (S2)
CO5	app	oly Lap	place Tr	ansform	to find	solution	s of Line	ear Ord	inary D	ifferent	ial Equat	ions	A Ma	pplying (nipulatio	K3), n (S2)
														•	, ,
					Ν	lapping	of CO	s with I	POs an	d PSO	S				
COs/Po	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3	2		3									
CO2		3	3	2		3									
CO3		3	3	2		3									
CO4	4 3 3 2 3														

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

3

3

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)									

*Alternate week

CO5

3

3

22PHT18 – PHYSICS FOR INFORMATION TECHNOLOGY

Program Branch	mme &	B.Tech- Information Technology	Sem.	Category	L	т	Ρ	Credit	
Prerequ	uisites	Nil	1/2	BS	3	0	0	3	
			1						
Preamble This course aims to impart the knowledge on oscillations & waves, lasers, fiber optics, conductors, semiconductors and smart materials. It also describes the applications of aforementioned topics in information technology.									
Unit – I		Oscillations and Waves:						9	
Periodic motion – Oscillations – Simple harmonic motion – Differential equation of simple harmonic motion – Forced oscillations – Damped oscillations – Application of simple harmonic motion in torsional pendulum, cantilever and LC circuit – Resonance – Waves – Equation of plane progressive wave – Types of progressive waves – Reflection and transmission of waves at a boundary (qualitative) – Energy transport of progressive waves.									
Unit – I		Conducting Materials:						9	
Conduc Lorentz function	Conductors – Classical free electron theory of metals – Electrical conductivity – Thermal conductivity – Wiedemann-Franz law – Lorentz number – Draw backs of classical free electron theory – Quantum free electron theory (qualitative) – Fermi distribution function – Effect of temperature on Fermi function – Density of energy states – Carrier concentration in metals.								
Unit – I	11	Semiconductors:						9	
Intrinsic semiconductor – Carrier concentration – Fermi level – Variation of conductivity with temperature – Determination of band gap – Extrinsic semiconductors – Carrier concentration in n-type and p-type semiconductors – Hall effect – Determination of Hall coefficient – Applications – Solar Cell: Principle, construction and working.									
COCINCIC								1	
Unit – ľ	V	Laser and Fiber Optics:						9	
Unit – I' Stimulat inversio fibers b displace	V ted absorption on – Pumping pased on refisement sensor	Laser and Fiber Optics: on – Spontaneous emission – Stimulated emission – Einstein' – CO ₂ laser – Holography – Fiber optics – Numerical aperture a ractive index, modes and materials – Fiber optics communications	's coeffic and acce ation sys	ients and the ptance angle stem (qualitat	eir re – Cl tive)	elatio assif – To	ns – icatio empe	9 Population n of optical rature and	
Unit – I Stimulat inversio fibers b displace Unit – V	V ted absorptic on – Pumping based on refi ement sensor V	Laser and Fiber Optics: on – Spontaneous emission – Stimulated emission – Einstein' – CO ₂ laser – Holography – Fiber optics – Numerical aperture a ractive index, modes and materials – Fiber optics communica 's. Smart Materials:	's coeffic and acce ation sys	tients and the ptance angle stem (qualitat	eir re – Cl tive)	elatio assif – To	ns – icatio empe	9 Population n of optical rature and 9	
Unit – I' Stimulat inversio fibers b displace Unit – V Metallic – Surfat beam lit Applicat	V ted absorption n – Pumping based on refreement sensor glasses: Pro ce-to-volume thography – tions.	Laser and Fiber Optics: on – Spontaneous emission – Stimulated emission – Einstein' – CO2 laser – Holography – Fiber optics – Numerical aperture a ractive index, modes and materials – Fiber optics communications: Smart Materials: perties, preparation and applications – Shape memory alloys: Caratio – Quantum confinement – Nanomaterials synthesis: Top Physical vapour deposition – Carbon nanotubes: Structures, press	s coeffic and acce ation sys haracter p-down a operties	tients and the ptance angle stem (qualitat istics and app and bottom-u , synthesis by	eir re – Cl tive) blicat p ap / las	elatio assif – To ions proa er ab	ns – icatio empe – Nar ches latior	9 Population n of optical rature and 9 nostructure – Electron n method –	
Unit – I' Stimulat inversio fibers b displace Unit – V Metallic – Surfat beam lit Applicat	V ted absorption n – Pumping based on refirement sensor J glasses: Pro ce-to-volume thography – tions.	Laser and Fiber Optics: on – Spontaneous emission – Stimulated emission – Einstein' – CO ₂ laser – Holography – Fiber optics – Numerical aperture a ractive index, modes and materials – Fiber optics communica 's. Smart Materials: perties, preparation and applications – Shape memory alloys: C e ratio – Quantum confinement – Nanomaterials synthesis: Top Physical vapour deposition – Carbon nanotubes: Structures, pr	s coeffic and acce ation sys haracter p-down a operties	ients and the ptance angle stem (qualitat istics and app and bottom-u , synthesis by	eir re – Cl tive) blicat p ap / las	elatio assif – To ions proa er ab	ns – icatio empe – Nar ches latior	9 Population n of optical rature and 9 nostructure – Electron n method – Total:45	
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COUR	SE OUTCOMES:	BT Mapped
On co	npletion of the course, the students will be able to	(Highest Level)
CO1	make use of the concepts of oscillatory and wave motion to comprehend the phenomena related to the propagation of elastic waves.	Applying (K3)
CO2	apply the concepts of classical and quantum free electron theory of metals to compute their electrical and thermal conductivities and to comprehend the effect of temperature on Fermi function and to derive the expressions for carrier concentration in metals using density of states.	Applying (K3)
CO3	use the concept of density of states to compute the carrier concentration, electrical conductivity and band gap of intrinsic semiconductors and to compute the carrier concentration of extrinsic semiconductors, and also to explain the Hall Effect and the working of solar cell.	Applying (K3)
CO4	apply the concepts of stimulated emission of radiation to explain the working and the applications of laser in engineering and technology. To apply the principle of propagation of light through optical fiber to compute acceptance angle and numerical aperture and to comprehend the loss in optical fiber and also to explain fiber optic communication system and the working of fiber optic sensors.	Applying (K3)
CO5	utilize appropriate methods to prepare metallic glasses, shape memory alloys, nanomaterials and carbon nano tubes and also to comprehend their properties and applications.	Applying (K3)
1		

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	3	2
CO2	3	2	2						2	2		2	3	2
CO3	3	2	2						2	2		2	3	2
CO4	3	2	2						2	2		2	3	2
CO5	3	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	15	40	45				100		
CAT2	15	40	45				100		
CAT3	20	50	30				100		
ESE	10	40	50				100		
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)									

ICommon to Computer Science and Engineering, Information Technology & Computer Science and Design Sem. Category L L T P Credit Branch BE - Computer Science and Design 1 BS 3 0 2 4 Prerequisites Nit The course aims to provide exposure to problem-solving through programming. It introduction to C and Control Statements: 9 9 Unit - I Introduction to C and Control Statements: 9 9 9 Introduction to C and Control Statements: 9 9 9 9 Introduction to C and Control Statements: 9 9 9 1 10	22CSC12 - PROGRAMMING IN C										
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 7. Programs to demonstrate modular programming concepts using functions (Using built-in and user-defined functions) 8. Programs to implement various character and string operations with and without built-in library functions. 9. Programs to demonstrate the use of pointers 10. Programs to illustrate the use of user-defined data types 11. Programs to implement various file operations 12. Programs to demonstrate the use of pre-processor directives Lecture:45, Practical:30, Total:75	6.	Programs for	or demonstrating two-dimensional arrays								
 Programs to implement various character and string operations with and without built-in library functions. Programs to demonstrate the use of pointers Programs to illustrate the use of user-defined data types Programs to implement various file operations Programs to demonstrate the use of pre-processor directives Lecture:45, Practical:30, Total:75	7.	Programs to	o demonstrate modular programming concepts using functions (Using bu	ilt-in and user	-de	efined	functio	ons)		
9. Programs to demonstrate the use of pointers 10. Programs to illustrate the use of user-defined data types 11. Programs to implement various file operations 12. Programs to demonstrate the use of pre-processor directives Lecture:45, Practical:30, Total:75	8.	Programs to	implement various character and string operations with and wit	hout buil	t-in library fur	ncti	ons.				
10. Programs to illustrate the use of user-defined data types 11. Programs to implement various file operations 12. Programs to demonstrate the use of pre-processor directives Lecture:45, Practical:30, Total:75	9.	9. Programs to demonstrate the use of pointers									
11. Programs to implement various file operations 12. Programs to demonstrate the use of pre-processor directives Lecture:45, Practical:30, Total:75	10. Programs to illustrate the use of user-defined data types										
Lecture:45, Practical:30, Total:75	Programs to implement various lie operations										
Lecture:45, Practical:30, Total:75											
TEXT BOOK:											
1. Sumitabha Das, Computer Fundamentals and C Programming, 1st Edition, McGraw Hill, 2018	1.	Sumitabha I	Das, Computer Fundamentals and C Programming, 1st Edition.	McGraw	Hill, 2018						
REFERENCES/ MANUAL / SOFTWARE:	REFER	ENCES/ MA	NUAL / SOFTWARE:		•						

1.	Yashavant Kanetkar, "Let us C", 16th, BPB publications,2018.	
2.	Reema Thareja., "Programming in C ", 2nd Edition, Oxford University Press, New Delhi, 2018	
3.	E.Balagurusamy, "Programming in ANSI C", seventh edition, Mc Graw Hill Education, 2017.	
COUR	SE OUTCOMES:	BT Mapped
On co	mpletion of the course, the students will be able to	(Highest Level)
CO1	Identify the appropriate looping and control statements in C and develop applications using these statements	Applying (K3), Precision(S3)
CO2	Develop simple C programs using the concepts of arrays and modular programming	Applying (K3), Precision(S3)
CO3	Recall the basic concepts of pointers and develop C programs using strings and pointers	Applying (K3), Precision(S3)
CO4	Make use of user-defined data types to solve given problems	Applying (K3), Precision(S3)
CO5	Explain various file operations and develop applications using files and pre-processor directives	Applying (K3), Precision(S3)

					Mappin	g of CO	s with	POs an	d PSO	5				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1				1	1		1	3	1
CO2	3	2	2	2	1				1	1		1	3	1
CO3	3	2	2	2	1				1	1		1	3	1
CO4	3	2	2	2	1				1	1		1	3	1
CO5	3	2	2	2	1				1	1		1	3	1
1 – Slight, 2	– Mode	erate, 3 –	Substant	ial, BT- I	Bloom's	Taxono	my							

	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	30	60				100							
ESE	10	30	60				100							
* ±3% may be varied (0	CAT 1 & 2 – 60 mark	s & ESE – 100 mai	rks)	κ										

		22ITC11 - SCIENTIFIC COMPUT	ING					
Pr	ogramme&			_		I		
	Branch	BTech – Information Technology	Sem.	Category	L	Т	Р	Credit
Pr	erequisites	Nil	1	ES	2	0	2	3
Prea	mble	This course provides the basic knowledge about the compo	nents of c	computer, sof	war	e clas	sificatio	ns, problem
Unit	-1	Introduction to Computers and Organization						6
Introc Comp stora	duction- Definition puter- Capabiliti	on- Characteristics of computer- Block Diagram of a comp es- and limitations of computer. Input Units- Output Units-	uter- Cla Storage	ssification Of devices- Prin	Co Co nary	mpute stora	ers- App ige- and	blications of secondary
Unit	- II	Number Systems and Software						6
Numl Lang Proce	ber Systems and uage- Assembl essing- Spread	d its conversions- Software and it's needs-Operating System- y Language- High-Level Language their advantages & dis Sheets and Presentation.	Utility Pro advantag	ograms- Prog es. Applicatio	ramr on S	ning /W a	Langua nd its t	ge: Machine ypes: Word
Unit	- 111	Problem Solving Technique						6
Algor Solvi selec	ithms - Flowcha ng in sequential tion and repetiti	rts – Pseudo codes – Structuring the logic: Sequential- select and selection and repetitive. Algorithm- Flowchart and Pseu ve structures	ion and re Ido code	epetitive struc for the proble	ture ms i	. Cas relate	e Study d to sec	on Problem quential and
Unit	- IV	Web Designing						6
Web Form confli	Basics – Introd s – Internal Linl icting styles – Iir	uction to HTML 5 – Headings – Linking – Images – Special king – meta elements. Introduction to Cascading Style Sheet iking external style sheets.	l Characte ts (CSS)	ers and Horiz - Inline styles	conta 3 — E	al rule Embe	es – List dded sty	– Tables – /le sheets –
Unit	- V	Git						6
Introc Line and t	duction – installi – Basic Git Con he Index.	ng Git – Installing Git on Windows – Installing the Cygwin Git cepts – Repositories – Object types – Index – Object Store	package - Pictures -	 Installing st Git Concept 	anda ts at	alone Worł	Git – Gi k. File m	t Command anagement
LIST	OF EXPERIME	NTS / EXERCISES:						
1.	Study of vario	us computer components						
2.	Installation of	Operating system						
3.	Write an algor	ithm, pseudocode and flowchart for solving sequential and se	election p	roblems using	g rap	otor		
4.	Write an algor	ithm- pseudocode and flowchart for solving repetitive probler	ns using r	aptor				
5.	Design a Web	Page using basic HTML Tags						
6.	Design an We	b Page to get and validate the data from the users						
7.	Develop an w	eb page and apply different stye sheet on the web page						
8.	Create a repo	and deploy the web page using gitup						
9.	Managing sou	rce code with multiple branches						
10.	Create a scen	ario for merge conflicts and resolve it using github						
				Lectu	re:30	0, Pra	actical:3	30, Total:60
TEXT	F BOOK:							
1.	Anita Goel- Co	omputer Fundamentals, First Edition, Pearson Education Indi	a,2010 (L	Jnit I,II,III)	D -		E du a d	ian 0010
2.	(Unit IV)	nveyDeitei, Abbey Deitei, "Internet & World Wide Web- How t	o Prograr	ff Dublishers	, Pe	arsor		(Unit)()
з.	Jun Lueliger a	na matthew miccullough- version control with Git-Second Ed	111011-31110			שמוואס	uis, 20 [°]	
REE		NIAL / SOFTWARE						
1		"How to Solve it by Computer"- Dearson Education, 2000						
1. 2	Balagurusam	Fow to solve it by computer - realsoft Education- 2009.	/cGraw⊔	ill Education	D\/t	ltd -	2017	
<u> </u>					νι.	LIU	2017	

COUR: On col	SE Ol mpleti	JTCON ion of t	IES: he cour	se, the st	udents	will be a	able to							BT Map (Highest	ped Level)
CO1	outli	ne the (Compute	er compon	ents, w	orking pr	inciples	and its	applica	ations			ι	Jnderstand	ling (K2)
CO2	explo	ore Nur	nber Sys	stem and i	ts conv	ersions,	Software	e classi	ficatior	S			ι	Jnderstand	ling (K2)
CO3	expr	ess the	solution	for struct	uring lo	gic in ter	ms of al	gorithm	- flowc	hart and	pseudo	code		Applying	(K3)
CO4	desi	gn a sir	nple web	page and	validat	e the for	ms using	g HTML	-					Applying	(K3)
CO5	crea	ite a rep	ository a	and mana	ge the r	epository	/ file fun	ctions u	ising G	it				Applying	(K3)
CO6	solve	e the re	al-world	problems	using r	aptor								Applying Precisior	(K3), n (S3)
C07	desi	gn a sir	nple web	opage usir	ng HTM	L								Applying Precisior	(K3), n (S3)
CO8	perfo	orm file	operatio	ons in Git										Applying Precision	(K3), (S3)
														110010101	(00)
						Маррі	ng of C	Os witł	h POs	and PSC	Ds				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3	2											2	1
CO	2	3	2	1	1									3	2
CO	3	3	2	1	1									3	2
CO	4	3	2	1	1									3	2
CO	5	3	2	1	1									3	2
CO	6	3	2	1	1									3	2
CO	7	3	2	1	1									3	2
CO	8	3	2	1	1									3	2
1 – Slię	ght, 2 ·	– Mode	rate, 3 -	Substant	ial, BT-	Bloom's	Taxono	my							
						ASSE	SSMEN	T PAT	FERN ·	THEOR	RY				
Tes C	atego	oom's ory*	Re	ememberi (K1) %	ng l	Jndersta (K2)	anding %	Apply (K3)	ying) %	Analyz (K4) 9	ing %	Evaluating (K5) %	C	reating (K6) %	Total %
	CAT	1		20		60		20)						100
	CAT	2		10		30		60)						100
	CAT	3		10		30		60)						100
	ESE			20		40		40)						100
* ±3%	may b	e varie	d (CAT 1	,2,3 – 50	marks &	& ESE –	100 mai	rks)							

22EET12 - BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to Information Technology and Computer Science and Design branches)

Programme& Branch	BTech – Information Technology & BE - Computer Science and Design branches	Sem.	Category	L	т	Ρ	Credit								
Prerequisites	Nil	1	ES	3	0	0	3								
	·	1		1	1										
Preamble	To provide comprehensive ideas about power Systems, applications of basic machines in electrical engineering.	AC and	DC circuits,	WO	rking	prine	ciples and								
Unit – I	Introduction to Power Systems:						9								
Fundamentals of Ele Sources of Energy Underground Syste	ectricity: Definition, Symbol and Unit of Quantities - Work, Powel - Structure of Electric Power System - Transmission and Distrib ms - Phase, Neutral - Electrical Safety Aspects - Principles of Ea	r and En oution Vo orthing -	ergy - Renewa oltages - Com Types of Earth	able paris ning.	and son o	Non-F If Ove	Renewable rhead and								
Unit – II DC Circuits and AC Circuits: 9 Ohm's Law - Kirchoff's laws - Resistances in Series and Voltage Division Technique - Resistances in Parallel and Current Divis 9															
Dhm's Law - Kirchoff's laws - Resistances in Series and Voltage Division Technique - Resistances in Parallel and Current Division Cechnique - Mesh Analysis of Simple Resistive Networks - Star to Delta and Delta to Star Transformations. AC Circuits: Alternating Sinusoidal) Voltage and Current, R.M.S and Average Value, Power Factor, Form Factor and Peak Factor.AC Series Circuits (RL, RC & RLC). Jnit - III DC Machines: Operation 9 Canastruction Resistion Principle of Operation of DC generator and PC Meter. DC Canastruction															
Unit – III	D & RLC). Init – III DC Machines: 9														
Onit – III DC Machines: 9 Construction, Principle of Operation of DC generator and DC Motor - DC Generator: EMF Equation, Types and Applications, DC Motor: Torque Equation, Types and Applications - Need for starter - DC Motor Starter Types and Construction. 9															
Unit – IV	AC Machines and Transformers:						9								
Construction and W Phase and Capacito Delta starter- Applic	orking Principle of Single Phase Transformer, Three Phase AC or Start Induction Motor), Three Phase Induction Motor - Starting o ations.	Generate of Three	or, Single Pha Phase Inducti	ase I on N	nduc lotor	tion N - DOI	lotor (Split _ and Star-								
Unit – V	Basic Electronics:						9								
Theory of PN Junct Regulator - Transist UPS and SMPS (Bl	ion Diode - Operation of Rectifiers (Half wave, Full wave) and F ors: Types - Operation of NPN Transistor - Transistor as an Amp ock Diagram approach).	ilters - Z plifier - C	ener Diodes Deration and	- Zei Cha	ner D racte	oiode eristics	as Voltage s of SCR -								
							Total:45								
TEXT BOOK:															
1. Muthusubra Hill, 2014	manian R. and Salivahanan S., "Basics of Electrical and Electro	nics Eng	ineering", 18 ^{tt}	^h Re	print,	Tata	McGraw								
REFERENCES :															
1. Jegathesar India, 2011	V., Vinoth Kumar K. and Saravanakumar R., "Basic Electrical a	and Elec	tronics Engin	eerir	ıg", 1	st Edi	tion, Wiley								
2. Sukhija M.S 2012.	8. and Nagsarkar T.K., "Basics of Electrical and Electronics Engi	ineering"	, 1 st Edition, 0	Dxfo	rd Un	iversi	ty Press,								
3. Smarajit Gł	nosh, "Fundamentals of Electrical and Electronics Engineering", 2	2 nd Editic	on, PHI Learni	ng, 2	2007										

COUR On co	SE O	UTCOM	IES: he cour	se, the st	uden	ts will be a	able to							BT Mapp (Highest L	oed evel)
CO1	inter para	rpret the	e basic c in circui	oncepts of ts	elect	rical powe	r systen	ns and I	dentify	the vari	ous elec	trical	U	nderstandi	ng (K2)
CO2	ana	lyze the	DC and	AC Circui	ts									Applying	(K3)
CO3	inte	rpret the	e constru	iction and	worki	ng of differ	ent type	es of DC	mach	ines				Applying	(K3)
CO4	illus	trate the	e workin	g of differe	nt typ	es of AC n	nachine	s and tr	ansfor	mers			U	nderstandi	ng (K2)
CO5	dem sem	nonstrate	e the ba ctor devi	sic function ces	ns of	semicondu	ctor dev	/ices an	d anal	yze the o	characte	ristics of		Applying	(K3)
Mapping of COs with POs and PSOs															
COs/F	COS/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02														
CO	1	3	2	2	1									2	1
CO	2	3	1	2										2	1
CO	3	3	1	2										2	1
CO	4	3	2	2										2	1
CO	5	3	1	2	1									2	1
1 – Slię	ght, 2	– Mode	rate, 3 -	- Substant	al, B	Γ- Bloom's	Taxono	my					4		
						ASSES	SMENT	PATTE	RN -	THEORY	,				
Tes C	t / Ble atege	oom's ory*	Re	ememberi (K1) %	ng	Understa (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing %	Evaluating (K5) %	g (Creating (K6) %	Total %
	CAT	1		10		60		30)						100
	CAT	2		10		60		30)						100
	CAT	3		10		60		30)						100
	ESE	=		10		60		30)						100
* ±3%	may t	be varie	d (CAT [·]	,2,3 – 50	marks	8 & ESE –	100 ma	rks)	•		·		·		

22EEL11 - BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY															
	(C	commo	n to Infe	ormatic	on Tech	nology	and Co	ompute	er Scier	nce and	Design bra	anch	es)		
imme& h	&	BTecl BE - C	h – Info Comput	rmatior er Scie	n Techr nce an	ology d Desig	& jn bran	ches		Sem.	Category	L	Т	P	Credit
uisite	S	Nil								1	ES	0	0	2	1
ble		This c device	ourse is es with it	designe ts chara	ed to im Icteristic	part pra cs.	ctical kr	nowledg	le about	t AC and	DC circuits	, mac	chine	es and e	lectronic
FEXP	PERIM	IENTS /	EXERC	CISES:											
Resis	stor co	olor cod	ing and	verificat	tion of (Dhm's L	aw and	Kirchho	off's Lav	VS					
Com	putatio	on of Cu	urrent in	a Loop	using N	/lesh ar	nalysis								
Meas	surem	ent of P	ower in	RL, RC	Cand RI	_C circu	uits								
Spee	ed con	trol of D	C shun	t motor											
Load test on DC shunt motor															
Load test on single phase induction motor															
Load test on single phase transformer															
Implementation of Half wave and Full wave Rectifier															
VI ch	naracte	eristics of	of PN ju	nction d	liode										
Volta	age Re	gulator	using Z	ener die	ode										
														•	Total:30
RENCE	ES/ M/	ANUAL	/SOFT\	NARE:											
Labo	oratory	Manua	I												
SE OU mpletio	JTCON on of	MES: the cou	urse, the	e stude	nts wil	l be abl	e to						(H	BT Map lighest l	ped Level)
selec	ct and	apply v	arious la	aws for t	the spe	cific ele	ctric cire	cuits					A Ma	pplying	(K3), on (S2)
perfo	orm su	itable te	ests and	analyze	e the pe	erformar	nce of A	C,DC N	lachine	s and tra	ansformers		Ai Ma	nalyzing	(K4), on (S2)
sketo	ch the	charact	eristics	of powe	er electr	onic de	vices ar	nd Interp	oret vari	ious app	lications		Aı Ma	nalyzing nipulatio	(K4), on (S2)
					Маррі	ng of C	os with	POs a	nd PSC	Ds					
Os I	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO	12	PSO1	PSO2
	3	2	2	1											
2	3	3	2	1											
3	3	2	2	1	-ום דם	om'c T-	Von								
	Immediate Immediate	22E (C uisites ole FEXPERIM Resistor co Computation Measurem Speed con Load test co Load test co Load test co Voltage Res RENCES/ M/ Laboratory SE OUTCOIN mpletion of select and perform su sketch the Os PO1 3 3 a 3	22EEL11 - I (Commo Imme& BTecl Dile Nil Dile This c Generation This c Dile This c Dile This c Computation of Cu Measurement of P Speed control of D Load test on Single Load test on single Load test on single Implementation of VI characteristics of Voltage Regulator Restort of the cou Seelect and apply vi perform suitable ter sketch the charact Os PO1 PO2 3 3 2	22EELT1 - BASICS (Common to Info Imme& BTech – Info Dile Nil Dile This course is devices with it devices with it FEXPERIMENTS / EXERCE Resistor color coding and Computation of Current in Measurement of Power in Speed control of DC shun Load test on DC shunt model Load test on single phase Implementation of Half wa VI characteristics of PN ju Voltage Regulator using Z Restort of the course, the select and apply various la perform suitable tests and sketch the characteristics Os PO1 PO2 PO3 3 2 2 A 2 2	22EEL11 - BASICS OF EL (Common to Information BE - Computer Scientistics uisites Nil Dele This course is designed devices with its chara OF EXPERIMENTS / EXERCISES: Resistor color coding and verification of Current in a Loop Measurement of Power in RL, RO Speed control of DC shunt motor Load test on DC shunt motor Load test on single phase induction Load test on single phase transfor Implementation of Half wave and VI characteristics of PN junction of Voltage Regulator using Zener did SE OUTCOMES: mpletion of the course, the stude select and apply various laws for reperform suitable tests and analyzed sketch the characteristics of power OS PO1 PO2 PO3 PO4 3 2 1 1 3 2 2 1 A 2 1 2 1	22EEL11 - BASICS OF ELECTRIC (Common to Information Techn BE - Computer Science and uisites NII BTech – Information Techn BE - Computer Science and devices with its characteristic Dole This course is designed to im devices with its characteristic F EXPERIMENTS / EXERCISES: Resistor color coding and verification of C Computation of Current in a Loop using N Measurement of Power in RL, RCand RI Speed control of DC shunt motor Load test on DC shunt motor Load test on single phase transformer Implementation of Half wave and Full wa VI characteristics of PN junction diode Voltage Regulator using Zener diode RECES/ MANUAL /SOFTWARE: Laboratory Manual SE OUTCOMES: mpletion of the course, the students will select and apply various laws for the spector perform suitable tests and analyze the perform suitable tests and analyze the perform Sketch the characteristics of power electric sketch the characteristics of power electric Mapping Mapping OS PO1 PO2 PO3 PO4 PO5 3 2 2 1 2 Mapping Mapping Mapping	22EEL11 - BASICS OF ELECTRICAL AN (Common to Information Technology BE - Computer Science and Design uisites Nil BTech – Information Technology BE - Computer Science and Design uisites Nil Discourse is designed to impart pradevices with its characteristics. FEXPERIMENTS / EXERCISES: Resistor color coding and verification of Ohm's L Computation of Current in a Loop using Mesh ar Measurement of Power in RL, RCand RLC circu Speed control of DC shunt motor Load test on DC shunt motor Load test on single phase induction motor Load test on single phase transformer Implementation of Half wave and Full wave Rect VI characteristics of PN junction diode Voltage Regulator using Zener diode Voltage Regulator using Zener diode SEOUTCOMES: mpletion of the course, the students will be abl select and apply various laws for the specific ele perform suitable tests and analyze the performal sketch the characteristics of power electronic de Mapping of C Mapping of C Se OUTCOMES: mpletion of the course, the students will be abl select and apply various laws for the specific ele perform suitable tests and analyze the	22EELT1 - BASICS OF ELECTRICAL AND ELE (Common to Information Technology and C mme& BTech – Information Technology & BE - Computer Science and Design bran uisites Nil ole This course is designed to impart practical kr devices with its characteristics. FEXPERIMENTS / EXERCISES: Resistor color coding and verification of Ohm's Law and Computation of Current in a Loop using Mesh analysis Measurement of Power in RL, RCand RLC circuits Speed control of DC shunt motor Load test on DC shunt motor Load test on single phase induction motor Load test on single phase transformer Implementation of Half wave and Full wave Rectifier VI characteristics of PN junction diode Voltage Regulator using Zener diode Voltage Regulator using Zener diode SE OUTCOMES: mpletion of the course, the students will be able to select and apply various laws for the specific electric circuits are sketch the characteristics of power electronic devices are Mapping of Cos with OF PO1 PO2 PO3 PO4 PO5 PO6 PO7 3 3 2 Mapping of Cos with	22EEL11 - BASICS OF ELECTRICAL AND ELECTRICK (Common to Information Technology and Compute mme& M BTech – Information Technology & BE - Computer Science and Design branches uisites Nil Delee This course is designed to impart practical knowledge devices with its characteristics. FEXPERIMENTS / EXERCISES: Resistor color coding and verification of Ohm's Law and Kirchho Computation of Current in a Loop using Mesh analysis Measurement of Power in RL, RCand RLC circuits Speed control of DC shunt motor Load test on Single phase induction motor Load test on single phase induction motor Load test on single phase transformer Implementation of Half wave and Full wave Rectifier VI characteristics of PN junction diode Voltage Regulator using Zener diode SEOUTCOMES: mpletion of the course, the students will be able to select and apply various laws for the specific electric circuits perform suitable tests and analyze the performance of AC,DC N sketch the characteristics of power electronic devices and Interprese Mapping of Cos with POs a GS PO1 PO2	22EELT1 - BASICS OF ELECTRICAL AND ELECTRONICS EN (Common to Information Technology and Computer Science mmme& M BTech – Information Technology & BE - Computer Science and Design branches will be able to - Computer Science and Design branches will be able to BE - Computer Science and Design branches Discusse is designed to impart practical knowledge about devices with its characteristics. FEXPERIMENTS / EXERCISES: Resistor color coding and verification of Ohm's Law and Kirchhoff's Law Computation of Current in a Loop using Mesh analysis Measurement of Power in RL, RCand RLC circuits Speed control of DC shunt motor Load test on single phase induction motor Load test on single phase induction motor Load test on single phase transformer Implementation of Half wave and Full wave Rectifier VI characteristics of PN junction diode Voltage Regulator using Zener diode Voltage Regulator using Zener diode SEOUTCOMES: mpletion of the course, the students will be able to select and apply various laws for the specific electric circuits Mapping of Cos with Pos and Pos Mapping of Cos with Pos and Pos Set UTCOMES: Set UTCOMES:	SPEEL11 - BASICS OF ELECTRICAL AND ELECTRONICS ENGINEER (Common to Information Technology and Computer Science and Imme& BTech – Information Technology & Sem. Implementation of Current in a Loop using Mesh analysis Measurement of Power in RL, RCand RLC circuits Speed control of DC shunt motor Load test on single phase induction motor Load test on single phase induction diode VI characteristics of PN junction diode Voltage Regulator using Zener diode Seect and apply various laws for the specific electric circuits Perform suitable tests and analyze the performance of AC, DC Machines and the sketch the characteristics of power electronic devices and Interpret various app Material Apply various laws for the specific electric circuits Perform suitable tests and analyze the performance o	Select INICAL AND ELECTRONICS ENGINEERING LARG (Common to Information Technology and Computer Science and Design branches Sem. Category Imme& BTech - Information Technology and Computer Science and Design branches Sem. Category uisites NII Sem. Category This course is designed to impart practical knowledge about AC and DC circuits devices with its characteristics. Sem. Category F EXPERIMENTS / EXERCISES: Resistor color coding and verification of Ohm's Law and Kirchhoff's Laws Computation of Current in a Loop using Mesh analysis Measurement of Power in RL, RCand RLC circuits Speed control of DC shunt motor Load test on Single phase induction motor Load test on single phase induction diode V////////////////////////////////////	Select Price And Paper Reprint to Information Technology and Computer Science and Design branches Sem. Category L uisites Nil 1 ES 0 tistes Nil 1 ES 0 certain and the science and Design branches 1 ES 0 uisites Nil 1 ES 0 certain and devices with its characteristics. 1 ES 0 F EXPERIMENTS / EXERCISES: Resistor color coding and verification of Ohm's Law and Kirchhoff's Laws Computation of Current in a Loop using Mesh analysis Measurement of Power in RL, RCand RLC circuits Speed control of DC shunt motor Load test on Single phase induction motor Load test on single phase induction motor Load test on single phase induction diode VI characteristics of PN junction diode Voltage Regulator using Zener diode Select and apply various laws for the specific electric circuits select and apply various laws for the specific electric circuits perform suitable tests and analyze the performance of AC,DC Machines and transformers select and apply various laws for the specific electric circuits perform suitable tests and analyze the performance of AC,DC Machines and transformers select and ap	Common to Information Technology and Computer Science and Design branches mme& mine& bit BTech – Information Technology & BE - Computer Science and Design branches Sem. Category L T uisites Nil I ES 0	Improvement to information Technology and Computer Science and Design branches Sem. Category L T P Sem. Category L T P Sem. Category L T P set of information Technology & SE - Computer Science and Design branches Sem. Category L T P get of information Technology & SE - Computer Science and Design branches I ES 0 0 2 This course is designed to impart practical knowledge about AC and DC circuits, machines and e devices with its characteristics. FEXPERIMENTS / EXERCISES: Resistor color coding and verification of Ohm's Law and Kirchhoff's Laws Computation of Current in a Loop using Mesh analysis Measurement of Power in RL, RCand RLC circuits Speed control of DC shunt motor Load test on single phase transformer Implementation of Half wave and Full wave Rectifier VI characteristics of PN junction diode Voltage Regulator using Zener diode

			221	PHL18	- PHYS	ICS LAE	BORAT	ORY FO	OR INF	ORMA	TION TE	CHNOLOG	iΥ			
			[1	
Progra Branch	mme & ח	L	B.Tec	h - Info	rmatio	n Techi	nology				Sem.	Category	L	т	Ρ	Credit
Prereq	uisites		Nil								1/2	BS	0	0	2	1
Preamb	ole F EXPE	ERIM	This c AC fre fiber, s of LCF / prod	ourse a equency specific R circuit uct rela	ims to ir , wavele resistar , p-n jur ted to se CISES:	npart ha ength o nce, bar nction di ocietal r	ands on f laser, nd gap, iode and requiren	training particle Hall coe d UJT, a nent.	in the c size, ac efficient and also	determir cceptano , thickne o to impa	nation of ce angle ess of thi art skills	parameters and numeri n wire and k on writing co	such ical ap nowle oding /	as ri bertu dge ⁄ dev	gidity n re of a on the veloping	nodulus, n optical working g project
1.	Deterr currer	mina nt and	tion of t d voltag	he rigid e in a s	ity modu eries LC	ulus of t CR circu	he give ıit.	n metal	lic wire	using to	orsional p	oendulum / S	Studyi	ng tł	ne varia	ation of
2.	Deterr	mina	tion of t	he frequ	lency of	falterna	ating cu	rrent us	ing elec	trically	vibrating	tuning fork	(Meld	e's a	appara	tus).
3.	(i) Det (ii) De	termi term	nation o	of the wa	aveleng article s	th of se ize of th	micond ne giver	uctor la n powde	ser. er using	laser.						
4.	Determination of the acceptance angle and the numerical aperture of the given optical fiber.															
5.	Determination of the specific resistance of the given metallic wire using Carey-Foster's bridge.															
6.	Determination of the band gap of the given semiconducting material using post-office box.															
7.	Observation of the I-V characteristics of a p-n junction diode / Determination of Hall coefficient using Hall effect arrangement.															
8.	arrangement. Observation of the I-V characteristics of a uni junction transistor.															
9.	Deterr	mina	tion of t	he thick	ness of	a thin f	ilm usin	ig air-we	edge ar	rangem	ent.					
10.	Writing	g coo	ding for	any one	e of the	above e	experim	ents / d	evelopi	ng a pro	oject / a j	product.				
															•	Total:30
REFER	RENCES	s/ m/	ANUAL	/SOFT	WARE:											
1.	Physic	cs La	borator	y Manu	al / Rec	ord, De	partme	nt of Ph	ysics, 1	st Editio	n, 2020.					
COURS On cor	SE OUT npletio	rCOI n of	MES: the cou	urse. th	e stude	ents wil	l be ab	le to						B (Hig	T Map ghest l	ped _evel)
CO1	detern LCR c and th	nine ircuit ie pa	the rigio , the fre rticle siz	dity mod equency ze of a p	dulus of of an a bowder	a wire Iternatir materia	or the ng curre I.	variation ont, the v	on of cu waveler	rrent an ngth of a	nd voltag a semico	e in a serie nductor lase	s er	Ap Pre	plying ecision	(K3), (S3)
CO2	detern resistiv	nine vity c	the acc of a met	eptance allic wir	e angle e.	and nur	merical	apertur	e of an	optical	fiber and	d the specifi	с	Ap Pr€	plying ecision	(K3), (S3)
CO3	detern coeffic develo	nine cient op a	the ban of a m coding /	id gap o aterial, / project	f a sem the I-V : / produ	iconduc charac ict.	tor, the teristics	I-V cha of a U	racteris JT, the	tics of a thickne	a p-n dioo ess of a	de or the Ha thin film an	d	Ap Pre	plying ecision	(K3), (S3)
						Маррі	ng of C	os witl	n POs a	and PSC	Os					
COs/P	Os P	01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	2	PSO1	PSO2
CO1		3	2	2	3					2	2		2		3	2
CO2		3	2	2	3					2	2		2	_	3	2
1 – Slic	ht, 2 –	კ Mod	2 erate. 3	– Subs	3 tantial	BT- Blo	om's Ta	axonom	v	2	2		2		3	2

		22EGT21 - COMMUNICATION SKILL	S II												
		(Common to All Engineering and Technology	Branche	s)											
Programme Branch	&	All B.E./B.Tech. Branches	Sem.	Category	L	т	Ρ	Credit							
Prerequisite	s	Communication Skills I	2	HS	3	0	0	3							
Preamble		This course is designed to equip students with the necessary s develop their linguistic and communicative competencies.	skills to li	sten, read, wi	ite a	ind s	peak sc	as to							
Unit – I		Grammar, Vocabulary, Listening, Speaking, Reading & Wr	iting					9							
Grammar: S substitution - Reading for 0	Grammar: Sentence Patterns - Simple, Compound & Complex sentences - Vocabulary: Portmanteau Words - One Word substitution - Listening: Speeches from company CEOs - TV debates Speaking: Just-a-minute talk - Group discussion - Reading: Reading for Gist - Writing: Job application letter with resume – Transcoding Unit - II Grammar, Vocabulary, Listening, Speaking, Reading & Writing 9 Grammar: Concord - Vocabulary: Phrasal verbs - Idioms & Phr														
Unit – II Grammar, Vocabulary, Listening, Speaking, Reading & Writing 9 Grammar: Concord - Vocabulary: Phrasal verbs - Idioms & Phrases - Listening: Listening to celebrity talks - Speaking: Talking 9															
Grammar: Concord - Vocabulary: Phrasal verbs - Idioms & Phrases - Listening: Listening to celebrity talks - Speaking: Talking about celebrities - Practicing Pronunciation through web tools - Reading: Company correspondence, technical texts/working principles of a machine - Writing: Description: Person, Place, Process, Product and Picture Unit – III Grammar, Vocabulary, Listening, Speaking, Reading & Writing 9															
principles of a machine - Writing: Description: Person, Place, Process, Product and Picture Unit – III Grammar, Vocabulary, Listening, Speaking, Reading & Writing 9															
Grammar: Discourse markers - Transitional words and phrases - Vocabulary: Commonly confused words - Listening: Listening to guest lectures - Speaking: Technical & Non-technical presentations - Workshop presentations - Reading: Reputed company profiles, Business Plans - Writing: a dream job/company - Letter to the Editor – Biography & Autobiography - Checklist															
Unit – IV		Grammar, Vocabulary, Listening, Speaking, Reading & Wr	iting					9							
Grammar: D Listening: 1 commentarie	egree Listen s - M	es of Comparison - Punctuations – Fragments & run-ons - Vocal ing to global accents - listening to motivational speeches - Spe ovie Enactment - Reading: Narrative passages - Writing: E m	bulary: E eaking: N nail - Age	British & Ame Narrating pers anda & Minute	ricai sona es o	n - S I mil f Me	pelling & estones eting - S	& words - - Sports Special &							
Unit – V	50115	Grammar, Vocabulary, Listening, Speaking, Reading & Wri	itina					9							
Grammar: F Listening to speeches/co from journals	Purpos samp nvers Writ	e and Function - If clause - Error detection - Vocabulary: Co le HR Interviews - Speaking: Introduction to phonetics - Stres ations - Giving feedback – Debate - Reading: Key Note speech ing: Circulars - Critical Appreciation of a non-detailed text - Tech	iding & E ss, rhyth nes - Nev inical pro	Decoding - Al m & Intonatio wspaper repo posals	phal on - orts ·	oet te - Gui - sho	est - Li ded & u rt techn	stening: unguided ical texts Total:45							
TEXT BOOK	K:														
1. Sanj	jay Ku	mar & Pushp Lata, "Communication Skills", 2nd Edition, Oxford L	Jniversity	/ Press, New	Dell	ni, 20)18.								
REFERENC	ES:														
1. Me Un	enaks iversit	shi Raman and Sangeeta Sharma. "Technical Communication- y Press, New Delhi, 2022.	Principle	s and Practic	e". 4	l th Eo	lition, O	xford							
2. Mu	rphy l	Raymond, "English Grammar in Use", 5 th Edition, Cambridge Uni	iversity F	Press, New Yo	ork, i	2019									
Jack 3. 2014	(C. R 4.	ichards and Chuck Sandy, "Passages" Student's Book 2, 3 rd Edit	tion, Can	nbridge Unive	ersity	/ Pre	ss, New	' York,							

COURS On con	SE OUTCO	OMES: of the cours	e. the	stude	nts will be	able to					BT I (Highe	Mapped	el)		
CO1	use fun	ctional gram	imar fo	or impre	oving comm	unicatio	n skills				Apply	/ing (K3)		
CO2	listen a	nd compreh	end di	fferent	accents and	l infer in	nplied m	eanings			Apply	/ing (K3)		
CO3	speak commu	clearly, init nicative stra	ate a tegies	nd su	stain a dis	cussion	and ne	gotiate us	ing app	oropriate	Crea	ting (K6)		
CO4	read dif them	ferent genre	es of te	exts, inf	er implied n	neanings	and crit	ically analy	ze and e	evaluate	Underst	anding (K2)		
CO5	CO5 produce different types of narrative, descriptive expository texts and understand creative, critical, analytical and evaluative writing Creating (K6)														
	Mapping of COs with POs and PSOs														
COs/P	Os PO1	PO2	Р	O3	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 – Slig	ht, 2 – Mo	oderate, 3 –	Substa	antial, E	3T- Bloom's	Taxono	my								
Test	N 1-	Demonstra		L Los al a	ASSES	SMENT	PATTER	N - THEOF	ξ Υ		0				
Cate	gory*	Kemembe (K1) %	ering	Unde	(K2) %	App (K3	aying 3) %	Analyzir (K4) %		(K5) %	(K6) %	Т	otal %		
CA	AT1				37	3	30				33		100		
CA	AT2				7	5	50				43		100		
CA	AT3				17	5	50				33		100		
E	SE				15	4	45				40		100		

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

	(C	ommon to BE - Computer Science Engineering, Comp BTech – Information Technology bra	outer Sc nches)	ience and D	esig	n &									
Progra Branch	imme & ז	BE - Computer Science Engineering, Computer Science and Design & BTech – Information Technology branches	Sem.	Category	L	т	Ρ	Credit							
Prereq	uisites	Nil	2	BS	3	1 *	2 *	4							
Pream	ble	To provide an in-depth knowledge in random variables, c ability to use probability distributions and analysis of varia	orrelatic	on, sampling experimenta	theo I data	ry ar a.	nd pro	omote the							
Unit –		Random Variables:		•				9							
Discret expecta	e and Cor ation and V	ntinuous random variables – Probability Mass and Pro 'ariance – Moments – Moment generating function.	obability	density fun	ction	s –	Mat	nematical							
Unit –	II	Standard Probability Distributions:						9							
Discret	e Distributi n distributio	ons: Binomial distribution – Poisson distribution – Geome nn – Exponential distribution – Normal distribution	etric dist	ribution – Co	ontin	uous	s Dist	ributions:							
Unit –	III	Two Dimensional Random Variables:						9							
Introdu	ction – Joi	int probability distributions - Marginal and conditional dis	stributio	ns – Covaria	ance	– C	orrel	ation and							
regress	sion.														
Unit –	IV otion Crit	Testing of Hypothesis:		omple testa:	7 + 2	ot fo	or oin	9							
and dif	Juction – Critical region and level of significance – Types of Errors – Large sample tests: Z-test for single mean lifference of means – Small sample tests: Student's t-test for testing significance of single mean and difference of the source of the second se														
means	s – F-test for comparison of variances – Chi-square test: Test of goodness of fit – Test of independence of utes.														
attribut	• V Design of Experiments: 9														
Analvs	- V Design of Experiments: 9 vsis of variance – One way classification: Completely Randomized Design – Two way classification: Randomized 9														
Block D	ysis of variance – One way classification: Completely Randomized Design – Two way classification: Randomized k Design – Three way classification: Latin Square Design.														
	ck Design – Three way classification: Latin Square Design.														
		MENTS / EXERCISES:													
1.															
2.	Identifying	Mean and Variance for discrete and continuous random v	/ariables	S.											
3.	Computati	ion of probability using Binomial, Poisson and Normal distr	noutions												
4. 5	Computati	on of contration coefficient for the given data.	l rondor	n voriable											
э. с		re Marginal and conditional distributions of two-dimensional	a randor	n vanable.											
0. 7	Testing sig	a independence of attributes by Chi aguara test													
7.		e independence of attributes by Chi-square test.				-l !									
8.	Analyze w	nether the difference in means is statistically significant by		etery random		desi	gn.	Totalico							
TEXT	BOOK:	Lectur	 ., 11	utoriais and	FID	51168	u. 19,	10(01.00							
1.	Veerarajar Education	n, T, "Probability and Statistics, Random Processes and , Chennai, 2019.	Queuin	g Theory", 1	st Ec	ditior	n, Mc	Graw-Hill							
REFER	RENCES/ N	IANUAL / SOFTWARE:													
1.	William Me Edition, Ce	endenhall, Robert J. Beaver and Barbara M. Beaver, "Int engage Learning, USA, 2013.	roductio	n to Probabi	lity a	ind S	Statis	tics", 14 th							
2.	Jay L. De USA, 2016	vore., "Probability and Statistics for Engineering and the	Science	es", 9 th Editio	on, C	Ceng	lage	Learning,							
3.	Johnson. F Pearson E	R.A., Miller. I and Freund. J., "Miller and Freund's Probabil ducation, India, 2018.	lity and S	Statistics for	Engi	neei	rs", 9	th Edition,							
4.	Douglas C John Wiley	C. Montgomery & George C. Runger, "Applied Statistics a y and Sons, USA, 2018.	and Pro	bability for E	ngin	eers	; ", 7 ¹	^h Edition,							
5.	Probability	and Statistics Laboratory Manual.													
				-				-							

COURS On com	E OUT	COI of	MES: the co	urse, th	e stud	ents will	be able	e to					(H	BT Mapp lighest L	oed .evel)
CO1	interp	et t	the con	cept of r	andom	variable	S.						A	pplying ((K3),
CO2	apply	the	standa	ird proba	ability c	listributio	ns in en	gineeri	ng pro	blems.			A A	pplying ((K3), (K3),
CO3	under	star	nd the c	concepts	of two	dimensi	onal rar	ndom va	ariable	s and re	gressior	٦.	A Ma	pplying ((K3), n (S2)
CO4	apply samp	sta es.	atistical	tests f	or solv	ving engi	neering	proble	ems ir	volving	small	and large	e A Ma	pplying ((K3), n (S2)
CO5	apply	the	concep	ots of an	alysis	of variand	ce to ex	perimer	ntal da	ta.			A Ma	pplying (nipulatio	(K3), n (S2)
Menning of OOe with DOe and DOOe															
Mapping of COs with POs and PSOs COs/POs PO1 PO1 <th< td=""></th<>															
COS/PO	Os PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 I												P012	P501	P502
CO1	3		1	1		3								1	
CO2	3		2	3		3								2	
CO3	3		2	1		3								1	
CO4	3		3	1	3	3								3	
CO5	3		3	2	3	3								3	
1 – Sligh	t, 2 – N	lod	erate, 3	3 – Subs	tantial	BT- Bloo	om's Ta	xonomy	/						
						ASSESS	SMENT	PATTE	RN -	THEOR	Y				
/ Test Cate	Bloom egory*	's	Rer	nember (K1) %	ing	Jndersta (K2)	nding %	Apply (K3)	/ing %	Analyz (K4) 9	ing E %	valuating (K5) %	g Cr (I	eating <6) %	Total %
C	AT1			10		20		70)						100
C	AT2			10		20		70)						100
С	AT3			10		20		70)						100
E	SE			10		20		70)						100
* ±3% m	ay be v	arie	ed (CAT	Г 1, 2 &	3 – 50	marks &	ESE –	100 ma	rks)						

*Alternate Week

		22CYT28 – CHEMISTRY FOR INFORMATION	N TECHNOL	.OGY						
Progra Branci	imme & h	B.Tech & Information Technology	Sem.	Category	L	۲	r F	2	Credit	
Prereq	uisites	Nil	2/1**	BS	3	(0 0)	3	
				4				1		
Pream	ble	This course explores the basic concepts of electroche electronic materials, insulating materials and e-waste man of these fields for IT students.	emistry, elec nagement. It	trochemical s also ensures	stora to in	ge npa	devi art the	ces e ap	s, organic oplicability	
Unit –		ELECTROCHEMISTRY							9	
Introdu calcula hydrog – cond	ction – cells tion of cell El en electrode, uctometric titr	 types – representation of galvanic cell – electrode pote MF from single electrode potential – reference electrodes: standard calomel electrode, glass electrode – EMF series a ations – mixture of weak and strong acid vs strong base. 	ntial – Nern construction nd its applica	ist equation (a, working and ations – poten	deriv I app tiom	ati olic etr	on of ations ic titra	ce s of atio	II EMF) – standard ns (redox)	
Unit –	II	ELECTROCHEMICAL STORAGE DEVICES							9	
Battern tests of mainte of fuel fuel ce	nes: Introduction battery – p nance of batter cells – descri ll and direct m	on- types of batteries – discharging and charging of battery - primary battery: silver button cell – secondary battery: Ni- pries – choice of batteries for electric vehicle applications. Fu ption, principle, components and applications of fuel cells: H pethanol fuel cell.	 characteris Cd battery Jel Cells: Int H₂-O₂ fuel co 	nodern battery -modern batt roduction-Imp ell, alkaline fu	– ba ery: ortai iel ce	itte lith nce ell,	ery rat nium- e and molte	on cla en o	– various battery – ssification carbonate	
Unit –		ORGANIC ELECTRONIC MATERIALS							9	
Introdu semico electro LED –o	ction – cono onducting ma spinning, drop organic field-e	ducting polymers – p-type and n-type organic semicor erials – organic dielectric materials – processing and fa o casting, templating – organic light emitting diodes – workin ffect transistors and organic solar cells- working, types and	nducting ma abrication – ng, types an applications	aterials – adv spin coating, d applications	vanta eva 5 – co	age ipo om	es ov pratior parise	er n, s on (inorganic puttering, of LCD vs	
Unit –	IV	INSULATING MATERIALS							9	
Introdu insulate electric materia – polar	ction – requi ors: glass, ce al resistivity – als: constanta ization of poly	rements – classification (solid, liquid & gas) – preparatio ramic products – solid organic insulator: epoxy resin - liqu factors influencing electrical resistivity of materials – component n, molybdenum disilicide and nichrome – polymers as electric mers.	n, propertie uid insulator osition, prope cal insulators	s and applica transformer erties and app s – non-polar p	itions oil – licati oolyn	s o ga on ner	of: so as ins s of h rs – po	olid ula ⁻ igh olar	inorganic tor: SF ₆ – resistivity polymers	
Unit –	V	E-WASTE AND ITS MANAGEMENT							9	
Introdu human recyclir global	iction-E- Was health- neec ng of e-waste scenario of E-	e – definition – sources of e-waste– hazardous substances for e-waste management– e-waste handling rules – waste – disposal treatment methods of e- waste- mechanism of e waste – E-waste in India- case studies.	in e-waste – e minimizatio xtraction of p	 effects of e-w on techniques precious meta 	/aste for I fror	; or ma m l	n env anagii leachi	ng o ng	ment and e-waste – solution –	
									Total:45	
TEXT	BOOK:									
1.	Wiley Editor	ial Board, "Wiley Engineering Chemistry", 2 nd Edition, Wiley	India Pvt. Lt	td, New Delhi,	Rep	rin	nt 201	9, f	or Unit-	
2.	 Palanisamy P.N., Manikandan P., Geetha A., Manjula Rani K., Kowshalya V.N., "Environmental Science", Pearson Education, New Delhi, Revised Edition 2019, for Unit- II, III ,V. 									
REFE	RENCES:									
1.	1. S. S. Dara, "A Text book of Engineering Chemistry", S. Chand & Co Ltd., New Delhi, 20 th B.TECH. (BCL) Page 16 Edition, 2013.									
2.	Palanna O.,	"Engineering Chemistry", McGraw Hill Education, New Delh	ni, 2018.							

** for 2022 batch 2^{nd} sem for IT, for 2023 batch 1^{st} sem for IT

COUR On co	SE OL mpleti	JTCOM	IES: he cour	se, the st	udent	s will be a	able to							BT Mapp (Highest L	oed .evel)			
CO1	appl	y the pr	rinciple o	of electrocl	nemist	ry for vario	ous app	lications	6.					Applying	(K3)			
CO2	use	the con	cepts of	batteries,	fuel ce	ells and th	eir appl	ications	in var	ious field	s.			Applying	(K3)			
CO3	utiliz	e the o	rganic e	lectronic n	nateria	ls for vario	ous appl	lications	6					Applying	(K3)			
CO4	appl	y the kr	nowledg	e of insula	tors to	make diff	erent in	sulating	mate	rials for v	arious a	oplications		Applying	(K3)			
CO5	utiliz	e the ki	nowledg	e to handl	e the e	e-waste ar	nd reduc	ce its im	pacts	on enviro	onment.			Applying	(K3)			
						Mappin	g of Co	s with	POs a	nd PSOs	5	I.	1	П	П			
Cos/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2			
со	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			3										
1 – Slig	ght, 2 ·	– Mode	rate, 3 -	- Substant	ial, BT	- Bloom's	Taxono	my		U	I.			1				
	-																	
						ASSES	SMENT	PATTE	RN –	THEOR	1							
Tes C	st / Blo Catego	oom's ory*	Re	ememberi (K1) %	ng	Understa (K2)	anding %	Apply (K3)	ying) %	Analyz (K4) 9	ing %	Evaluating (K5) %	g (Creating (K6) %	Total %			
	CAT	1		25		35		40)						100			
	CAT	2		25		35		40)						100			
	CAT	3		25		35		40)					10				
	ESE			25		35		40)						100			
* ±3%	may b	e varie	d (CAT [·]	1,2,3 – 50	marks	& ESE –	100 ma	rks)			·							

		22ITC21 - DATA STRUCTURES									
Progra Branci	imme&	B.Tech. – Information Technology	Sem.	Category	L	т	Ρ	Credit			
Prereq	uisites	Programming in C	2	PC	3	0	2	4			
Pream	ble	This course helps the students to learn the basic concepts of lir and their applications	near dat	a structures,	non-	linea	⁻ data	structures			
Unit –	I	Data structures and Linked List:						9			
Introdu Linked	ction to Data lists vs Array	Structures – Classification – Dynamic memory allocation- Self-r s – Singly linked list-Doubly Linked list-Circular Linked list-Polyno	eferentia omial ma	al structures- anipulations.	Intro	ducti	on to	Linked lists -			
Unit –	II	Stack and Queue:						9			
Introduction – Stack – Implementation of stack using array and linked list – Application of stack –Balanced Parentheses-Infix to Postfix expression conversion, Postfix expression evaluation. Queue – Implementation of Queue using array and linked list – Circular queue-Applications of queue-reversing the queue using stack.											
Unit –	III	Sorting and Hashing:						9			
Sorting: Internal sorting: Bubble sort – Shell sort – Bucket sort – External sorting: Multiway Merge – Polyphase Merge – Replacement Selection. Hashing: Hash Functions – Separate Chaining – Open Addressing: Linear Probing – Quadratic Probing – Double Hashing – Rehashing – Extendible Hashing.											
Unit –	IV	Trees:						9			
Prelimi Search	naries: Imple Tree ADT- I tion - Deletio	mentation of trees – Tree Traversals with an Application – Binar Binary Search Trees: Construction – Searching – Insertion – Dele	y trees: etion – F	Implementatio Find Min – Fir	on – nd Ma	Expr ax– <i>A</i>	essio VL tr	n trees – The ees: Rotation			
Unit –	V	Graphs:						9			
Definitions – Representation of Graphs – Types of Graph – Depth-first traversal – Breadth-first traversal – Topological Sort – Applications of DFS: Bi-connectivity – Euler circuits – Finding Strongly Connected Components – Applications of BFS: Bipartite graph – Graph Coloring.											
1.	Program to	implement singly linked list									
2.	Program to	implement Stack and Queue using array and linked list									
3.	Program to	implement Infix to Postfix conversion using stack									
4.	Program to	evaluate postfix evaluation using stack									
5.	Program to	implement Reversing the queue using stack									
6.	Program to	implement shell sort									
7.	Program to	implement double hashing									
8.	Program to	implement binary search tree and its operations									
9.	Program to	implement BFS and DFS									
10.	Program to	implement topological sort									
TEXT	BOOK			Lectur	e:45	, Pra	ctical	:30, Total:75			
1	Weiss M A	"Data Structures and Algorithm Analysis in C" 2nd Edition Pea	arson Ec	lucation I on	don	2016					
REFE	RENCES/ MA	NUAL / SOFTWARE:					•				
1. Cormen T. H., Leiserson C. E., Rivest R. L., & Stein C., "Introduction to Algorithms", 3rd Edition, MIT Press, USA, 2009.											
2.	Horowitz E.	, Sahni S., "Fundamentals of Data Structures in C", 2nd Edition, (Galgotia	Publications	, Nev	v Del	hi, 20	08.			
COUR On co	SE OUTCOM	ES: he course, the students will be able to				(⊦	BT M lighes	apped st Level)			

CO1	des	describe the different operations on linked list Applying (K3)															
CO2	mar	nipulate	the ope	rations on	stacks	and que	le							Applying	ı (K3)		
CO3	dem	nonstrat	e the co	ncept of so	orting a	nd hashi	ng techr	niques						Applying	ı (K3)		
CO4	build	d trees a	and perf	orm its vai	ious op	erations								Applying	J (K3)		
CO5	cho	ose app	oropriate	graph alg	orithm f	or solvin	g proble	ms						Applying	J (K3)		
CO6	impl	lement l	inear da	ta structur	e for sc	lving pro	blems							Applying	(K3), (S3)		
CO7	perf	perform sorting and hashing operations Applying (K3), Procision (S2)															
	-	Precision (S3)															
CO8	impl	lement	various	operations	on non	-linear d	ata struc	ctures						Precision	า (S3)		
Mapping of COs with POs and PSOs																	
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO	1	3	2	1	1								_	3	2		
CO	2	3	2	1	1									3	2		
CO	3	3	2	1	1									3	2		
CO	4	3	2	1										3	2		
CO	5	3	2	1	1									3	2		
CO	6	3	2	1	1									3	2		
CO	7	3	2	1	1									3	2		
CO	8	3	2	1	1									3	2		
1 – Slig	ght, 2	– Mode	erate, 3 -	- Substant	ial, BT-	Bloom's	Taxono	my									
						ASSE	SEMEN	толт		THEOR	v						
Tes	t/Bl	oom's	R	ememberi	na	Inderst:	anding				ing I	Evaluating	1 (Creating			
C	Catego	ory*		(K1) %		(K2)	%	(K3)	%	(K4)	%	(K5) %	, , ,	(K6) %	Total %		
	CAT	1		10		30		60)						100		
	CAT	2		10		30		60)				100				
	CAT	3		10		30		60)						100		
	ESE 10 30 60 100																
* ±3%	may	be var	ied, CA	T1, 2, 3 -	- 50 m	arks, ES	SE – 10	0 mark	S								

22ITC22 - OBJECT ORIENTED PROGRAMMING												
Progra Branci	ımme& n	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit				
Prereq	uisites	Problem Solving and Programming	2	PC	3	0	2	4				
Pream	ble	This course provides the concepts of object oriented programm also covers Java programming and its basic packages includin	ning with g GUI pr	a comprehens	sive	introc	luctio	n to C++. It				
Unit –	I	Introduction to OOP and C++ :	<u> </u>	<u> </u>				9				
Object	Oriented Pro	gramming - Features – Merits & Demerits- Applications – Diffe	rence –S	tructure of C+	-+ -	Data	types	– variables –				
consta	nts – Input a	nd Output statements- Decision control and looping statemen	nts-Funct	ons-Arrays-C	lasse	es ar	nd Ob	jects-Memory				
allocati	on - Array of	bbjects – Constructors - Destructors						0				
Softwa	n re Developma	introduction to Java.	Structure	of Java - Data	5 T.vr	000 -	Varia	9 bles – control				
statem	ents - Arravs	-Classes – Fundamentals – Declaring Objects - Assigning Object	ect Refer	ence Variable	s iyr s - l	Vetho	ods –(Constructors -				
this ke	his keyword - Overloading Methods - Access Control – Static – Inheritance – Basics – Super keyword - Multilevel Hierarchy - Method											
Overric	ling											
Unit –		Packages, Interfaces and Exception Handling:						9				
Abstrac	ract Classes - final with Inheritance. Packages - Access Protection - Importing Packages – Interfaces - Exception Handling basics –											
Multiple	e catch Claus	es- Nested try Statements – Java's Built-in Exceptions – User de	efined Ex	ception								
Unit –	IV brood Model	Multithreading and I/O :	tion Int	arthroad Cam		icatio		9				
Java I Type W	/rappers - Au	- Creating a Thread –Creating Multiple Threads – Synchroniza	lion – ini Vriter Cla	ennieau Con ss - Reading	and	Writir	n. ⊏r na File					
Unit –	V	Strings and Event Handling:		ioo rtoading	ana	•••••	19 1 110	9				
String (String Class – operations – String Buffer Class. Event Handling: Event Handling – Mechanisms Event Classes -ActionEvent - Sources											
of Events - Event Listener Interfaces – Action Listener. AWT Classes - Window Fundamentals - Frame Windows - AWT Controls - Layout												
Manag	ers.											
LIST O		NTS / EXERCISES:										
1.	Develop sin	ple C++ programs using control statements										
2.	Develop a s	imple C++ application using class and object										
3.	Develop sin	ple Java programs using control statements and arrays										
4.	Demonstrat	e inheritance & polymorphism using C++ and Java programs										
5.	Develop Jav	a applications using interfaces and packages										
6.	Demonstrat	e exception handling in Java										
7.	Develop mu	Itithreaded applications in Java										
8.	Develop pro	grams in Java using java.io packages										
9.	Demonstrat	e string manipulation in Java										
10.	Develop ap	lications in Java using collections classes										
11.	Design a Gl	JI based simple application using AWT classes										
				Lectur	re:45	ō, Pra	ictica	I:30, Total:75				
TEXT I	BOOK:											
1.	ReemaThar	eja, "Object Oriented Programming with C++", Third Edition, Oxfo	ord Unive	rsity Press,Ne	ew D	elhi,2	2018 (UNIT 1)				
2.	Herbert Sch	ildt, "Java: The Complete Reference", 12th Edition, McGraw Hill	Educatio	n, New Delhi,	202	1.(UN	NIT 2	to 5)				
REFER	RENCES/ MA	NUAL / SOFTWARE:										
1.	BuyyaRajku 1 st Edition, 1	mar, ThamaraiSelvi S. and Xingchen Chu, "Object Oriented Prog ata McGraw Hill, New Delhi, 2009.	gramming	g with Java Es	sen	tials a	and Ap	oplications",				
2.	Deitel Paul a	and Deitel Harvey, "Java How to Program", 11 th Edition, Pearson	Education	on, New Delhi	, 20′	18.						
3.	Cay S. Hors	tmann, "Core Java: Volume I Fundamentals", 11 th Edition, Addis	son Wesle	ey, New Delhi	, 201	9.						
					_	_						

COURSE OUTCOMES:BT MappedOn completion of the course, the students will be able to(Highest Level)										I)					
CO1	appl	y the co	oncepts o	of classes	and ob	jects to s	olve sim	ple prol	blems	using C+	+			Applying Precision	(K3), (S3)
CO2	deve	elop sin	nple appli	ications u	sing ba	sic Java	construc	ts						Applying Precision	(K3), (S3)
CO3	builc	applic	ations ma	aking use	of pack	ages, int	erfaces	and exc	ception	handling	g in Java			Applying Precision	(K3), (S3)
CO4	mak	e use o	of multithr	eading ar	nd I/O s	treams								Applying Precision	(K3), (S3)
CO5	O5 develop simple event-based GUI applications in Java using AWT classes and controls Applying (K3), Precision (S3)														
				1		Марр	ing of C	Os wit	h POs	and PSC	Os	1	I	1	
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1									3	2
CO2	2	3	2	1	1									3	2
COS	3	3	2	1	1									3	2
CO4	4	3	2	1	1									3	2
COS	5	3	2	1	1									3	2
1 – Slig	ght, 2 ·	– Mode	erate, 3 –	Substant	ial, BT-	Bloom's	Taxonor	my							
						ASSE	SSMEN	IT PAT	TERN ·	THEOR	RY				
Tes C	t / Blo atego	oom's ory*	Re	memberi (K1) %	ing l	Jndersta (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing %	Evaluating (K5) %	Cre	ating (K6) %	Total %
	CAT	1		20		30		50)						100
	CAT	2		10		30		60)						100
	CAT	3													
	ESE			10		30		60)						100
* ±3%	may	be var	ied, CA	Г1, 2, 3 -	- 50 ma	arks, ES	E – 100) marks	5						

22ITT21 -DIGITAL LOGIC PRINCIPLES AND DESIGN												
Pro	gramme& Branch	B.Tech. & Information Technology	Sem.	Category	L	т	Р	Credit				
Pre	requisites	Nil	2	ES	3	0	0	3				
Pream	ble	This course enables the students to understand the combinational and sequential logic circuits.	basic prir	nciples of nu	umbe	r syst	em, Bo	olean algebra,				
Unit - I Number Systems and Boolean Algebra:												
Number Systems - Complements – Signed Binary Numbers –Binary Codes – Binary Logic - Boolean Algebra: Definitions – Bas Axiomatic –Theorems of Boolean Algebra – Boolean functions: Realization of functions using Logic gates												
Unit - II Gate Level Minimization:												
Canonical and Standard Forms of Boolean functions – Minimization of functions using Karnaugh Map – Don't–Care Conditions – N and NOR Implementation– Exclusive-OR function - Minimization of functions using Quine-McCluskev method												
Unit -		Combinational Logic:						9				
Analys Adder implen	sis procedure – – Code Conv nentation using	Design procedure – Half Adder – Full Adder - Half Subtra erters - Magnitude Comparator – Decoders – Encoders Multiplexers and Decoders.	actor – Ful s – Multiple	l Subtractor exers – Den	– Bin nultip	ary A lexers	dder-Su s – Boo	Ibtractor – BCD Iean Functions				
Unit -	IV	Sequential Logic:						9				
Introdu Diagra	uction – Latche m– State Redu	es and Flip-flops – Triggering – Analysis of clocked sequenction and Assignment– Mealy and Moore machines and	uential cir	cuits: State t design proc	Equa edur	tions e	 State 	e Table – State				
Unit -	V	Register, Counter and Programmable Logic:						9				
Shift R – up-d PROM	egisters: SISO own Binary Co I – PLA – PAL.	– SIPO– PISO–PIPO–Bidirectional Shift register–Univers ounter – BCD Counter – modulo-N Counter – Ring Coun	al Shift reg iter – John	ister– Synch son Counte	nrono r – Pi	us Co rograr	unters: nmable	Binary Counter Logic devices:				
								Total:45				
TEXT	BOOK:											
1	1 Morris Mano M., MichealD.Ciletti, "Digital Design: With an Introduction to the Verilog HDL,VHDL, and System Verilog", 6 th Edition, Pearson Education, Noida, 2020.											
REFE	REFERENCES:											
1	Charles H. Ro	th, "Fundamentals of Logic Design", 6th Edition, Thomsor	n Learning,	UK, 2013.								
2 Thomas L. Floyd, "Digital Fundamentals", 10 Edition, Pearson Education, New Delhi , 2011.												

COUR On co	SE OU mpletior	TCOME	S: cou	urse, the	e studer	nts will b	e able to)								B (Hiç	T Map ghest l	ped _eve	l)		
CO1	summ	arize the	e di	fferent	number	system	s and th	eir conv	ersion a	nd bool	ean a	algebra	a			Ap	plying	(K3)			
CO2	interpr	et boole	an	expres	sion usi	ng map	and tab	ulation t	echniqu	e and re	ealize	e it usii	ng logic	; gates		Ap	plying	(K3)			
CO3	desigr	o combir	nati	onal log	jic circu	its										Ap	plying	(K3)			
CO4	desigr	sequer	ntia	l logic c	ircuits											Ap	plying	(K3)			
CO5	implen	nent dig	ital	system	is using	register	s, count	ers and	program	nmable	logic	devic	es			Ap	plying	(K3)			
	Mapping of COs with POs and PSOs																				
COs/ POs	PO	1 PC	2	PO3	PO4	PO5	PO6	P07	PO8	PO9	P	010	PO1	1	PO12		P012		PSC	01	PSO2
CO1	3	3	2	1	1												3		2		
CO2	3	3	2	1	1												3		2		
CO3	3	3	2	1	1												3		2		
CO4	3	3	2	1	1												3		2		
CO5	3	3	2	1	1												3		2		
1 – Sli	ght, 2 –	Modera	ate,	3 – Su	bstantia	I, BT- Bl	oom's T	axonom	ıy												
							ASSES	SMEN		ERN - T	HEO	RY									
Tes Bloo Categ	st/ m's jory*	Rem (em K1	nbering) %		Unders (K2	tanding ?) %		Applyin	g (K3) %	6	Anal (K4	yzing) %	Evalu (K5	ating) %	Crea (K6	ating) %	Тс	otal %		
CA	T1		1	0		5	0		4	0									100		
CA	T2		1	0		3	0		6	0									100		
CA	T3		1	0		4	0		5	0						100					
ES	E		1	0		4	.0		5	0						100					

* ±3% may be varied, CAT1, 2, 3 – 50 marks, ESE – 100 marks

22TAM01 - தமிழர் மரபு																
Dreare		(Common to All Engineering and Technology	/ Branch	es)	1											
Branch	mme &	All BE / BTech Branches	Sem.	Category	L	Т	Р	Credit								
Prereq	uisites	Nil	1/2	HS	1	0	0	1								
Preamb	Preamble தமிழர்களின் மொழி, இலக்கியம், ஓவியங்கள், சிற்பக்கலைகள், நாட்டுப்புறக் கலைகள், வீர விளையாட்டுக்கள், திணைக் கோட்பாடுகள், இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பைப் பற்றிய அறிவை வழங்குவதே இந்த பாடத்தின் நோக்கமாகும்.															
ക്കരം	- I	மொழி மற்றும் இலக்கியம்						3								
இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.																
அலகு – 11 மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை 3 நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.																
ക്കരം	- 111	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுக்	കന്					3								
தெருச் சிலம்ப	கூத்து, பாட்டம், எ	கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.	രുഥിഖ	ரட்டம், (தோல	ОПЦ е	തഖദ്	ைகூத்து,								
ക്കരം	- IV	தமிழா்களின் திணைக் கோட்பாடுகள்						3								
தமிழச புறக் (கல்வி கடல்ச	கத்தின் தா கோட்பாடு யும் – சங் டைந்த நா(வரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்? கள் – தமிழா்கள் போற்றிய அறக்கோட்பாடு– சங் பககால நகரங்களும் துறை முகங்களும் – சங்ககால தெளில் சோழா்களின் வெற்றி.	றும் சா க கால லத்தில்	ங்க இலக்கி லத்தில் தமி 9 ஏற்றுமதி	யெத்த ழகத் மற்	நில் தில் றும்	அக்ட எழு இற	ம் மற்றும் ஒத்தறிவும் க்குமதி –								
அலகு	- v	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்। பங்களிப்பு	ѩற்குத்	தமிழர்கள	ரின்			3								
இந்திய – சுய கையெ	ப விடுதன மரியாதை பழுத்துப்பட	லப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிற 5 இயக்கம் – இந்திய மருத்துவத்தில் சித்த ம டிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.	றபகுதிச ருத்துவ	களில் தமிழ் பத்தின் பா	ழ் பல வகு	जिता – ४	ட்டிஎ கல்ெ	ர் தாக்கம் வட்டுகள்,								
								Total: 15								
TEXT E	BOOK:															
1.	ஆ. பூபால	லன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 2022.														
REFER	ENCES:															
1.	தமிழக வ கல்வியிட	ரலாறு- மக்களும் பண்பாடும்- கே கே பிள்ளை (வெளி பல் பணிகள் கழகம்)	யீடு தப	ிழ்நாடு பாட	_நூ	ல் மர	ற்றும்)								
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)																
3.	கீழடி - சை	வகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்	லியல்	துறை வெ	ണിനു	<u></u> ዓ)										
4.	பொருறை	, - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளி	յողԸ)													
COUR	SE C ກ⊔ (UTCOI மடிக்ச	MES: ചെല	ன்,	மாண	பர்க	जंग								BT Map (Highest	ped Level)
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CO1	தம் மு	தழ் பெ டியும்.	பாழி	Ъ	ற்றும் 🖁	இலச்	கியத்தி	ல் மதிட	ப்புமிக்	ቴ ቆጡ	,த்துக்க	ണെ ഒ	រាំំាត់ភ	Und	erstanding	g (K2)
CO2	தப	ிழர்க	ளின்	சிற்	ற்வ ப்ப	றும்	அவர்க	ளின் ஒ	வியங்	கள் ப	ற்றி வி	ளக்க பு	றடியும்.	Und	erstanding	g (K2)
CO3	தப் கூ	ிழர்க ற முடி	றின் பிட்ட	நாட 1.	_டுப்புந) மற்	றும் தற்	காப்புக்	கலை	ക്തണ	ப் பற்றி) சுருக்க	கமாகக்	Und	erstandin	g (K2)
CO4	தப	ிழர்க	វវាត់ា	தில	னைக் (கோட	்பாடுகஎ	ளைப் பர	ற்றி வ	ிளக்க	முடிய	ضا.		Und	erstanding	g (K2)
CO5	இர பங	ந்திய (பகளிப்	தேசி। பு பர்	ய இ ற்றி	ியக்கம் விளக்ச	் மற் பில் ப	றும் இந் டியும்.	திய பல	ன்பாட்	டிற்கு	த் தமிழ	ர்களில்	Т	Und	erstanding	g (K2)
							Main	in a of C				0-				
00-/0		DO 4	DO		DOD	D O				n POS			DO11	DO10	D0 04	DQQQ
COS/P	'OS	P01	PC	02	P03	PO	4 PO5	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
CO1								3		3	2	2		3		
CO2	2							3		3	2	2		3		
COS	3							3		3	2	2		3		
CO4	ł							3		3	2	2		3		
CO5	5							3		3	2	2		3		
1 – Slio	aht, 2	2 – Mod	erate	, 3 -	- Substa	ntial.	BT- Bloon	ı's Taxoı	nomy							
				1 -		,			,							
							ASS	ESSMEN	IT PAT	FERN ·	- THEOI	RY				
Tes C	t / Bl ateg	oom's ory*		Rer	nemberi (K1) %	ing	Underst (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing %	Evaluating (K5) %	Cı (eating K6) %	Total %
	CAT	1			40		60)								100
	CAT	2			40		60)								100
	CAT	3			40		60)							Understanding (K2 Understanding (K2 Understanding (K2 O12 PSO1 PS 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	
	ES	E				1			1	l	NA	1		1		
* ±3%	may	be varie	ed (C	AT 1	1,2&3-	- 50 r	narks)									

	22TAM01 - HERITAGE OF TAMI	LS					
	(Common to All Engineering and Technolog	y 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 Tan arts, heroic games, doctrines, contribution of Tamils to Indian	nil langua culture.	ge, literature,	pain	tings,	sculp	tures, folk
UNIT I	Language and Literature						3
Language familie sangam literature & jainism in tamil - contribution of b	s in india - dravidian languages – tamil as a classical language – distributive justice in sangam literature - management principle land - bakthi literature azhwars and nayanmars - forms of minor harathiyar and bharathidhasan.	e - classi s in thiruk poetry - c	cal literature i ural - tamil ep development	n tan lics al of mc	nil — s nd im dern	secula pact o literat	r nature of f buddhism ure in tamil
UNIT II	Heritage - Rock Art Paintings to Modern Art – Sculpture						3
Hero stone to me sculptures, village nadhaswaram - re	dern sculpture - bronze icons - tribes and their handicrafts - deities, thiruvalluvar statue at kanyakumari, making of musical ir ble of temples in social and economic life of tamils.	art of te nstrumen	mple car ma ts - mridhang	king am, p	m arai,	assive veena	e terracotta ii, yazh and
UNIT III	Folk and Martial Arts						3
Therukoothu – ka and games of tan	ragattam - villu pattu - kaniyan koothu – oyillattam - leather pup ils.	petry – s	lambattam –	valar	i - tige	er dar	ice - sports
UNIT IV	Thinai Concept of Tamils						3
Flora and fauna c and literacy during of cholas.	f tamils & aham and puram concept from tholkappiyam and sang g sangam age - ancient cities and ports of sangam age - export and sangam age - export and sangam age - export a	gam litera nd import	ture - aram co during sanga	oncep Im ag	ot of ta e - ov	amils rersea	- education is conquest
UNIT V	Contribution of Tamils to Indian National Movement and I	Indian Cu	ulture				3
Contribution of tai - role of siddha m	nils to indian freedom struggle - the cultural influence of tamils ov edicine in indigenous systems of medicine – inscriptions & manu	er the oth uscripts –	er parts of inc print history of	lia – s of tarr	elf-re	spect oks.	movement
							Total: 15
TEXT BOOK:							
1. S.Muthur	amalingam, M.Saravanakumar, Heritage of Tamils, Yes Dee Pul	blishing F	Vt Ltd, 2023.				
REFERENCES:							
1. Historica Tamil Stu	Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thiruna) idies).	vukarasu)) (Published b	y : In	terna	tional	Institute of
2. The Con Studies).	tribution of Tamil of the Tamils to Indian Culture(Dr.M.Valarma	athi)(Pupl	ished by Inte	ernatio	onal I	nstitu	te of Tamil
3. Keeladi - Tamilnac	 'Sangam City C ivilzation on the banks of river Vaigai; (Joir u Text Book and Educational Services Corporation, Tamilnadu). 	ntly Publi	shed by: Dep	bartm	ent o	f Arch	naeology &

COUR On cor	SE C mple	UTCOI tion of	MES: the c	our	se, the s	studer	nts will be	able to)						BT Map Highest	ped Level)
CO1	exp	olain val	uable	e coi	ncepts in	langu	lage and l	literature	e of tam	ils.				Und	erstanding	g (K2)
CO2	illus	strate al	bout t	the t	amils scu	ulpture	and their	painting	gs.					Und	erstanding	g (K2)
CO3	sur	nmarize	e abou	ut th	e tamils	folk ar	nd martial	arts.						Und	erstanding	g (K2)
CO4	exp	lain the	e thina	ai co	oncept of	tamils								Und	erstanding	g (K2)
CO5	exp	lain the	e cont	ribu	tion of Ta	amils t	o the India	an Natio	nal Mov	/emen	t and Inc	lian cult	ure.	Und	erstanding	g (K2)
							Маррі	na of C	Os with	1 POs	and PS	Os				
COs/P	os	PO1	РО	2	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	ŀ							3		3	2	2		3		
CO5	5							3		3	2	2		3		
1 – Slig	ght, 2	2 – Mod	erate,	, 3 –	- Substar	ntial, B	T- Bloom'	's Taxor	nomy							
							4005	COMEN	T D A T		TUEO	2				
Τος	t / Bl	oom's		Rei	member	ina	ADDE	33WI⊑N andina		ERN -	Δnalvz	ina	Evaluating	Cr	eating	
C	ateg	ory*		i.c.	(K1) %		(K2)	%	(K3)	%	(K4)	%	(K5) %	(<td>Total %</td>	Total %
	CAT	Г1			40		60									100
	CAT	Г2			40		60									100
	CAT	ГЗ			40		60									100
	ES	E									NA					
* ±3% I	may	be varie	ed (CA	AT 1	1,2&3-	- 50 m	arks)									

			2	2MEL1	1 - EN	GINEE	ring p	RACTIO	CES LA	BORAT	ORY				
		1		(Comm	ion to A	ll Engin	eering	and Teo	chnolog	y Branch	es)			1	
Programme Branch	e&	All B	E/BTec	h Brano	ches					Sem.	Category	L	т	Ρ	Credit
Prerequisit	tes	Nil								1/ 2	ES	0	0	2	1
Preamble		This engin	course eering p	is desi practice	gned to s.	o provi	de a ha	ands-or	n exper	ience in	basic of r	necha	inical	and e	electrical
LIST OF EX	PERIN	IENTS	/ EXER	CISES:											
					PA	RT A –	MECH	ANICA	L ENGI	NEERIN	G				
1.	Prepa Tappii	re a Sq ng, and	uare / F Assem	Rectang bling Ta	gular / V asks fro	/-Shape m the g	e Projec iven Sq	tion wit uare / F	h its Co Rectang	ounterpai Jular MS	t for Mating Plates using	y and g Mod	Perfor ern Po	m the ower ∃	Drilling, Tools.
2.	Prepa Powei	re T / L r Tools.	/ Lap J	oint fro	m given	Woode	en Worl	k Piece	and Ma	ike a Bo	<pre><!-- Tray out</pre--></pre>	of Ply	wood	using	Modern
3.	Perfor Leak-	m the T Proof.	Thread	Format	ion on a	a GI/P∖	/C Pipe	and Pi	repare a	a Water	Line from t	ne Ov	erhead	d Tan	k that is
4.	Make a Butt / Lap / Tee Joint of MS Plate using Arc Welding Process and Welding Simulator. Activity: Prepare an Innovative Model with the Knowledge from Fitting / Carpentry / Plumbing / Welding Involving														
5.	Activity: Prepare an Innovative Model with the Knowledge from Fitting / Carpentry / Plumbing / Welding Involving Modern Power Tools.														
	Modern Power Tools. PART B – ELECTRICAL AND ELECTRONICS ENGINEERING														
6.	Wiring	; circuit	for fluoi	rescent	lamp a	nd Stair	case w	viring							
7.	Wiring	circuit	of Inca	ndesce	nt lamp	using I	mpulse	Relay							
8.	Measu	urement	t of Eart	th Resis	stance										
9.	Solde	ring of S	Simple (Circuits	and tro	uble sh	ooting								
10.	Impler	mentatio	on of ha	lf wave	and ful	l wave	Rectifie	r using	diodes						
														•	Total:30
REFERENC	CES/ M	ANUAL	./SOFT	WARE											
	Engin	eering F	Practice	s Labor	atory N	lanual.							рт	Mon	nod
On comple	tion of	the co	urse, th	ne stud	ents wi	ll be at	ole to						ы (Higł	nest L	pea .evel)
CO1	plan t	the seq	uence	of ope	rations	for effe	ective c	ompleti	on of th	he planr	ed models	/	Creat	ting (ł	(6) (S2)
CO2	identi	fy and i	use app	oropriate	e mode	rn powe	er tools	and co	mplete	the exer	cises/mode	ls	Apply	ving (k	(3)
CO3	perfor	m hous	e wiring	and re	alize the	e impor	tance o	f earthir	ng				App	lying	(S2) (K3),
CO4	solder	ing with	simple	electro	nics cir	cuits			0				App	lying	n (S2) (K3),
CO5	trouble	e shoot	the elec	ctrical a	nd elec	tronic c	ircuits						App	lying	n (52) (K3),
	Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	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	orato 3	ა კ_ Subs	2 stantial	1 BT- Blo	oom's T	axonon	 זע	2	2		3		ა	2

			2	22CYL1	2 – CH	EMIST	RY LAB	BORATO	ORY FC			SYSTEMS				
				(Comm	on to C	SE, CS	SD, IT, A	AIDS an	d AIML	branche	es)				
Progra Branch	imme 1	&	B.E & Comp Techi & Arti branc	Compo outer So nology, ificial Ir ches	uter Sc cience Artific ntellige	ience a and De ial Intel nce and	ind Eng sign, B Iligence d Mach	gineerir Tech – e and D ine Lea	ng & Inform ata Sci irning	ation ence	Sem.	Category	L	т	Ρ	Credit
Prereq	uisite	es	Nil								1 / 2**	BS	0	0	2	1
Pream	ole		This spectr impro param life.	course rophotor ve the a neters (0	aims metric a analytic Ca, Mg	to imp and pH al capa & alkal	art the metry bility. It inity) ar	basic experin also ai nd the to	concep nents fo ms to in oxic sub	ots of or the e mpart th ostance	volumetri estimation ne knowle s (Cu, Cr	ic, conduct of given s edge on imp) that we co	ometr ample oortan me ad	ic, p es ar ce of cross	otenti id the wate in da	ometric, reby, to r quality y to day
LIST O	FEX	PERIN	IENTS	EXER	CISES:											
1.	Dete	ermina	tion of s	strength	of an u	Inknowr	n solutio	on using	pH me	ter.						
2.	Anal	lysis a	nd com	parison	of the s	strength	of acid	ls in the	given n	nixture	using con	ductivity me	ter.			
3.	Pote	entiom	etric ap	proach	using a	Pt elec	trode fo	or the es	timatior	n of iron	in the giv	ven sample.				
4.	Spectrophotometric method for the determination of nickel.															
5.	Iodometric analysis of Cu content from discarded PCBs.															
6.	Volumetric analysis of chromium prepared from electroplating sludge.															
7.	Determination of Dissolved Oxygen in the given wastewater sample.															
8.	Assessment of the given water sample for the suitability of drinking / industrial purpose by estimating the calcium, magnesium and total hardness by EDTA method.															
9.	Estir	mation	of alka	linity of	river ar	d bore	well wat	er colle	cted fro	m differ	ent place	s.				
10.	Dete	ermina	tion of r	nolecula	ar weigl	nt of a p	olymer	/ liquid	by Ostv	vald vis	cometer.					
11.	Con	structi	on and	working	of Zinc	-Copp	er Elect	rochem	ical Cel	l (Demo	onstration).				
12.	Elec	troplat	ting pro	cess (D	emonst	ration).										
															-	Total:30
REFER	RENCI	ES/ M	ANUAL	/SOFT	WARE:											
1.	Pala Raja	anisam aganap	iy P.N., bathy Pi	Manika ublisher	ndan P. s, Erod	., Geeth e, 2022	na A. an	ıd Manjı	ula Ran	i K., "Cł	nemistry L	aboratory N	lanua	l", 1 ^s	Editio	on,
COURS	SE Ol	JTCO	MES:											BT	Мар	ped
On cor	npleti	ion of	the co	urse, th	e stude	ents wi	II be ab	le to						(Hig	hest I	
CO1	dem solut	ionstra tion.	ate the c	conducti	vity me	ter and	pH met	ter to an	alyze tr	ne stren	gth of the	given		App Pre	olying cision	(K3), (S3)
CO2	anal	lyze th	e amou	nt of C	u, Cr, D	O, harc	Iness a	nd alkal	inity pre	esent in	the given	sample.		App Pre	olying cision	(K3), (S3)
CO3	dem Ni ai	ionstra nd Vis	ate the p comete	otention r for the	metric a determ	and spenination	ctropho of mole	tometric ecular w	: metho eight of	d for the a polyr	e estimati ner.	on of Fe &		App Pre	lying cision	(K3), (S3)
<u> </u>						Марр	ing of (Cos wit	h POs a	and PS	Os					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	2 P	SO1	PSO2
CO1		3	2	1	3			3								
CO2		3	2	1	3			3								
CO3		3	2	1	3			2								
1 – Slig	ght, 2 -	– Mod	erate, 3	– Subs	stantial,	BT- Blo	om's T	axonom	iy		I					

** for 2022 batch 1st sem for CSE, CSD, AIML & AIDS & 2nd sem for IT, for 2023 batch 1st sem for CSE, CSD, IT & 2nd sem for AIML & AIDS

		22VEC11 - YOGA AND VALUES FOR HOLIS		/ELOPMENT									
		(Common to All Engineering and Technol	ogy Brand	ches)									
Progra Branch	mme & n	All B.E./B.Tech. Branches	Sem.	Category	L	т	Ρ	Credit					
Prereq	uisites	Nil	1/2	HS	1	0	1	1					
Preamb	ole	Yoga or yogasanas are considered as art and science of he harmony of body and mind for general wellbeing. Yoga is co Indians for healthy living. Students in particular are benefitte	althy livin onsidered d by learr	g by our ancier as one of the hing yoga.	nt guru greate	s. It i st gif	s me ts to	thod to bring the world by					
Unit – I	l	Introduction:						2					
The Ori Asanas Practice	The Origins of Yoga – Definitions - Concepts - Aims and objectives of Yoga – Yoga is a Science and Art – Rules and Regulations of Asanas – Classifications of Yogasanas – Patanjali's Ashtanga Yoga – Pranayama – Mudras & Bandhas - Shatkarma (Cleansing Practice) - Streams of Yoga – Modern Trends in yoga.												
Unit –		Yoga and Mind:						2					
The Na problen	ture of Mine ns: Mood D	d - Five Elements and the Mind - Meditation and the Mind - F isorders, Major Depressive Disorder, Cyclothymic Disorder.	unctions	of the Mind - R	ole of	Yoga	a in P	sychological					
Unit – I		Yoga and Values, Diet:						2					
Human Diet – S	Values – S Soothing Die	Social Values – Role of Yoga in Personality Integration - Conc et – Constructive Diet.	cepts of N	latural Diet - N	aturopa	athy	Diet -	 Eliminative 					
Unit –	IV	Asanas:						2					
Prayer of Prac	 Starting & ticing Asana 	Closing - Preparatory practices – Loosening Practices – Mear as. Asanas: Standing – Sitting – Prone – Supine – Suryanama	ning, Defir askar.	nitions and Obj	ectives	of As	sana	s - Principles					
Unit – '	V	Pranayama and Meditation:						2					
Breathi Shuddł	ng Practice ni - Kapalat	s for awareness - Definitions and Objectives of Pranayama - F bathi – Sitali – Sitkari – Bhranari – Ujjayi – Relaxation Techniq	Principles Jues – Me	of Practicing P ditation.	ranaya	ima.	Pran	ayama: Nadi					
				Lecture	e: 10, F	ract	ical:	10, Total:20					
TEXT E	BOOK:												
1.	Swami sa	tyananda saraswathi, "Asana pranayama mudra bandha", Bih	ar school	of yoga, 4 th Ec	lition, 1	969.							
2.	Swami mu	ukthi Bodhanandha, "Hatha yoga pradipika", Bihar school of yo	oga, 4 th E	dition, 1985.									
REFER	RENCES:												
1.	B.K.S. lye	nkar, "Yoga the path of holistic health", DK Limited, 2 nd Edition	n, 1969.										
2.	Selvarasu	, "Kriya cleansing in yoga", Aruvi yoga, 3 rd Edition, 2002.											

COURS On com	E OUT	COMES on of the	: course, t	the stude	ents will	be able t	0						BT M (Highe	lapped st Level)
CO1	real	ize the im	portance	of yoga	in physic	al health.							Apply	ring (K3)
CO2	real	ize the im	portance	of yoga	in menta	l health.							Apply	ring (K3)
CO3	real	ize the ro	le of yoga	a in perso	onality de	velopmer	nt and diet.						Apply	ring (K3)
CO4	do t	he looser	ning pract	ices, Asa	anas and	realize its	s benefits.						Apply	ring (K3)
CO5	do t	he practio	ce of Prar	nayama,	meditatio	n and rea	alize its ber	efits					Apply	ring (K3)
					Ма	pping of	COs with	POs	and F	PSOs				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PC	70	PO8	PO9	PO10	PO11	PO12
CO1	1						3			2	1			
CO2	2						3			2				
CO3	3						3			3				
CO4	4						3			2	3			
CO5	5						3			3				
1 – Sligh	nt, 2 –	Moderate	e, 3 – Suł	ostantial,	BT- Bloo	m's Taxo	nomy							
					AS	SESSME		RN -	- THE	ORY				
Test Bloon Catego	:/ n's ory*	Reme (ł	embering (1) %	j U	nderstar (K2) %	nding %	Applyir (K3) %	ng %	Ar (nalyzing K4) %	Eva (ł	luating (5) %	Creating (K6) %	g Total %
CAT	1		-		-		-			-		-	-	-
CAT	2		-		-		-			-		-	-	-
CAT	3		20		30		50			-		-	-	100
ESE	Ξ		-		-		-			-		-	-	-
* ±3% m	nay be	varied (C	CAT3 – 1	00 marks	3)									

	22TAM01 - தமிழர் மரபு						
Programme &	(Common to All Engineering and Technology	y Branch	es)				
Branch	All BE / BTech Branches	Sem.	Category	L	Т	Р	Credit
Prerequisites	Nil	1/2	HS	1	0	0	1
Preamble	தமிழர்களின் மொழி, இலக்கியம், ஓவியங்கள், சிற் விளையாட்டுக்கள், திணைக் கோட்பாடுகள், இ பங்களிப்பைப் பற்றிய அறிவை வழங்குவதே இந்த	பக்கனை)ந்திய த பாடத்	லகள், நாட் பண்பாட்டி த்தின் நோச	டுப்ட ற்குத் க்கம	றக் ந் ாகுப்	கஷை தமி ப.	லகள், வீர 1ழர்களின்
அலகு − I	மொழி மற்றும் இலக்கியம்						3
இந்திய மொழிச் – சங்க இலக்கி மேலாண்மைக் பக்தி இலக்கியட வளர்ச்சி – தமி	ைகுடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு (யத்தின் சமயச் சாா்பற்ற தன்மை – சங்க இலக்கி கருத்துக்கள் – தமிழ் காப்பியங்கள், தமிழகத்தில் ம், ஆழ்வாா்கள் மற்றும் நாயன்மாா்கள் – சிற்றிலக்கி ழ் இலக்கிய வளா்ச்சியில் பாரதியாா் மற்றும் பாரதி	செம்பெ யத்தில் சமண யங்கள் தாசன்	பாழி – தமி பகிர்தல் பௌத்த ச – தமிழில் ஆகியோரி	ழ் ெ அறப மயா நவி ன் ப	சவ் 6 – வகளி ன (g ங்க	பிலச் திரு ரின் த இலக் ளிப்பு	கியங்கள் க்குறளில் தாக்கம் – கியத்தின்
அலகு – 11 நடுகல் முதல் ர கைவினைப் ெ தெய்வங்கள் – யாழ், நாதஸ்வ	மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங் வீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழர் பாருட்கள், பொம்மைகள் – தேர் செய்யும் கலை குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் ரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் பே	கள் வஎ வகுடியி – சுடு கருவிச கோவில	ரை – சிற்பு னர் மற்றும் மண் சிற்ட என் – மிருத களின் பங்	ந் கல அவை பங்க தங்க பகு.	லை வர்க ள் – ம், ட	ள் த - நா பறை	3 யாரிக்கும் ட்டுப்புறத் , வீணை,
அல ரு – 111	நாட்டுப்புறக் கலைகள் மற்றும் விர விளையாட்டுக்	കണ്					3
தெருக்கூத்து, சிலம்பாட்டம், ச	கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.	രുഥിഖ	ாட்டம், 🕻	தால்	ОПЦ (തഖദ്	ைத்து,
<u> എ</u> ക് – IV	தமிழர்களின் திணைக் கோட்பாடுகள்						3
தமிழகத்தின் தா புறக் கோட்பாடு கல்வியும் – சா கடல்கடந்த நா(அலகு – v	ாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்ற கள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு– சங் வககால நகரங்களும் துறை முகங்களும் – சங்ககா நகளில் சோழர்களின் வெற்றி. இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்	றும் சா க கால லத்தில் டிற்குத்	ங்க இலக்கி நத்தில் தமி ஏற்றுமதி தமிழர்கவ	யத்த ழகத் மற் ரின்	தில் தில் றும்	அக்ட எழு இற	ம் மற்றும் ஒத்தறிவும் க்குமதி – 3
-	ບເພັ່ສສາໃບປຸ		• •				
இந்திய விடுதல – சுயமரியாதை கையெழுத்துப்ப	லைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிர த இயக்கம் – இந்திய மருத்துவத்தில் சித்த ம டிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.	றபகுதிச ருத்துவ	களில் தமிழ் பத்தின் பா	ற்கு பல	ன்பா – ச	ட்டிஎ கல்ெ	ர் தாக்கம் வட்டுகள்,
							Total: 15
TEXT BOOK:							
1. ஆ. பூபா	லன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 2022.						
REFERENCES:							
 1. தமிழக வ கல்வியி	பரலாறு- மக்களும் பண்பாடும்- கே கே பிள்ளை (வெளி யல் பணிகள் கழகம்)	யீடு தப	ற்ந்நாடு பாட	_நூ	ல் மர	ற்றும்)
2. கணினித்	தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)						
3. கீழடி - ன	வகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்	லியல்	துறை வெ	ണിഥ്	<u></u> ይ)		
4. பொருன	ந - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளி	ியூடு)					

COUR	SE C ກ⊔ (UTCOI மடிக்ச	MES: ചെല	ன்,	மாண	பர்க	जंग								BT Map (Highest	ped Level)
CO1	தம் மு	தழ் பெ டியும்.	பாழி	Ъ	ற்றும் 🖁	இலச்	கியத்தி	ல் மதிட	ப்புமிக்	ቴ ቆጡ	,த்துக்க	ണെ ഒ	រាំំាត់ភ	Und	erstanding	g (K2)
CO2	தப	ிழர்க	ளின்	சிற்	ற்வ ப்ப	றும்	அவர்க	ளின் ஒ	வியங்	கள் ப	ற்றி வி	ளக்க பு	றடியும்.	Und	erstanding	g (K2)
CO3	தப் கூ	ிழர்க ற முடி	றின் பிட்ட	நாட 1.	_டுப்புந) மற்	றும் தற்	காப்புக்	கலை	ക്തണ	ப் பற்றி) சுருக்க	கமாகக்	Und	erstandin	g (K2)
CO4	தப	ிழர்க	វវាត់ា	தில	னைக் (கோட	்பாடுகஎ	ளைப் பர	ற்றி வ	ிளக்க	முடிய	ضا.		Und	erstanding	g (K2)
CO5	இர பந	ந்திய (பகளிப்	தேசி। பு பர்	ய இ ற்றி	ியக்கம் விளக்ச	் மற் பில் ப	றும் இந் டியும்.	திய பல	ன்பாட்	டிற்கு	த் தமிழ	ர்களில்	Т	Und	erstanding	g (K2)
							Main	in a of C				0-				
00-/0		DO 4	D 0		DOD	D O				n POS			DO11	DO10	D0 04	DQQQ
COS/P	'OS	P01	PC	02	P03	PO	4 PO5	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
CO1								3		3	2	2		3		
CO2	2							3		3	2	2		3		
COS	3							3		3	2	2		3		
CO4	ł							3		3	2	2		3		
CO5	5							3		3	2	2		3		
1 – Slio	aht, 2	2 – Mod	erate	. 3 -	- Substa	ntial.	BT- Bloon	ı's Taxoı	nomy							
				1 -		,			,							
							ASS	ESSMEN	IT PAT	FERN ·	- THEOI	RY				
Tes C	t / Bl ateg	oom's ory*		Rer	nemberi (K1) %	ing	Underst (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing %	Evaluating (K5) %	Cı (eating K6) %	Total %
	CAT	1			40		60)								100
	CAT	2			40		60)								100
	CAT	3			40		60)							Understanding (K2 Understanding (K2 Understanding (K2 O12 PSO1 PS 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	
	ES	E				I			1	l	NA	1		1		
* ±3%	may	be varie	ed (C	AT 1	1,2&3-	- 50 r	narks)									

	22TAM01 - HERITAGE OF TAMIL	.S					
	(Common to All Engineering and Technology	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 Tam arts, heroic games, doctrines, contribution of Tamils to Indian	il langua culture.	ge, literature,	pain	tings,	sculp	tures, folk
UNIT I	Language and Literature						3
Language families sangam literature & jainism in tamil I - contribution of bl	in india - dravidian languages – tamil as a classical language – distributive justice in sangam literature - management principles and - bakthi literature azhwars and nayanmars - forms of minor p narathiyar and bharathidhasan.	- classion - classion - classion - classion - classic -	cal literature i ural - tamil ep development	n tan lics al of mc	nil – s nd im odern	secula pact o literat	r nature of f buddhism ure in tamil
UNIT II	Heritage - Rock Art Paintings to Modern Art – Sculpture						3
Hero stone to mo sculptures, village nadhaswaram - ro	dern sculpture - bronze icons - tribes and their handicrafts - a deities, thiruvalluvar statue at kanyakumari, making of musical in le of temples in social and economic life of tamils.	art of te strumen	mple car ma ts - mridhang	king am, p	m arai,	assive veena	e terracotta ii, yazh and
UNIT III	Folk and Martial Arts						3
Therukoothu – ka and games of tam	ragattam - villu pattu - kaniyan koothu – oyillattam - leather pupp ils.	oetry – si	lambattam –	valar	i - tig	er dar	ice - sports
UNIT IV	Thinai Concept of Tamils						3
Flora and fauna of and literacy during of cholas.	tamils & aham and puram concept from tholkappiyam and sanga sangam age - ancient cities and ports of sangam age - export an	am litera Id import	ture - aram co during sanga	oncep Im ag	ot of t e - ov	amils ⁄ersea	- education is conquest
UNIT V	Contribution of Tamils to Indian National Movement and Ir	ndian Cu	ulture				3
Contribution of tan	nils to indian freedom struggle - the cultural influence of tamils ove edicine in indigenous systems of medicine – inscriptions & manus	er the oth scripts –	er parts of inc print history of	lia – s of tarr	self-re nil boo	espect oks.	movement
							Total: 15
TEXT BOOK:							
1. S.Muthura	amalingam, M.Saravanakumar, Heritage of Tamils, Yes Dee Pub	lishing F	vt Ltd, 2023.				
REFERENCES:							
1. Historical Tamil Stu	Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunaved dies).	ukarasu)	(Published b	y : In	iterna	tional	Institute of
2. The Cont Studies).	ribution of Tamil of the Tamils to Indian Culture(Dr.M.Valarma	thi)(Pupl	ished by Inte	rnatio	onal I	nstitu	te of Tamil
3. Keeladi – Tamilnad	'Sangam City C ivilzation on the banks of river Vaigai; (Join J Text Book and Educational Services Corporation, Tamilnadu).	tly Publi	shed by: Dep	bartm	ent o	f Arcl	naeology &

COUR On cor	SE O mple	UTCOI tion of	MES: the c	our	se, the s	studen	ts will be	able to)						BT Map Highest	ped Level)
CO1	exp	lain val	uable	e cor	ncepts in	langu	lage and l	literature	e of tam	ils.				Und	erstanding	g (K2)
CO2	illus	strate al	bout t	he t	amils scu	ulpture	and their	painting	gs.					Und	erstanding	g (K2)
CO3	sun	nmarize	e abou	ut th	e tamils	folk an	d martial	arts.						Und	erstanding	g (K2)
CO4	exp	lain the	e thina	ai co	oncept of	tamils								Und	erstanding	g (K2)
CO5	exp	lain the	e conti	ribu	tion of Ta	amils to	o the India	an Natio	nal Mov	/emen	t and Ind	lian cult	ure.	Und	erstanding	g (K2)
							Маррі	na of C	Os witł	1 POs	and PS	Os				
COs/P	os	PO1	PO	2	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	Ļ							3		3	2	2		3		
CO5	5							3		3	2	2		3		
1 – Slig	ght, 2	– Mod	erate,	, 3 –	- Substar	ntial, B	T- Bloom'	's Taxor	nomy							
Tee	4 / DI			Dai	mombor	ma	ASSE	SSMEN		ERN -	- THEOP	{Y ina	Evolucting	C.	acting	
C	ateg	ory*		Rei	(K1) %	ing	(K2)	maing %	(K3)	%	(K4)	mg %	(K5) %	(1	eating (6) %	Total %
	CAT	[1			40		60									100
	CAT	2			40		60									100
	CAT	T3			40		60									100
	ES	E									NA					
* ±3% I	may	be varie	ed (CA	AT 1	1,2&3-	- 50 m	arks)									

	22TAM02 – தமிழரும் தொழில்	நட்பமும்	1											
	(Common to All Engineering and Techno	logy Brar	nches)		1									
Programme & 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	_பங்கலை	ள பற்றிப் எ	டுத்	ക്വത	ரத்த	ல்							
<u> എ</u> ക്ര – I	நெசவு மற்றும் பானை தொழில்நுட்பம்						3							
சங்க காலத்தில் கீறல் குறியீடுக	் நெசவு தொழில் – பானைத் தொழில்நுட்பம் க ள்	கருப்பு சி	ിഖப்பு பாൽ	ரடங்	ப கள்	– LI	ாண்டகளில்							
ച ്ചെക്കെ – 11	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்						3							
சங்க காலத்தில்	வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க கா	ாலத்தில்	வீட்டுப்பொ	ருட	_கள்	ിல் ഒ	வடிவமைப்பு							
– சங்க காலத்த	டுல் கட்டுமான பொருட்களும் நடுகல்லும் – சி	லப்பதிகா	ாரத்தில் பே	வை		പ്രതന	ப்பு பற்றிய							
– சங்க காலத்தால் கட்டூயான வாருட்களுய நடுகல்லுய் – சாலப்பதுகாரத்தால் யேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச்சிற்பங்களும், கோவில்களும் – சோழர் காலத்து பெருங்கோயில்கள் மற்றும் பிற														
வழிபாட்டுத் தல	வுவரங்கள் – மாமல்லபுரச்சிறபங்களும், கோவில்களும் – சோழா காலத்து பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் –மாதிரிகட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி													
அம்மன் ஆலய	ம் மற்றும் திருமலை நாயக்கா் மஹால் – செட	ட்டிநாட்(டு வீடுகள்	– Ľ	ிரிட்	டில்	காலத்தில்							
சென்னை இந்தே	தா–சாரோசெனிக் கட்டிடக் கலை.													
ച രെക്ര – 111	உற்பத்தித் தொழில்நுட்பம்						3							
கப்பல் கட்டும்	அலகு – III உற்பத்தித் தொழில்நுட்பம் 3 கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு –													
வரலாற்றுச்சான்	றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நால	னயங்க	n அச்சடித்த	ം -	- ഥ6	തി മ	டருவாக்கும்							
தொழிற்சாலைக	ள் – கல்மணிகள் – கண்ணாடி மணிகள் –	சுடுமன்	1 மணிகள்	-	Ъ	டு	மணிகள் –							
எலும்புத்துண்டுக	<u>கள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தி</u>	ல் மணிக	ക്നിൽ ഖതം	ይ ይ	٦.									
ച லகு – IV	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்	فاں۔					3							
அணை, ஏரி, கு	ளங்கள், மதகு – சோழா்கால குமிழித் தூம்பின்	முக்கிய	த்துவம் –	காஎ	ல்நன	า∟ เ	பராமரிப்பு –							
கால்நடைகளுக்	காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை	மற்றும் (வளாண்ன	மச	ார்ந்	த செ	யல்பாடுகள்							
– கடல்சார் அறி	வு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல்	் – பெரு	ங்கடல் குறீ) த் த	പൽ	ாடை	_ய அறிவு –							
அறிவுசார் சமூக	<u>نە.</u>													
அல கு – v	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்						3							
அறிவியல் தமி	ழன் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி – தமி	ழ் நூல்க	களை மின்ப	பதிட்	цG	சய்த	தல் – தமிழ்							
மென்பொருட்கள்	n உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகட	ம் – தமி	ழ் மின் நூ	លេង	ம் –	இ6	ணையத்தில்							
தமிழ் அகராதிக	ள் சொற்குவைத் திட்டம்.													
							Total:15							
TEXT BOOK:														
தமிழக வர	லாறு – மக்களும் பண்பாடும் – கே கே பிள்ளை	(ഖെണില്	¹ டு தமிழ்நா	յ Բ	பாட	நால்	மற்றும்							
^{1.} கல்வியில்	பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவன	ம், சென்	ഞ്ഞ, 2002	-		-								
2. கணினித்த	<u>ற</u> ிழ் முனைவர் இல _் சுந்தரம், விகடன் பிரசுரம், 2	2016												
REFERENCES:														
1. கீழடி–வை	கை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொ	ல்லியல்	துறை வெ	เளาแ	ያው)									
2. பொருநை–	ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெ	៣៣ភ្)												
3. Social Life of	Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and	d RMRL –	(in print)											
4. Social Life of	the Tamils – The Classical Period (Dr.S.Sigaravelu) (Publish	ned by: Inte	ernational Inst	itute	of Ta	amil S	Studies).							
5. Historical Her Tamil Studies	itage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunave	ukarasu) (Published by	: Inte	rnati	onal I	nstitute of							
6. The Contribu	tion of the Tamil to Indian Culture (Dr.M.Valarmathi) (Puplish	ed by Inte	rnational Instit	tute	of Ta	mil St	udies).							

7.	Keeladi – 'S Tamilnadu	Sangam C Text Book	ity Civi and E	Ization on ducationa	the bar I Servic	nks of riv es Corpo	er Vaig pration,	iai; (Join Tamilna	tly Puk adu)	lished by	/: Depart	tment of	Archaeo	logy &	
8.	Studies in t	he History	of Ind	a with Sp	ecial Re	eference	to Tarr	nilnadu (I	Dr.K.K	.Pillay) (F	Published	d by: The	Author)		
9.	Porunai Civ Corporatior	vilization (J n, Tamilna	lointly du)	Published	by: De	partment	of Arc	haeology	/ & Ta	milnadu ⁻	Textbook	and Edu	ucational	Service	S
10.	Journey of	Civilizatior	n Indus	to Vaigai	(R.Bala	akrishnai	n) (Pub	lished by	/: RMF	RL) – Ref	erence E	Book.			
COU	RSE OUTCO	OMES:											,	BT Map	ped
படிப்	பை முடித்தவ	புடன், மாவ	னவர்க	ள்			_		_				(Highest	Level)
CO1	^{தமிழ்} க தொழில்	லாச்சார நுட்பம் ட	ம் மற்றி	மற்றும் விளக்க மு	தமிழ் டியும்.	சமூகத்	ക്രിത്വം	லடய	நெச	ഖ ഥ	ற்றும்	பானை	ิ ปิก	derstand	ling (K2)
CO2	தமிழர்கள்	் ன் வடிவ	மைட்	பு மற்ற	<u>ј</u> ம் கட்	டிடத் (தொழி	ல்நுட்ப	ஆற்	றல் பர்	றி விளச்	க் முடியு	ம். Un	derstand	ding (K2)
CO3	தமிழர்கள்	ன் உற்பத	ந்தித்	தொழில்	நுட்பட	பற்றி க	ஈருக்கம	ாகக் கூழ	ը լրել	பும்.			Un	derstand	ding (K2)
CO4	தமிழர்களி	ன் வேள	ாண்ன	ை மற்ற	 றம் நீ	ர்ப்பாசஎ	ாத் ெ	தாழில்	நட்பட	பி பற்றி வ	ிளக்க மு	ஷயும்.	Un	derstand	ding (K2)
CO5	தமிழர்களி	ன் அறி	<u>ி</u> யல்	தமிழ்	மற்றுட	் கணி	னித்த	மிழ் ப	- ற்றி வ	ிளக்க (فهمالا	J.	Un	derstand	ding (K2)
					Марр	ing of (COs w	ith POs	and	PSOs		1			
C	Os/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
	CO2						3		3	2	2		<u>კ</u>		
	CO3						3		3	2	2		3		
	CO4						2		2	2	2		2		
	CO5						3		3	2	2		3		
1_9	Slight $2 - Mc$	derate 3	Subs	tantial B	L- Bloor	n'e Tavo	nomv		5	2	2		5		
1-0	$\sin g(\pi, 2 - inc)$		- 5003	ianiai, D			nonny								
					ASS	ESSME	NT PA	TTERN -	- THE	ORY					
Test	/ Bloom's C	ategory*	Rer	nemberin (K1) %	g Un	derstan (K2) %	ding	Applyin (K3) %	ng A	nalyzing (K4) %	j Eva (K	luating (5) %	Crea (K6)	ting) %	Total %
	CAT1			40		60									100
	CAT2			40		60									100
	CAT3			40		60									100
	ESE								N	IA					
* ±3%	% may be va	ried (CAT	1,2,3	– 50 marl	ks)										

	22TAM02 - TAMILS AND TECHNO	LOGY					
	(Common to All Engineering and Technology	ogy Branc	hes)				
Programme & Branch	All BE/BTech Branches	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	2/3	HS	1	0	0	1
Preamble	This course aims to impart the essential knowledge on the tamil of	culture and	d related techno	logy			
UNIT – I	WEAVING AND CERAMIC TECHNOLOGY						3
Weaving Indust	ry during Sangam Age – Ceramic technology – Black and Red Ward	e Potteries	s (BRW) – Graff	iti on	Potte	eries.	
UNIT – II	DESIGN AND CONSTRUCTION TECHNOLOGY						3
Designing and a of Sangam age Cholas and oth – Chetti Nadu H	Structural construction House & Designs in household materials durir – Details of Stage Constructions in Silappathikaram – Sculptures er worship places – Temples of Nayaka Period – Type study (Madu łouses, Indo – Saracenic architecture at Madras during British Perio	ng Sangar and Temp urai Meena od.	n Age – Building oles of Mamalla akshi Temple) –	ı mate purar Thiru	erials n – C ımala	and I Great ai Nay	Hero stones Temples of rakar Mahal
UNIT – III	MANUFACTURING TECHNOLOGY						3
Art of Ship Build of Coins – Beac – Gem stone ty	ding – Metallurgical studies – Iron industry – Iron smelting, steel – Co Is making – industries Stone beads – Glass beads –Terracotta beads pes described in Silappathikaram.	opper and s –Shell be	gold – Coins as ads/ bone beats	sour s – Ar	ce of cheol	histo logica	ry – Minting I evidences
UNIT – IV	AGRICULTURE AND IRRIGATION TECHNOLOGY						3
Dam, Tank, po Agriculture and Specific Society	nds, Sluice, Significance of Kumizhi Thoompu of Chola Period, A Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche /.	nimal Hus e diving – .	bandry – Wells Ancient Knowled	desi dge o	gned f Oce	l for (ean –	cattle use – Knowledge
UNIT – V	SCIENTIFIC TAMIL & TAMIL COMPUTING						3
Development o Academy – Tar	f Scientific Tamil – Tamil computing – Digitalization of Tamil Book nil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	ks – Deve	lopment of Tam	il So	ftwar	e – T	amil Virtual
							Total:15
TEXT BOOK:							
1. Social Lif	e of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and R	MRL – (in	print)				
2. Social Lif	e of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published	by: Intern	ational Institute	of Ta	mil S	tudies	6).
REFERENCES	:						
1. தமிழக பணிகள	வரலாறு - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளி ா கழகம்), உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை, 2	யீடு தமி 2002	ழ்நாடு பாடத	ால் ப	ற்ற	ும் ச	ல்வியில்
2. கணின்	த்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016						
3. கீழடி எ	வகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்லி	ியல் துல	றை வெளியீடு))			
4. பொருஎ	றை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீ(Б					
5. Historical Studies)	Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavuka	ırasu) (Pul	olished by : Inter	natio	nal Ir	nstitut	e of Tamil
6. The Cont	ribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished	by Interna	ational Institute of	of Tar	nil St	udies).
7. Keeladi - Text Boo	'Sangam City Civilzation on the banks of river Vaigai; (Jointly Publis and Educational Services Corporation, Tamilnadu)	shed by: D	epartment of A	rchae	eolog	y & T	amilnadu
8. Studies in	the History of India with Special Reference to Tamilnadu (dr.K.K.Pi	illay) (Pub	lished by : The /	Autho	r)		
9. Porunai (Corporati	Civilization (Jointly Published by: Department of Archaeology & Tamion, Tamilnadu)	ilnadu Tex	tbook and Educ	ation	al Se	rvice	3
10. Journey of	of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL	.) – Refere	ence Book.				

SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
explain weaving and ceramic technology in tamil culture and tamil society.	Understanding (K2)
Illustrate about the design and construction technology.	Understanding (K2)
summarize about the manufacturing technology.	Understanding (K2)
explain the agriculture and irrigation technology.	Understanding (K2)
explain the significance of tamil in scientific and computing.	Understanding (K2)
	SE OUTCOMES: npletion of the course, the students will be able to explain weaving and ceramic technology in tamil culture and tamil society. Illustrate about the design and construction technology. summarize about the manufacturing technology. explain the agriculture and irrigation technology. explain the significance of tamil in scientific and computing.

					Mappin	g of COs	s with PC	os and P	SOs					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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 - Slight, 2 - Moderate, 3 - Substantial, BT- Bloom's Taxonomy

		ASSESSN	IENT PATTERN	I – THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE				NA			
* ±3% may be va	ried (CAT 1.2.3 – 5	0 marks)					

		22GCL11 – FOUNDATION ENGINEERING L	ABORAT	FORY I				
		(Common to All BE/BTech branch	hes)	1	T	T	T	
Progra Branci	imme& า	All BE/BTech branches	Sem.	Category	L	т	Р	Credit
Prereq	uisites	Nil	1/2	ES	0	0	6	3
Pream	ble	This course is designed to provide foundational knowled developing a prototype model with the basic knowled Processes, 3D Printing Technology, Robotics and Embe	ge on eng Ige of Co edded Cor	jineering with mputer-aided htrol.	hano I De:	ds-on sign,	expe Manu	rience on ufacturing
LIST O	FEXPERIM	IENTS / EXERCISES:						
		PART A – Manufacturing (30 Ho	ours)					
1.	Selection of	of product, free hand sketching and detailing						
2.	Constructi	on of model using Arc/TIG/MIG/Gas/Spot welding operation	ons					
3.	Enhancing	g the model with sheet metal						
4.	Creating t	he parts of the model using lathe						
5.	Creating t	he parts of the model using milling and drilling machines						
		PART B – Product Design and Developm	ent (30 H	ours)				
1.	Free hand	d sketching and detailing of the component						
2.	3D part m	odelling of the component using CAD software						
3.	Engineerii	ng Analysis of the component model						
4.	Generate	the component using 3D printer						
5.	Value add	lition to the produced component using CNC milling maching	ine, CNC	laser cutting r	nach	ine a	nd Cl	NC router
	1	PART C – Robotics (30 Hour	rs)					
1.	Design of	electronic circuit and its debugging						
2.	Interfacing	g of sensors, actuators and wireless communion modules	with micro	ocontroller				
3.	Assembly	of Tracker Robot with accessories						
4.	Developm	nent of control strategies for motion control, path planning	and obsta	cle avoidance)			
5.	Demonstr	ation and testing of Robot in static environment						
								Total:90
REFEF	RENCES/ M	ANUAL /SOFTWARE:						
1.	Laboratory							
2.	AutoCAD	2020 and SOLID WORKS 2018 Software						

COUR On co	SE O mplet	UTCO tion of	MES: the co	urse, th	e stude	ents wil	ll be ab	le to					(۲	BT Map lighest L	oed .evel)
CO1	dev mac	elop t chining	he prot proces	otype i ses	model (using m	nechani	cal ope	erations	like w	elding, f	orming an	d F	Applying Precision	(K3), (S3)
CO2	ske milli	tch 3D ing ma	model chine, (and en CNC La	hance tl ser cutte	ne proto er and C	otype us CNC Ro	sing mo outer	dern ma	achines	like 3D p	orinter, CN	C /	Applying Precision	(K3), (S3)
CO3	des	ign an	d develo	op the a	utonom	ous rob	ot for re	eal-time	applica	tions			/ F	Applying Precision	(K3), (S3)
						Mappi	ing of C	COs wit	h POs a	and PS	Os				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3	3		2				3	2		2		
CO2	2	3	3	3		3				3	2		2		
CO3	3	3	3	3		2				3	2		2		
1 – Slię	ght, 2	– Mod	lerate, 3	3 – Subs	stantial,	BT- Blo	om's Ta	axonom	у	•	•			•	•

		22GCL12 – FOUNDATION ENGINEERING LA	BORAT	ORY II				
		(Common to all BE/BTech branche	es)					
Progra Branch	mme& 1	All BE/BTech branches	Sem.	Category	L	т	Ρ	Credit
Prereq	uisites	Nil	1 /2	ES	0	0	6	3
Pream	ble	This course is designed to provide a foundational knowled on the house wiring, Internet of Things and Web Technolo	dge on ei ogies.	ngineering wi	ith ł	nands	-on ex	perience
LIST O	FEXPERIM	IENTS / EXERCISES:						
		PART A – Electrical Installation (30	Hours)					
1.	Develop w	iring diagrams using software tools.						
2.	Identify an	d select suitable components for Energy Measurement and	l Circuit F	Protection				
3.	Design a v	viring circuit integrating Energy Meter, MCB and RCCB						
4.	Develop a	wiring circuit for incandescent lamp and fluorescent lamp						
5.	Develop a	nd Investigate Simple and Staircase Wiring for Residential	Applicatio	ons				
6.	Design the	Wiring Circuits for Calling Bell System and Dimmable Ligh	t					
7.	Create wir	ing circuits for power loads						
8.	Measurem	nent of Earth Resistance and its connections.						
		PART B – Internet of Things (30 Ho	ours)					
1.	Design a S	Single layer PCB layout designing						
2.	Fabricate	Single layer PCB printing						
3.	Assemblin	g, soldering and desoldering practice on single layer PCB						
4.	GPIO prog	gramming in ESP8266						
5.	Sensor an	d actuator interfacing with internet enabled microcontroller	device					
6.	Sensor an	d actuator calibration						
7.	Integration	of microcontroller based system with Cloud platform						
		PART C – Web Technologies (30 H	ours)					
1.	Design a v	vebsite for an application using HTML and CSS.						
2.	Convert th	e designed website into responsive website using Bootstra	р.					
3.	Add dynar	nism to the website by using JavaScript and embed the So	cial Medi	a component	ts to	o the v	website	Э.
4.	Incorporate	e database interaction to the website.						
5.	Deploy the	e developed website in the server.						
RFFFR	ENCES/ M	ANUAL /SOFTWARF						rotal:90
1.	Laboratory	/ Manual						
2.	Eric T.Free	eman,Elisabeth Robson, "Head First JavaScript Programmi	ng A Bra	in-Friendly G	Guid	e", 1s	t Editio	on,
3.	Eric T.Free	eman,Elisabeth Robson, "Head First HTML and CSS",2nd E	Edition, C	O'Reilly , 2012	2			
4.	Lynn Beigl	hley,"Head First SQL",1st Editin, O'Reilly,2007.						

COUR On cor	SE O nple	UTCO tion of	MES: the co	urse, th	e stude	ents wi	ll be ab	le to					(ዞ	BT Mapı lighest L	oed .evel)
CO1	des	sign ele	ctrical v	viring ci	rcuits fo	or buildir	ngs bas	ed on th	neir requ	uiremen	ıt		F	Applying(Precision	K3), (S3)
CO2	dev	elop Ic	T base	d solutio	ons and	PCB fo	r real w	orld use	e cases				A F	Applying (Precision	(K3), (S3)
CO3	des	sign and	d host a	n intera	ictive dy	namic v	website						F	Applying(Precision	K3), (S3)
						Маррі	ing of C	Os wit	h POs a	and PS	Os				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	2	2	1					1					
CO2	2	3	2	2	1					1					
CO3	3	3	2	2	1					1					
1 – Slig	ght, 2	2 – Mod	lerate, 3	- Subs	stantial,	BT- Blo	om's Ta	axonom	iy						•

		22ITT31 - DESIGN AND ANALYSIS OF ALGO	ORITHM	S				
Progra Branci	amme& h	B.Tech. & Information Technology	Sem.	Category	L	т	Р	Credit
Prereq	luisites	Data Structures, Problem Solving and Programming	3/4	PC	3	0	0	3
Pream	ble	This course imparts a formal introduction to various algorithm des performance of algorithms and improving their efficiency.	sign tech	niques, metho	ods	for an	alyzin	g the
Unit –	l	Introduction						9
Notion Algorith recursi	of an Algorith hm Efficiency ve algorithms	 Fundamentals of Algorithmic Problem Solving - Important Pr Analysis Framework - Asymptotic Notations and its properties - Empirical analysis of algorithm - Algorithm visualization. 	oblem Ty - Mathem	ypes - Fundar natical analysi	ner s fo	itals o or Rec	f the a cursive	Analysis of and Non-
Unit –	II	Brute Force						9
Selecti method Strasse	on and Bubb dology: Merge en's Matrix Mu	le Sort, Sequential search and String Matching - closest pair a sort - Quick sort - Binary search - Binary tree traversals and relate Itiplication - closest pair and convex hull problem.	and conv d proper	/ex hull probl ties - Multiplic	em. atio	 Divident Divident<	de and arge in	d Conquer tegers and
Unit –	111	Decrease and Conquer						9
Insertio Presor	on sort -Topol ting - Balance	ogical Sorting - Fake coin problem - Computing a Median and th d search trees -AVL trees -2-3 Trees- Heaps and Heap sort.	ne Select	tion Problem	- Tr	ansfo	rm an	d conquer:
Unit –	IV	Dynamic Programming						9
Warsha algorith	all's and Floyd nm - Kruskal's	's algorithm - Optimal Binary Search Trees - Knapsack Problem ar Algorithm - Dijkstra's Algorithm - Huffman Trees.	nd Memo	ry functions -	Gre	edy T	echnio	que: Prim's
Unit –	V	Backtracking						9
n-Quee Traveli	ens problem - ng Salesman	Hamiltonian Circuit Problem - Subset Sum Problem-Branch and Bo Problem - Overview of P, NP and NP-Complete Problems.	ound: As	signment prob	lem	- Kna	apsack	Problem -
								Total: 45
TEXT	BOOK:							
1.	Anany Levit	n, "Introduction to the Design and Analysis of Algorithms", 3 rd Edition	on, Pears	son Education	, Ne	ew De	lhi, 20	17
REFE	RENCES:							
1.	Thomas H. Edition, PHI	Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Steir , New Delhi, 2010.	n, "Introdu	uction to Algo	rithr	ns", E	asterr	n Economy
2.	Alfred V. Ah	o, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Al	gorithms	", Pearson Ed	uca	tion, N	New D	elhi, 2005.
	•							

COURS On cor	SE OUT(mpletion	COME of the	ES: le coul	rse, the s	tudent	s will be a	able to						()	BT Mapp lighest L	ed evel)
CO1	examin	e asyı	mptoti	c notatior	and fi	nd time co	mplexity	of algo	rithms				ļ	Analyzing	(K4)
CO2	apply l efficien	orute cies	force	and divi	de-and-	conquer	techniqu	es to v	arious	problem	s and id	dentify the	ir	Applying ((K3)
CO3	utilize o	lecrea	ase an	d conque	r and tra	ansform &	conque	r strateg	ies for s	solving p	roblems			Applying ((K3)
CO4	make u	se of	dynam	nic progra	mming	and greed	ly techni	ques to	solve p	roblems				Applying ((K3)
CO5	solve d	ifficult	t comb	inatorial p	oroblem	s with bac	ktrackin	g and br	anch &	bound te	echnique	5		Applying ((K3)
						Mappir	ng of CC	s with	POs an	d PSOs				1	
COs/ POs	PO	IF	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3	2	2		3	3	3	3	3	3	1	3	3
CO2	3		2	1	1		3	3	3	2	2	3		3	2
CO3	3		2	1	1		3	3	3	2	2	3		3	2
CO4	3		2	1	1		3	3	3	2	2	3		3	2
CO5	3		2	1	1		3	3	3	2	2	3		3	2
1 – Slig	jht, 2 – N	lodera	ate, 3 -	 Substar 	ntial, BT	- Bloom's	Taxonoi	my							
						ASSES	SSMENT	PATTE	RN - T	HEORY					
Test	/ Bloom	's	Re	memberi	ing	Understa	nding	Apply	ying	Analyz	ing l	Evaluating	g Cr	eating	Total
Ca	ategory		-	(K1) %		(K2)	%	(K3)	%	(K4) '	%	(K5) %	((6) %	%
	CAI1			20		40		40)						100
	CAT2			20		30		50)						100
	CAT3			20		30		50)						100
	ESE			10		40		50)						100
* ±3% r	may be v	aried	(CAT	1,2,3 – 50) marks	& ESE –	100 mar	ks)							

		22ITT32 - PYTHON PROGRAMMING AND FRAME	WORK	5				
Program Branch	mme&	B.Tech. & Information Technology	Sem.	Category	L	т	Ρ	Credit
Prerequ	uisites	Nil	3	PC	3	0	0	3
		· · · · ·						
Preamb	ble	This course provides fundamental knowledge on Python programming packages for data manipulation and analysis.	g and its	frameworks.	It als	so ex	plore	s various
Unit – I		Basic Concepts						9
Introduc parame String s	ction – Varia ters, local ar lices – Searc	bles, Expressions and Statements – Functions – Conditionals and read global scope, function composition, recursion – Iteration Statements ching – Looping and Counting – String methods – String Comparison.	ecursior – Mutab	i – Fruitful Fi le vs Immutal	uncti ble d	ons lata t	– reti ypes	urn values, – Strings –
Unit – I	I	Data Structures						9
Lists – L Lists – Operatio	List operatior Tuples – Tu ons – Case \$	ns – slices and methods – Dictionaries – Dictionaries as set of Counters ples Basics – Lists and Tuples – Dictionaries and Tuples – Sequenc Study – Data Structure Selection – Files – Basic File Operations – File r	s – Loop ces of se names a	ing and Dictic equences – S nd paths – E>	onario Sets kcept	es – – Se tion I	Dictio ets Ba Handl	onaries and asics – Set ling.
Unit – I	11	Object Oriented Programming & Python Database Integration						9
Classes Overloa Connec	s and Objects iding – Type it Database -	s – Classes and Functions – Classes and methods – Object-oriented fea -based dispatch – Polymorphism – Inheritance – Aggregation and Ass - CRUD operations – Cursor Attributes	atures – sociatior	init() method n – Need for o	–str(datal) me base	ethod prog	 Operator ramming –
Unit – ľ	V	Data Manipulation with NumPy Arrays						
		Data Manpulation with Nulling Arrays						9
Python Arrays - and Boo	Environmen – Aggregatic olean Logic -	t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ins – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays	s of Nur n Arrays	nPy Arrays – : Broadcastin	Cor g – (nputa Comj	ation pariso	9 on NumPy ons, Masks
Python Arrays - and Boo Unit – V	Environmen - Aggregatic blean Logic -	t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ns – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization	s of Nur h Arrays	nPy Arrays – : Broadcastin	Cor g – (nputa Comj	ation pariso	9 on NumPy ons, Masks 9
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty	Environmen – Aggregatic blean Logic - / anipulation w g – Concat a les – Axes L	t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ns – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization hth Pandas: Pandas Objects – Data Indexing and Selection – Operating nd Append – Merge and Join – Aggregation and Grouping - Data Visuali imits – Labeling Plots	s of Nur n Arrays on data alization	nPy Arrays – Broadcastin – Handling m with Matplotli	Cor g – (iissin ib: Li	nputa Comp ng da	ation pariso ta – H lots: I	9 on NumPy ons, Masks 9 Hierarchical Line Colors
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty	Environmen – Aggregatic olean Logic - / anipulation w g – Concat a les – Axes L	t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ns – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization ith Pandas: Pandas Objects – Data Indexing and Selection – Operating nd Append – Merge and Join – Aggregation and Grouping - Data Visua imits – Labeling Plots	s of Nur Arrays on data alization	nPy Arrays – : Broadcastin – Handling m with Matplotli	Cor g – (iissin ib: Li	nputa Comp ng da	ation pariso ta – H lots: I	9 on NumPy ons, Masks 9 Hierarchical Line Colors Total:45
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty TEXT B	Environmen – Aggregatic blean Logic - / anipulation w g – Concat a les – Axes L	t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ns – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization rith Pandas: Pandas Objects – Data Indexing and Selection – Operating nd Append – Merge and Join – Aggregation and Grouping - Data Visual imits – Labeling Plots	s of Nur Arrays on data alization	nPy Arrays – Broadcastin – Handling m with Matplotli	Cor g – (iissin ib: Li	nputa Comp ng da ine p	ation pariso ta – H lots: I	9 on NumPy ons, Masks 9 Hierarchical Line Colors Total:45
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty TEXT B 1.	Environmen – Aggregatic olean Logic - / anipulation w g – Concat a les – Axes L BOOK: Allen B. Dr (for Units I,	 bata Manpulation with Runn y Arrays t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ns – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization ith Pandas: Pandas Objects – Data Indexing and Selection – Operating nd Append – Merge and Join – Aggregation and Grouping - Data Visual imits – Labeling Plots Dwney, "Think Python: How to Think Like a Computer Scientist", II, III) 	on data alization	nPy Arrays – : Broadcastin – Handling m with Matplotli dition, O'Reil	Cor g – (iissin ib: Li	nputa Comp ng da ne p Publis	ation pariso ta – H lots: I	9 on NumPy ons, Masks 9 Hierarchical Line Colors Total:45
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty TEXT B 1. 2.	Environmen – Aggregatic olean Logic - / anipulation w g – Concat a les – Axes L GOOK: Allen B. Do (for Units I, Jake Vande (for Units I)	 bata Manpulation with Runn y Arrays t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ns – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization rith Pandas: Pandas Objects – Data Indexing and Selection – Operating nd Append – Merge and Join – Aggregation and Grouping - Data Visua imits – Labeling Plots Dwney, "Think Python: How to Think Like a Computer Scientist", II, III) er Plas, "Python Data Science Handbook: Essential Tools for Working wit (& V) 	s of Nur h Arrays on data alization , 2 nd Ei th Data"	nPy Arrays – Broadcastin – Handling m with Matplotli dition, O'Reil	Cor g – (iissin ib: Li	nput Comp ng da ne p ublis	ation pariso ta – H lots: I hers,	9 on NumPy ons, Masks 9 Hierarchical Line Colors Total:45 2016. hers, 2017,
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty TEXT B 1. 2. REFER	Environmen – Aggregatic olean Logic - / anipulation w g – Concat a les – Axes L BOOK: Allen B. Do (for Units I, Jake Vande (for Units I) ENCES:	 bata Manpulation with Runn y Arrays t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ins – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization rith Pandas: Pandas Objects – Data Indexing and Selection – Operating ind Append – Merge and Join – Aggregation and Grouping - Data Visua imits – Labeling Plots Downey, "Think Python: How to Think Like a Computer Scientist", II, III) er Plas, "Python Data Science Handbook: Essential Tools for Working wit (& V) 	on data alization , 2 nd E	nPy Arrays – : Broadcastin – Handling m with Matplotli dition, O'Reil	Cor g – (nputa Com ng da ne p Publis	ation pariso ta – H lots: I hhers,	9 on NumPy ons, Masks 9 Hierarchical Line Colors Total:45 2016. hers, 2017,
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty TEXT B 1. 2. REFER 1.	Environmen – Aggregatic olean Logic - / anipulation w g – Concat a les – Axes L Cook: Allen B. Du (for Units I, Jake Vande (for Units IN ENCES: John V Gut	t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ns – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization ith Pandas: Pandas Objects – Data Indexing and Selection – Operating nd Append – Merge and Join – Aggregation and Grouping - Data Visua imits – Labeling Plots powney, "Think Python: How to Think Like a Computer Scientist", II, III) er Plas, "Python Data Science Handbook: Essential Tools for Working wit / & V)	s of Nur n Arrays on data alization , 2 nd Ei th Data"	nPy Arrays – Broadcastin – Handling m with Matplotli dition, O'Reil , 1 St Edition, 0 d expanded E	Cor g – (iissin ib: Li ly P O'Re	nputa Comp ng da ne p Publis	ation parisc ta – H lots: I hers, Wublis	9 on NumPy ons, Masks 9 Hierarchical Line Colors Total:45 2016. hers, 2017, ess, 2013.
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty TEXT B 1. 2. REFER 1. 2.	Environmen – Aggregatic olean Logic - / anipulation w g – Concat a les – Axes L BOOK: Allen B. Du (for Units I, Jake Vande (for Units I) ENCES: John V Gut https://www	t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ns – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization ith Pandas: Pandas Objects – Data Indexing and Selection – Operating nd Append – Merge and Join – Aggregation and Grouping - Data Visua imits – Labeling Plots Downey, "Think Python: How to Think Like a Computer Scientist", II, III) er Plas, "Python Data Science Handbook: Essential Tools for Working wit (& V) tag, "Introduction to Computation and Programming Using Python", Rev 2. Geeksforgeeks.org/difference-between-association-and-aggregation/	s of Nur n Arrays on data alization , 2 nd Er th Data" vised an	nPy Arrays – : Broadcastin – Handling m with Matplotli dition, O'Reil , 1 St Edition, 0	Cor g – (iissin b): Li ly P O'Re	nputa Com ng da ne p Publis iilly F	ation pariso ta – H lots: I hhers, Publis	9 on NumPy ons, Masks 9 Hierarchical Line Colors Total:45 2016. hers, 2017, ess, 2013.
Python Arrays - and Boo Unit – V Data Ma Indexing and Sty TEXT B 1. 2. REFER 1. 2. 3.	Environmen – Aggregatic olean Logic - / anipulation w g – Concat a les – Axes L COOK: Allen B. Du (for Units I, Jake Vande (for Units IN ENCES: John V Gut https://www	bata Manpulation with Runn y Arrays t & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics ons – Case Study Using Aggregation and Histogram – Computation on - Sorting Arrays – Structured Arrays Data Manipulation with Pandas and Visualization ith Pandas: Pandas Objects – Data Indexing and Selection – Operating nd Append – Merge and Join – Aggregation and Grouping - Data Visualizities – Labeling Plots owney, "Think Python: How to Think Like a Computer Scientist", II, III) er Plas, "Python Data Science Handbook: Essential Tools for Working wit (& V) tag, "Introduction to Computation and Programming Using Python", Rev. 2. Geeksforgeeks.org/difference-between-association-and-aggregation/	s of Nur h Arrays on data alization , 2 nd Ei th Data" vised an	nPy Arrays – Broadcastin – Handling m with Matplotli dition, O'Reil , 1 St Edition, 0 d expanded E	Cor g _ (iissin ib: Li ly P O'Re 	nputa Comp ng da ne p Publis	ation parisc ta – H lots: I hers, ublis	9 on NumPy ons, Masks 9 Hierarchical Line Colors Total:45 2016. hers, 2017, ess, 2013.

COURS On cor	SE Ol nplet	UTCON ion of t	IES: he cour	se, the st	udents	will be at	ole to						(BT Mapp Highest L	oed .evel)
CO1	dev	elop sin	nple app	lications u	sing pyt	hon - fund	ctions, st	ring, data	a structu	res				Applying ((K3)
CO2	buil	d Pytho	n applic	ations mal	king use	of List, D	ictionarie	s, Tuples	and Se	ts				Applying ((K3)
CO3	арр	ly Obje	ct Orient	ed Progra	mming o	concepts a	and CRU	D operatio	ons in P	ython ap	olications	5		Applying ((K3)
CO4	mak	e use o	f NumP	y Arrays in	Python	applicatio	ons							Applying ((K3)
CO5	utiliz	e Pand	las and	Matplotlib	for deve	loping ad	vance ap	plications	in Pyth	on				Applying ((K3)
	Mapping of COs with POs and PSOs														
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	2	1	1		3	3	3	2	2	3		3	2
CO2	2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	ļ	3	2	1	1		3	3	3	2	2	3		3	2
CO5	5	3	2	1	1		3	3	3	2	2	3		3	2
1 – Slig	ht, 2	– Mode	erate, 3 -	- Substant	ial, BT-	Bloom's T	axonomy	,					•		
						ASSE	SSMENT	PATTER	RN - THE	EORY					
Tes C	t / Blo atego	oom's ory*	R	ememberi (K1) %	ng	Understa (K2)	nding %	Apply (K3)	/ing %	Analyz (K4) ^c	ing %	Evaluating (K5) %	C	reating (K6) %	Total %
	CAT	1		20		30		50							100
	CAT	2		10		20		70							100
	CAT	3		10		20		70							100
	ESE	Ξ		10		40		50							100
* ±3% r	nay b	e varie	d (CAT [·]	,2,3 – 50	marks 8	ESE – 1	00 marks)							

		22ITT33 - COMPUTER ORGANIZATI	ON											
Programm Branch	ie&	B.Tech. & Information Technology	Sem.	Category	L	т	Ρ	Credit						
Prerequisi	tes	Nil	3	PC	3	1	0	4						
Preamble		This course deals with the basics of computer and its functiona memory and I/O devices. Advanced topics like pipelining and c	al units. It computer	t also covers t performance	the in are	nterfa also	cover	with ed.						
Unit – I		Basic Structure of Computers and Machine Instructions:						9+3						
Functional and Addres and CISC	Units–Ba sses – Me Styles.	sic Operational Concepts–Number Representation and Arithmetic emory Operations – Instruction and Instruction Sequencing – Ad	c Operat dressing	ions – Perforr Modes – CIS	nanc SC Ir	e – N Istruc	lemoi tion S	ry Locations Sets – RISC						
Unit – II	Unit – II Arithmetic Unit: 9+3 Addition and Subtraction of Signed Numbers–Design of Fast Adders–Multiplication of Unsigned Numbers – Multiplication of Signed 9+3													
Addition and Subtraction of Signed Numbers–Design of Fast Adders–Multiplication of Unsigned Numbers – Multiplication of Signed Numbers – Fast Multiplication – Integer Division – Floating Point Numbers and Operations.														
Unit - III	Unit - III Basic Processing Unit and Pipelining: 9+3 Fundamental Concepta Instruction Execution Executi													
Fundamental Concepts–Instruction Execution –Hardware Components–Instruction Fetch and Execution Steps – Control Signals - Hardwired control – CISC Style Processors. Pipelining – Basic concepts – Pipeline Organization – Pipelining Issues - Data Dependencies – Memory Delay – Branch Delay – Performance Evaluation.														
Unit - IV		Memory System:						9+3						
Basic Con Memories:	cepts–Se Mapping	miconductor RAM Memories – Read-Only Memories – Direct Functions – Performance Consideration – Virtual Memory – Sec	Memory condary \$	^r Access – N Storage: Mag	lemc netic	ry H Haro	ierarc d Disk	hy - Cache s.						
Unit - V		I/O Organization:						9+3						
Accessing Arbitration	I/O Devic – Interfac	es–Interrupts – Enabling and Disabling Interrupts – Handling Mu e Circuits – Interconnection Standards: USB.	ltiple De	vices – Bus S	truct	ure -	Bus	Operation –						
				Lecture:	45, -	Futor	ial: 1	5, Total:60						
TEXT BOC	DK:													
1. Ca ed	rl Hamac ition, McC	her, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, "Com Graw Hill International Edition, New York, 2017.	puter Or	ganization an	d En	nbed	ded S	ystems", 6 th						
REFEREN	CES:													
1. Patterson David, A. and Hennessy John L., "Computer Organization and Design: The Hardware / Software Interface", 6 th edition, Harcourt Asia, Morgan Kaufmann, Singapore, 2021.														
2. Sta Ne	 Stallings William, "Computer Organization and Architecture: Designing for Performance", 10th edition, Pearson Education, New Delhi, 2015. 													
	· ·													

COURS On cor	SE O	UTCOM	/IES: the cou	rse, the	student	s will be	able to)						BT Mapp (Highest L	oed .evel)
CO1	des the	cribe th addres	e basic : sing mod	structure	et of inst	etic and tructions	memory	operati	ons of a d	ligital co	mputer ar	nd illustrate	e	Applying	(K3)
CO2	des	cribe ar	nd apply	algorith	ms for pe	erformino	g differer	nt arithr	netic ope	rations.				Applying	(K3)
CO3	mak give	ke use o en instru	of the da uction ar	ta path i nd apply	n a proce the conc	essor to cepts of p	write the	seque	nce of ste	ps to fet	ch and ex	cecute a		Applying	(K3)
CO4	disti leve	inguish els of m	betweer emory	n differer	nt types o	of memo	ry and a	pply the	e mapping	g functio	ns betwee	n differen	t	Applying	(K3)
CO5	illus ope	strate va	arious ty	pes of in	terrupts	in I/O tra	nsfer an	d the ro	ole of diffe	erent type	es of bus	in I/O		Applying	(K3)
	Mapping of COs with POs and PSOs														
COs/ POs	COs/ POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02														
CO1		3	2	1	1		3	3	3	2	2	3		3	2
CO2		3	2	1	1		3	3	3	2	2	3		3	2
CO3		3	2	1	1		3	3	3	2	2	3		3	2
CO4		3	2	1	1		3	3	3	2	2	3		3	2
CO5		3	2	1	1		3	3	3	2	2	3		3	2
1 – Slig	jht, 2	– Mode	erate, 3 -	- Substa	intial, BT	- Bloom	's Taxon	omy							
						ASSE	ESSMEN	IT PAT	TERN - T	HEORY					
Test Ca	/ Bloo tego	om's ry*	Rer	nember (K1) %	ing	Under (K	standin (2) %	g /	Applying (K3) %	Ana (۲	alyzing (4) %	Evaluat (K5)	ting (%	Creating (K6) %	Total %
(CAT1 20						40		40						100
(CAT2	2		20			40		40	1					100
(CAT3 20						40		40						100
	ESE			20			40		40						100
* ±3% r	may t	oe varie	d (CAT	1,2,3 – 5	50 marks	& ESE	– 100 m;	arks)		.		<u>.</u>			

		22ITT34 - INFORMATION THEOR		i											
Program	me &	B. Tech & Information Technology	Sem.	Category	L	т	Р	Credit							
Branch	sites	Nil	3	FS	3	1	0	4							
Trerequi	51105		5	20	J	•	v	-							
Preamble)	This course aims at introducing information theory techniques and error-control coding.	and the practica	I aspects of v	vario	us da	ita co	mpression							
Unit – I		Information Entropy Fundamentals:						9+3							
Uncertain Informatio	nty, Informa	tion and Entropy – Source coding Theorem – Data el Capacity – Channel Coding Theorem.	Compaction – D	iscrete Memo	ryles	s cha	annel	s – Mutual							
Unit – II		Error Control Coding:						9+3							
Discrete-l codes – C Calculatio	Discrete-Memory less Channels- Linear Block codes- Syndrome - Minimum Distance Considerations – Syndrome Decoding - Cyclic codes – Generator Polynomial – Parity Check Polynomial – Generator and Parity-Check Matrices -Encoder for Cyclic codes – Calculation of the Syndrome – Convolutional Codes: Code Tree, Trellis and State Diagram. Unit – III Text and Image Compression: 9+3														
Unit – III	Init – III Text and Image Compression: 9+3														
Onit – III Text and image Compression: 9+3 Compression Principles – Text compression: Static Huffman Coding - Dynamic Huffman coding – Arithmetic coding – LZW coding - Image Compression: Graphics Interchange format – Tagged Image File Format – Digitized documents – Digitized Pictures - JPEG Standards.															
Unit – IV		Audio Compression:						9+3							
Audio Cor –Linear P	mpression: Predictive co	Differential Pulse code Modulation – Adaptive Differer oding – Code-excited LPC – Perceptual coding- MPEG	ntial Pulse Code audio coders –	Modulation – / Dolby audio co	Adap oders	tive p 3.	oredic	tive coding							
Unit – V		Video Compression:						9+3							
Principles MPEG-3	s: Frame ty - MPEG-4	pes-Motion estimation and compensation-Implementat video standards.	tion issues – H.2	61- H.263- MF	PEG	MPE	G-1 -	MPEG-2 -							
				Lecture:	45,1	utor	ial:15	, Total: 60							
TEXT BO	OK:														
1. S	Simon Hayk	in, "Communication Systems", 5 th Edition, John Wiley	and Sons, New `	/ork, 2017, for	Unit	s I, II									
2. F	red Halsa ducation, N	I, "Multimedia Communications, Applications, Netwo New Delhi, 2009, for Units III, IV, V.	orks, Protocols	and Standard	ls",	4 th E	dition	i, Pearson							
REFERE	NCES:														
1. R	Ranjan Bos	e, "Information Theory, Coding and Cryptography", 3rd	Edition, Tata Mc	Graw-Hill, Indi	a, 20	17.									
2. Z	Ze-Nian Li,Mark S. Drew, Jiangchuan Liu, "Fundamentals of Multimedia", 2 nd Edition, Springer, CBS Publishers and Distributors Pvt Ltd, New Delhi, 2014.														
3. N	/lark Nelsor	n and Jean-loup Gailly, "Data Compression Book", 2 nd	Edition, BPB Pul	olication, New	Delh	i, 200)4.								

COUR On co	SE O mplet	UTCON	IES: the co	ours	se, the st	uden	ts will be	able to							(BT Mapp Highest L	ed evel)
CO1	illus	trate so	urce	codi	ng theore	m an	d entropy	to quant	ify infor	matior	I				Арр	lying (K3)	
CO2	outli	ine vario	ous e	error	control co	oding	and apply	/ to given	proble	m					Арр	lying (K3)	
CO3	mak	ke use o	of diffe	eren	t compres	sion	standard	s for imag	ge and t	ext co	mpressic	n			Арр	lying (K3)	
CO4	арр	lyvariou	is aud	dio c	ompressi	on co	ding stan	dards in (different	t appli	cations				Арр	lying (K3)	
CO5	use	the diffe	erent	vide	eo compre	essior	n standaro	ds in diffe	rent ap	plicatio	ons				Арр	lying (K3)	
	Mapping of COs with POs and PSOs																
COs/F	POs	PO1	PC	02	PO3	PO	4 PO5	PO6	P07	PO8	PO9	PO10	PO11	PC)12	PSO1	PSO2
со	1	3	2	2	1	1		3	3	3	2	2	3			3	2
CO	2	3	2	2	1	1		3	3	3	2	2	3			3	2
CO	3	3	2	2	1	1		3	3	3	2	2	3			3	2
CO	4	3	2	2	1	1		3	3	3	2	2	3			3	2
CO	5	3	2	2	1	1		3	3	3	2	2	3			3	2
1 – Slię	ght, 2	– Mode	erate,	3 –	Substanti	al, B	T- Bloom'	s Taxono	my								
							ASSE	SSMENT	PATTE	ERN -	THEORY	/					
Test / Bloom's Remembering Category* (K1) %				ng	Unders (K2	tanding) %	Apply (K3)	ying) %	Analyz (K4) ^o	ing %	Evaluating (K5) %	9	C (reating (K6) %	Total %		
CAT1 30				5	0	20	C							100			
	CAT	2			30		4	0	30)							100
	CAT	3			30		5	0	20)							100
	ESE	=			20		4	5	35	5				T			100

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

		22EIT35 - MICROPROCESSORS AND EMBEDDE	D SYST	EMS										
Programme& Branch		B.Tech. & Information Technology	Sem.	Category	L	Т	Ρ	Credit						
Prerequisites		Digital Logic Principles and Design	3	ES	3	0	0	3						
Preamble		This course gives an introduction to 8086/8088 microprocessor with 8051 microcontroller architecture and programming.	r archited	cture and pro	gram	iming	i. It als	so deals						
Unit – I		8086 Microprocessor:						9						
Architecture of instructions – E Language Prog	f 808 Branc grams	6 – The execution unit – Bus interface unit- Addressing mode h Instructions -Logical instructions - Arithmetic instructions – Shif of 8086	es – Inst ft and rot	ruction set o	f 80 ns -	86: E Simp	Data t le Ass	ransfer sembly						
Unit – II 8051 Microcontroller: 9 Introduction to 8051 Microcontroller- Architecture- Memory Organization- Special function registers – Program Counter – PSV 9														
Introduction to register – Stac	ntroduction to 8051 Microcontroller- Architecture- Memory Organization- Special function registers – Program Counter – PSW register – Stack - Instruction set - Addressing modes Init – III 8051 Programming 9													
Unit – III8051 Programming:9														
I/O Ports – Tin port programm	ner / (ing- ⁻	Counter (Mode 1) – Serial Data Communication - Interrupt progr Fimer programming-Counter programming-Serial port programmi	amming ng-Interr	 Programm upt programm 	ing i ning	n Em	bedde	ed C: I/O						
Unit – IV		8051 Interfacing with Peripherals:						9						
LED - Seven s	egme	ent display – Switch interfacing – LCD - A/D and D/A converters-	LM35 se	ensor - Steppe	er mo	otor -	Matri	x keypad						
Unit – V		Applications of Microcontrollers (Block Diagram Approach	n):					9						
Smart Card re Printers, Smar	eader t Hom	, Automated Meter Reading System, Washing machine, Speen automation system.	dometer	, Healthcare	mon	itorin	g sys	tems, 3D						
								Total:45						
TEXT BOOK:														
1. Muhar Educa	nmeo ition,	ł Ali mazidi, Janice GillipieMazidi, RolinMcKinlay, Lyla B. Das, "M New Delhi, 2020.	licroproc	essors and N	licro	contr	ollers'	', Pearson						
REFERENCES	S:													
1. Soumi 8086 a	 Soumitra Kumar Mandal, "Microprocessors and Microcontrollers Architecture, Programming and Interfacing Using 8085, 8086 and 8051", 1st Edition, Tata McGraw Hill, New Delhi, 2011 													
2. Patel, Delhi,	"The 2014	8051 Microcontroller Based Embedded Systems", 1st Edition, Ta	ata McGi	raw Hill Publis	shing	l Con	npany	, New						

COUR On cor	SE Ol nplet	UTCOM ion of t	ES: he cours	se, the stu	Idents	will be a	ble to							BT Mapp Highest Le	ed evel)
CO1	deso	cribe the	e internal	blocks an	d regist	er organ	ization o	of 8086	microp	rocessor	architec	ture.		Applying (I	K3)
CO2	deso	cribe the	e internal	blocks of	8051 m	icrocontr	oller Ar	chitectu	re					Applying (I	K3)
CO3	write	e embeo	dded c pr	ograms fo	r 8051 i	features	program	nming						Applying (I	K3)
CO4	appl	ly progr	amming	skills to int	erface	peripher	al devic	es.						Applying (I	K3)
CO5	inter	rpret the	e applicat	ions of mi	crocont	roller								Applying (I	K3)
	Mapping of COs with POs and PSOs														
COs/P	COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02														
CO	1	3	3	2	2		3	3	3	2	2	3		3	2
CO2	2	3	3	2	2		3	3	3	2	2	3		3	2
CO	3	3	2	2	2		3	3	3	2	2	3		3	2
CO4	4	3	2	2	2		3	3	3	2	2	3		3	2
CO	5	3	2	2	2		3	3	3	2	2	3		3	2
1 – Slig	ght, 2	– Mode	rate, 3 –	Substantia	al, BT- E	Bloom's ⁻	Taxonor	ny							
						ASSES	SMENT	PATTE	ERN - T	HEORY					-
Tes C	t / Blo atego	oom's ory*	Re	memberi (K1) %	ng l	Jndersta (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing I %	Evaluating (K5) %	Cre	ating (K6) %	Total %
CAT1 20						40		40)						100
	CAT	2		20		30		50)						100
	CAT	3		20		30		50)						100
	ESE	Ξ		10		40		50)						100
* ±3% ı	may b	e varie	d (CAT 1	,2,3 – 50 r	narks &	ESE – 1	00 marl	ks)					•		

	22GET31- UNIVERSAL HUMAN VALU	ES												
	(Common to All Engineering and Technology E	Branches)		1									
Programme & Branch	All BE/BTech Branches	Sem.	Category	L	т	Ρ	Credit							
Prerequisites	Nil	3	HS	2	0	0	2							
Preamble	To make the student to know what they 'really want to be' in the	eir life ar	nd profession,	unc	lersta	nd th	e meaning							
	of happiness and prosperity for a human being. Also to facilitat	te the stu	udents to und	erst	andin	g of h	armony at							
	all the levels of human living, and live accordingly													
Unit – I	Introduction:						6							
Need and Basic Gu Exploration – Conte Aspirations – Contir Human Aspirations	idelines of Value Education – Content and Process of Value E ent and Process of Self exploration – Natural Acceptance – R nuous Happiness and Prosperity – Exploring Happiness and Pro – Relationships – Physical Facilities – Right Understanding.	ducatior ealizatio osperity	n – Self Explo n and Unders – Basic Requ	oratio stan iiren	on – ding nent f	purpo – Bas or Fu	se of self- sic Human Ifillment of							
Unit – II Harmony in the Self and Body: 6 Human Dairs and Dady. Haderstanding Muself as On existence of Ontf (W) and Dady. 6														
Onit – II Harmony in the Self and Body: 6 Human Being and Body – Understanding Myself as Co–existence of Self ('I') and Body, Needs of the Self and Body, Activities in the 6														
Human Being and Body – Understanding Myself as Co–existence of Self ('I') and Body, Needs of the Self and Body, Activities in the Self and Body, Self ('I') as the Conscious Entity, the Body as the Material Entity – Exercise – Body as an Instrument– Harmony in														
Self and Body, Self ('I') as the Conscious Entity, the Body as the Material Entity – Exercise – Body as an Instrument– Harmony in the Self ('I) – Understanding Myself – Harmony with Body.														
Ine Self (1) - Understanding Myself - Harmony with Body.Unit - IIIHarmony in the Family and Society:6														
Harmony in the Fam	nily – Justice – Feelings (Values) in Human Relationships – Rela	ationship	from Family	to S	ociety	/ – Ide	entification							
of Human Goal – Fiv	ve dimensions of Human Endeavour.													
Unit – IV	Harmony in Nature and Existence:						6							
Order of Nature – I Conformance – Intro is Co–existence.	nterconnectedness – Understanding the Four order – Innatene oduction to Space – Co–existence of units of Space – Limited and	ess – Na I unlimite	atural Charac ad – Active an	teris d No	tic – o–act	Basic ivity –	Activity – Existence							
Unit – V	Implications of the above Holistic Understanding of Harmo	ony on P	Professional	Ethi	cs:		6							
Values in different c Identification of Cor Professional Ethics.	limensions of Human Living – Definitiveness of Ethical Human (mprehensive Human Goal – Humanistic Education – Universa	Conduct I Humar	–Implications Order – Co	of mpe	Value	e base e and	ed Living – Issues in							
							Total:30							
TEXT BOOK:														
1. Gaur R.R., Books Pvt.	Sangal R., Bagaria G.P., "A Foundation Course in Human Value: Ltd., New Delhi, 2016.	s and Pr	ofessional Eth	nics'	, 1 st 6	editior	n, Excell							
REFERENCES:														
1. Ivan Illich, "	Energy & Equity", The Trinity Press, USA, 1974.													
2. Schumache	er E.F., "Small is Beautiful: a study of economics as if people mat	tered", B	britain, 1973.											

COUR	SE OU	лсом	ES:											BT Mapp	bed
On co	mpleti	on of t	he cours	se, the stu	ident	s will be a	able to						(Highest L	evel)
CO1	resta in the	ate the r e societ	meaning ty	of happine	ess ar	nd prosper	ity and o	do a cor	rect ap	praisal c	of the cur	rent scena	rio	Applying	(K3)
CO2	distir Co–e	nguish I existen	between ce of Self	the Self a and Body	nd th	ie Body, u	ndersta	nd the r	neanir	ng of Har	mony in	the Self, t	he	Applying	(K3)
CO3	infer feelir	the val	ue of ha iuman-h	rmonious uman rela	relations	onship bas hips and ex	ed on t xplore th	rust, res neir role	spect a	and other suring a h	r natural narmonio	ly acceptab ous society	ole	Applying	(K3)
CO4	CO4 transform themselves to co-exist with nature by realising interconnectedness and four order of nature Applying (K3)														
CO5 distinguish between ethical and unethical practices, and extend ethical and moral practices for a Applying (K3) better living															
						Mannin	n of CO	s with	POs a	nd PSOs					
COs/F	POs	PO1	PO2	PO3	PO	4 PO5	PO6	PO7	PO8	PO9	, PO10	P011	P012	PSO1	PSO2
CO	1	3	2	1	1		3	3	3	2	2	3		3	2
CO	2	3	2	1	1		3	3	3	2	2	3		3	2
CO	3	3	2	1	1		3	3	3	2	2	3		3	2
CO	4	3	2	1	1		3	3	3	2	2	3		3	2
CO	5	3	2	1	1		3	3	3	2	2	3		3	2
1 – Slig	ght, 2 -	- Mode	rate, 3 –	Substanti	al, B1	- Bloom's	Taxono	my			•	• •			
						ASSES	SMENT	PATTE	RN -	THEORY	,				
Tes	t / Blo	om's	Re	memberii	ng	Understa	inding	Apply	ying	Analyz	ing	Evaluating	J C	reating	Total
C	atego	ry*		(K1) %		(K2)	%	(K3)	%	(K4) %	6	(K5) %		(K6) %	%
	CAT1	1		25		75									100
	CAT2	2		25		75									100
	ESE			NA											100
* ±3%	may be	e varied	d (CAT 1	& 2 – 50	marks	<u>s & ESE –</u>	100 ma	rks)							

		22TAM02 – தமிழரும் தொழில் (Common to All Engineering and Techno	நுட்பமு logy Brar	ம் nches)											
Prog	ramme &	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit							
Prere	equisites	Nil	3/2	HS	1	0	0	1							
					-	-	-	-							
முன்	ானுரை	தமிழ் கலாச்சாரத்தோடு ஒன்றிய தொழில் ந	ட்பங்கல	ளை பற்றிப்	எடு)த்து	ரை	த்தல்							
அல	கு – 1	நெசவு மற்றும் பானை தொழில்நுட்பம்						3							
சங்க கீறவ	க காலத்தில் (ல் குறியீடுகள்	நெசவு தொழில் – பானைத் தொழில்நுட்பம் க	ருப்பு சி	வப்பு பாண்	ாடங்	கள்	- 🗆	ாண்டகளில்							
ച്ചல	கு – 11	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்ட	مار					3							
சங்க வடில் பற்ற மற்ழ கால அல	க காலத்தில் வமைப்பு – சங் றிய விவரங்க றம் பிற வழிட ரை மீனாட்சி லத்தில் சென்ன கு – III	வடிவமைப்பு மற்றும் கட்டுமானங்கள் & ங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல் ள் – மாமல்லபுரச்சிற்பங்களும், கோவில்களுட பாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்க அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் ம ன இந்தோ–சாரோசெனிக் கட்டிடக் கலை. உற்பத்தித் தொழில்நுட்பம்	சங்க லும் – ச ம் – சே கள் –மா ஹால் -	காலத்தில் லப்பதிகார пழர் காலத திரிகட்டபை - செட்டிநாட 	ை எ ந்தி மப்ட டு	பீட்டு ல் ே பெ புகள் வீடு	ப்பெ மன ருங் - பற் கள்	பாருட்களில் நட அமைப்பு கோயில்கள் றறி அறிதல், – பிரிட்டிஷ் 3							
கப்ப வரல உரு மண	தல்கு பட – சுச்தச்ச சிசிக்கை – உலாகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள் – கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள். அலகு – IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் 3														
அல	பணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள். அலகு – IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் 3														
அன கால் செய பண் அல அறி	அலகு – IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் 3 அனை, ஏரி, குளங்கள், மதகு – சோழர்கால குமிழித் தாம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம். 3 அலகு – v அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் 3 அறிவியல் தமிழின் வளர்ச்சு – கணினிதத்தமிழ் வளர்ச்சு – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ்														
தமி _i	ழ் அகராதிகள்	உருவாககை – தமிழ் இல்லாமக் கல்வக்கழக 1 சொற்குவைத் திட்டம்.	ய – றா		10005	ш –									
TEVT								Total:15							
IEX			T (Oolaf	யீடை சுமில்	ъпС)									
1.	தமிழல் வரல கல்வியில் ப <u>search.php?ta</u>	ணிகள் கழகம்), <u>https://www.tamildigitallibrary.in</u> , g=%E0%AE%9A%E0%AF%86%E0%AE%A9%E0%AF%	/ <u>book-</u> 8D%E0%	<u>AE%A9%E0%</u>	<u>6AF</u> %	<u>688</u>	 ഉ	கத்							
2	தயழாராயச		2016												
^{2.} RFFI	ERENCES:	ചം പംഗാരായായി ജ്രംഗം എത്തുന്ന, ബക്ലംഗ് വിന്നിന്ന്, പ്രാംഗാരായിന്ന് ജ്രംഗം എത്തുന്ന, പിക്ലംഗം വിന്നിന്ന്,	2010												
1.	 கீழட–வைை	க நகிக்கரையில் சங்ககால நகா நாகரிகம்.(செ	கால்லிய	ം ചനെ ഒ	ഖണ	ពយះជ	<u>)</u>)								
2.	பொருநை-அ	 பற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெ	ளியீடு)	<u> </u>											
3.	Social Life of Ta	amils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and	d RMRL –	(in print)											
4.	Social Life of the	e Tamils – The Classical Period (Dr.S.Sigaravelu) (Publish	ed by: Inte	ernational Inst	itute	of Ta	amil S	Studies).							
5.	Historical Herita Tamil Studies)	ge of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavi	ukarasu) (Published by :	Inte	rnatio	onal I	Institute of							
6.	The Contribution	n of the Tamil to Indian Culture (Dr.M.Valarmathi) (Puplish	ed by Inte	rnational Instit	ute c	of Tar	nil St	tudies).							
7.	Keeladi – 'Sang Tamilnadu Text	am City Civilzation on the banks of river Vaigai; (Jointly Pu Book and Educational Services Corporation, Tamilnadu)	ublished by	: Department	of A	Archa	eolo	gy &							
8.	Studies in the H	listory of India with Special Reference to Tamilnadu (Dr.K.I	K.Pillay) (F	Published by:	The	Autho	or)								
9.	Porunai Civilizat	tion (Jointly Published by: Department of Archaeology & Taminadu)	amilnadu	Textbook and	Educ	catior	nal So	ervices							
10.	Journey of Civili	ization Indus to Vaigai (R.Balakrishnan) (Published by: RM	IRL) – Ref	erence Book.											

COUF படிப்	SE OUTCO பை முடித்	SMES: ந்தவுடல	ன், ம	ாண	வர்கள்									(BT Map Highest I	ped _evel)
CO1	தமிழ் ச தொழில்	கலாச்ச ்நட்பப	ாரம் பற்	 றி வ	ற்றும் விளக்க	த்மிழ் முடியு	் சமூச ம்.	<u>கத்தி</u>	ച്ചലെന്ന	நெச	⊧ഖ് ഥ	ற்றும்	பானை	ळा Un	derstand	ing (K2)
CO2	தமிழர்சு முடியும்.	ளின் எ	ນເຊຄ	மை	ப்பு ம	ற்றும்	கட்டிட	_த் ெ	தாழில்	நட்ப	ஆற்ற	ல் பற்ற)) விளக்	க Un	derstand	ing (K2)
CO3	தமிழர்க	ளின் உ	டற்ப	த்தித்	த் தொ	ழில்நு	ட்பம் ப	ற்றி ச	-ருக்கம	ாகக்	கூற மு	டியும்.		Un	derstand	ing (K2)
CO4	தமிழர்க முடியும்.	ளின் (ഖേണ	ாண்	ாமை	மற்றுப	் நீர்ட்	ப்பாச	னத் தெ	தாழிஎ	்நட்ப	ம் பற்றி) விளக்	^க Un	derstand	ing (K2)
CO5 தமிழர்களின் அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் பற்றி விளக்க முடியும். Understanding (K2)																
Mapping of COs with POs and PSOs																
CC	COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02															
(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 – Sli	ight, 2 – Mo	derate,	3 – S	ubsta	antial, BT	- Bloon	n's Taxo	nomy								
	-															
						ASS	ESSME	NT PA	TTERN	- THEC	DRY					
Test /	Bloom's C	Categor	y*	Reme (K	emberin (1) %	g Un	derstan (K2) %	ding	Applyir (K3) %	ng Ai	nalyzing (K4) %	g Eva (K	luating (5) %	Crea (K6	ting) %	Total %
	CAT1				40		60									100
	CAT2				40		60									100
	CAT3				40		60									100
	ESE							L		N	Ą				1	
* ±3%	mav be va	ried (C/	AT 1.2	2.3 –	50 mark	(S)										

		22TAM02 - TAMILS AND TECHNO	LOGY										
		(Common to All Engineering and Technolo	ogy Brand	ches)	1	1	1	1					
Prog Brar	gramme & nch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit					
Prer	equisites	Nil	3/2	HS	1	0	0	1					
Prea	mble	This course aims to impart the essential knowledge on the tamil of	culture and	d related techno	loav								
UNI	Г — I	WEAVING AND CERAMIC TECHNOLOGY			- 37			3					
Wea	ving Industr	y during Sangam Age – Ceramic technology – Black and Red Ward	e Potterie	s (BRW) – Graff	iti on	Potte	eries.						
UNIT	Г – II	DESIGN AND CONSTRUCTION TECHNOLOGY		. ,				3					
Desi of Sa Chol – Ch	gning and S angam age as and othe letti Nadu He	tructural construction House & Designs in household materials durin – Details of Stage Constructions in Silappathikaram – Sculptures r worship places – Temples of Nayaka Period – Type study (Madu ouses, Indo – Saracenic architecture at Madras during British Perio	ng Sangar and Tem urai Meena od.	n Age – Building ples of Mamalla akshi Temple) –	ı mate purar Thiru	erials n – (umala	and I Great ai Nay	Hero stones Temples of /akar Mahal					
UNIT - III MANUFACTURING TECHNOLOGY 3													
Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel – Copper and gold – Coins as source of history – Minting of Coins – Beads making – industries Stone beads – Glass beads – Terracotta beads – Shell beads/ bone beats – Archeological evidences – Gem stone types described in Silappathikaram.													
UNI	r – IV	AGRICULTURE AND IRRIGATION TECHNOLOGY						3					
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean – Knowledge Specific Society.													
UNIT	Г – V	SCIENTIFIC TAMIL & TAMIL COMPUTING						3					
Deve Acad	elopment of demy – Tam	Scientific Tamil – Tamil computing – Digitalization of Tamil Book il Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	ks – Deve	lopment of Tarr	il So	ftwar	e – T	amil Virtual					
								Total:15					
TEX	Т ВООК:												
1.	Social Life	of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and R	MRL – (in	print)									
2.	Social Life	of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published	by: Intern	ational Institute	of Ta	mil S	tudie	s).					
REF	ERENCES:												
1.	தமிழக எ பணிகள்	வரலாறு - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளி 1 கழகம்), உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை, 1	யீடு தமி 2002	ழ்நாடு பாடந	ால் ட	ற்ற	றம் ச	ல்வியில்					
2.	கணினி	த்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016											
3.	ஜீந்ர உ	வகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்லி	ியல் து	றை வெளியீடு))								
4.	பொருன	ந ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீ(Б										
5.	Historical I Studies)	Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavuka	irasu) (Pu	blished by : Inter	natio	nal I	nstitu	te of Tamil					
6.	The Contri	bution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished	by Interna	ational Institute of	of Tar	nil S	tudies	s).					
7.	Keeladi – ' Text Book	Sangam City Civilzation on the banks of river Vaigai; (Jointly Publis and Educational Services Corporation, Tamilnadu)	shed by: [Department of A	rchae	eolog	ју & Т	amilnadu					
8.	Studies in	the History of India with Special Reference to Tamilnadu (dr.K.K.P	illay) (Pub	lished by : The <i>i</i>	Autho	r)							
9.	Porunai Ci Corporatio	ivilization (Jointly Published by: Department of Archaeology & Tami n, Tamilnadu)	ilnadu Te>	tbook and Educ	ation	al Se	rvice	S					
10.	Journey of	f Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL	.) – Refere	ence Book.									

COURSE OUTCOMES: On completion of the course, the students will be able to												(BT Mapped (Highest Level)			
CO1	CO1 explain weaving and ceramic technology in tamil culture and tamil society.															
CO2	Illustrate	Un	Understanding (K2)													
CO3	summariz	Un	Understanding (K2)													
CO4	explain th	Un	Understanding (K2)													
CO5	explain the significance of tamil in scientific and computing.													Understanding (K2)		
Mapping of COs with POs and PSOs																
COs/P	Os PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
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 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy																
ASSESSMENT PATTERN – THEORY																
Test / Bloom's Category*		Remembering (K1) %		Understanding (K2) %		Ap (I	Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		ting) %	Total %		
CAT1		4	C	(60									100		
CAT2		4	C	60										100		
CAT3		4	C	(60									100		
E	SE							NA					i			
* ±3%	* ±3% may be varied (CAT 1.2.3 – 50 marks)															

22ITL31 - DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY																
Branch		B.Teo	:h. & In	formati	on Tec	hnolog	у			Sem.	Category	L	. т	Р	Credit	
Prerequisites		Data	Structur	es						3	PC	C	0	2	1	
Pream	Preamble This course investigates the various algorithm design techniques and methods for designing and analyzing algorithms.															
LIST OF EXPERIMENTS / EXERCISES:																
1.	Find the order of growth of the given problems. Identify the basic operation and count the number of times the basic operation is executed															
2.	Implement the Quick sort algorithm and analyze with respect to space and time															
3.	Implement the Merge sort algorithm and analyze with respect to space and time															
4.	Implement binary search and analyze with respect to space and time															
5.	Using Decrease and conquer technique, compute the kth smallest element in the list of 'n' numbers. Also, find the time complexity															
6.	Write the heap sort algorithm to sort 'n' numbers using transform and conquer															
7.	Com	npare t	op dow	n and b	ottom-u	p appro	oaches (of solvir	ng the K	napsac	k proble	m using Dyi	nam	ic Pro	gramm	ing
8.	Con	struct	the Huf	fman co	de for t	he give	n data.	Also pe	rform er	ncoding	and dec	oding (use	Gre	edy te	echniqu	e).
9.	Appl	ly bacł	ktrackin	g to sol	ve the g	iven ins	stance c	of subse	t sum p	roblem						
10.	10. Solve the travelling salesman problem of the given graph using branch and bound technique															
																Total:30
REFER	RENC	ES/ M	ANUAL	/SOFT	WARE:											
1.	C/JA	AVA/P	ython													
2.	Labo	oratory	/ Manua	al												
	SE Ol moleti	JTCOI	MES:	ursa th	o stude	onte wil	ll ha ah	le to							BT I	Mapped
					e stude										Analv	zina (K4)
CO1	anal	yze th	e Space	e and Ti	me effic	ciency o	of variou	is algori	thms						Preci	sion (S3)
CO2	estimate the performance of various algorithm design techniques												Evaluating (K5) Precision (S3)			
CO3	3 choose appropriate design strategies for solving a given problem Applying (K3) Precision (S3)												/ing (K3) sion (S3)			
Mapping of COs with POs and PSOs																
COs/POs PO1		PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PC	12	PSO1	PSO2
CO1		3	3	2	2	1	3	3	3	3	3	3			3	3
CO2	2	3	3	3	3	2	3	3	3	3	3	3	2	2	3	3
CO3	3	3	2	1	1		3	3	3	2	2	3			3	2
1 – Slig	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy															
			2217	L32 -	рүтно	N PRO	GRAM	MING A	ND FR	AMEWO	ORKS L	ABORATOF	۲Y			
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Progra Branci	ammeð h	&	B.Tec	:h. & Inf	ormati	on Tecl	hnolog	у			Sem.	Category	L	Т	Р	Credit
Prereq	luisite	s	Nil								3	PC	0	0	2	1
															•	
Pream	ble		This c	ourse p es on pr	rovides ogramn	hands- hing wit	on expo h datab	osure to ases	develo	p applic	ations u	sing the feat	tures	of F	ython.	lt also
LIST C	OF EXF	PERIN	IENTS	EXER(CISES:											
1.	Imple	ement	linear s	earch a	nd bina	ry sear	ch									
2.	Imple	ement	Quick	Sort and	Merge	Sort										
3.	Find	the m	ost freq	uent wo	rds fror	n a give	en text fi	ile and o	copy the	e same i	into anot	ther file				
4.	Explo	ore sti	ring mar	nipulatio	n functi	ons (wo	ord play)								
5.	Prog	ıram u	sing us	er-define	ed funct	ions wit	th differe	ent type	es of arg	jument j	bassing	methods				
6.	Demonstrate tuple, list, set and dictionary operations															
7.	7. Program to illustrate the concept of constructors															
8.	Program to implement different types of inheritance, Aggregation and Association															
9.	. Develop an application to illustrate CRUD operations using python and MySQL															
10.	10. Program to demonstrate the usage of exception handling															
11.	Perfo	orm da	ata man	ipulatior	n using	NumPy										
12.	Dem	onstra	ate Data	Visuali	zation u	ising Pa	indas ai	nd Matp	olotlib							
																Total:30
REFER	RENCE	ES/ M	ANUAL	/SOFT	WARE:											
1.	Softv	ware :	Python,	Anacor	ida, Jup	yter No	tebook									
COUR	SE OU	JTCO	MES:	urea th	o studo	nte wil	l bo abl	la ta						Е /Ц	BT Map	ped
						IIIS WII				4				<u>с</u>	reating	(K6),
CO1	build	, test	and dec	ug simp	Die Pyth	on prog	rams us	sing cor	ntrol stru	uctures	and fund	tions		P	recision	<u>(S3)</u>
CO2	deve datal	elop ap base o	oplicatio connect	ns usinę ion	g Object	t Oriente	ed Prog	frammin	ig conce	epts in F	ython a	nd establish	1	A P	pplying recisior	(K3), ı (S3)
CO3	CO3 demonstrate data manipulation and data visualization using Numpy, Pandas and Matplotlib Applying (K3), Precision (S3)															
				r	1	Маррі	ng of C	Os witl	h POs a	and PSC	Ds			-		
COs/P	DS/POS PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PSO1 PSO2															
CO1		3	3	3	3	3	3	3	3	3	3	3	3		3	3
CO2	2	3	2	1	1		3	3	3	2	2	3		-	3	2
CO3	3	3	2	1	1		3	3	3	2	2	3			3	2
1 – Slio	aht. 2 -	– Mod	erate. 3	- Subs	tantial.	BT- Blo	om's Ta	axonom	v							

			22	2EIL33	- DIGI	TAL LO	GIC AN		ROPRO	CESSO	RS LAE	BORATORY				
Progra Branc	amme h	&	B.Tec	:h. & Inf	ormatio	on Tecl	hnology	y			Sem.	Category	L	т	Р	Credit
Prerec	luisite	es	Nil								3	ES	0	0	2	1
Pream	ble		This c	ourse p	rovides	practica	al expos	sure in i	mpleme	enting va	arious di	gital circuits	. It als	so d	eals wit	h
LIST C		PERIN				nogram	ming ai		acing w)					
1.	Sim	plifv ar	nd Imple	ement Si	imple C	ombina	tional C	ircuits								
2.	Sim	plify ar	nd Imple	ement A	dder an	d Subtra	actor									
3.	Sim	plify ar	nd Imple	ement D	ecoder	and End	coder									
4.	Sim	plify ar	nd Imple	ement C	ode cor	verters										
5.	Sim	plify ar	nd Imple	ement M	ultiplex	er and [Demultip	olexer								
6.	B. Design counters and shift Registers															
7.	7. Write simple programs using 8086 (Addition, subtraction, multiplication and division)															
8.	8. Write simple programs using 8086 (Maximum and Minimum in a given list)															
9.	Writ	e simp	le progi	rams usi	ing 808	6 (Asce	nding/D	escend	ing orde	ering of	a list)					
10.	10.Perform the following Interfaces: i) Generate a square wave and rectangular wave by interfacing timer with 8051,ii) Generate rolling display by interfacing 8279 with 8051															
	Total:30															
REFE	RENC	ES/ M	ANUAL	/SOFT	WARE:											
1.	Lab	oratory	/ Manua	d												
COUR	SE Ol	UTCO	MES:	ursa th	o studo	nte wil	l ha ahl	e to						Е /ні	3T Map	ped avel)
					c stude			0.10						A	pplying	(K3),
CO1	desi	ign and	d implen	nent cor	nbinatic	nal logi	c circuit	S						Pr	recision	(S3)
CO2	exai	mine s	equentia	al logic o	circuits	using fli	p-flops							An	alyzing	(K4),
	deve	elon as	sembly			rams fo	r simple	annlica	ations a	nd inter	face ne	rinherals		Pr Ar	recision	(S3) (K3)
CO3	with	16 bit	micropi	rocessoi	ge prog		i simple					ipriciais		Pr	recision	(S3)
						Mappi	ng of C	Os witl	n POs a	nd PSC	Ds					
COs/P	Os/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PSO1 PSO2															
CO		3	2	1	1		3	3	3	2	2	3			3	2
CO2	2	3	3	2	2	1	3	3	3	3	3	3	1		3	3
COS	3	3	2	1	1		3	3	3	2	2	3			3	2
1 – Slig	ght, 2	– Mod	erate, 3	– Subs	tantial,	BT- Blo	om's Ta	xonom	у							

		22ITC32 - DATA STRUCTURES USING	i JAVA											
Progra Branch	mme & N	B.Tech. – Information Technology	Sem.	Category	L	т	Р	Credit						
Prereq	uisites	Object Oriented Programming	3	PC	3	0	2	4						
Pream	ble	This course helps the students to learn the basic concepts of li and their applications	near dat	a structures,	non-	linea	r data	structures						
Unit –		Data structures and Linked List						9						
Overvie Finding	ew of Data Solaria	tructures – Java for C++ Programmers- The Basics of Arrays ir specified Links - Doubly Linked lists – Recursion: Factorial - A F	n Java - Recursiv	Linked lists: e Binary Sear	Link rch -	s – A - The	Simp Towe	ble linked list- ers of Hanoi.						
Unit –	<u> </u>	Stack and Queue		,				9						
Introdu Queue Expres	ction – Stack – Circular qu sions.	: Implementation of stack – Stack Example: Reversing a Word eue – Dequeue – Parsing Arithmetic Expressions: Postfix Notatio	l – Delin on – Trar	niter Matching Infix to	j. Qi D Po	ueue: stfix -	Imple - Eval	ementation of uating Postfix						
Unit –		Sorting and Hashing						9						
Simple to Hash	Sorting: Bubl ning: Open Ad	ole sort – Selection sort – Insertion Sort – Sorting objects – Advan ddressing - Linear Probing – Quadratic Probing – Double Hashin	nced Sor ng - Sepa	ting – Shell sc arate Chaining	ort – g - H	Quicl ash I	k sort - Functi	 Introduction ons. 						
Unit –	iit – IV Trees 9													
Binary Minimu	trees – Tree m values - D	terminology – Binary Search Tree: Finding a node – Inserting a eleting a node – Red-Black Trees: Rotations – Inserting a New N	a node - Iode – D	Tree Travers eletion – Red	als - -Bla	- Fin ck Tr	ding N ee Im	Aaximum and plementation.						
Unit –	V	Graphs						9						
Introdu Graphs	ction to Grap – Connectiv	hs - Depth-First Search – Breadth-First Search – Minimum S ity in Directed Graphs – Shortest Path Problem – Dijikstra's Algo	panning prithm – J	Tree - Topol All Pair Shorte	ogic est p	al Sc ath A	orting Algorit	with Directed						
LIST O	FEXPERIM	ENTS / EXERCISES:												
1.	Program to	implement singly linked list												
2.	Program to	implement Doubly linked list												
3.	Program to	implement Stack and Queue												
4.	Program to	evaluate postfix evaluation using stack												
5.	Program to	implement Reversing a word using stack												
6.	Program to	implement shell sort												
7.	Program to	implement double hashing												
8.	Program to	implement binary search tree and its operations												
9.	Program to	implement BFS and DFS												
10.	Program to	implement topological sort												
				Lectur	e:45	, Pra	ctical	:30, Total:75						
TEXTE	BOOK:													
1.	Robert Lafo	re., "Data Structures and Algorithms in JAVA", 2nd Edition, Pear	rson Edu	ication, Londo	on, 2	018.								
KEFER	ENCES/MA				AIT -)		2002						
1.	Cormen 1.1	H., Leiserson C. E., Rivest R. L., & Stein C., "Introduction to Algo	pritnms",	sra Edition, N		ress	, USA	, 2009.						
2.	Horowitz E.	, Sahni S., "Fundamentals of Data Structures in C", 2nd Edition,	Galgotia	Publications	, Ne	w De	lhi, 20	08.						

COUR On cor	SE OI mplet	UTCON ion of t	IES: the cours	se, the st	udents	will be a	able to							BT Map (Highest	ped Level)
CO1	desc	cribe the	e differen	it operatio	ns on li	nked list								Applying	(K3)
CO2	man	ipulate	the operation	ations on a	stacks a	and queu	ie							Applying	(K3)
CO3	dem	onstrat	e the con	ncept of sc	orting ar	nd hashir	ng techn	iques						Applying	(K3)
CO4	build	d trees a	and perfo	orm its var	ious op	erations								Applying	(K3)
CO5	choo	ose app	oropriate	graph algo	orithm fo	or solving	g proble	ms						Applying	(K3)
	Mapping of COs with POs and PSOs														
COs/F	COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02														
CO	1	3	2	1	1									3	2
CO	2	3	2	1	1									3	2
CO	3	3	2	1	1									3	2
CO	4	3	2	1	1									3	2
CO	5	3	2	1	1									3	2
1 – Slię	ght, 2	– Mode	erate, 3 –	Substanti	al, BT-	Bloom's	Taxono	my							
						ASSE	SSMEN	T PATI	ERN -	THEOR	RY				
Tes C	at / Blo	oom's ory*	Re	memberi (K1) %	ng l	Jndersta (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing %	Evaluating (K5) %	C (reating (K6) %	Total %
	CAT	1		10		20		70)						100
	CAT	2		10		20		70)						100
	CAT3 10 20 70 100														
	ESE			10		30		60)						100
* ±3%	may b	e varie	d (CAT 1	,2,3 – 50	marks &	ESE –	100 mai	rks)			•		•		

	22MAT43 - DISCRETE MATHEMATICS Common to Computer Science and Engineering, Computer Science and Design & Information Technology branches)														
(Common	(Common to Computer Science and Engineering, Computer Science and Design & Information Technology branches) Programme & BE - Computer Science and Engineering, Computer														
Programm Branch	ne &	BE - Computer Science and Engineering, Computer Science and Design & BTech - Information Technology branches	Sem.	Category	L	т	Ρ	Credit							
Prerequisi	ites	Nil	4	BS	3	1	0	4							
Preamble		To impart knowledge in mathematical logic, partial ordering functions and develop skills to apply group structures in codi	g and lat	tices, investio	gate	vario	ous ca	ategory of							
Unit – I		Propositional Calculus:						9+3							
Proposition Tautologies – Principal arguments	ns – Log s and Co l conjune	pical connectives – Compound propositions – Conditional an ontradictions – Inverse, Converse and Contrapositive – Logical ctive normal form and Principal disjunctive normal form – F	nd bicono equivale Rules of	ditional propo ences and im inference –	ositio plica Argu	ns – tions ımen	Truth –Nor ts – V	n tables – mal forms Validity of							
Unit – II Predicate Calculus: 9+3 Predicates – Statement function – Variables – Quantifiers – Universe of discourse – Theory of inference – Bules of universal 9+3															
Predicates specificatio	Predicates – Statement function – Variables – Quantifiers – Universe of discourse – Theory of inference – Rules of universal specification and generalization – Rules of Existential specification and generalization – Validity of arguments. Jnit – III Set Theory: 9+3														
Unit - III Set Theory: 9+3															
Cartesian product of sets – Relations on sets – Types of relations and their properties – Matrix representation of a relation – Graph of a relation – Equivalence relations – Partial ordering – Poset – Hasse diagram – Lattices – Properties of lattices.															
Unit – IV		Functions:						9+3							
Definition - Recurrence functions.	 Classi relation 	fication of functions – Composition of functions – Inverse functions – Solution of recurrence relations – Generating Functions	unctions s – Solvi	 Character ng recurrence 	ristic e rel	func ation	tion o by g	of a set – Jenerating							
Unit – V		Group Theory:						9+3							
Groups and Theory : G theorems in	d Subgr Group co n coding	oups (Definitions only) – Homomorphism – Cosets – Lagrar des –Hamming distance – Basic notions of error correction theory)	nge's the – Error	orem – Norr recovery in	nal s grou	ubgr p co	oups des (Coding Excluding 							
				Lecture:4	l5, T	utori	al:15	, Total:60							
TEXT BOC	DK:														
1. Veo Pul	erarajan blishing	T., "Discrete Mathematics with Graph Theory and Combin Company, New Delhi, 2013.	natorics"	, Reprint Ed	ition	, Tat	a Mc	Graw Hill							
REFEREN	REFERENCES:														
1. Tre Hill	emblay J I, New D	.P and Manohar R, "Discrete Mathematical Structures with App elhi, Reprint 2010.	lications	to Computer	Scie	nce",	Tata	McGraw–							
2. Kei Ne	nneth H. w Delhi,	Rosen, "Discrete Mathematics and its Applications", 8 th Edition 2012.	n, Tata M	1cGraw Hill E	duca	ition	Privat	e Limited,							
3. Su	sanna S	. Epp, "Discrete Mathematics with Applications", Metric Edition	n, Cenga	ge Learning,	USA	., 201	9.								

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	apply propositional logic to validate the arguments.	Applying (K3)
CO2	apply the rules of inference and methods of proof in predicate calculus to verify the validity of arguments.	Applying (K3)
CO3	possess knowledge of various set theoretic concepts.	Applying (K3)
CO4	understand different types of functions and solve recurrence relations.	Understanding (K2)
CO5	apply the concepts of group structures in coding theory.	Applying (K3)

					Mappin	g of Co	s with	POs ar	nd PSO	S				
Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										3	
CO2	3	2	1										1	
CO3	3	2	1											
CO4	3	3	3										1	
CO5	3	3	3										3	
1 – Slight, 2	2 – Mod	lerate, 3	- Substa	ntial, BT	- Bloom	's Taxo	nomy							

		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	30	60	-	-	-	100
CAT3	10	30	60	-	-	-	100
ESE	10	35	55	-	-	-	100
* ±3% may be varied	(CAT 1,2,3 - 50 ma	arks & ESE – 100 n	narks)				

22ITT41 - DATABASE MANAGEMENT SYSTEMS

Progra Branci	imme& า	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit						
Prereq	uisites	Nil	4	PC	3	0	0	3						
Pream	ble	This course provides the fundamentals of database concepts various concurrency control techniques for transactions.	s, SQL (queries and t	rans	actio	ns. It	also deals with						
Unit –	I	Data Models and Relational Model:						9						
Introdu Databa Databa	ction–Databa Ises – Databa Ise Schema -	ase System Applications–Purpose of database systems – V ase Architecture – Database Users and administrators - Relat – Keys – Schema Diagrams – Relational Query Languages - R	liew of o tional Mo Relationa	data – Datab odel – Struct Il Operations-	oase ure c · Rel	Lan of Re ation	guage lation al Alg	es – Relational al Databases – jebra.						
Unit –	II	SQL and Database Design:						9						
Databa structu Constra	Database Design - E-R model- Constraints – ER diagrams – Reduction to Relational Schema – ER design issues. SQL: Basic structure – Operations –Aggregate Functions –Sub queries - Nested Sub queries - Intermediate SQL: Joins – views– Index – Integrity Constraints– SQL data types and schemas – Authorization.													
Unit –	Init – III Relational Database Design: 9													
Feature decom Organia	es of good re position. Nor zation of Rec	elational designs- Functional dependency theory - Decomposi mal Forms: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF-Data Storag cords in Files – Data dictionary storage.	ition usii ge: RAIE	ng functional D – Tertiary	dep stora	ende age -	ncies File	-Algorithms for Organization -						
Unit –	IV	Indexing, Hashing and Transactions:						9						
Ordere Proces Serializ	d indices– B sing- Trans ability.	trees - B+ Tree index files–Multiple key access - Static and Dyr action concept–Transaction model–Storage structure–Tran	namic Ha Isaction	ashing – Bitm atomicity a	ap ir Ind	ndice dura	s. Ov bility	erview of Query – Isolation –						
Unit –	V	Concurrency Control and Recovery System:						9						
Lock-ba – Stora	ased Protoco Ige – Recove	ols - Deadlock Handling – Multiple Granularity – Timestamp and ry and atomicity – Algorithm – Buffer management – Failure w	d Valida vith loss	tion Based P of nonvolatile	rotoc stor	ols - age	Failu	re classification						
	Total:45													
TEXT I	TEXT BOOK:													
 Silberschatz Abraham, Korth Henry F. and Sudarshan S., "Database System Concepts", 7th Edition, McGraw Hill, New York, 2019. 														
REFER	RENCES:						_							
1.	Elmasri, Ra 2010.	mez and Navathe, Shamkant B., "Fundamental Database Sys	stems",	6 th Edition, P	ears	on E	ducat	ion, New Delhi,						
2.	 2010. Date C.J., Kannan A. and Swamynathan S., "An Introduction to Database Systems", 8th Edition, Pearson Education, New Delhi, 2006. 													

COUR	SE Ol	JTCOM	ES:											BT	lapped				
On cor	nplet	ion of th	ne cours	se, the s	students	s will be	able to							(Highe	est Level)				
CO1	outli	ne the fe	eatures,	architec	ture and	l applica	tions of	database	e systen	n				Apply	ing (K3)				
CO2	desi	gn an El	R model	and use	e relatior	nal datab	ase with	n SQL st	atemen	ts				Apply	ving (K3)				
CO3	desi	gn relati	onal dat	abase u	sing nor	malizatio	on metho	ods						Apply	ving (K3)				
CO4	appl	y indexir	ng and h	ashing t	echniqu	es in rela	ational d	latabase	, and pe	erform tra	ansactio	n processi	ng	Apply	ving (K3)				
CO5	appl	y the co	ncepts c	of concu	rency c	ontrol an	d recove	ery in a r	elationa	al databa	se			Apply	ving (K3)				
	Mapping of COs with POs and PSOs																		
COs POs	COs/ POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02																		
CO	1	3	2	1	1		3	3	3	2	2	3		3 2					
CO	2	3	2	1	1		3	3	3	2	2	3		3	2				
CO	3	3	2	1	1		3	3	3	2	2	3		3	2				
CO	4	3	2	1	1		3	3	3	2	2	3		3	2				
CO	5	3	2	1	1		3	3	3	2	2	3		3	2				
1 – Slig	ght, 2	– Moder	ate, 3 –	Substar	ntial, BT	- Bloom'	s Taxon	omy				•							
						ASSE	SSMEN	IT PATT	ERN - 1	THEORY	,								
Tes C	t / Blo atego	oom's ory*	Rem	nemberi (K1) %	ng U	ndersta (K2) 9	nding %	Apply (K3)	ying) %	Analyz (K4)	zing l %	Evaluating (K5) %	Crea (K6	ating 6) %	Total %				
	CAT	1		10		20		70	C						100				
	CAT	2		10		20		70	0						100				
	CAT	3		10		20		7(0						100				
	ESE			10		30		60	C						100				
* ±3%	mav b	e varied	(CAT 1	,2,3 – 50) marks	& ESE -	- 100 ma	arks)			•		÷	•					

Progra Branch	mme& າ	B.Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit						
Prereq	uisites	Object Oriented Programming	4	PC	3	0	0	3						
Pream	ble	This course provides an introduction to HTML, CSS and Bo ServerSide JS Framework.	otstrap.	It also deals	with	n Clie	ent-sio	le JS and						
Unit –	l	UI Design:						9						
HTML5 Respor Forms-	: Introduction nsive Web De Input – Input	 Basic tags – HTML Forms Element– Page Structured Eler sign: Introduction - Bootstrap - Grid basics – Tables –Images - Bu Groups – Modal. 	ments– utton - lis	Media Tags - st - Drop down	-Cas ı - Na	scadi avs -	ng St Nav E	yle Sheet. Bar -						
Unit –	II	JavaScript ES6:						9						
Introdu Collect	roduction – Variables – Operators - Control structures -Functions - Scope - Objects - Array, Date - Math – RegExp – HTML DOM – Dilections - Event Handling – JSON parsing.													
Unit –	nit – III Server-side JS Framework: 9													
Node JS: Introduction – Architecture – Features- Creating Web Servers with HTTP -Request - Response – Event Handling - GET and POST Methods –File Upload - Connect to NoSQL Database using Node JS – Implementation of CRUD operations.														
Unit –	IV	TypeScript and Angular:						9						
TypeSo Angula - Contr	cript: Introduc r : Introductior ollers – Scope	tion – Features – Variables – Data types – Enum – Array – Tup n - Needs - Evolution – Features – Architecture - Setup and Config e – Directives – Data Binding.	oles – Fu uration –	unctions – OC Components)P c and	oncej Modi	ots – ules –	Interfaces. Templates						
Unit –	V	AngularJS Framework:						9						
Pipes/F Animat	Filters -DOM – ions.	- Events - Routing - Services – HTTP – Ajax– Template Driven Fo	rms - Re	active Forms	– Fo	rm V	alidati	on – Basic						
								Total:45						
TEXT E	300K:													
1.	1. Infosys campus connect material shared by Infosys													
REFER	REFERENCES:													
1.	1. Paul Deitel, Harvey M.Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", 5th Edition, Prentice Hall,2011.													
2.	https://www.	javatpoint.com												

COUR On cor	SE Ol npleti	JTCOM ion of t	IES: he cours	se, the st	udents	will be a	ble to						B' (H	T Mapped lighest Lev	vel)
CO1	desi	gn stati	c web pa	iges using	HTML	, CSS an	d Bootst	trap.						Applying	g (K3)
CO2	deve	elop inte	eractive a	and dynan	nic web	pages u	sing bas	ics cons	structs	of Javas	cript ES6	6		Applying	g (K3)
CO3	deve	elop a w	veb appli	cation usi	ng nod	e JS with	databas	e conne	ectivity					Applying	g (K3)
CO4	appl	y the fe	atures of	f Typescri	ot and	Angular to	o develo	p web a	pplica	tions.				Applying	g (K3)
CO5	dem	onstrat	e full sta	ck web de	velopm	ent using	y Typeso	ript, An	gular a	nd Node	JS			Applying	g (K3)
Mapping of COs with POs and PSOs															
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	2	1	1		3	3	3	2	2	3		3	2
CO2		3	2	1	1		3	3	3	2	2	3		3	2
CO3		3	2	1	1		3	3	3	2	2	3		3	2
CO4		3	2	1	1		3	3	3	2	2	3		3	2
CO5		3	2	1	1		3	3	3	2	2	3		3	2
1 – Slig	ght, 2	– Mode	erate, 3 –	Substanti	al, BT-	Bloom's	Taxonor	ny							
						ASSES	SMENT		ERN -	THEORY	,				-
Tes C	t / Blo atego	oom's ory*	Re	ememberi (K1) %	ng	Understa (K2)	anding %	Apply (K3)	ving %	Analyz (K4) 9	ing E %	Evaluating (K5) %	g Cre	ating (K6) %	Total %
	CAT	1		20		20)	60)						100
	CAT	2		20		20)	60)						100
	CAT	3		20		20)	60)						100
	ESE	Ξ		20		20)	60)						100
* ±3% ı	may b	e varie	d (CAT 1	,2,3 – 50	marks	& ESE –	100 mar	ks)							

	22ITT43 - FORMAL LANGUAGES AND AUTOM	ΑΤΑ ΤΗ	EORY				
Programme& Branch	B.Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit

Prerequ	uisites	Nil	4	PC	3	0	0	3				
					•							
Preamb	ble	This course deals with models of computation, along with their their recognizers. It familiarizes students with the foundations This can be applied in the design of compilers, network protoco	ir types i and prin ols and p	n the context ciples of thec attern recogr	of for oretic	orma al co n syst	l langi mpute em.	Jages and r science.				
Unit – I		Automata:						9				
Introduc Automa	ction to Form ita - Applicati	al Proof - Additional Forms of Proof - Inductive Proofs - Determi on: Text Search - Finite Automata with Epsilon Transitions	nistic Fir	nite Automata	a - N	on-de	etemin	istic Finite				
Unit – I	I	Regular Expressions and Languages:						9				
Regular Express Express	r Expressions sions - Provi sions: Closur	s - Finite Automata and Regular Expressions - Applications of Re ng Language Not to Be Regular -Closure Properties of Regula e of Regular Languages under Boolean Operations – Reversal -	egular Ex ar Expre Equival	xpressions - / ssions: Closi ence and Min	Algel ure F iimiz	braic ^P rope ation	Law for rties of of Au	or Regular of Regular tomata				
Unit – I	II	Context -Free Grammars and Languages:						9				
Context	t - Free Gram	nmars-Parse Trees - Application of Context-Free Grammars - An	nbiguity i	n Grammars	and	Lang	uages	3				
Unit – ľ	V	Pushdown Automata:						9				
Definitio - Norma	on of Pushdo al Forms of C	wn Automata - The Languages of PDA - Equivalence of PDA's a context Free Grammars - The pumping Lemma for Context Free	and CFG Languag	's - Determin jes	istic	Push	ldown	Automata				
Unit – \	/	Turing Machine:						9				
Problem Basic Tr is RE -	ns that Comp uring Machin Undecidable	buters cannot Solve - The Turing Machine - Programming Tech e - Restricted Turing Machines - A language that is not Recursiv Problems About Turing Machine – Post's Correspondence Prob	niques fo ely Enur Ilem	or Turing Mac nerable - An I	chine Unde	es - E ecidal	xtensi ole Pr	ons to the oblem that				
								Total:45				
TEXT B	BOOK:											
1.	1. Hopcroft J.E., Motwani R. and Ullman J.D., "Introduction to Automata Theory, Languages and Computations", 3 rd Edition, Pearson Education, New Delhi, 2008.											
REFER	REFERENCES:											
1.	Kamala Krit Pearson Ed	thivasan and Rama R, "Introduction to Formal Languages, Au ucation, 2009.	tomata ⁻	Theory and (Com	putati	on", 1	I st Edition,				
2.	Martin J., "Ir	ntroduction to Languages and the Theory of Computation", 4 th Ed	lition, Ta	ta McGraw-H	ill, N	lew D	elhi, 2	2010.				

COURS On cor	SE Ol nplet	UTCON ion of t	IES: the cours	se, the stu	udents	will be a	able to							BT Mapp (Highest L	oed .evel)
CO1	desi	gn DFA	and NF	A for the g	iven la	nguage								Applying	(K3)
CO2	appl	y regula	ar expres	sions to ic	lentify i	regular la	inguage	s and it	s study	/ closure	properti	es.		Applying	(K3)
CO3	spec	cify con	text free	languages	s using	context f	ree grar	nmars a	and stu	dy its pr	operties.			Applying	(K3)
CO4	deve	elop pus	shdown a	automata f	or reco	gnizing c	ontext f	ree lang	guages	;				Applying	(K3)
CO5	cons	struct T	uring ma	chines and	d study	the prop	erties of	f undeci	dable	problems	S			Applying	(K3)
	Mapping of COs with POs and PSOs														
COs/P	COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02														
CO	CO1 3 2 1 1 3 3 3 2 2 3 3 2														
CO2	2	3	2	1	1		3	3	3	2	2	3		3	2
COS	3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	4	3	2	1	1	Τ	3	3	3	2	2	3		3	2
COS	5	3	2	1	1		3	3	3	2	2	3		3	2
1 – Sliç	ght, 2	– Mode	erate, 3 –	Substanti	al, BT-	Bloom's	Taxono	my						·	
						ASSES	SMENT	PATTE	RN - 1	HEORY	,				
Tes C	t / Blo atego	oom's ory*	Re	memberii (K1) %	ng l	Jndersta (K2)	inding %	Apply (K3)	/ing %	Analyzi (K4) 9	ing l %	Evaluating (K5) %		reating (K6) %	Total %
	CAT	1		10		30		60)						100
	CAT	2		10		30		60)						100
	CAT	3		10		30		60)						100
	ESE	=		10		30		60)						100
* ±3% ı	mav b	e varie	d (CAT 1	.2.3 – 50 ו	marks {	& ESE –	100 ma	rks)							

	22ITT44 - OPERATING SYSTEM	IS					
Programme& Branch	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit

Prereq	uisites	Nil	4	PC	3	1	0	4						
Pream	ble	This course describes about operating system abstractions, more process management, synchronization, scheduling, deadlock a	echanisr and file s	ns and their i ystems.	mple	ment	ations	such as						
Unit –	I	Operating Systems Overview						9+3						
Introdu Protect Linkers	ction – Comp tion – Virtualiz and Loaders	puter System Organization – Computer System Architecture – zation – Computing Environments. Operating Systems Structure s – Operating system Structure – Building and Booting OS.	Operations: Service	ons – Resour es – User an	rce M Id OS	lana S Inte	gemei rface	nt – Security and – System Calls –						
Unit –	11	Process Management:						9+3						
Proces Passin Algorith	s Concept, P g Systems. Ti nms.	Process Scheduling, Operations on Processes, Interprocess Co hreads: Overview - Multicore Programming - Multithreading Mode	mmunica els. CPU	ation – IPC in Scheduling:	n Sha Sche	ared dulin	Memo g Crit	ory and Message eria – Scheduling						
Unit –		Process Synchronization						9+3						
Critical – Dead	Critical Section Problem – Mutex Locks – Semaphores – Monitors. Deadlocks: Deadlock Characterization – Methods for handling deadlocks – Deadlock Prevention and Avoidance – Deadlock Detection – Recovery from Deadlock.													
Unit –	Unit – IV Memory Management 9+3													
Main M Memor	lemory – Bac y: Backgroun	kground – Contiguous Memory Allocation – Paging – Segmenta d – Demand Paging – Page Replacement – thrashing.	ation – S	tructure of the	e paç	je tal	ole – S	Swapping. Virtual						
Unit –	V	Storage Management						9+3						
Mass S File Sys Manag	Storage Struct stem Impleme ement – Case	ture – Overview – HDD Scheduling – File System: File Concept - entation – File System Structure-File System Operations – Director e study: Linux System.	 Access ory Imple 	Methods – E mentation – A	Direct Alloca	ory S ation	Structi Meth	ure – Protection – ods – Free Space						
				Le	ectur	e:45,	Tuto	rial :15, Total:60						
TEXT	BOOK:													
1.	1. Silberschatz A, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley & Sons Inc., 2018.													
REFER	REFERENCES:													
1.	William Stal	llings, "Operating Systems Internals and Design Principles", 9th	Edition, I	Prentice Hall,	2018	3.								
2.	Andrew S.	Tanenbaum, "Modern Operating Systems", 4th Edition, Pearson	Educatio	on, New Delh	i, 201	6.								

COUR On co	SE O mplet	UTCON ion of t	IES: he coui	se, the st	udents	will be a	able to							BT Ma (Highes	apped st Level)
CO1	iden	tify ope	rating s	/stem stru	cture, s	ervices a	nd syste	em calls	;					Applyi	ng (K3)
CO2	dem	onstrat	e variou	s process	schedu	ing algo	rithms a	nd desc	ribe m	ultithrea	ding mod	lels		Applyi	ng (K3)
CO3	appl	ly differe	ent meth	ods for pr	ocess s	ynchroni	zation a	nd for h	andling	g deadlo	cks .			Applyi	ng (K3)
CO4	illus	trate me	emory m	anagemer	nt strate	gies and	demon	strate va	arious	bage rep	blacemer	nt		Applyi	ng (K3)
CO5	sum	marize	the feat	ures of file	system	s and ap	ply vari	ous disk	<pre>c schec</pre>	luling alo	gorithms			Applyi	ng (K3)
						Мар	ping of	COs wi	ith PO:	s and P	SOs				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	CO1 3 2 1 1 3 3 3 2 2 3 3 2														
CO2 3 2 1 1 3 3 3 2 2 3 3 2													2		
CO	3	3	2	1	1		3	3	3	2	2	3		3	2
CO	4	3	2	1	1		3	3	3	2	2	3		3	2
CO	5	3	2	1	1		3	3	3	2	2	3		3	2
1 – Slię	ght, 2	– Mode	erate, 3 -	- Substant	ial, BT-	Bloom's	Taxono	my							
						ASS	ESSME	ENT PA	TTERN	- THEC	DRY				
Tes C	at / Blo	oom's ory*	R	ememberi (K1) %	ng l	Jndersta (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing %	Evaluating (K5) %) C	reating (K6) %	Total %
	CAT	1		20		50		30)						100
	CAT	2		20		50		30)						100
	CAT	3		20		50		30)						100
	ESE	Ξ		10		60		30)						100
* ±3%	may b	e varie	d (CAT	1,2,3 – 50	marks &	& ESE –	100 ma	rks)			·		•		

22ITL41 - DATABASE MANAGEMENT SYSTEMS LABORATORY												
Programme& Branch	B.Tech. & Information Technology	Sem.	Category	L	т	Ρ	Credit					

Prere	quisit	es	Nil								4	PC	0	0	2	1
Prear	nble		This c langua	ourse p ages	rovides	hands-	on expe	erience	n datab	ases ar	nd its ope	erations us	ing SC	L an	d othe	r high level
LIST	OF EX		IENTS /	EXER	CISES:											
1.	Data	definiti	on lang	uage, co	ommano	ds, integ	rity con	straints								
2.	Data	manipu	ulation la	anguage	e, Data	control	languag	ge comn	nands a	nd TCL	. comma	nds				
3.	Neste	ed quer	ies													
4.	Join	operatio	ons													
5.	View	s and ir	ndex													
6.	PL/S	QL stat	ements													
7.	Curs	ors														
8.	Trigg	ers														
9.	Proce	edures	and Fur	nctions												
	Mini I	project:	(Applic	ation De	evelopm	nent usi	ng Orac	le/ SQL	SERVI	ER / MY	/SQL)					
	Sam	ole App	lication	S:	_											
	 Inventory Control System Hospital Management System Railway Reservation System 															
10	 Hospital Management System Railway Reservation System Web Based User Identification System 															
10.	 Railway Reservation System Web Based User Identification System Hotel Management System 															
	 Web Based User Identification System Hotel Management System 															
	 Hotel Management System Student Information System 															
	 Student Information System Library Information System and etc 															
																Total:30
REFE		ES/ M	ANUAL	/SOFT	WARE:											
1.	Front	End: N	/licrosof	t Visual	Studio	6.0, Mic	rosoft.	NET Fra	amewor	k SDK v	v2.0, Jav	a etc				
2.	Back	End : 0	ORACLI	E / SQL	SERVE	R / MY	SQL									
COLI			MEG.												DT M	annad
On c	omple	tion of	the cou	urse, th	e stude	ents wil	l be abl	e to						(1	Highe	apped st Level)
CO1	deve	elop SC	QL and I	PL/SQL	comma	inds to a	create a	ind mar	ipulate	databas	ses				Applyi Precis	ng (K3), ion (S3)
<u> </u>			davam		rico ucir		onto of	omboda						ŀ	Analyz	ing (K4),
002	exec	cute an	u exam	ine que	nes usir	ig conce	epts of e	empedo	lea que	ry langu	lages				Precis	ion (S3)
CO3	app	ly datat	base co	ncepts t	o solve	real wo	rld prob	lems							Applyi	ng (K3),
	Precision (53)															
						Мар	ping of	COs w	vith PO	s and P	SOs					
COs/	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	2 P	SO1	PSO2
CC	01	3	2	1	1		3	3	3	2	2	3			3	2
CC)2	3	2	1	1	1	3	3	3	3	3	3	1		3	3
CC	03	3	2	1	1		3	3	3	2	2	3			3	2
1 – S	liaht. 2	– Mod	erate. 3	– Subs	tantial.	BT- Blo	om's Ta	axonom	v							

22ITL42 - WEB TECHNOLOGY LABORATORY												
Programme& Branch	B.Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit					
Prerequisites	Object Oriented Programming	4	PC	0	0	2	1					
	·											

Pream	Preamble This course provides hands-on experience in databases and its operations using SQL and other high level languages														
LIST O	FEX	PERIM	IENTS	/ EXER	CISES:										
1.	Desi	ign a v	veb pag	e using	HTML	tags an	d host i	t in gith	ub repo	sitory.					
2.	Desi	ign a r	espons	ive web	site usir	ng Boot	strap.								
3.	Des	ign a r	egistrat	ion form	and pe	erform fo	orm vali	dation ι	using Ja	vaScrip	ot.				
4.	Desi	ign an	webpa	ge to cre	eate sim	nple inte	eractive	Bill calo	culator u	using D0	DM.				
5.	Dev	elop si	imple lo	gin pag	e by pe	rforming	g event	handlin	g using	GET ar	nd POST	methods in	n Node J	S.	
6.	Desi	ign a v	vebpag	e to mai	ntain pe	ersonal	informa	tion usi	ng CRL	ID opera	ations in	MongoDB.			
7.	Desi	ign a v	veb app	lication	using c	ompone	ents, mo	odules a	and rout	er in An	igular.				
8.	Dev	elop a	web ap	plicatio	n using	Angula	r http se	ervices.							
9.	Des	ign a r	eactive	form to	maintai	n perso	nal info	rmation	and pe	erform va	alidation	using Angu	ılar.		
10.	Dev	elop a	nd depl	oy eCar	t manag	gement	system	using A	Angular.						
	Total:30														
DEFE															
KEFER		E 5/ IVI.		/SUF1	WARE:										
1.	Visu	ial Stu	dio cod	e/ GEdit	, Node	JS+NP	M, Mon	goDB							
2.	Ang	ular, G	Bithub												
COUR	SF OI	ITCO	MES											BT Man	hed
On cor	npleti	ion of	the co	urse, th	e stude	ents wil	l be ab	le to					()	lighest L	evel)
CO1	deve	elop in	teractiv	e web p	ages us	sing HT	ML, CS	S, Java	Script a	nd Boot	tstrap.			Applying (Precision	(K3), (S3)
CO2	deve	elop a	web ap	plicatior	n to mai	ntain in	formatio	on in a c	latabas	e using	server-si	de scripting	g. /	Applying ((CC), (K3),
				· · · ·									- (Precision Creating ((S3) K6).
CO3	appl	ly the d	concept	s of Ang	gular to	design	full-fled	ged wel	o applic	ations.				Precision	(S3)
	Manning of COs with POs and PSOs														
COs/P	COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02														
CO1		3	2	1	1		3	3	3	2	2	3		3	2
CO2	2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	3	2	1	1	3	3	3	3	3	3	3	3	3	2
1 – Slic	ght, 2 ·	 Mod 	erate, 3	- Subs	tantial.	BT- Blo	om's Ta	axonom	v						

22GEL41 - PROFESSIONAL SKILLS TRAINING - I															
(Common to All BE/ BTech Engineering and Technology branches) Programme & All BE/ BTech Engineering and Technology branches Branch															
Programme & Branch	Programme & BranchAll BE/ BTech Engineering and Technology branchesSem.CategoryLTPCreditPrerequisitesNil6000802														
Prerequisites	Nil	4	EC	0	0	80	2								
Preamble This subject is to enhance the employability skills and to develop career competency															
Preamble This subject is to enhance the employability skills and to develop career competency Unit – I Soft Skills – I : 20															
Unit – I Soft Skills – I : 20 Soft skills and its importance: Pleasure and pains of transition from an academic environment to work environment-Need for change 20															
Solit shine and its importance. Fleasure and pairs of transition from an academic environment to work environment. Fear, stress and competition in the professional world-Importance of positive attitude- Self motivation and continuous knowledge upgradation-Self-confidence. Professional grooming and practices: Basics of corporate culture-Key pillars of business etiquette- Basics of etiquette-Introductions and greetings-Rules of the handshake, earning respect, business manners-Telephone etiquette- Body Language. Unit – II Quantitative Aptitude and Logical Reasoning – I: 30 Problem solving level I: Number System-LCM &HCF-Divisibility test-Surds and indices-Logarithms- Ratio-proportions and variation-Partnership-Time speed and distance-Data interpretation-data representation. Logical reasoning: Family tree- Deductions-Logical connectives-Binary logic Linear arrangements- Circular and complex arrangement															
Unit – III	Written Communication & Verbal Aptitude						30								
Writing Skills: Writi Professional e-mail (Transcoding) Writi Phrases Paired wo Spotting Errors Ser Rearranging Jumbl	ng strategies and formats Importance of Résumés Writing a Writing Responding to e-mails and business letters Technica ing One-page Essays. Verbal Aptitude Synonyms Antonyms ords Analogies Spelling test Cloze test using suitable verb for ntence Correction and Formation Grammar Based questions (T ed Sentences & Jumbled paragraphs, Identifying Facts, Inferen	Cover let I Report Homony rms usin ransform ces and	ter -Respond writing Inter yms One wo g appropriate ation : Active Judgements	ding oreta ord si e arti e-Pas state	to Jol tion c ubstit cles a ssive ment	5 Advert of Techn ution Idi and prep & Direct- s	isements ical Data oms and positions; Indirect);								
							Total:45								
TEXT BOOK:															
1. Edgar Thorpe and Showick Thorpe, "Objective English for Competitive Examination", 6th Edition, Pearson India Education Services Pvt Ltd, 2017.															
REFERENCES:	REFERENCES:														
1. Stephen Ba	ailey, "Academic Writing: A practical guide for students", Routle	dge, Nev	v York, 2011.												
2. Meenakshi University I	Meenakshi Raman and Sangeeta Sharma. "Technical Communication- Principles and Practice". 4th Edition, Oxford University Press, New Delhi, 2022.														

COUR On cor	SE O mplet	UTCON tion of	MES: the cou	urse, the	studen	ts will b	e able to	0					()	BT Mapped Highest Lev	l el)
CO1	dev indi	elop the viduala	e soft s nd as a	kills of lea team	arners	o suppoi	t them	work ef	ficientl	y in an c	organiza	ition as an		Applying (K3 Precision (S3), 3)
CO2	solv	/e real t	ime pro	blems usi	ng nun	nerical ab	ility and	logical	reasor	ning				Applying (K3 Precision (S3), 3)
CO3	App writ	oly comi ten disc	municat courses	ion skills grammat	effectiv ically w	ely to une ith accura	derstand acy	l and de	eliver ir	nformatio	on in va	rious		Applying (K3 Precision (S3), 3)
Mapping of COs with POs and PSOs															
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	2				3	3		3		3	2		
CO2	2	3	2				3	3		3		3	2		
CO3	3		2					3	3		3	3	3	2	
1 – Slię	ght, 2	– Mode	erate, 3	– Substa	ntial, B	T- Bloom	's Taxor	nomy							
						ASSE	SSMEN	IT PAT	TERN	- THEOF	RY				
Test C	t / Blo atego	oom's ory*	Re	emember (K1) %	ing	Understa (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing %	Evaluating (K5) %	Creat	ing (K6) %	Total %
	CAT	1		2	0	50		30							100
	CAT	2				50		50							100
	CAT3 50 50 100														
	ESE NA 100														
* ±3%	may I	be varie	ed (CAT	1,2,3 - 50) marks	5)									

	22EGL31 - COMMUNICATION SKILLS DEVELOPMENT LABORATORY														
				(Comn	non to Al	l Enginee	ring and	Technolo	ogy Bran	ches)			1		
Prograr Branch	nme &	All B.E./E	3.Tech B	ranches					S	em.	Category	L	Т	Р	Credit
Prerequ	lisites	Nil								4	HS	0	0	2	1
Preamb	le	This cour professio	se is des nal comn	igned to nunication	impart ne n skills.	ecessary	skills to li	sten, spe	eak, read	and w	rite in order	to obta	in be	tter	
LIST OF	EXPER	IMENTS /	EXERCI	SES:											
1.	Self Int	roduction a	& Mock II	nterview											
2.	Job A	oplication l	etter with	Resume											
3.	Presentation: A Technical topic / Project report &a Case study														
4.	4. Situational Dialogues / Telephonic Conversations														
5.	Group	Discussior	1												
6.	Readir	g Aloud													
7.	Listeni	ng Compre	hension												
8.	Writing Company Profiles														
9.	Preparing reviews of a book/product/movie														
10.	. Pronunciation Test														
	Total:30														
REFER	ENCES/	MANUAL /	SOFTW	ARE:											
1.	Lab N	lanual													
2.	Orell	Digital Lan	guage La	ab Softwa	are										
COURS		OMES.											рт	Mon	nod
On com	Detion of	of the cou	se, the	students	will be a	able to							Hiql	hest L	Jeu Level)
CO1	enhand	ce effective	listening	and rea	ding skills	S						U	nders	standi	ng (K2),
CO2	acquire	nrofessio	nal ekille	required	for workr	blace/big	per educ	ation					App	lying	(S1) (K3),
002	acquire	professio		required		Jace/Higi						1	Vatura Ann	alizatio	on (S5)
CO3	use En	glish langu	age skill	s effective	ely in var	ious situa	ations						Artic	ulation	ו (S4) ו (S4)
	Mapping of Cos with POs and PSOs														
	COs/PO	5	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010) P	011	PO12
	CO1										2	3			3
	CO2										2	2			2
	CO3										2	2			2
1 – Sligh	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														

22ITT51 - COMPUTER NETWORKS									
Programme & Branch	B. Tech & Information Technology	Sem.	Category	L	Т	Ρ	Credit		

Prerequisit	s Nil	5	PC	3	0	0	3	
Preamble	This course deals with the fundamental concepts of compute different layers along with their concepts, functions and protocol	r networ ols.	rks. It preser	nts bo	ttom	up ap	oproach of	
Unit - I	Network Models and Physical Layer						9	
Data Comm conversion:	inications – Networks – Networks Types. Network Models: TCP/IP Prote Line coding – Line Coding Schemes – Transmission Modes – Transmiss	ocol suit sion mea	e - The OSI dia: Guided -	Mode - Ung	I. Dig uided	ital-to medi	-digital ia.	
Unit - II Data Link Layer								
Introduction HDLC - Po Connecting	Introduction – Link Layer Addressing – Error Detection and Correction: Introduction – Block Coding – CRC – Checksum– Framing – HDLC - Point-to-point protocol. Media Access Control: Random Access – Channelization - Wired LAN: Standard Ethernet – Connecting Devices – Virtual LANs.							
Unit - III	Network Layer						9	
Network Lay Algorithms:	er Services- Network layer performance - IPV4 addresses – Internet Pro Distance Vector and Link-state routing unicast – Routing Protocols: RIP	otocol (If and OS	P) - ICMPv4. PF - IPV6 ac	Unic: Idress	ast R sing- I	outing PV6) protocol.	
Unit - IV	Transport Layer						9	
Introduction Quality of Se	 Transport layer protocols: Simple – Stop-and-wait - Go-back-N – Sele rvice: Data Flow Characteristics – Flow control to improve QoS. 	ctive Re	peat - Piggy	backir	ng – l	JDP -	- TCP.	
Unit - V	Application Layer						9	
World Wide system – Ne	Neb and Hyper Text Transfer Protocol – File transfer protocol – Electror twork Management: Introduction – Simple Network Management Protoc	nic Mail - ol.	 Telnet – Se 	ecure	shell	– Dor	nain name	
							Total:45	
TEXT BOOI	(:							
1. Beh	rouz A. Forouzan, "Data Communications and Networking", McGraw-Hil	I, 5 th Ed	ition, 2013.					
REFERENCES:								
1. Kurose James F. and Ross Keith W., "Computer Networking: A Top-Down Approach", 6 th Edition, Pearson Education, New Delhi, 2017.								
2. Stal	ings, "Data and Computer Communications", PHI, 10 th Edition, New De	lhi, 2015	5.					

COUR On co	COURSE OUTCOMES: On completion of the course, the students will be able to										BT Mapped (Highest Level)				
CO1	ехр	lore the	e basics	of network	mod	els and pł	nysical la	ayer						Applying	(K3)
CO2	ider	ntify err	or detec	tion and co	orrectio	on metho	ds and p	orotocol	s at da	ta link la	yer			Applying	(K3)
CO3	CO3 outline the different addressing schemes and apply various routing protocols at network layer										Applying (K3)				
CO4	illus tecl	strate th nniques	he diffei	rent trans	port la	ayer proto	ocols ar	nd emp	loy su	itable flo	ow cont	rol and Qo	S	Applying	(K3)
CO5 know various protocols and their working principles at application layer										Applying	(K3)				
	Mapping of COs with POs and PSOs														
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1		3	3	3	2	2	3		3	2
CO	2	3	2	1	1		3	3	3	2	2	3		3	2
CO	3	3	2	1	1		3	3	3	2	2	3		3	2
CO	4	3	2	1	1		3	3	3	2	2	3		3	2
CO	5	3	2	1	1		3	3	3	2	2	3		3	2
1 – Slię	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														
						ASSES	SMENT	PATTE	ERN - 1	THEORY	,				
Tes	t / Blo	oom's	Re	ememberi	ng	Understa	anding	Appl	ying	Analyz	ing	Evaluating	C	creating	Total
	atego	ory≃ ₄		(K1) %	(N2) % (N3) % (N4) % (N3) %				(116) %	100					

CAT2

CAT3

ESE

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

22ITT52 - MACHINE LEARNING									
Programme & Branch	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit		
L		1	1	1	1				

Prerequisite	Design and Analysis of Algorithms	5	PC	3	0	0	3	
	1							
Preamble	This course provides an insight into different types of machine real-world problems	learning	algorithms a	nd t	heir u	tility in	various	
Unit - I	Introduction to Machine Learning						9	
Introduction – Definition - Types of Machine Learning - Applications - Tools in machine learning - Types of data - Exploring structure of data - Data Quality and Remediation - Data preprocessing.								
Unit - II	Modeling and Evaluation						9	
Introduction t representatio Introduction-	 model – Model Selection: Predictive Model-Descriptive Model-Tra and Interpretation – Evaluating performance of Model – Improving eature Transformation - Feature Subset Selection. 	aining a performa	Supervised ance of a Mo	Lea del.	rning Featu	Mode ire En	el - Model igineering:	
Unit - III	Supervised learning: Classification						9	
Introduction - examples- Classification Model- Classification learning -Classification algorithms: Naive Bayes - K-nearest Neighbour - Decision tree - Random forest model - Support Vector Machine. Evaluating performance of model - Regression: Examples – Regression algorithm: simple linear regression - Multiple linear regression - polynomial regression model - Logistic regression, Evaluating performance of a model								
Unit - IV	Neural Networks						9	
Introduction t forward ANN Deep Learnin	biological and artificial neuron – Types of activation functions –Arch Multilayered feed forward ANN-competitive network-Recurrent Networ J. Unsupervised Learning: Introduction –Applications – Clustering algo	itecture k -Learn prithms –	of neural net ing process i Evaluating p	worl n AN erfo	k: Sing IN- Ba rmang	gle lay ack Pro ce of n	vered feed opagation- nodel.	
Unit - V	Other Types of Learning						9	
Reinforcemer Learning-Acti Regularizatio	t learning - Elements of Reinforce learning –Model based Learning - e learning –Instance based Learning – Association rule learning Algorithm.	- Tempo algorith	ral difference Im - Ensem	e lea ble	rning Learn	- repr ing A	esentation Igorithm -	
							Total:45	
TEXT BOOK								
1. Saika	: Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learni	ing", 1 st (edition, Pears	son l	Educa	ition, 2	2019.	
REFERENCE	S:							
1. Ether	Alpaydin, "Introduction to Machine Learning", 3 rd edition, Prentice Ha	all, 2015						
2. Tom	1. Mitchell, "Machine Learning", 1 st edition, Tata McGraw-Hill Education	on, 2017.						

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	utilize data preprocessing and explore structure of data	Applying (K3)
CO2	Select models and apply feature engineering methods to choose suitable models	Applying (K3)
CO3	employ supervised learning methods to solve real world problems	Applying (K3)
CO4	Solve problems using neural networks and unsupervised learning	Applying (K3)
CO5	apply the concepts of reinforcement learning and other types of machine learning algorithms	Applying (K3)
	1	

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	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		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	20	50	30				100	
CAT2	20	40	40				100	
CAT3	20	40	40				100	
ESE	10	40	50				100	

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

22ITC51 - SOFTWARE ENGINEERING									
		1			1				
Programme & Branch	B. Tech & Information Technology	Sem.	Category	L	Т	Ρ	Credit		

Prerequ	isites	Nil	5	PC	3	0	2	4
Preambl	e	This course promotes the practice of software engineering c to be acquired by software engineers and developers. It also	concepts	at a higher le agile softwar	evel of a e engir	abstra neerin	action g prir	which is nciples
		that are applicable to the analysis, design, development and	testing	of software s	ystems			
Unit - I		Process Models						9
Software	e process s	structure - Process models - Waterfall model, Incremental	process	s models, Ev	olution	ary p	roces	ss models,
Specializ	zed process	models – Unified Process						
Unit - II		Agile Principles and Scrum						9
Understa	anding the A	gile Values–Agile Principles–Agile Project-Scrum and Self-Org	ganizing	Teams-Basic	patterr	n for a	Scru	m Project-
Rules of	Scrum-Se	If-Organizing Teams-Scrum Values-Daily Scrum-Sprints, P	lanning	and Retrosp	ectives-	Scru	m Pla	anning and
Collectiv	e Commitm	ent-User stories–Conditions of Satisfaction–Story Points and V	/elocity-	Burn down C	harts– I	Plann	ing ar	nd Running
a Sprint-	-Generally /	Accepted Scrum Practices						
		AP and incremental Design	A 11					9
Primary	Practices of	of XP-The XP values help the team change their mindset -/	An effec	ctive mindset	starts	with t		P values –
Design a	and the Holi	AP principles-Feedback Loops - Make Code and Design Decisi	onsattr	ie Last Respt	Insidie i	viorne	ent - II	Icremental
Unit - IV		Lean and Kanhan						٩
Lean Th	inking_Con	mitment Ontions Thinking and Set Based Development	Create	Heroes and	Magica	al Thi	nkina	-Eliminate
Waste_\	/alue Strear	m Man–Deliver As Fast As Possible–WIP Area Chart–Pull Svst	tems – T	he Principles	of Kan	han -	Imnr	
Process	with Kanba	n – Measure and Manage Flow – Little's Law – Emergent Beh	avior wit	h Kanban	oritari	ban	mpi	oving roui
Unit - V		Software Testing Fundamentals						9
Software	e testing stra	ategies: Strategic approach – Issues – Test strategies for conv	entional	and Object C	Driented	softv	vare -	-Validation
and Sys	tem testing	 Debugging – Testing conventional applications: White box 	x testing	ı – Basis pat	h testin	g – C	Contro	ol structure
testing -	Black box	testing – Software configuration management – SCM reposito	ry – SCI	M process.		0		
LIST OF	EXPERIM	ENTS / EXERCISES:						
1.	Create a p	roduct back log with stories						
2.	Determine	Release plan to decide which stories can be accomplished in	the rele	ase				
3.	Write Sprin	at plan to determine which features can be accomplished in the	e first ite	ration, or spr	int			
4.	Manage yo	bur workload						
5.	Use severa	al predefined and user created queries to Track project progre	SS					
6.	Schedule t	he sprint review to allow team members to add their thought a	and revie	w the discus	sion at t	the m	eeting	g
7.	Create a p	an to shut down the first sprint and get ready to start the next	one					
8.	Identify use	e cases and develop business use case model (System use ca	ase diag	jram)				
9.	Identify the diagram.	conceptual classes (boundary, controller and entity classes) a	and deve	elop a domair	n model	with	UML	Class
10.	Develop us	ser interface using Python and Database creation using MySQ	L and P	erform unit a	nd integ	gratio	n test	ing
				Lectur	e:45, P	racti	cal:30	0, Total:75
TEXT BO	OOK:							
1	Roger S. Pr	essman, Bruce R. Maxim, "Software Engineering: A Practition	ner's App	proach", 8 th E	dition, I	McGra	aw-Hi	II
1.	Education,	India, 2019. (Units 1 & 5)						
2	Andrew Ste	Ilman and Jennifer Greene, "Learning Agile: Understanding Se	crum, XI	P, Lean and I	Kanban	", 1 st	Editio	n, O'Reilly
	Media Inc,2	015 (Units 2,3 &4)						
REFERE	ENCES/ MA	NUAL / SOFTWARE:						
1.	Ali Bahrami	, "Object Oriented Systems Development", 1st Edition, Tata M	cGraw-H	Hill, New Delh	ni, 2008			
2.	Infosys spri	ng board contents provided by Infosys at						
<u> </u>	https://infys	pringboard.onwingspan.com/web/en/page/home						

COUR	SE OUTCOMES:	BT Mapped
On cor	npletion of the course, the students will be able to	(Highest Level)
CO1	identify various software development models	Applying (K3), Precision (S3)
CO2	outline agile principles and apply Scrum for project development.	Applying (K3), Precision (S3)
CO3	use XP methods for modeling and design of a software system	Applying (K3), Precision (S3)
CO4	model applications using Lean and Kanban practices	Applying (K3), Precision (S3)
CO5	make use of various software testing techniques to test the software systems	Applying (K3), Precision (S3)

					Mappin	g of CO	s with	POs an	d PSOs	3				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
1 _ Slight 2	Mode	rato 3	Substanti		Bloom's	Tayono	mv							

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	40	40				100
CAT2	20	40	40				100
CAT3	20	40	40				100
ESE	20	40	40				100
* ±3% may be varied (0	CAT 1,2,3 – 50 mark	s & ESE – 100 mai	·ks)				

		22ITC52 - USER INTERFACE DESIGI	R INTERFACE DESIGN Sem. Category L T P Credit 5 PC 3 0 2 4 ating user interfaces using React javascript. 9 d Arrays Arrow Functions - Classes - Virtual DOM - React Elements - dding style to React elements - Dynamic element creation. 9 ating user interfaces using React javascript. 9 d Arrays Arrow Functions - Classes - Virtual DOM - React Elements - dding style to React elements - Dynamic element creation. 9 and Arrays Arrow Functions - Classes - Virtual DOM - React Elements - dding style to React elements - Dynamic element creation. 9 Pont - constructor - Rendering a component - Composing components - ive components. 9 Information constructor. React Lifecycle: 9 Jancontrolled component - Working with lists and keys - Adding forms - dding multiple fields - Validation Pomponents, elements and styles. Omponents, elements and styles. Interference - Redux Inteference - Redux <td colspa<="" th=""></td>					
Progra Branch	mme & າ	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit
Prereq	uisites	Web Technology	5	PC	3	0	2	4
Broom		This course provides knowledge on creating user interfaces us		et iovoccrint				
Unit –		Introduction	ing read	or javascript.				9
Basics Introdu	of React - ins ction to JSX -	stallation - Environment - ES6: Objects and Arrays Arrow Functic Create element - Rendering element - Adding style to React ele	ons - Cla ements -	sses - Virtual Dynamic eler	DON nent	/I - R crea	leact ation.	Elements -
Unit –		Component						9
Creatin Extract	g component	s - Class component - Function component - constructor - Rend nts - Styling Component - Mobile responsive components.	lering a o	component - C	Comp	osir	ng cor	mponents -
Unit –	III	Props and State						9
Creatin Lifecyc	g property - V le of compon	alidation - Creating state - Using state - Changing the state - Pass ents - Mount - Unmount - Update	sing data	- Props in cor	stru	ctor.	Read	t Lifecycle:
Unit –	IV Janadlana Dir	React Events	A \A/ant	in a with lints a	با ام ما		م ما ما	9
Event F	handlers - Bir handling - Coi	nd: React Form: Controlled component - Uncontrolled component nditional rendering - Submitting forms - Adding multiple fields - V	alidation	ing with lists a	іпа к	eys	- Add	ing forms -
Unit –	V	Router and Hooks						9
Routing	g overview - A	uthentication - Basics - State hook - Effect hook - Rules of hook -	Building	j hooks - Hook	as AF	Pl Re	feren	ce - Redux
LIST O	F EXPERIME	ENTS / EXERCISES:						
1.	Create a Re	eact based website for your client using components, elements a	nd style:	S.				
2.	Create a us	er profile page using props						
3.	Create a ca	Iculator application that performs basic arithmetic operations usin	ng Reac	t's state mana	gem	ent.		
4.	Create a sin pages.	nple e-commerce website with minimum of three pages. Use Re	act Rout	er to impleme	nt ro	uting	g betv	veen these
5.	Build a simp	ble counter application that increments or decrements a value ba	sed on ι	user input.				
6.	Create a fo quantity of t	rm that allows users to add new items to a list. The form shou he item.	ld includ	le fields for th	e na	me,	desc	ription and
7.	Create a we	eather application that displays the weather forecast for a specific	c location	n.				
8.	Build a CRL	JD application that allows users to add, view, edit and delete data	a from a	database.				
9.	Create a to-	do list application using hooks.						
10.	Build a user	authentication system that allows users to sign up, log in, and lo	og out.					
				Lecture:4	5, Pr	acti	cal:3), Total:75
TEXT E	BOOK:							
1.	Wieruch, Ro Germany, 2	bbin, "The Road to Learn React: Your Journey to Master Plain Ye 017.	et Pragm	natic React. Js	s.", Le	ean	Publis	shing,
REFER	ENCES/ MA	NUAL / SOFTWARE:			_	_		
1.	Banks, Alex United State	, and Porcello, Eve, "Learning React: Functional Web Developm es, 2017.	ent with	React and Re	edux"	', O'l	Reilly	Media,
2.	https://react	js.org						
3.	Martin Saute	er, "From GSM to LTE, An Introduction to Mobile Networks and N	Mobile B	roadband", W	iley,	201	4.	

COUR On co	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	develop a react applications using basic elements and styles	Applying (K3), Precision (S3)
CO2	apply the fundamental concepts of component in react	Applying (K3), Precision (S3)
CO3	demonstrate properties and state in react	Applying (K3), Precision (S3)
CO4	implement simple applications using react events	Applying (K3), Precision (S3)
CO5	illustrate the functionalities of React hooks and routing	Applying (K3), Precision (S3)

					Mappin	g of CO	s with	POs an	d PSO:	5				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	2	1	1	3	3	3	3	2	2	3		3	2
CO2	3	2	1	1	3	3	3	3	2	2	3		3	2
CO3	3	2	1	1	3	3	3	3	2	2	3		3	2
CO4	3	2	1	1	3	3	3	3	2	2	3		3	2
CO5	3	2	1	1	3	3	3	3	2	2	3		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	20	40	40				100
CAT2	20	40	40				100
CAT3	20	40	40				100
ESE	20	40	40				100
* ±3% may be varied (0	CAT 1,2,3 – 50 mark	s & ESE – 100 mai	·ks)				

					2	22ITL51	- NE	TWORK	S LAB	ORATO	ORY					
Progra	mmo	8														
Branch	h	a	B.Teo	:h. & In	formati	on Tec	hnolog	у			Sem.	Category	L	Т	Р	Credit
Prereq	luisite	S	Nil								5	PC	0	0	2	1
Preaml	ble		This c Trace Trace	ourse p r. It also r.	orovides o enable	an exp es the st	osure to udents	o config to confi	ure the gure ro	routers, uting pro	, end dev otocols ι	vices and se using tools li	ervers ike GN	using IS3 a	g pack and Pa	et icket
LIST O			IENTS		CISES:		ing Sta	r and M	och) uc		o Pock	t Tracor				
1.	Sint	ulate t	ne netw		Jogies	(DUS, K	ing, Sta		esn) us							
2.	Imple	emen	t bit stuf	fing and	l byte st	uffing u	sing C	progran	ı.							
3.	Simu	ulate a	and iden	tify the	differen	ce in wo	orking c	peratio	n of Hub	and S	witch usi	ing Cisco Pa	acket 7	Frace	ər	
4.	Conf be a serve	figure Illocate er and	a Web s ed for th Access	server, l ne host s to the	DHCP s through webpag	erver a DHCP je has t	nd a DN server, o give b	IS serve Conve y web s	er all tog rsion of server u	ether ir Canon sing Cis	n a single ical Nam sco Pack	e simulation ne to IP add tet Tracer.	throug Iress t	gh wl o be	hich IP done	have to by DNS
5.	Simu in the	ulate a e netv	networ vork.	k that pe	erforms	Networ	k addre	ss Tran	slation t	o share	a single	public IP to	the en	tire h	nost co	nnected
6.	Deve	elop a	s chat a	pplicati	on using	g TCP s	ocket									
7.	Crea	ate UD	P base	d netwo	ork appli	cation ι	ising so	ocket pro	ogramm	ing						
8.	Imple	emen	t Go-Ba	ck-N an	d Selec	tive rep	eat flow	/ contro	protoc	ols						
9.	Tran beha	sfer a aviour:	file to a sof TCF	remote using	e server Wiresha	, analyz ark	e the tr	aces of	the TCI	o segme	ents sen	t and receiv	ed and	d inv	estigat	te the
10.	Capt proto	ture pa ocol u	acket tra sing Wir	aces by eshark	retrievii	ng an H	TML file	e and in	vestigat	e the o	perations	s of Etherne	t proto	col a	and the	e ARP
																Fotal:30
REFER	RENCE	ES/ M	ANUAL	/SOFT	WARE:											
1.	Cisc	o Pac	ket Trac	cer /C, J	lava /W	ireshark	Tool									
	SE OL	JTCO	MES:	ursa th	o stude	nts wil	l ha ah	le to						B' (Hio	T Map	ped evel)
CO1	dem	onstra	ate and	configur	e netwo	orking p	rotocols	s using (Cisco P	acket T	racer			Ap	plying	(K3),
CO2	imple	ement	the wo	rking m	echanis	m using) data li	nk, netv	ork and	d transp	ort layer	protocols		Ap	plying	(K3),
002	dem	onstra	ate the v	arious l	ayer pro	otocols	using si	mulator	tool					Pre Ap	ecision plying	<u>(S3)</u> (K3),
003														Pre	ecision	(S3)
						Маррі	ng of C	cos witl	n POs a	ind PSC	Os	,				
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	2 F	PSO1	PSO2
CO1		3	2	1	1	3	3	3	3	2	2	3	2		3	2
CO2	2	3	2	1	1	3	3	3	3	2	2	3	2		3	2
1 – Slic	3 ht2-	3 - Mod	2 erate 3	1 – Subs	1 stantial	3 BT- Blo	3 om's Tr	3 axonom	З v	2	2	3	2		3	2

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

					22ITL	52 -	MACHI	NE LEA	ARNING	S LABO	RATOR	Y				
Progra	amme a	&	B.Tec	:h. & In	formati	on Tec	hnolog	У			Sem.	Category	L	т	Р	Credit
Prereq	luisite	s	Desig progr	in and a ammin	Analysi g	s of Al	gorithn	ns, Obje	ect orie	nted	5	PC	0	0	2	1
Pream	ble		This c real lit	ourse p ie probl	orovides ems	implen	nentatio	n of var	ious ma	achine le	earning a	algorithms fo	or desi	ignir	ng solut	ions for
LIST O	F EXP	PERIN	IENTS		CISES:											
1.	Impu	te mis	ssing va	lues in	data inp	outs										
2.	Use f	featur	e selec	tion/extr	action r	nethod	to perfo	orm dim	ensiona	ality redu	uction					
3.	Dem	onstra	ate Naïv	e Baye	s Class	ification										
4.	Class	sify th	e input	dataset	using d	lecision	tree									
5.	Perfo	orm cl	assifica	tion usii	ng Supp	oort Veo	tor Mac	chines								
6.	Perfo	orm m	ultivaria	te class	sification	n and re	gressic	n								
7.	Deve	elop a	program	n to imp	olement	feed-fo	orward r	neural n	etworks	;						
8.	Imple	ement	K-mea	ns clust	ering											
9.	Deve	elop a	simple	applicat	tion to d	lemonst	trate rei	nforcem	nent lea	rning						
10.	Asse	ss ma	achine l	earning	algorith	ms usir	ng cross	s validat	tion met	thods						
															٦	Fotal:30
REFER	RENCE	ES/ M	ANUAL	/SOFT	WARE:											
1.	Pytho	on/ R/	' Java													
2.	Jupy	ter No	otebook	/Eclipse	•											
COUR	SE OU		MES:	urso th	o stude	onte wil	ll bo ab	la ta						B /LII	BT Map	ped
CO1	apply	/ var	ious le	arning	method	ds to	preproc	ess th	e data	set by	data c	leaning an	d	Ap	oplying	(K3),
	dime use v	nsion /ariou	ality rec s super	luction vised le	arning r	nethod	s to per	form cla	ssificat	ion				Pr Ar	ecision	(S3) (K3).
CO2					<u></u>						-1 -			Pr	ecision	(S3)
CO3	aemo	JUSILA	ile unsu	pervise	u iearni	ng and	reinford	ement	earning	metho	us.			Pr	recision	(N3), (S3)
						Марр	ing of C	Cos wit	h POs a	and PS	Os					
COs/P	Os F	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	2	PSO1	PSO2
CO1		3	2	1	1	3	3	3	3	2	2	3	2		3	2
CO2	2	3	2	1	1	3	3	3	3	2	2	3	2	+	3	2
1 – Slic	oht. 2 –	ა - Mod	∠ erate. 3	– Subs	tantial.	ാ BT- Bla	ى om's Ta	് axonom	ى v	2	2	3	Ζ		ა	2

													2	220	GE	L5	51	-	- F	PR	0	FE	ES	SI	0	N	AL	L	Sł	KII	LL	S	5 T	٢R	A	IN	IN	G	- 11															
										((Cc	m	m	on	to	A		BB	E/	B.	Те	ecł	h E	Ξn	gir	ne	e	erir	ng	а	nc	۲t	Те	ecł	hn	olo	рg	y b	rar	ncł	nes	s)												
Progra Branci	amme & h	1	A	A	41	IB	BE	/ E	3T	e	ch	E	inę	gir	nee	əri	ng	g a	an	٦d	Te	ec	hr	no	lo	g)	y I	br	rar	nc	:he	es	5				Se	əm	•	С	ate	eg	or	у	L		т		l	Ρ		(Cred	it
Prereq	luisites	I	Ν	Ν	Ni	I																																5			I	EC	;		0		0			80	D		2	
Pream	ble	-	Т	TI	Th	nis	รเ	ıb	je	ct	is	to	e	nh	an	се	e th	he	e e	em	nple	oy	/ab	oilit	ty	sł	kil	lls	a	nc	d to	0 0	de	ev	elo	эр	Са	are	er	COI	mp	pet	en	су										
Unit –			S	S	Sc	oft	S	ki	lls	; -	· II	:																																									20	
Group a team an inte Comm	discussions n, why team-l erview: Four unication ski	is: A i-Ele unda <u>kills</u>	Ac Ele dat Is-	Ac ler lat s-/	nd en ati	va nei on	nt nt ii ivi	ag s c n o tie	of co	s c ea re be	of ad s efc	gr er ut	ou sh oje e li	ip ip ect	dis , di - ir erv	cu sa ndu iev	uss adv us [.] w,	sic va stry	on ant y (tag ori	St ge: ier	true es c nta nte	ctu of a atic erin	ure a t on ng	ed ea / in	G am kr hte	D n, nc erv	D- st ow vie	Te taç vle ew	ea ge edg v r	m s o ge	of a om	vo te ab	rk ea ou du	: V m ut 1 urii	/al fo the ng	lue rm e j th	e of nati cor ne	f te ion npa inte	arr - G an <u>y</u> erv	n w Gro y- iev	vor oup pr w a	ki de ofe anc	n c eve ess d a	orga elop sion t th	ani om al e e	zat ent pe enc	ior tac rsc I M	ns- cti on: 100	- D viti alit ck	Def ies ty- int	ini s. F	ition Facir <u>view</u>	of Ig s.
Unit –		(Q	Q	ຊເ	Ja	nt	ita	Iti	Ve	• A	۱p	tit	uc	le	an	١d	L	.00	gio	са	I F	Rea	as	or	niı	nç	g٠	<u> </u>	II:																							30	
Proble polyno Statisti Conditi Quant	m solving lev mial equatio ics-Data suff ionality and based reaso	evel ions uffici d gr soni	el ns- cie gro nin	el I s-: cie ro in	II -S ier ou ng	: N Spe ncy upi g-F	/lo ec y- ng la	ne ial G J-S	>y , € e Se <u>de</u>	re eq on qu ete	ela ua ne ie <u>ec</u>	ite atio try nc tio	d on /-T :in	pro s-l Trię g a <u>P</u>	obl ne gor and uz:	en equinor d s zle	ns ual me sch	s-N liti eti he <u>-C</u>	Vii) ies ry- ed Cry	xtu s-& ⁄-H luli <u>⁄pt</u>	ure Se leig ing tar	es- equ gh g- rith	-Sy uer its Se	ym nc a ele s.	nbo e a nd ecti	ol an d c tio	b nd dis ons	bas d s ista s-l	se ser an Ne	rie nce etv	ro s- es NO	bl Se -C	er et Co	m- : th :-0 :-(-Cl nec ord Co	loc ory lina de	cks y-F ate es;	er Per e g C	nd mu jeo ube	ca ita me es-	ler tio etry	nda ns y-N eni	ars ar Ne n c	-S nd ns lia	imp con urat grai	nb tio m	-lin ina n. in	ea tio Lo log	nr-cons gio gic	qua s- F cal al	ad Pro Ire rea	rat obi as as	tic ar abilit sonin sonin	nd y- g: g-
Unit –		I	R	R	Re	ead	diı	۱g	8	. 5	Sp	ea	aki	ing	g S	3ki	ills	s																																			30	
Readir Identify compro of an a notices Real T Variou Discus Conve	ng: Reading ying and lo ehension / s irgument – id s and book r Fime Experie is Topics – T ssion – Grou irsations & S	g co loca sca ider rev rienc Te Dup Skil	co cat car ent evi nc cc c c c c c c c c c c c c c c c c	ills	ntir ntir ce ch D	np ng nin fyi ews ; (nni iso 	rei fa ig ng S - Co ca cu: No	ne fo fo fo l / l / ss eg	ne tu r ne nte /e N io	al sp w rp lo n ia	n ii ec rit ore at n-	nfo cifi er etin Te Th	Ef orr c 's ng na ech s l S l	fec na inf att gi I F nni pi kill	rap Pra ca ca ca ca ca ca ca ca ca	ve n de ohio cti I T æs	Ri w atic a a c c ice for ss	lea vith on and da es opio	ad hir d c ata ics of (ding – d op a & –R o S – Gr	g : det bini & A cole - F rou	str te tail ior Ad Pro up	rati ext lec ns lve Pla oje Di	eg – I – I erti ay ect isc	jie: cor Re se Re cu:	es glo mp ea en en ss	– lot pr adi ne Sh vie sio	- L ba rel in(ent on ew on	Je il he gr ts. rt v F i –	re ens ne S Ta Pro	sio sio sio sio sio sio sio sio sio sio	pti dir on s a ea <s sei sei rat</s 	ng / art / nt	e, j/s in tic in T at gie	In skir iter sle: g: E[ior es	nte mr ns sii Mo D n - to	re ni ive n t oc Ta – (o t	ntia ng e re ous k I alks Ora	al, fo eac sine nte s – ator ado	& r (ss rvi Ex ry opt	Ar ge g - g - ev ter an tec	ne – L nag vs mp id – L	ral inc jaz Jaz or Eff	ec kill	ativ nde star es, f-In Giv tive ls A	ve ers nd ne tro vin P	rea tar ing ws du g a ubl	adi th pa ctic ic se	ng ng ipe on Pre Sj d	j p de ers ese pe	as - : - : - : - : - : - : - : - : - : - :	se se lo Re na tino lep	ages lectiv pme eadir ring ion c g; Pa phon	- nt ng of nir ic
																																																			•	То	otal:4	5
TEXT	BOOK:																																																					
1.	Edgar Tho Services P	orp Pvt	pe /t L	be t L	e a Lt	an td,	d 2	Sł 01	10 7.	wi	ck	τ	hc	orp	e,	"C)bj	je	cti	tive	e E	Ξn	gli	sh	ı fc	or	С	Col	m	pe	etit	tiv	e	E	xa	mi	ina	atic	on",	6t	h	Ed	itic)n,	Pe	ar	sor	n Ir	ndi	ia	Ed	luc	catio	n
REFE	RENCES:																																																					
1.	Aruna Kon	ner	eru	ru	u,	"F	Pro	fe	s	sic	n	al	Sp	bea	aki	ng	, s	Ski	ills	s,"	0	Dxf	ord	dι	Jn	niv	/ei	ers	sity	۲	۶re	es	s	In	dia	a,∣	Ne	ew	De	lhi	, 2	201	15.											
2.	Thorpe, Sh	Shov	ow	w	Nİ	ck	a	٦d	E	d	ga	r -	Γh	or	oe,	, "∖	Ni	inr	nir	ng	l at	t Ir	nte	erv	/ie	w	s,	," (5tł	h e	ed	liti	ior	n,	Pe	ea	rs	on	Ed	uc	ati	ion	ı, lı	ndi	a, 2	20	13.							
3.	Rizvi, Ashr	hraf	af I	f١	N	1, "	E	fe	ct	ive	э -	Ге	ch	nni	cal	С	or	mr	mı	un	nica	ati	on	۱,"	2r	nd	1 E	Ed	diti	or	٦, I	M	сС	Gr	aw	v۲	Hill	I E	duc	cat	ior	n lı	ndi	a,	201	7.								
	•																												-													-	-	-										

COUR On co	SE O mplet	UTCON tion of	MES: the cou	rse, the s	tudent	s will be	able to							BT Mappe (Highest Le	ed vel)
CO1	dev indiv	elop th viduala	e soft sk ind as a	ills of lear team	ners to	support t	hem wo	rk efficie	ently in	an orga	nization	as an		Applying (K Precision (S	(3), 63)
CO2	solv	/e real t	time prot	olems usir	ng num	erical abil	ity and I	ogical re	easoni	ng				Applying (K Precision (S	(3), 63)
CO3	appl	ly readi	ing and s	peaking s	skills ef	fectively f	or variou	us acad	emic a	nd profe	ssional p	ourposes		Applying (K Precision (S	(3), 63)
						Mappin	a of CC)s with	POs a	nd PSO	s				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	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 – Slig	ght, 2	– Mod	erate, 3 -	- Substan	tial, BT	- Bloom's	Taxono	omy						11	
-															
						ASSES	SMENT		ERN -	THEOR	(
Test Ca	t / Blo atego	om's ry*	Re	memberi (K1) %	ng	Understa (K2)	anding %	Apply (K3)	ving %	Analyz (K4) 9	ing l %	Evaluating (K5) %	Cre	ating (K6) %	Total %
	CAT1	1		20		40		40)			. ,			100
	CAT2	2				50		50)						100
	CAT	3				50		50)						100

NA

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

ESE

		22ITT61 - DEVOPS												
Progra Branch	mme &	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit						
Prereq	uisites	Computer Networks & Operating System	6	PC	3	0	0	3						
Pream	ole	This course covers the new paradigm of combined developmer virtualization, Containerization, Continuous integration and dev	nt and op elopmer	perations in S and cluster	DLC. / clou	. It cov ud inte	/ers egrat	concepts like ion.						
Unit –		Introduction to DevOps, SDLC, Agile and Virtualization						9						
Definiti (Planni – Agile Virtuali Setting on the up vers Kanbar	on of DevOp ng,Analysis,E practices (S zation vs con up virtualizat virtual machir sion control w n or Lean met	as –The need for DevOps – Key concepts and principles of Design, Development, Testing, Deployment, Maintenance) – Overvic crum, Kanban, Lean) – Role of DevOps in SDLC – Continuous tainerization –Overview of virtualization technologies (VMware, V cion software (e.g., VirtualBox, VMware) and creating a virtual must setting up a web application development environment with th th Git and creating a simple Git repository. Implementing Agile r thodologies.	DevOps ew of Ag s Integra /irtualBo: achine. I e LAMP methodo	 Overview ile methodolo ition and Cor x). nstalling and stack (Linux, logy with a team 	of S ogy – ntinuc confi Apac am-b	SDLC Agile bus De igurine the, M ased	– P princ ploy g a L ySQ proje	hases of SDLC ciples and values yment (CI/CD) – .inux distribution PL, PHP). Setting ect using Scrum,						
Unit - I		Containerization and Docker						9						
Overvie comma Installi access server.	ew of containe ands – Docke ng and settin ing its shell. (erization - Introduction to Docker - Docker architecture and comp r file for building custom images - Docker Compose for multi-con g up Docker on a Linux machine. Building a Docker image us Creating and running a multi-container application with Docker (oonents - itainer ap sing a D Compose	Docker imag oplications. ocker file. Ru e. Deploying a	ies ar Innin a Doo	nd cor g a D cker c	itain ocke onta	ers - Docker CLI er container and iner to a remote						
Unit - I		CI/CD with Jenkins Pipeline						9						
Introdu compor Manage Installir sample Adding	oduction to Jenkins - Understanding Continuous Integration and Continuous Delivery/Deployment - Jenkins architecture and nponents - Setting up Jenkins and Creating jobs - Jenkins Pipeline as code - Jenkins Master-Slave setup - Jenkins security and User nagement - Integrating Jenkins with other DevOps tools. talling and setting up Jenkins on a Linux machine. Setting up a Jenkins pipeline job. Configuring the pipeline job to build and test a nple application from a Git Hub repository. Integrating the pipeline job with a Docker registry to store and deploy the Docker image. ding notifications and alerts to the pipeline job using Slack or email. it - IV Kubernetes roduction to Kubernetes - Kubernetes architecture and components - Kubernetes cluster setup and configuration - Kubernetes objects													
Introdu	ction to Kube	rnetes - Kubernetes architecture and components - Kubernetes	cluster s	etup and con	figura	ation -	Kub	ernetes objects						
(Pods, healing Installi Kubern creating	Adding notifications and alerts to the pipeline job using Slack or email. 9 Unit - IV Kubernetes 9 Introduction to Kubernetes - Kubernetes architecture and components - Kubernetes cluster setup and configuration - Kubernetes objects (Pods, Services, Deployments, etc.) - Kubernetes CLI commands - Kubernetes Networking and Service Discovery - Scaling and self-healing with kubernetes. Creating and managing applications with Kubernetes. Installing and setting up Kubernetes on a local machine or a cloud provider. Deploying a sample application to Kubernetes using Kubernetes CLI commands. Creating and managing Kubernetes objects (Pods, Services, Deployments, etc.). Scaling the application by creating replicas and load balancing with Kubernetes. Upgrading and rolling back the application with Kubernetes.													
Introdu Manage Introdu Grafan Installir Promet	ction to Infra ement - Terr ction to Prom a. ng and setting heus server t	structure as Code (IaC) - Overview of Terraform - Terraform aform Modules and Variables - Provisioning Resources with hetheus and Grafana - Setting up Prometheus and Grafana - Cu up Terraform on a Linux machine. Creating and managing infras- to monitor a sample application. Setting up alert rules and notific iss with Grafana	Configu Terrafor reating a structure ations w	iration file - ⁻ m - Overview and visualizing using Terrafo ith Promether	Terra w of g me orm. us an	form monit trics v Creatind Ale	Prov oring vith I ng a rt ma	riders and State g and alerting - Prometheus and and configuring a anager. Creating						
								Total:45						
TEXT	BOOK:													
1.	Gene Kim, I Reliability, a	Patrick Debois, John Willis, and Jez Humble , "The DevOps Han and Security in Technology Organizations", 2016.	dbook: H	low to Create	Wor	ld-Cla	ss A	vgility,						
REFER	RENCES:													
1.	Docker - htt	ps://www.docker.com/use-cases/devops												
2.	Kubernetes	- https://kubernetes.io/docs/concepts/overview/what-is-kubernet	tes/											
3.	Amazon We	b Services (AWS) DevOps - https://aws.amazon.com/devops/												
4.	Agile Alliand	ce - https://www.agilealliance.org/												
5.	Cloud Nativ	e Computing Foundation - https://www.cncf.io/												
6.	The DevOp	s Enterprise Summit - https://events.itrevolution.com/us/												
7.	Continuous	Delivery Foundation - https://cd.foundation/												
COUR On co	SE OUTCO	MES: the course, the students will be able to					B (I L	6T Mapped Highest .evel)						
CO1	Select and developm	d install a virtualization software and create a virtual machi ent using WAMP/LAMP.	ine for v	veb applicat	ion			Applying (K3)						

CO2	Exp	perime	nt with c	ontaine	ization	by insta	lling and	l setting	g up D	ocker ar	nd Docke	er Compo	ose	Арр	lying (K3)
CO3	Der inte	monstr egrated	ate Con I with otl	tinuous her Dev(Develo Ops too	pment (0 ols.	CD) / Co	ntinuou	us Inte	gration (CI) usin	g Jenkins	6	Арр	lying (K3)
CO4	Ма	ke use	of Kube	ernetes t	o build	scalable	applica	tions o	n clus	ters to a	chieve lo	ad balan	cing.	Арр	lying (K3)
CO5	Bui for	ld and effectiv	deploy /e monit	cloud-ba toring ar	ised so id prov	alable so isioning (olutions of resou	using T rces	errafo	rms, Pro	metheu	s, and Gr	afana	App	lying (K3)
Маррі	na o	f COs	with PC)s and F	SOs										
COs/P	COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS02 CO1 3 2 1 1 2 3 3 2 3 3 2 3														
CO1	CO1 3 2 1 1 3 3 3 3 2 2 3 3 2														
CO2	O1 3 2 1 1 3 3 3 3 2 2 3 3 2 O2 3 2 1 1 3 3 3 3 2 2 3 3 2 O2 3 2 1 1 3 3 3 3 2 2 3 3 2														
CO3		3	2	1	1	3	3	3	3	2	2	3		3	2
CO4		3	2	1	1	3	3	3	3	2	2	3		3	2
CO5		3	2	1	1	3	3	3	3	2	2	3		3	2
1 – Sli	ght, 2	2 – Moo	derate, 3	3 – Subs	tantial,	BT- Blo	om's Ta	xonom	у						
1005															
ASSE	SSMI			N - THE											
Categ	Bloo ory*	m′s	Kei (K1	nember) %	ing	Understa (K2) %	anding	(K3)	ying %	Analyz (K4) %	ing E' (M	/aluating (5) %	g Cre (K6	ating) %	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)

22ITT62 - MOBILE COMMUNICATION														
Progra Branch	mme &	B. Tech & Information Technology	Sem.	Category	Ρ	Credit								
Prereq	uisites	Computer Networks	6	ES	3	0	0	3						
Preamb	Pre-requisites: Basic knowledge about data communication such as concepts of modulation, error correcti code as well as networking concepts such as TCP/IP protocols.													
Unit - I	nit - I Introduction to Wireless Communication													
Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Spread spectrum – cellular systems-MAC-Motivation – SDMA – FDMA – TDMA – CDMA														
Unit - II Telecommunication and Satellite systems 9														
Tele Co	mmunication	is –GSM: Mobile services -System architecture -Radio interface	-Protocc	ols -Localizati	on ai	nd ca	lling -	-Handover						
Unit – I	.y -new uala	Wireless LAN	Jover.					9						
Wireles	s LAN -Infrar	ed Vs Radio Transmission –Infrastructure Networks and Adhoc I	Network: ture.	s -IEEE 802.′	11 –8	Syste	m arc	hitecture-						
Unit – I	V	Mobile Network and Transport Layer						9						
Mobile – Tunne and wire	IP: Goals, as eling and End eless networ	sumptions and requirements – Entities and terminologies – IP pa capsulation – Dynamic Host Configuration Protocol-Mobile ad-ho	acket de oc Netwo	livery – Agen orks –Improv	t diso emei	cover nt on	y – R TCP	egistration for mobile						
Linit _ \	1	Application Layer & IoT						٥						
WAP-A loT Cor – Big da	rchitecture -V nmunication ata analytics	Vireless application environment–Definition and Characteristics Models - IoT Communication APIs – IoT enabling Technologies - – Communication Protocols - Embedded Systems – IoT Levels a	of IoT, F Wireles and Tem	Physical Designs Sensor Net plates	gn of work	loT - s - C	– loT loud (Protocols, Computing						
								Total:45						
TEXT B	BOOK:													
1.	Schiller J., "	Mobile Communication", 2 nd Edition,Pearson Education, New Del	hi, 2014	(For Units I,I	I,III,I	V)								
2. ArshdeepBahga and Vijay Madisetti, "Internet of Things – A Hands-on Approach", 1 st Edition, University Press, 2015. (For Units V)														
REFERENCES:														
1. Raj Kamal, "Mobile Computing", 3 rd edition, Oxford University PressInc. New Delhi, 2019														
2.	Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing Technology, applications and Service Creation", 2 nd Edition, McGraw Hill Education Private Ltd, 2018													
3.	Honbo Zhou	, "The Internet of Things in the Cloud: A Middleware Perspective	e", 1 st Ec	lition, CRC P	ress,	2012	2							
4.	Jonathan Ro	odriguez, "Fundamentals of 5G Mobile Networks", Wiley, 2015.												

COUR On co	COURSE OUTCOMES: On completion of the course, the students will be able to						
CO1	summarize the fundamentals of wireless communication and determine the suitable medium access control techniques	Applying (K3)					
CO2	elaborate the concepts and protocol architectures of GSM and satellite systems	Applying (K3))					
CO3	illustrate the concepts of Wireless LAN and associated technologies	Applying (K3)					
CO4	explore the routing protocols and TCP congestion control mechanisms in wireless network	Applying (K3)					
CO5	use the WAP and IoT architecture, infrastructure and explore the constraints of Internet of Things	Applying (K3)					
Mapping of COs with POs and PSOs							

						-								
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		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	20	50	30				100					
CAT2	20	50	30				100					
CAT3	20	50	30				100					
ESE	20	50	30				100					
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

22ITL61 - CLOUD COMPUTING LABORATORY											
Programme & Branch	B.Tech. & Information Technology	Sem.	Category	L	Т	Ρ	Credit				

Prereq	Prerequisites Operating Systems, Computer Networks									6	PC	0	02	1	
Pream	ble		This c	ourse e	nables	the stud	dents to	design	, develo	op, and	deploy cl	oud-based	web ap	plications	
LIST O	LIST OF EXPERIMENTS / EXERCISES:														
1.	Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.														
2.	Install a C compiler in the virtual machine created using virtual box and execute Simple Programs														
3.	Install Google App Engine. Create hello world app and other web applications using python/java														
4.	Use GAE launcher to launch web applications														
5.	Create EC2-AWS S3 bucket based static web pages														
6.	Create EC2-AWS- instance and migration														
7.	Create EC2-AWS web application using Beanstalk														
8.	Perform AWS load balancing and auto scaling														
9.	Implement PaaS-Mobile sensor based IoT application hosted via PaaS environment														
10.	Insta	all Had	loop sin	gle nod	e cluste	er and ru	un simp	le applie	cations	like wor	dcount.				
	1														Fotal:30
REFER	RENCE	ES/ M	ANUAL	/SOFT	WARE:										
1.	VMw	vare, C	Google	App Eng	gine										
2.	C/Py	/thon/、	Java												
3.	Hade	оор													
COUR	SE OL	JTCO	MES:					• •						ВТ Мар	ped
On cor	npleti expe	i on of erimer	the count with v	urse, th arious v	e stude virtualiza	ents will ation too	l be ab	le to as Virt	ual Box	and VI	/ware wo	orkstation.	(Highest I Applvina	-evel) (K3).
CO1		· -												Precision	(S3)
CO2	2 develop EC2-AWS buckets, instances and web applications Applying (K3), Precision (S3)														
CO3	3 apply large data sets in a parallel environment. Applying (K3), Precision (S3)											(K3), (S3)			
						Маррі	ing of C	Cos witl	h POs a	and PS	Os				
COs/P	COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS										PSO2				
CO1		3	2	1	1	3	3	3	3	2	2	3	2	3	2
CO2	2	3	2	1	1	3	3	3	3	2	2	3	2	3	2
CO3	3	3	2	1	1	3	3	3	3	2	2	3	2	3	2
					22ITL	62 - IN	ITERNI	ET OF 1	THINGS	LABO	RATOR	Y			
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			1												1
Progra Branci	amme h	&	B.Tec	:h. & In	formati	on Tecl	hnolog	у			Sem.	Category	L	ТР	Credit
Prereq	luisite	S	Comp	outer N	etwork	5					6	ES	0	0 2	1
Pream	ble		This c Arduii transr explor	course on no. Vari nitted us res the o	lemonst ous env sing the develop	rates th rironmer se tech ment of	e worki ntal con nologie simple	ing of vanditions s and the real time	arious c like tem ne value ne appli	ommun peratur es will be cations	ication te e, humic e upload using Ra	echnologies lity etc. will b led to cloud. aspberry Pi	like G e ser This (SM, ZigBe sed and course als	e, and
LIST O	OF EXF	PERIN	IENTS	EXER	CISES:										
1.	Expe Basi	erimer c AT (nts on G Comma	iSM / Gl nds, Vo	PRS ice calls	s / Voice	e comm	unicatio	n, Phor	ne Book	, SMS				
2.	Expe Data	erimer a comr	nts using nunicat	g ZigBe	e veen co	-ordinat	or and	device ı	nodule						
3.	Crea	ate sim	nple sec	urity ala	arm syst	tem usir	ng Rasp	oberry F	Pi / Ardu	ino					
4.	Web	page	integra	tion with	n Raspb	erry Pi	/ NODE	MCU							
5.	Crea	ate you	ur own s	smart lig	tht using	g Raspb	erry Pi	/ Arduir	no / NO	DEMCU	J				
6.	Cont	trol an	d monit	or the te	emperat	ure of t	he elerr	nents us	sing tem	peratur	e senso	r with NODE	мси		
7.	Sens	sing a	nd send	ling the	sensor	value vi	a SMS	/ Gmail							
8.	Cont	trol an	y electr	ical app	liance v	ria webp	age us	ing Ras	pberry	pi/ Ardu	ino / NC	DEMCU			
9.	Push IoT sensor data for cloud storage and apply simple data analytics.														
10.	Deve	elop a	mini-pr	oject us	ing Ras	pberry	pi/Ardui	ino							
															Total:30
REFEF	RENCE	ES/ M	ANUAL	/SOFT	WARE:										
1.	Wind	dows/l	_inux												
2.	Win	X Tall	k, Pytho	n IDE, ⁻	Thingsp	eak									
3.	Ras	pberry	∕pi,Ar	duino, N	ODEM	CU, GS	M Mod	ule and	Sensor	S					
4.	Pyth	on an	d C												
COUR	SE OU	лтсоі	MES:											BT Map	ped
On cor	mpleti	on of	the cou	urse, th	e stude	ents wil	l be ab	le to						(Highest	Level)
CO1	dem WiFi	onstra i, ZigB	ite the b ee	asic wo	orking pi	rinciples	s of diffe	erent co	mmunic	cation sy	/stems li	ke GSM,		Applying Precisio	(K3), n (S3)
CO2	deve appli	elop si icatior	mple ex 1	perime	nts to se	ense, m	onitor a	ind cont	rol sma	rt objec	ts via we	ep.		Applying Precisio	(K3), n (S3)
CO3	build	l loT s	olutions	for the	societa	l proble	ms							Applying Precisio	(K3), n (S3)
						Manni	ng of (OE Wi4	h POs r	and De) e		I		
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	PO9	PO10	P011	PO12	PSO1	PSO2
CO1		3	2	1	1	3	3	3	3	2	2	3	2	3	2
CO2	2	3	2	1	. 1	3	3	3	3	2	2	3	2	3	2
CO3	3	3	2	1	1	3	3	3	3	2	2	3	2	3	2
1 – Slig	ght, 2 -	– Mod	erate, 3	– Subs	stantial,	BT- Blo	om's Ta	axonom	У						

	22ITP61 - PROJECT WORK						
		- <u>r</u>					
Programme & Branch	B.Tech. & Information Technology	Sem.	Category	L	т	Ρ	Credit

Prereq	luisit	tes	Prog	rammin	g Lang	uages,	Softwa	are Eng	ineerin	g	6	EC	0	0 8	4	
Pream	ble		It prov to sol	vides pr	actical e eal worl	exposur d proble	e to the ems. It a	studen also giv	ts and a es oppo	an oppo ortunity t	rtunity to the stu	apply the dents to w	IT mathe ork in a	ematical o team.	oncepts	
														т	otal:120	
COUR On co	SE C mple	OUTCO etion of	MES: the co	urse, th	e stude	ents wil	l be ab	le to					(BT Map Highest	ped Level)	
CO1	lde	entify ar	nd formu	late an	IT relate	ed solut	ions for	an eng	lineering	g proble	m			Applying	(K3)	
CO2	CO2 Analyze and review research literature related to the problem Applying (K3)														(K3)	
CO3	Ap	Apply mathematical knowledge for design a solution for the problemApplying (K3)														
CO4	Im	plemen	t IT en	abled s	olutions									Applying	(K3)	
CO5	Co	mmunio	cate, de	monstra	ate and	docume	ent the	work as	sa mer	nber an	d leader	in a team		Applying	(K3)	
						Марр	ing of C	Cos wit	h POs a	and PS	Os					
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1		3	2	1	1	1	2	2	3	3	3	3	3	3	2	
CO2	2	3	2	1	1	1	2	2	3	3	3	3	3	3	2	
CO3	3	3	2	1	1	1	2	2	3	3	3	3	3	3	2	
CO4	1	3	2	1	1	1	2	2	3	3	3	3	3	3	2	
CO5	5	3	2	1	1	1	2	2	3	3	3	3	3	3	2	
1 – Slig	ght, 2	2 – Mod	lerate, 3	– Subs	stantial,	BT- Blo	om's Ta	axonom	ıy							

						221	TP62 -	PRO	JECT W	ORK I						
Progra Branch	amm h	e &	B.Teo	ch. & In	formati	on Tec	hnolog	у			Sem.	Category	L	т	Р	Credit
Prereq	luisit	tes	Prog	rammin	g Lang	uages,	Softwa	re Eng	ineerin	g	6	EC	0	0	10	5
Pream	ble		It prov to sol	vides provides provides provide the relation of the provide the relation of the relation of the provide the prov	actical e eal worl	exposur d proble	e to the ems. It a	studen also giv	ts and a es oppo	an oppo ortunity t	rtunity to the stu	apply the l	T mat ork in a	hem a tea	atical c m.	oncepts
															Т	otal:120
COURSE OUTCOMES:BT MappedOn completion of the course, the students will be able to(Highest Level)														ped _evel)		
CO1 Identify and formulate an IT related solutions for an engineering problem Applying (K3)														(K3)		
CO2	An	Analyze and review research literature related to the problem Applying (K3)														
CO3	Ар	ply mat	hematic	al know	ledge fo	or desig	n a solu	ution for	the pro	blem				Ap	plying	(K3)
CO4	Im	plemen	t IT en	abled so	olutions									Ap	plying	(K3)
CO5	Co	mmunio	cate, de	monstra	ate and	docume	ent the	work as	a mer	nber an	d leader	in a team		Ap	plying	(K3)
						Маррі	ing of C	cos wit	h POs a	and PS	Os					
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO1	2	PSO1	PSO2
CO1		3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO2	2	3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO3	3	3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO4	ļ	3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO5	5	3	2	1	1	1	2	2	3	3	3	3	3		3	2

	22MNT31 - ENVIRONMENTAL SCIEN	CE					
	(Common to All Engineering and Technology E	Branches)				
Programme & Branch	All BE/BTech Engineering & Technology branches	Sem.	Category	L	Т	Ρ	Credit

Prerequisites	Nil	6	MC	2	0	0	0
Preamble	This course provides an approach to understand the various ne pollution control & monitoring methods for sustainable life and	atural res also to p	sources, ecc rovide know	osyste ledge	m, bi and	o-dive to cre	ersity, ate
Unit - I	Environmental Studies and Natural Resources:						5
Introduction to resources-cas	Environmental Science – uses, over-exploitation and conservation of studies	of forest,	water, mine	eral, fo	od, e	energy	/ and land
Unit - II	Ecosystem and Biodiversity:						5
Ecosystems: c Food web only and Conservat	ncept and components of an ecosystem -structural and functional fe Biodiversity: Introduction – Classification – Bio geographical classi on of biodiversity - case studies.	eatures - ification o	Functional of India-Valu	attribu ue of b	utes (biodiv	Food ersity	chain and - Threats
Unit - III	Environmental Pollution:						5
Environmental acid rain, ozor	Pollution: Definition – causes, effects and control measures of: (a) λ layer depletion (b)Water pollution (c) Soil pollution - Role of an indiv	Air pollut vidual in p	ion - Climate prevention of	e cha f pollu	nge, tion -	global · case	warming, studies.
Unit - IV	Environmental Monitoring:						5
Sustainability - Introduction to and control of	Tree pillars of sustainability- factors affecting environmental sustainal EIA - objectives of EIA - environment protection act – air (prevention ollution) act.	bility-app and cont	roaches for rol of pollution	susta on) ac	inable t – w	e deve ater (j	elopment - prevention
Unit - V	Introduction to Biological Science:						5
Functions of C nucleus- Here meiosis - Cell	arbohydrates, lipids, proteins and nucleic acids - Cells and its orga ty and DNA - organization of DNA in cells - Genes and chromosome ycle and molecules that control cell cycle.	anelles - s- Cell di	plasma me vision -Type	mbrar s of c	ne, m ell div	itocho ∕ision∙	ondria and - mitosis &
							Total:25
TEXT BOOK:							
1. Anubr Intern	κaushik, and Kaushik C.P., "Environmental Science and Eng tional Pvt. Ltd., New Delhi, 2018, for Unit-I, II, III, IV.	jineering	", 6th Multi	coloui	[.] Edi	tion,	New Age
2. Rasto 2008,	.SC, "Cells and Molecular Biology", 2 nd Edition, reprint, New Age Ir or Unit-V.	nternatio	nal (P) Limit	ed Pu	ıblish	ers, N	lew Delhi,
REFERENCE	:						
1. Palan Educa	amy P.N., Manikandan P., Geetha A., Manjula Rani K., Kowsh on, New Delhi, Revised Edition 2019.	alya V.N	I., "Environr	nenta	l Sci	ence"	, Pearson
2. Mukht	r Ahmad, "Text book of modern biochemistry", Volume I & II, Oxford	& IBH P	ublishing Co	. Pvt.	LTD,	Delhi	, 1995.

COUR On co	SE OI mplet	UTCON ion of t	IES: he cour	se, the st	udents	will be a	able to						(BT Mapp Highest L	oed .evel)
CO1	illust	trate the	e various	natural re	source	s and rol	e of indi	ividual f	or its c	onservat	tion		Un	derstandi	ng (K2)
CO2	elab	orate th	ne featur	es of ecos	ystem a	and biodi	versity t	o find th	ne need	d for con	servatio	n.	Un	derstandir	ng (K2)
CO3	man	nipulate	the sour	ces, effect	s and o	control m	ethods of	of vario	us envi	ronment	al pollut	ion.		Applying	(K3)
CO4	mak	ke use o	f the kno	wledge of	EIA ar	nd enviro	nmental	legislat	ion law	vs toward	ds susta	inability.		Applying	(K3)
CO5	explain the functions of carbohydrates, lipids, proteins, nucleic acids, Cells and its organelles Understanding (K2)														
						Mappin	a of CO	s with	POs a	nd PSO	s				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	2	1					3							1
CO	2	2	1					3							
CO	3	3	2	1				3							
CO	4	3	2	1				3							
CO	5	3	1												
1 – Slig	ght, 2	– Mode	erate, 3 –	Substanti	al, BT-	Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	ERN - 1	THEORY	/				
Tes C	st / Blo Catego	oom's ory*	Re	memberii (K1) %	ng l	Understa (K2)	anding %	Apply (K3)	ying %	Analyz (K4) 9	ing %	Evaluating (K5) %		reating (K6) %	Total %
	CAT	.1		25		40		35	5						100

35

100

100

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

25

NA

40

CAT2

ESE

						22GEP	61 - CC	MPRE	HENSI	VE TES		VA				
					(Co	mmon	to All Ei	ngineeri	ing and	Techno	ology Bran	ches)				
Progra Branci	amme h	e &	B.Tee	ch. & Ir	format	ion Teo	hnolog	ay			Sem.	Category	L	т	Р	Credit
Prereq	luisit	es	All co	ore Sub	ojects o	of IT					6	EC	0	0	0	2
															٦	Fotal:60
COUR On co	SE O mple	UTCO tion of	MES: the co	urse, tł	ne stud	ents wi	ll be at	ole to					(BT High	Mapp nest Lo	ed evel)
CO1 Identify the foundation courses in the field of Information Technology Applying(K3)													3)			
CO2 Examine each foundation course and relate it to other courses Applying(K3)													3)			
CO3	Su pla	mmariz cemen	ze the c its and o	oncepts	s, metho tive exa	ods and aminatic	tools in	the fiel	ld of Inf	ormatio	n Technol	ogy to excel in	A	Apply	ving(K3	3)
CO4	Orę	ganize	the con	itents of	f the co	urses ai	nd disco	over a h	olistic a	pproacl	h to proble	em solving	A	Apply	ving(K3	3)
CO5	Ма	ke use	of all th	ne core	course	s to qua	lify as a	a fully co	ompeter	nt gradu	iate in IT f	ield.	A	Apply	ving(K3	3)
						М	apping	of Cos	with P	Os and	PSOs					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	F	SO1	PSO2
CO1		3	2	1	1	1	2	3	3	2	2	3	3		3	2
CO2	2	3	2	1	1	1	2	3	3	2	2	3	3		3	2
CO3	3	3	2	1	1	1	2	3	3	2	2	3	3		3	2
CO4	ŀ	3	2	1	1	1	2	3	3	2	2	3	3		3	2
CO5	5	3	2	1	1	1	2	3	3	2	2	3	3		3	2
1 – Slig	ght, 2	– Moc	lerate, 3	3 – Sub	stantial,	BT- Bl	oom's T	axonon	ny							

		22GET71 - ENGINEERING ECONOMICS AND M	ANAGEI	MENT									
		(Common to All BE/BTech branches	5)										
Prograr Branch	mme &	All BE/BTech branches	Sem.	Category	L	т	Ρ	Credit					
Prerequ	uisites	Nil	7	HS	3	0	0	3					
Preamb	le	The aim of the course is to create fundamental knowledge on mar economics, national income, marketing, operations management,	nagemei accoun	nt by introduc ting principles	ing c etc.	conce	epts lil	ke					
Unit – I		Micro Economics						9					
Economics – Basics Concepts and Principles – Demand and Supply – Law of demand and Supply – Determinants – Market Equilibrium – Circular Flow of Economic Activities and Income.													
Unit – II Macro Economics, Business Ownership and Management concepts 9													
National Income and its Measurement Techniques. Inflation - Causes of Inflation - Controlling Inflation - Business Cycle - Forms of Business - Ownership Types. Management concepts: Taylor and Fayol's Principles - Functions of Management - Managerial Skills - Levels of Management - Roles of Manager.													
Unit – II	II	Marketing Management						9					
Marketir Product	ng - Core Life Cycle	Concepts of Marketing - Four P's of Marketing - New Product Deve e - Pricing Strategies and Decisions.	lopment	- Intellectua	Pro	perty	' Righ	ts (IPR),					
Unit – ľ	V	Operations Management						9					
Operation and Cor	ons Mana htrol - Inve	gement - Resources - Types of Production System - Site Selection, entory - EOQ Determination.	, Plant L	ayout, Steps i	in Pr	oduc	tion F	Planning					
Unit – V	/	Financial Management						9					
Account Even Ar	ting Princi nalysis – (ples – Financial Statements and its Uses – Depreciation - Straight Capital Budgeting - Significance –Traditional and Discounted Cash	Line and Flow Me	I Diminishing thods.	Bala	ince l	Metho	od – Break					
								Total:45					
TEXT B	OOK:												
1.	Compileo Engineer	by Department of Management Studies, Kongu Engineering Colle s", 1 st Edition, McGraw Hill Education, Noida, 2013.	ge, "Ecc	nomics and N	lana	agem	ent fo	or					
REFER	ENCES:												
1.	Geetika,	Piyali Ghosh and Purba Roy Choudhury, "Managerial Economics",	3 rd Editi	on, McGraw-I	Hill, I	New	Delhi,	2018.					
2.	William J	. Stevenson, "Operations Management", 14th Edition, McGraw-Hill B	Educatio	on, 2021.									
3.	William G Education	6. Nickels, James M. McHugh, Susan M. McHugh, "Understanding I n, New York, 2019.	Busines	s", 12 th Editio	n, Me	cGrav	w-Hill						

COUR On cor	SE OI	UTCON on of th	IES: e course	, the stude	ents will	be able	to						BT (Hig	Mapped ghest Leve	el)
CO1	iden	itify mai	rket equil	ibrium and	d interpr	et natior	nal incor	ne calci	ulations	and inf	lation iss	ues		Applying	(K3)
CO2	choo	ose a si	uitable bu	usiness ov	vnership	for thei	r enterp	rise and	l illustra	te mana	agerial fu	nctions		Applying	(K3)
CO3	CO3 infer marketing management decisions												Ur	nderstandir	ng (K2)
CO4	appl	ly appro	opriate op	eration m	anagem	nent con	cept in t	ousines	s situati	ons				Applying	(K3)
CO5	inter	rpret fin	ancial ar	d account	ting state	ements	and eva	luate ne	w prop	osals				Applying	(K3)
						Mappin	g of CC	s with	POs an	d PSO	5				
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PO12 PSO1 P	
00	1	1	1	2			2		2	2	2	2	2		

CO1	1	1	2		3		2	2	2	3	2	
CO2		1	2		2	2	2	2	2	3	2	
CO3	1	2	1		2		2	2	2	3	2	
CO4	1	2	1		2		2	2	2	3	2	
CO5	2	2			2		2	2	2	3	2	

		ASSESSMENT	PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	40	40				100
CAT2	20	40	40				100
CAT3	20	40	40				100
ESE	20	40	40				100
* ±3% may be varied (0	CAT 1, 2 & 3 – 50 m	arks & ESE – 100 r	narks)	· · · · · · · · · · · · · · · · · · ·			

					1	22ITP71	I - PR	OJECT	WORK	II PHA	SEI					
Progra Branci	ammo h	e &	B. Te	ch & In	formati	on Tec	hnolog	у			Sem.	Category	L	т	Р	Credit
Prereq	luisit	tes	NIL								7	EC	0	0	10	5
Pream	ble		It prov to sol	vides pr	actical e eal worl	exposur d proble	e to the ems. It a	studen also giv	ts and a es an o	an oppo pportun	rtunity to ity to the	apply the listudents to	T mat work	nem in a	atical c team.	concepts
															Т	otal:150
COURSE OUTCOMES:BT MappedOn completion of the course, the students will be able to(Highest Level)																
CO1 Identify and formulate a new problem from the existing work Applying (K3)													(K3)			
CO2 Analyse and review research literature related to the new problem identified Applyir													Applying (K3)			
CO3	Ch	oose aj	ppropria	te desig	n meth	odology	for find	ling sol	ution to	the prol	blem			Ap	oplying	(K3)
CO4	Imp	olemen	t IT en	abled so	olutions									Ap	oplying	(K3)
CO5	Co	mmunio	cate, de	monstra	ate and	docume	ent the	work as	sa mer	nber an	d leader	in a team		Ap	oplying	(K3)
						Маррі	ing of C	Cos wit	h POs a	and PS	Os					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	P012	2 1	PSO1	PSO2
CO1		3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO2	CO2 3 2 1 1 2 2 3 3 3										3		3	2		
CO3	3	3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO4	ļ	3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO5	5	3	2	1	1	1	2	2	3	3	3	3	3		3	2
1 – Slię	ght, 2	2 – Moc	lerate, 3	s – Subs	stantial,	BT- Blo	om's Ta	axonom	У							

						22ITP72	2 - PR	OJECT	WORK	II PHA	SE I					
Progra Branci	ammo h	e &	B. Te	ch & In	formati	on Tec	hnolog	у			Sem.	Category	L	т	Ρ	Credit
Prereq	luisit	tes	NIL								7	EC	0	0	12	6
Pream	ble		It prov to sol	vides pr	actical e eal worl	exposur d proble	e to the ems. It a	studen also giv	ts and a es an o	an oppo pportun	rtunity to ity to the	apply the listudents to	T matł work	nema in a	atical c team.	oncepts
															Т	otal:150
COURSE OUTCOMES:BT MappedOn completion of the course, the students will be able to(Highest Level)																
CO1 Identify and formulate a new problem from the existing work Applying (K3)													(K3)			
CO2 Analyse and review research literature related to the new problem identified Application													Applying (K3)			
CO3	Ch	oose a	ppropria	te desig	gn meth	odology	for find	ling sol	ution to	the prol	blem			Ap	oplying	(K3)
CO4	Imp	olemen	t IT en	abled so	olutions									Ap	oplying	(K3)
CO5	Co	mmunio	cate, de	monstra	ate and	docume	ent the	work as	sa mer	nber an	d leader	in a team		Ap	oplying	(K3)
						Маррі	ing of C	Cos wit	h POs a	and PS	Os					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	P012	2	PSO1	PSO2
CO1		3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO2	2	3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO3	3	3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO4	ļ	3	2	1	1	1	2	2	3	3	3	3	3		3	2
CO5	5	3	2	1	1	1	2	2	3	3	3	3	3		3	2
1 – Slię	ght, 2	2 – Moc	lerate, 3	s – Subs	stantial,	BT- Blo	om's Ta	axonom	У							

		22ITT71 - BLOCKCHAIN TECHN	IOLOGY					
Progra Branc	amme & h	B. Tech & Information Technology	Sem.	Category	L	т	Р	Credit
Prerec	luisites	Cryptography and Network Security	7	PC	3	1	0	4
Pream	ble	This course provides a comprehensive introduction to t technologies and its applications.	he theoret	ical and prac	tical	aspe	ects o	f block chain
Unit -		Blockchain 101						9+3
Distrib chain t	uted systems echnology -	s - The history of block chain - Introduction to block chain – c Tiers - Types of block chain - Consensus in block chain - CAF	lefinitions - theorem -	elements - Fe Benefits and	eatur limita	es - / ations	Applica of blo	ations of block ck chain
Unit -	1	Decentralization, Cryptography and Technical Foundat	ions					9+3
organiz Integrit probler	zation - Platf y – Authent m - Hash fur	icorms for decentralization. Cryptography and Technical Found ication - Cryptographic primitives - Asymmetric cryptography ictions - Elliptic Curve Digital signature algorithm Bitcoin	lations – In - Public ar	troduction - C nd private key	rypto 's – I	grap RSA	hy - C - Disc	onfidentiality - rete logarithm
Bitcoin Litecoi	– Transacti n – Primecoi	ons – Blockchain - Bitcoin payments - Alternative Coins - The in – Zcash - Smart Contracts	eoretical for	undations - Bi	tcoin	limita	ations	– Namecoin -
Unit -	IV	Ethereum 101						9+3
Introdu – Mess	iction - Ether sages – Mini	reum block chain - Elements of the Ethereum block chain - Pre ng - Clients and wallets - The Ethereum network - Ethereum D	compiled c Developmer	ontracts – Aco nt Environmer	coun [.] It	ts – E	Block –	Block header
Unit - '	V	Hyperledger	-					9+3
Project	ts – protocol	- Hyperledger Fabric - Sawtooth lake - Corda - Blockchain-O	utside of Cu	urrencies: Inte	rnet	of Th	ings	
				Lect	ure:	45, T	utoria	I:15, Total:60
TEXT	BOOK:							
1.	Imran Bas Publishing	hir, "Mastering Blockchain: Distributed ledgers, decentralizati , 2018.	on and sm	art contracts	Expla	ained	", 2 nd	Edition, Packt
REFE	RENCES:	·						
1.	Brenn Hill, application	Samanyu Chopra, Paul Valencourt, "Blockchain Quick Refe development", 1 st Edition, Packt publishing, 2018.	erence: A g	juide to explo	ring	dece	ntraliz	ed blockchain
2.	Andreas A	ntonopoulos, "Mastering Bitcoin: Programming the open block	chain", 2 nd	Edition, O'Re	illy N	ledia,	201	7.

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	outline the history and different applications of block chain, and choose appropriate consensus in block chain	Applying (K3)
CO2	make use of practical aspect of cryptography in decentralization of block chain	Applying (K3)
CO3	use bitcoins, identify alternative coins and smart contracts for your application	Applying (K3)
CO4	construct a distributed application using Ethereum	Applying (K3)
CO5	develop an application using Hyperledger	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	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
1 – Slight, 2	– Mode	erate, 3 –	Substant	al, BT-	Bloom's	Taxono	my			·				

		ASSESSMENT	PATTERN -	THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	30	50	20				100
CAT2	30	50	20				100
CAT3	30	50	20				100
ESE	30	40	30				100
* ±3% may be varied (0	CAT 1,2,3 – 50 mark	s & ESE – 100 mai	·ks)				

						221	ГР81 -	PROJE	ст wo	RK II P	HASE II						
Progra Branch	mme 1	&	B. Tec	h & Inf	ormatio	on Tech	nology	/			Sem.	Category	L	т	Р	c	redit
Prereq	uisite	es	NIL								8	EC	0	0	8		4
Preamb	ole		lt provi design	ides ind methoo	ustry ex dology f	cposure or solvi	to the s ng the p	students problem	s and ar s. It als	n opport o gives	unity to a an oppor	nalyze the tunity to the	proble stude	ems, i ents to	dentif work	y the ap c in a te	propriate am.
																•	Total:120
COURS On con	SE Ol nplet	UTCOI ion of	MES: the cou	rse, the	e stude	nts will	be abl	e to								BT M (Hi L	/lapped ghest evel)
CO1	D1 Identify and formulate IT related solutions for an engineering problem Applying (K3)																
CO2	Ana	ılyze ar	nd reviev	w existir	ng syste	m										Apply	ving (K3)
CO3	Cho	ose ap	opropriat	e desig	n metho	odology	for the	problen	า							Apply	ving (K3)
CO4	Impl	lement	IT ena	bled so	lutions											Apply	ving (K3)
CO5	Com	nmunic	cate, der	nonstra	te and c	locume	nt the v	work as	a mem	nber and	l leader ii	n a team				Apply	ving (K3)
						M	apping	of Cos	with P	Os and	PSOs						
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO	12	P	SO1	PSO2
CO1		3	2	1	1	1	2	2	3	3	3	3	3	3		3	2
CO2		3	2	1	1	1	2	2	3	3	3	3	3	3		3	2
CO3		3	2	1	1	1	2	2	3	3	3	3	3	3		3	2
CO4		3	2	1	1	1	2	2	3	3	3	3	3	3		3	2
CO5		3	2	1	1	1	2	2	3	3	3	3	3	3		3	2

Programme & B. Tech & Information Technology Sem. Category L T P Credit Prerequisites Mathematics I 5 PE 3 0 0 3 Preamble This course describes about the basic algorithms of 2D and 3D objects representation and applications describes about the basic algorithms of 2D and 3D objects representation and applications describes applications - Graphics applications - Graphics systems – Output Primitives: Line, Circle and Ellipse drawing algorithms – Attributes of Output Primitives Unit - I Introduction - Graphics applications - Graphics systems – Output Primitives: Line, Circle and Ellipse drawing algorithms – Attributes of Output Primitives Unit - II 2D Transformations – Basic Transformation – Matrix Representation and Homogeneous 9 Concopsits - Three dimensional Object representations: Polygon Surfaces - Curved Lines and Surfaces - Quadratic Surfaces - Quitratic Surfaces - Spline 9 Unit - IV 3D Modeling 9 Three Dimensional Geometric and Modeling Transformations – Three Dimensional Viewing Pileline – Viewing Councers – Spline 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. D			22ITE01 - COMPUTER GRAPHICS											
Programme & Branch B. Tech & Information Technology Sem. Category L T P Credit Preaeulisites Mathematics I 5 PE 3 0 0 3 Preamble This course describes about the basic algorithms of 2D and 3D objects representation and applications of computer graphics. 9 9 Unit -1 Introduction - Graphics applications - Graphics systems – Output Primitives: Line, Circle and Ellipse drawing algorithms – Attributes of Output Primitives 9 9 Unit -1 2D Transformations - Basic Transformation – Matrix Representation and Homogeneous 9 9 Unit -11 3D Transformations – Basic Transformation – Matrix Representation and Homogeneous 9 9 Unit -11 3D Transformations – Basic Transformation – Matrix Representation and Homogeneous 9 9 Unit -11 3D Transformations – Basic Transformation – Matrix Representation and Homogeneous 9 9 Unit -11 3D Transformations – Basic Transformation – Matrix Representation and Homogeneous 9 9 Unit -11 3D Transformations – Basic Transformations – Basic Transformation – Une propertiee – Visualization of Datasets 9 9 Unit -1V 3D Modeling 3D Modeling Transformations – P														
Prerequisites Mathematics I 5 PE 3 0 0 3 Prearry Image: Second Secon	Progran Branch	mme &	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit					
Preamble This course describes about the basic algorithms of 2D and 3D objects representation and applications of computer graphics. Unit -1 Introduction Introduction 9 Introduction - Graphics applications -Graphics systems – Output Primitives: Line, Circle and Ellipse drawing algorithms – Attributes of Output Primitives 9 Unit -II 2D Transformations 9 Two Dimensional Geometric Transformation - Two Dimensional Clipping and Viewing 9 Unit -III 3D Transformations 9 Concepts - Three dimensional object representations: Polygon Surfaces - Curved Lines and Surfaces - Quadratic Surfaces - Spline Representations - Visualization of Datasets 9 Unit - IV 3D Modeling 9 Three Dimensional Geometric and Modeling Transformations - Three Dimensional Viewing – Viewing Pipeline – Viewing Coordinates – Projection – Parallel Projection – Perspective Projection 9 Unit - V Color Models and Computer Animations 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. 9 Total:45 TEXT BOOK: 1 Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries	Prerequ	uisites	Mathematics I	5	PE	3	0	0	3					
Unit - I Introduction 9 Introduction - Graphics applications -Graphics systems – Output Primitives: Line, Circle and Ellipse drawing algorithms – Attributes of Output Primitives 9 Unit - II 2D Transformations 9 Two Dimensional Geometric Transformations – Basic Transformation – Matrix Representation and Homogeneous Coordinate – Composite Transformation – Other Transformation - Two Dimensional Clipping and Viewing 9 Unit - III 3D Transformations 9 Concepts - Three dimensional object representations: Polygon Surfaces - Curved Lines and Surfaces - Quadratic Surfaces - Spline Representations - Visualization of Datasets 9 Unit - IV 3D Modeling 9 Three Dimensional Geometric and Modeling Transformations – Three Dimensional Viewing Pipeline – Viewing Coordinates – Projection – Parallel Projection – Perspective Projection 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. 9 TeXT BOOK: 1 Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Preamb	le	This course describes about the basic algorithms of 2D and 3D objection computer graphics.	ects repr	esentation ar	id app	olicati	ons o	f					
Introduction - Graphics applications -Graphics systems – Output Primitives: Line, Circle and Ellipse drawing algorithms – Attributes of Output Primitives Unit - II 2D Transformations 9 Two Dimensional Geometric Transformations – Basic Transformation – Matrix Representation and Homogeneous Coordinate – Composite Transformation – Other Transformation – Two Dimensional Clipping and Viewing 9 Unit - III 3D Transformations 9 Concepts - Three dimensional object representations: Polygon Surfaces - Curved Lines and Surfaces - Quadratic Surfaces - Spline Representations - Visualization of Datasets 9 Unit - IV 3D Modeling 9 Three Dimensional Geometric and Modeling Transformations – Three Dimensional Viewing – Viewing Pipeline – Viewing Coordinates – Projection – Parallel Projection – Perspective Projection 9 Unit - V Color Models and Computer Animations 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. Total:45 Tetret BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Princip	Unit - I		Introduction						9					
Unit - II 2D Transformations 9 Two Dimensional Geometric Transformations – Basic Transformation – Matrix Representation and Homogeneous Coordinate – Composite Transformation – Other Transformation – Two Dimensional Clipping and Viewing 9 Unit - III 3D Transformations 9 Concepts - Three dimensional object representations: Polygon Surfaces - Curved Lines and Surfaces - Quadratic Surfaces - Spline Representations - Visualization of Datasets 9 Unit - IV 3D Modeling 9 Three Dimensional Geometric and Modeling Transformations – Three Dimensional Viewing – Viewing Pipeline – Viewing Coordinates – Projection – Parallel Projection – Perspective Projection 9 Unit - V Color Models and Computer Animations 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. 9 TEXT BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Introduc Output I	ction - Graph Primitives	ics applications -Graphics systems – Output Primitives: Line, Circle	and Ellip	ose drawing a	algorit	thms	– Attr	ibutes of					
Two Dimensional Geometric Transformations – Basic Transformation – Matrix Representation and Homogeneous Coordinate – Composite Transformation – Other Transformation – Two Dimensional Clipping and Viewing Image: Concepts - Transformation – Other Transformation - Two Dimensional Clipping and Viewing Unit - III 3D Transformations 9 Concepts - Three dimensional object representations: Polygon Surfaces - Curved Lines and Surfaces - Quadratic Surfaces - Spline Representations - Visualization of Datasets 9 Unit - IV 3D Modeling 9 Three Dimensional Geometric and Modeling Transformations – Three Dimensional Viewing – Viewing Pipeline – Viewing Coordinates – Projection – Parallel Projection – Perspective Projection 9 Unit - V Color Models and Computer Animations 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. 9 Text BOOK: Total:45 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Unit - II		2D Transformations						9					
Unit - III 3D Transformations 9 Concepts - Three dimensional object representations: Polygon Surfaces - Curved Lines and Surfaces - Quadratic Surfaces - Spline Representations - Visualization of Datasets 9 Unit - IV 3D Modeling 9 Three Dimensional Geometric and Modeling Transformations – Three Dimensional Viewing – Viewing Pipeline – Viewing Coordinates – Projection – Parallel Projection – Perspective Projection 9 Unit - V Color Models and Computer Animations Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. 9 Total:45 TEXT BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Two Di Compos	Two Dimensional Geometric Transformations – Basic Transformation – Matrix Representation and Homogeneous Coordinate – Composite Transformation – Other Transformation - Two Dimensional Clipping and Viewing												
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Unit - IV 3D Modeling 9 Three Dimensional Geometric and Modeling Transformations – Three Dimensional Viewing – Viewing Pipeline – Viewing Coordinates – Projection – Parallel Projection – Perspective Projection 9 Unit - V Color Models and Computer Animations 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. 9 Total:45 Text BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Concep Represe	ets - Three d entations - V	imensional object representations: Polygon Surfaces - Curved Line isualization of Datasets	es and S	urfaces - Qua	adrati	c Sur	faces	- Spline					
Three Dimensional Geometric and Modeling Transformations – Three Dimensional Viewing – Viewing Pipeline – Viewing Coordinates – Projection – Parallel Projection – Perspective Projection 9 Unit - V Color Models and Computer Animations 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. Total:45 TEXT BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Unit - I\	V	3D Modeling						9					
Unit - V Color Models and Computer Animations 9 Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. Total:45 Total:45 TEXT BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Three D Projecti	0imensional on – Paralle	Geometric and Modeling Transformations – Three Dimensional Viewi Projection – Perspective Projection	ng – Vie	wing Pipeline	– Vie	ewing	Coor	dinates –					
Properties of Light – Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HSV – Conversion between HSV and RGB Model. Design of Animation sequences – Animation Functions – Raster Animation – Key Frame Systems. Total:45 Text BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Unit - V	1	Color Models and Computer Animations						9					
Total:45 TEXT BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	Properti Design	ies of Light - of Animation	Standard Primaries – XYZ Color Model – RGB – YIQ – CMY – HS\ sequences – Animation Functions – Raster Animation – Key Frame	/ – Conv Systems	ersion betwee 3.	en HS	SV an	d RG	B Model.					
TEXT BOOK: 1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.									Total:45					
1. Hearn, Donald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edition, Pearson Education, India, 2008. REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	TEXT B	BOOK:												
REFERENCES: 1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	1.	Hearn, Don	ald and Baker, M. Pauline, "Computer Graphics - C Version", 2 nd Edi	tion, Pea	rson Educatio	on, In	dia, 2	008.						
1. John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3 rd Edition, Pearson Education, India, 2013.	REFER	ENCES:												
	1.	John F. Hug "Computer	hes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. F Graphics: Principles & Practice", 3 rd Edition, Pearson Education, Indi	Foley, Ste a, 2013.	even K. Feine	er, and	d Kurl	t Akel	ey,					

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	interpret the fundamental concepts of computer graphics and the components that constitute 2D and 3D graphics	Applying (K3)
CO2	brief 2D objects by applying transformation, clipping, and viewing operations	Applying (K3)
CO3	apply 3D concepts and 3D object representations	Applying (K3)
CO4	experiment with 3D transformations, viewing, projection and volume	Applying (K3)
CO5	make use of color models and computer animations	Applying (K3)
1	Manning of COs with POs and PSOs	

					wappin	y or co	S with	rus an	u F30:					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
	1	I	I	1		1				I		1		1

		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	55	25				100
CAT3	20	55	25				100
ESE	20	35	45				100

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

		22ITE02 - SEARCH METHODS FOR	R PROBLEM SOLVIN	IG				
Progran	nme	B. Tech & Information Technology	Som	Category	1	т	P	Credit
& Branc	ch			Gategory	-	•	•	orean
Prerequ	lisites	Artificial Intelligence	5	PE	3	0	0	3
Preambl	le	This course provides basic knowledge about different kir	nds of search method	s for solving rea	al wor	ld pro	oblems	•
Unit- I		Solving problems by Searching						9
Problem cost sea	n - Solvi arch – D	ng agents - Example problems - Search Algorithms - Unin epth - first search – Depth - limited search - Iterative deep	formed Search Strate bening depth - first se	egies - Breadth arch - bidirectio	First \$ nal se	Searc earch	:h — un	iform -
Unit- II		Heuristic Search Strategies						9
Greedy Functior	best - fi ns.	rst search - A* search - Optimality of A* - Memory - bound	ded heuristic search -	learning to sea	rch be	etter -	Heuris	stic
Unit- III		Searching and Optimization problems						9
Local Se Partially	earch ai Obser	nd Optimization Problems - Local Search in Continuous Spable Environments.	paces - Search with N	londeterministi	c Actio	ons -	Search	ו in
Unit- IV		Adversarial Search and Games						9
Game T	heory -	Optimal Decisions in Games - Heuristic Alpha - Beta Tre	e Search - Stochastic	Game - Partia	lly Ob	serva	ble Ga	ime
Unit- V		Constraint Satisfaction Problems						9
Defining Search f	g Constr for CSP	aint Satisfaction Problems - Constraint Propagation: Inference s - The Structure of Problems.	ence in CSPs - Backt	racking Search	for C	SPs -	Local	
							-	Fotal:45
TEXT B	OOK:							
1.	Stuart	Russell and Peter Norvig, "Artificial Intelligence – A Mode	ern Approach", 4 th Edi	tion, Pearson E	ducat	ion P	ress, 2	2022.
REFERE	ENCES							
1.	Georg	e F. Luger, "Artificial Intelligence", 1 st Edition, Pearson Edu	ucation, 2001.					
2.	Georg	e F. Luger, "Structures and strategies for complex problen	n solving", 6 th Edition,	Pearson, 2021				
k								

COURS On com	COURSE OUTCOMES: On completion of the course, the students will be able to													BT Mapped (Highest Level)			
CO1	exp	olain se	arch stra	tegies an	d solve	problem	s by app	olying a	suitable	e searcl	n method			Applying(K3)			
CO2	app	bly heu	ristic sea	rch techni	ques									Applying(K3)			
CO3	model search strategies as optimization problems Applying(K3)																
CO4	make use of game theory to solve adversarial problems Applying(K3)																
CO5	solve problems using constraint satisfaction formulation Applying(K3)																
						Mappin	g of CO	s with	POs an	d PSOs	5						
COs/PC	Os	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1		3	2	1	1		3	3	3	2	2	3		3	2		
CO2		3	2	1	1		3	3	3	2	2	3		3	2		
CO3		3	2	1	1		3	3	3	2	2	3		3	2		
CO4		3	2	1	1		3	3	3	2	2	3		3	2		
CO5		3	2	1	1		3	3	3	2	2	3		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 10 60 30 100											
CAT2	10	60	30				100				
CAT3	20	50	30				100				
ESE 15 45 40 100											
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)											

22ITE03 - GAME DESIGN AND DEVELOPMENT												
Programme 8 Branch	B.Tech. & Information Technology	Sem.	Category	L	т	Р	Credit					
Prerequisites	Computer Networks	5	PE	3	0	0	3					
		r			1							
Preamble	This course focuses to design and develop a simple game app	lication u	using unity to	ol.								
Unit - I	Unity Basics & 2D Games						9					
The Basics of Game Development : Introduction - Installing Unity – GameObjects - Creating and Destroying GameObjects - Unity Components - Adding Components – Interface – Develop a First Unity Project - Introduction to Unity 2D – Sprites – create – Modes – Modify - Creating GameObject and Adding Components - 2D Sprite Sheet - Transforms and Object Parenting - Internal Assets												
Unit – II	Programming C# in Unity						9					
The Default C# Script In Unity – Variables - Data Types - Operators - Functions - If And Switch - Loops - Classes And Methods – Scope and Access Modifiers Collisions - Prefabs and instantiation – GameObject Destruction – Simple application												
Unit – III	2D Graphics with GIMP and Unity						9					
2D Graphics with GIMP and Unity - Introduction To Gimp - Bouncing Donuts Design - Creating A Wooden Plank In Gimp - Three Planks And A Donut In Unity - 2d Graphics With Blender And Unity - Introduction To Blender - Creating The Donut Box In Blender - Exporting From Blender To Unity -Bouncing Donuts Prototype: First Gameplay!												
Unit – IV	The Unity Interface, Sound & music effects						9					
The Unity Inter Rendering: Ma MuseScore	ace - The Unity Editor - The Scene View - The Hierarchy Window - T erials And Shaders - Lights - Collision: Donut Vs. Sphere-Cameras -	he Proje Sound E	ct Window - ⁻ ffects with A	The udac	nspe ity -	ctor V Music	Vindow - ; with					
Unit – V	2D Tools in Unity						9					
Sprites - Tiles release	 2d Sprite Sheet Animation - Designing a 2D Game – Menu - Anima 	ating the	Player Chara	acter	– Te	sting	and					
							Total:45					
TEXT BOOK:												
1. https:/	earn.unity.com / https://www.javatpoint.com (for Units 1 & 2)											
2. Franz	anzinger,"2D Game Development with Unity", CRC Press,1 st Edition	,2021 (fc	or Units 3,4 &	5)								
REFERENCE	:											
1. Nicolas Alejandro Borromeo, "Hands-On Unity 2022 Game Development: Learn to use the latest Unity 2022 features to create your first video game in the simplest way possible", 3 rd Edition, Packt Publishing, 2022.												
 Paris Buttfield-Addison , Jon Manning , Tim Nugent ,"Unity Game Development Cookbook: Essentials for Every Game", 1st Edition, O'Reilly Media, 2019. 												
3. Joe H	cking , "Unity in Action, Third Edition: Multiplatform game developme	nt in C#	", 3 rd Edition,	Mar	ning,	, 2022						

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Summarize the concepts of unity platform tools	Applying (K3)
CO2	Apply the game programming concepts of C# in Unity	Applying (K3)
CO3	Design and develop a simple 2D Graphics with GIMP	Applying (K3)
CO4	Develop a 2D Graphics with sound and music effects	Applying (K3)
CO5	Create a simple animation game application using 2D unity tools	Applying (K3)
1		

Mapping of COs with POs and PSOs	
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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

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	50	30				100				
CAT3	20	50	30				100				
ESE	20	50	30				100				

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

		22ITE04 - BIG DATA ANALYTICS								
Progra Branci	ımme & n	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit		
Prereq	uisites	Database Management Systems	5	PE	PE 3 0			3		
Pream	ble	This course provides basic knowledge about Big data, its frame processing with SPARK and KAFKA.	ework, s	torage in data	abas	es an	d Stre	eam		
Unit - I Big Data 9										
Introdu importa	ction - Types ance – data s	s of Digital Data – characteristics – evolution – definition – cl cience – terminologies used in Big Data environments– Analytics	hallenge s Tools.	s – Big Data	— E	Big D	ata A	nalytics: -		
Unit - I	I	Hadoop						9		
Introdu – Inter Search	ction – RDBN acting with H iing - Sorting	AS Vs Hadoop – Distributed computing challenges – Hadoop Ov ladoop Ecosystem. Introduction to MapReduce Programming: - Compression.	erview – - Mappe	HDFS – Pro r– Reducer–	cess Cor	ing d nbine	ata wi er – F	th Hadoop Partitioner–		
Unit - I	II	MongoDB AND Cassandra						9		
Introdu Cassar Export	ction to Mon ndra – Featur – Querying S	goDB – Terms used in MongoDB– Data types in MongoDB es of Cassandra – CQL Data types – CQLSH– CRUD operation system tables.	– Mongo s – Colle	DB Query L ections – Alter	ang r cor	uage nmar	Intro ds –	duction to Import and		
Unit - I	V	Hive and Pig						9		
Introdu – Pig o Comple	ction to Hive n Hadoop – [ex Data types	 Architecture – Data types – File format – Hive Query Languag Data types – Running Pig – Execution modes of Pig – HDFS com a. 	ge – RCF nmands -	File implemen - Relational C	itatio Opera	n. Int ators	roduc –Eval	tion to Pig function –		
Unit - V	V	Apache SPARK AND KAFKA						9		
Stream applica	n processing v htions – Apacl	vith SPARK: Introduction – SPARK architecture- SPARK Eco systemeters and the systemeters of the systemeters	tem – SF	PARK for Big [Data	Proc	essinę	g – SPARK		
								Total:45		
TEXT E	TEXT BOOK:									
1. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", 2 nd Edition, Wiley, 2019. (For Units I, II, III, IV)										
2.	2. Dr.Anil Maheshwari, "Big Data", 1 st Edition, McGraw Hill Education, New Delhi, 2017 (For Unit V)									
REFEF	RENCES:									
1.	1. EMC Education Services, "Data science and Big data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", 1 st Edition, John Wiley and Sons, 2015.									

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	apply the concepts and characteristics of big data	Applying (K3)
CO2	make use of MapReduce programs in Hadoop framework	Applying (K3)
CO3	utilize MongoDB and Cassandra to solve real world problems	Applying (K3)
CO4	develop solutions for big data problems using Hive and Pig	Applying (K3)
CO5	identify the need for stream processing and apply Spark and Kafka architectures.	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	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
			0 1 <i>i i</i>		D 1 1	-								

ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
CAT1 10 50 40 10												
CAT2	10	30	60				100					
CAT3	10	50	40				100					
ESE	ESE 10 40 50 100											
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

22ITE05 - INFORMATION SECURITY PRINCIPLES												
Progra Branch	mme& 1	B. Tech &	Information Techn	ology		Sem.	Category	L	т	Ρ	Credit	
Prereq	uisites	Nil				5	PE	3	0	0	3	
Preamb	ble	This cours networks th and comm	e describes the exp hat have increased t unicated using crypt	blosive growth c he dependence ographic system	of security in c of both organi ns.	omputer zations a	systems and nd individuals	thei s on	r inte the ir	erconn Iforma	ections via ation stored	
Unit –	it – I Elementary Number Theory											
Divisibility and the Euclidean algorithm- Linear Diophantine equations – Congruences: Definitions and properties– linear congruences and Quadratic congruences- residue classes- Euler's phi function – Fermat'sLittle Theorem – Chinese Remainder Theorem – Exponentiation and Discrete logarithm- Quadraticresidues – Legendre symbol – Jacobi symbol – Algebraic structures: groups, rings, fields, GF(p)fields, GF(2 ⁿ)fields, (Theorems without proof)												
Unit –	I	Simple Cr	yptosystems								9	
Enciphe Vigene Cipher Encrypt	Enciphering Matrices – Encryption Schemes – Symmetric and AsymmetricCryptosystems – Substitution Cipher: Affine cipher – Vigenere Cipher- Modern Stream Ciphers: Onetime pad- LFSR -Block ciphers – Use of Block Ciphers - Hill Cipher - Transposition Cipher – MultipleEncryption — Secure Cryptosystem – Problems in Advanced Encryption Standard(AES) – Problems in Data Encryption Standard. (Theorems without proof)											
Unit –	11	Public Ke	y Cryptosystems								9	
The ide ElGama Knapsa SHA ar	ea of public k al cryptosyste ick problem - id HMAC (Th	key cryptogra em – Signatu - Zero-Knowl neorems with	uphy – The Diffie – I ure Algorithms: RSA ledge Protocols : Fia out proof)	Hellman Key Ag signature- ElGa t Shamir protoco	reement Proto amal signature d– Guillou Quis	col - RSA - Schnorr quater pr	Cryptosyste Signature- D rotocol-Hash a	m – igita and I	Rabii I sign //AC	n cryp ature algorit	tosystem – standard – thms: MD5-	
Unit –	V	Prime Ger	neration, Testing ar	nd Factoring							9	
Genera Factoriz method	tion: Merser zation: Trial I. (Theorems	nne Prime, divisionmeth without proc	Fermat Prime, Tes od-Fermat method f)	ting:Divisibility a – Pollard rho (γ	algorithm- Fer /) method – co	mat test- ontinued	 Square roc fraction meth 	ot te: od –	st- N the	liller I quadr	Rabin test- atic seieve	
Unit – Y	V	Number T	heory and Algebrai	ic Geometry							9	
Elliptic factoriz	curves – bas ation –elliptic	sic facts – e c curve confid	elliptic curvecryptosy dentiality and signate	stems – elliptic ure.(Theorems w	curve primalit vithout proof)	y test – e	elliptic curve	facto	orizati	on-Le	nstra's ecc	
											Total:45	
TEXT E	BOOK:											
1. William Stallings, "Cryptography and Network Security", 7 th Edition, Pearson Education, New Delhi, 2017.												
REFER	ENCES:											
1.	Behrouz A. Education, I	. Ferouzan, India, 2015.	Debdeep Mukhopa	dhyay, "Cryptoo	graphy and No	etwork S	ecurity", 3 rd	Editi	on, T	ata N	/IcGraw-Hill	
2.	Charles P F	Fleeger, "Sec	urity in Computing",	5 th Edition, Prer	ntice Hall of Inc	ia, New I	Delhi, 2015.					
3.	Victor SI University F	houp, "A Press, 2005.	Computational	Introduction	to Numbe	er The	eory and	Al	gebra	ι",	Cambridge	

COUR: On cor	OURSE OUTCOMES: In completion of the course, the students will be able to													BT Mapped (Highest Level)				
CO1	cons	struct nu	umber the	eory conce	epts in v	arious s	security	applicat	ions					Applying	(K3)			
CO2	appl	y symm			Applying	(K3)												
CO3	build various public key cryptography, hashing and digital signature techniques for real case scenarios													Applying	(K3)			
CO4	Illust	trate the	e techniq	ues to ger	nerate, t	est and	factorie	s prime	numbe	rs			Applying (K3)					
CO5	mak	e use o	f elliptic o	curve, pro	perties f	or secu	rity servi	ces						Applying	(K3)			
	1																	
						Mappin	g of CC)s with	POs ar	nd PSO	s							
COs/P	COS/POS P01 P02 P03 P04 P05 P06 P07 P08 P09 P010 P011 P012 PS01 PS02																	

COS/POS	PUT	PUZ	P03	P04	PU5	PU6	P07	PUo	P09	POID	PUTT	PUIZ	P301	P302
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

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

22ITE06 - ALGORITHMIC THINKING IN BIOINFORMATICS														
Progran Branch	mme &	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit						
Prerequ	uisites	Data Structures, Design and Analysis of algorithm	5	PE	3	0	0	3						
Preamb	le	To prepare students to develop an algorithmic thinking to addre bioinformatics, to acquire knowledge of various problem formul transformed the field of biomedicine in modern times, to obtain algorithms on strings, trees, and graphs, many of which can be	ess key o ations a insights applied	data science ond algorithm printo many ke to other area	chall bara y bio <u>s as</u>	enge digm binfor well.	s in s, whi matic	ch have s						
Unit – I		Replication Origins-Algorithmic warmup						9						
Genome The Clu words w	Genome Replication-Origin-Hidden Messages- frequent k-mers in a string-Reverse complement problem-Pattern Matching problem- The Clump finding problem-Minimum skew problem-Hamming distance problem-Approximate pattern matching problem-Frequent words with mismatches problem- Frequent words with mismatches and reverse complement problem.													
Unit – II		Motif Identification-Randomized Algorithms						9						
Motif Fi Motif Se	nding proble earch-Rando	m-Brute force Motif search-Motif scoring function-Median Strir mized Motif search-Gibbs Sampling.	ng proble	em-Reformula	ted	Moti	f findi	ng-Greedy						
Unit – I	II	Genome Assembly-Graph Algorithms						9						
Genome Hamilto	e sequencing nian path pro	g-assembly-The String composition and reconstruction problem-	Genome	path problem	n-Ov	erlap	grapl	h problem-						
Unit – ľ	V	Antibiotic Sequencing-Dynamic Prgramming						9						
Antibioti Sequen	ics-Protein T cing problem	ranslation problem-Peptide encoding problem- Generating Theo - BFCyclopeptide Sequencing- Branch and Bound Cyclopeptide	oretical Sequer	Spectrum Prol ncing- Cyclope	blerr eptid	n -Th le Sc	e Cyc oring	leopeptide Problem.						
Unit – V	1	Sequence Alignment-Dynamic programming						9						
Sequen problem model.	ce Alignment h-Change pro	t-Introduction-Longest common subsequences problem- The Mar bblem-DPManhattan Tourist problem-Manhattan to an arbitrary	nhattan ⁻ DAG-L(Tourist Proble CS backtracki	m-L ing p	onge probl	st pat em-LC	h in a DAG CS scoring						
								Total:45						
TEXT B	00K:													
1.	1. Phillip Campeau, "Bioinformatics Algorithms: an Active Learning Approach", 2 nd Edition, Active Learning Publisher, 2015													
REFER	REFERENCES:													
1.	Richard Dur Proteins and	bin, Sean Eddy, Anders Krogh, and Graeme Mitchison, "Biologic d Nucleic Acids", 7 th reprint, CRC press, 2002.	al Sequ	ence Analysis	s: Pr	obab	ilistic	Models of						
2.	Neil C. Jone	s, Pavel A. Pevzner, "An Introduction to Bioinformatics Algorithm	ns", 1 st E	dition, MIT Pr	ess,	200	4.							

COURSE OUTCOMES: On completion of the course, the students will be able to (H													BT Mapp (Highest L	oed evel)	
CO1	inter	pret the	e genome	e as a DN	A string	g using co	omputati	ional me	ethods					Applying	(K3)
CO2	solve	e motif	identifica	tion using	rando	mized alg	orithms							Applying	(K3)
CO3	eluc	idate ge	enome se	equencing	proble	ms using	graph a	algorithr	ns					Applying	(K3)
CO4	dete	rmine a	antibiotic	sequencir	ng usin	g dynami	c progra	amming	approa	aches				Applying	(K3)
CO5 implement sequence alignment using algorithmic design techniques Applying (K3)															
					1	Mappin	g of CO	s with	POs a	nd PSOs	S	1	1	Г	1
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1		3	3	3	2	2	3		3	2
CO	2	3	2	1	1		3	3	3	2	2	3		3	2
CO	3	3	2	1	1		3	3	3	2	2	3		3	2
CO	4	3	2	1	1		3	3	3	2	2	3		3	2
CO	5	3	2	1	1		3	3	3	2	2	3		3	2
1 – Slig	ght, 2	– Mode	rate, 3 –	Substanti	al, BT-	Bloom's	Taxono	my	•						
						ASSES	SMENT	PATTE	RN - 1	HEORY	,				
Tes C	atego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)	nding %	Apply (K3)	/ing %	Analyzi (K4) 9	ing I %	Evaluating (K5) %	C	Creating (K6) %	Total %
	CAT	1		10		30		60							100
	CAT	2		10		30		60							100
	CAT	3		10		30		60							100
	ESE			10		30		60							100
* ±3%	may b	e varie	d (CAT 1	, 2 & 3 – 5	50 marl	ks & ESE	– 100 r	narks)			•		·		

	22ITE07 - DESIGN THINKING						
Program me & Branch	B. Tech & Information Technology	Sem.	Category	L	Т	Р	Credit
Prerequisites	i Nil	5	PE	3	0	0	3
Preamble	Design Thinking is human-centered problem solving tool which empha stakeholder feedback to unlock creativity and innovation, to devises feasi	asize on ble and v	empathy, colla iable idea/solu	aborat itions.	ion,	co- ci	reation and
Unit – I	Design Thinking and Explore:						9
Design Think Design Thinki Framing.	ing: Key Principles and Mindset – Five Phases, Methods and Tools of Designing – Explore: Methods & Tools – STEEP Analysis – Strategic Priorities – Ac	n Thinkir tivity Syst	ng – User Guid tem – Stakeho	le – F Ider N	ound /Iappi	ation ng – (Building for Opportunity
Unit – II	Empathize:						9
Empathize: M Insights - Use	lethods & Tools – Field Observation – Deep User Interview – Empathy Map – r Persona Development.	- User Joi	urney Map - N	eed F	indin	g – U:	ser
Unit – III	Experiment:						9
Experiment: Prototyping– I	Methods & Tools – Ideation – SCAMPER – Analogous Inspiration – Deconstr dea Refinement.	uct & Red	construct – Us	er Exp	perier	nce Jo	ourney –
Unit – IV	Engage:						9
Engage: Meth	nods & Tools – Story Telling – Art of Story Telling – Storyboarding – Co-Creat	tion with l	Jsers – Collec	t Fee	dback	c from	Users.
Unit – V	Evolve:						9
Evolve: Meth – Viability Ana	ods & Tools – Concept Synthesis – Strategic Requirements –Evolved Activity Ilysis – Innovation Tools using User Needs, CAP, 4S – Change Management	Systems - Quick V	s – Activity Sys Vins.	stem I	ntegra	ation	
							Total:45
TEXT BOOK:							
1. L	ee Chong Hwa, "Design Thinking The Guidebook", Design Thinking Master T	rainers o	f Bhutan, 2017	7. (E-E	Book)		
REFERENCE	S:						
1. J F	eanne Liedtka and Tim Ogilvie, "Designing for Growth: A Design Thinking To- ress, 2011.	ol Kit for I	Managers", Co	olumb	ia Un	iversit	ty
2. J	eanne Liedtka, Tim Ogilvie, and Rachel Brozenske, "The Designing for Grow Buide", Columbia University Press, 2014.	th FieldBo	ook: A Step-by	/-Step	Proj	ect	

COURS On cor	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	construct design challenge and reframe the design challenge into design opportunity.	Applying (K3)
CO2	interview the user, and know the feelings of users to foster deep user understanding and be able to uncover the deep user insights and needs.	Applying (K3)
CO3	develop ideas and prototypes by brain storming using the ideation tools.	Applying (K3)
CO4	organize the user walkthrough experience using ideal user experience journey.	Applying (K3)
CO5	develop smart strategies & implementation plan that will deliver/achieve the idea/solution deduced from earlier phases.	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	3	3	3	2	2	3	3	3	3	3	3	2
CO2	3	2	3	3	3	2	2	3	3	3	3	3	3	2
CO3	3	2	3	3	3	2	2	3	3	3	3	3	3	2
CO4	3	2	3	3	3	2	2	3	3	3	3	3	3	2
CO5	3	2	3	3	3	2	2	3	3	3	3	3	3	2
1 – Slight 2	– Mode	rate 3_	Substantia	al BT- F	Rloom's	Taxonol	mv							

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	15	75				100						
CAT3	10	15	75				100						
ESE	10	15	75				100						
* ±3% may be varied (C	CAT 1,2,3 – 50 mark	s & ESE – 100 mar	ks)										

		22ITE08 - ENTERPRISE APPLICATION DEVELOPME		NG JAVA				
Progra Branch	mme &	B.Tech. Information Technology	Sem.	Category	L	т	Ρ	Credit
Prereq	uisites	Nil	5	PE	2	0	2	3
Pream	ble	This course offers good knowledge on how to develop an enter technologies and hosting with application server.	prise or	iented applica	itions	s usi	ng jav	/a
Unit –		Network Programming and RMI						6
Networ Inet6Ac - Datag	k Programmi ddress - TCP/ jrams - RMI a	ng - Basics - Classes and Interfaces - InetAddress - Factory mo /IP Client Sockets - URL - URLConnection - HttpURLConnection urchitecture - Developing Simple RMI applications.	ethods - -URI CI	Instance Me ass - Cookies	thod s - T(s - Ir CP/IF	net4A P Ser	ddress and ver sockets
Unit –		Servlets and JSP				_		6
Reload Cachin - Includ	ction - HTTP ing - init and g - Retrieving les and Forwa	Serviet Basics: Serviet API - Page Generation - Web Applicat destroy - Single Thread Model - Background Processing - Load information - Sending HTML information - Java Server Pages : B ards - Custom Tag libraries - Simple JSP program.	on Start asics - E	ervlet Life Cyo up - Client-Si Expression ar	de C de De	servi achi eclara	et Ali ng - S ation	Server-Side Directives
J2EE a Applica and Mo Infra La	architecture - ation server - , pholith Archite ayer - REST /	EJB - Session, Entity and Message driven beans - Model Vid Apache Tomcat - Installation - services - Hosting Java Apps with ecture - Micro Services - Micro Service Architecture - Application API - Advantages with Micro Services	ew Cont server. on Layer	trol (MVC) ar Types of soft - Business L	chite ware ayer	ecture arc - Ei	e – C hitect nterpi	Case study: ures - SOA ise Layer -
Unit –	IV of Continent from	Configuration of Spring Framework	Ctores.	ara i Miah Ch		Da	40 15	6
DevToo Numbe	of Spring fra ols for rapid a r	application development : Run JAR - Application Properties - A	Automat	ic Restart - L	ive I	- Da Reloa	ad - S	Server Port
Unit –	V	SpringBoot Framework and Database connectivity						6
Spring with JP - Data	Boot: Introduc A - POJO cla JPA with cust	ction to Spring vs. Spring Boot vs. Spring MVC - Architecture - Init asses - MYSQL - Working with Hibernate - Data JPA with CRUD com queries	tializr Mo Reposit	odules – Interf ories - Data J	ace IPA v	- Dat with	abas custo	e - Working m methods
1.	Develop cha	at application using TCP and UDP						
2.	Develop a F	RMI application						
3.	Develop sei	rvlet based Login application for session tracking						
4.	Develop a s	imple application using JSP						
5.	Create web	application using Servlets, JDBC and JSP						
6.	Develop an	EJB application that demonstrates Entity Bean						
7.	Implement a	an EJB application that demonstrates Session Bean						
8.	Implementir	ng simple application using Hibernate with database connection						
9.	Develop a s	imple application using Spring with database connectivity						
10.	Deploy simp	ble database application using SpringBoot		L octuro:3	0 D	racti	col:2	0 Total-60
TEVT	BOOK.			Lecture:3	υ, Ρ	auti	cai.3	u, 10(a):00
	Schildt, Her	bert, "Java: The Complete Reference", 9 th Edition, Tata McGraw	-Hill, Ne	w Delhi, 2014				
2.	Mark Heckle Inc., USA, 2	er, "Spring Boot: Up and Running: Building Cloud Native Java and 2021.	l Kotlin A	Applications",	1 st E	ditio	n, O'F	Reilly Media
REFER	ENCES/ MA	NUAL / SOFTWARE:						

1. Asbury, Stephen and Weiner, Scott R.,"Developing Java Enterprise Applications", 2nd Edition, Wiley Publications, 2001.

COUR: On cor	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	construct network with socket programming concepts and RMI architecture	Applying (K3)
001		Precision (S3)
<u> </u>	interpret converside programming using ISP and Services	Applying (K3)
002	interpret server side programming using 55F and Services	Precision (S3)
c_{0}	make use of EID, application convertend microsonvice to implement enterprise application	Applying (K3)
003	make use of EJB, application server and microservice to implement enterprise application	Precision (S3)
CO1	experiment with appetations, day tools in Spring framework	Applying (K3)
004		Precision (S3)
COF	utilize IDA/Hibernete for Spring Post detabage connectivity	Applying (K3)
005	ענוווצי שראירוושנווומני וטו סטוווש שטטו עמנמשמשי כטווויפטוועוע	Precision (S3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3		3	3	3	2	2	3		3	2
CO2	3	2	3	3		3	3	3	2	2	3		3	2
CO3	3	2	3	3		3	3	3	2	2	3		3	2
CO4	3	2	3	3		3	3	3	2	2	3		3	2
CO5	3	2	3	3		3	3	3	2	2	3		3	2
						-								

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

		22ITE09 - 3D MODELLING AND MIXED REALITY	APPLIC	ATIONS								
Progra Branci	ımme & n	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit				
Prereq	uisites	Mathematics I	6	PE	3	0	0	3				
		· · · · · · · · · · · · · · · · · · ·				1		1				
Pream	ble	This course imparts the basic concepts in Virtual Reality and A creation and applications. It also provides foundations in 2D an	ugmente d 3D ob	ed Reality whi ject modeling	ch ir	nclude	e cont	tent				
Unit - I	Jnit - I 2D Modeling 9											
Two Di Compo	imensional G site Transfor	eometric Transformations – Basic Transformation – Matrix Rep mation – Other Transformations - Two Dimensional Clipping and	resentat Viewing	tion and Hom J	oge	neous	s Coo	ordinates –				
Unit - I	I	3D Modeling						9				
Three Coordi	Dimensional nates – Proje	Geometric and Modeling Transformations – Three Dimensi ctions – Parallel Projection – Perspective Projection	onal Vie	ewing – View	ving	Pipe	line ·	 Viewing 				
Unit - I	I	Getting started with VR and AR						9				
Definin the cur	g virtual and rent state of a	augmented reality – Introduction – Types of VR and AR – Explori augmented reality.	ing the c	urrent state o	f virt	ual re	ality ·	- Exploring				
Unit - I	v	Consuming content in VR and AR						9				
Consu Option Future	ming content s - Consumin Options.	in VR: Exploring Consumer-Grade VR - Identifying Near-Futur g Content in AR: Exploring Consumer-Grade AR - Identifying No	re Hardv ear-Futu	ware - Compa re Hardware	aring - Co	l Cur mpar	rent a ing C	and Future urrent and				
Unit - V	V	Creating content in VR and AR						9				
Evalua Augme	ting Project: A Inted Reality	Assessing Project's Technology Needs - Choosing VR - Choosing Project - Creating Content for Virtual and Augmented Reality: As	I AR - Pla sessing	anning Virtual Design Softw	Rea are ·	ality P · Cap	roject turing	t- Planning I Real Life.				
								Total:45				
TEXT	BOOK:											
1.	Hearn, Don	ald and Baker, Pauline.M, "Computer Graphics C Version", 2 nd E	dition, F	earson Educa	ation	, 200	8. (fo	r Units I,II)				
2.	Allen Paul N	Nealy, "Virtual & Augmented Reality for Dummies", 1 st Edition, Job	hn Wiley	v & Sons, 201	8. (fo	or Un	its III,	IV,V)				
REFEF	RENCES:											
1.	John F. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, and Kurt Akeley, "Computer Graphics: Principles & Practice", 3rd Edition, Pearson Education, 2013.											
2.	Steve Auks and VR", 1s	takalnis, "Practical Augmented Reality: A Guide to the Technolog ^t Edition, Addison Wesley, 2016.	gies, App	blications, and	Hu	man I	acto	rs for AR				
							-					

COUR On cor	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	manipulate 2D objects using transformation, clipping, and viewing operations	Applying (K3)
CO2	perform 3D transformations, viewing, projection and view volume	Applying (K3)
CO3	outline the current states of virtual and augmented reality	Applying (K3)
CO4	develop different applications for consuming VR and AR contents and indicate near future hardware for VR and AR experience.	Applying (K3)
CO5	design and develop contents for VR and AR projects	Applying (K3)

	Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
1 – Slight 2	1 - Slight 2 - Moderate 3 - Substantial RT- 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	30	50				100					
CAT2	20	35	45				100					
CAT3	20	40	40				100					
ESE	ESE 20 35 45 100											
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22ITE10 - KNOWLEDGE REPRESENTAT	ΓΙΟΝ								
Progra Branc	amme & h	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit			
Prerec	quisites	Nil	6	PE	3	0	0	3			
Pream	ble	To understand the basics of Knowledge Engineering and discu Design and Development.	iss meth	odologies and	d mo	delin	g for <i>i</i>	Agent			
Unit –		Introduction						9			
Introdu Functio Initiativ	uction – Abdu ons – Baconia ve Reasoning	uctive reasoning – Probabilistic reasoning: Enumerative Proba n Probability – Fuzzy Probability – Uncertainty methods - Evidenc – Knowledge Engineering.	abilities ce-based	 Subjective reasoning – 	Bay Intel	/esia ligen	n viev t Agei	w – Belief nt – Mixed-			
Unit – II Methodology and Modeling 9											
Conventional Design and Development – Development tools and Reusable Ontologies – Agent Design and Development using Learning Technology – Problem Solving through Analysis and Synthesis – Inquiry-driven Analysis and Synthesis – Evidence-based Assessment – Believability Assessment – Drill-Down Analysis, Assumption-based Reasoning, and What-If Scenarios.											
Unit - III Ontologies - Design and Development 9											
Conce Inherita Develo	pts and Insta ance – Conce opment – Dom	nces – Generalization Hierarchies – Object Features – Defininepts as Feature Values – Ontology Matching. Design and Deviain Understanding and Concept Elicitation – Modelling-based O	ng Featu relopmer ntology \$	ures – Repre nt Methodolog Specification.	sent gies	ation – St	– Tra eps ir	ansitivity – 1 Ontology			
Unit –	IV	Reasoning with Ontologies and Rules						9			
Produc Evider Learne	ction System / ice-based hyped d Knowledge	Architecture – Complex Ontology-based Concepts – Reduction a pothesis analysis – Rule and Ontology Matching – Partially Le	and Synt earned k	hesis rules ar Knowledge –	nd th Rea	e Infe Isonii	erenco ng wit	e Engine – th Partially			
Unit –	V	Learning and Rule Learning						9			
Machir Learni	ne Learning – ng and Proble	Concepts – Generalization and Specialization Rules – Types – m Solving – Rule learning and Refinement – Overview – Rule G	Formal eneratio	definition of 0 n and Analys	Gene is — I	raliza Hypo	ation. thesis	Modelling, Learning.			
								Total:45			
TEXT	BOOK:										
1.	 Gheorghe Tecuci, Dorin Marcu, Mihai Boicu, David A. Schum, "Knowledge Engineering Building Cognitive Assistants for Evidence-based Reasoning". 1st Edition. Cambridge University Press. 2016. 										
REFE	RENCES:										
1.	Ronald J. B 2004.	rachman, Hector J. Levesque, "Knowledge Representation and F	Reasonir	ng", 1 st Editio	n, Mo	orgar	n Kaul	fmann,			
2.	Ela Kumar,	"Knowledge Engineering", Dreamtech Press, 2019.									

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	apply probabilistic reasoning under uncertain conditions	Applying (K3)
CO2	apply learning methodologies and modelling for agent design and development	Applying (K3)
CO3	develop ontologies using concepts and instances	Applying (K3)
CO4	make use of ontologies and rules for reasoning	Applying (K3)
CO5	Utilize machine learning to model rule learning and refinement	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
I														

ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
CAT1	40	50	10				100					
CAT2	40	50	10				100					
CAT3	40	50	10				100					
ESE 30 50 20 1												
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22ITE11 - 5G WIRELESS NETWORK	S									
Progra Branch	ımme & 1	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit				
Prereq	uisites	Nil	6	PE	3	0	0	3				
		· · · · · · · · · · · · · · · · · · ·										
Pream	ble	To understand the basics of channel modeling, Mobile Communand Interference Management systems.	nication	Systems, Rad	dio A	Acces	s Net	works				
Unit –		Introduction and 5G channel modelling and use cases						9				
Historic machin plane -	cal backgrour le-type comm Localized co	nd-Rationale of 5G - Use cases and requirements - system co nunication - Ultra-reliable machine-type communication - Dynam ntents and traffic flows - Spectrum toolbox	ncept - ic radio	Extreme mob access netwo	oile t ork -	oroad Lear	band i syste	- Massive em control				
Unit – II Architecture 9												
Introdu Functic coordir Massiv	ction - NFV a onal split crite nation features e MTC.	and SDN - Basics about RAN architecture- High-level requireme eria- alternatives-Functional optimization- Integration of LTE s- Physical architecture and 5G deployment Machine-type comm	ents- Fui and nev nunicatio	nctional archi w air interfac ns: Fundame	tectu ce- I ental	ure a Enha tech	nd 5G nced niques	i flexibility- Multi-RAT s for MTC-				
Unit – III Device-to-device (D2D) communications& MIMO 9												
D2D: 4 system and wit	G to 5G- star design – exa h network as	dardization- research challenges- Radio resource management imple-Multi-hop communications - National security and public sa sistance. Massive multiple-input multiple-output (MIMO) systems	- RRM te afety req :: Introdu	echniques for uirements- D uction - Theore	mol evic etica	oile b e diso I bac	roadb covery kgrou	and D2D- / without nd.				
Unit –	IV	Radio-access technologies						9				
Access dense	design princ deployments	ciples for multi-user communications - Multi-carrier with filtering - Radio access for V2X communication- Radio access for massiv	j- Non-o ve mach	rthogonal sch ine type comr	neme nuni	es- R catio	adio : n.	access for				
Unit –	V	Interference management, mobility management, and Spec	ctrum					9				
Networ Introdu	k deploymen ction - 5G spe	t types - Interference management -Mobility management - I ectrum landscape and requirements - access mode - technologie	Dynamic es	network rec	onfi	gurat	on -	Spectrum:				
								Total:45				
TEXT E	BOOK:											
1.	Afif Osseira Cambridge	n, Jose F. Monserrat, Patrick Marsch, "5G Mobile and Wireless C University Press, 2016	Commun	ications Tech	nolc	gy",	1 st Ed	ition,				
REFER	RENCES:											
1.	Erik Dahlma Elsevier, 20	n, Stefan Parkvall, Johan Skoʿld, "5G NR: The Next Generation 15.	Wireless	S Access Tech	nnol	ogy",	1 st Eo	dition,				
2.	Christopher	Cox , "An Introduction to 5G: The New Radio, 5G Network and E	Beyond",	1 st Edition, W	'iley	publi	cation	,2020				

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	explore the channel models and the use cases for 5G	Applying (K3)
CO2	interpret and explain 5G architecture, its components and functional criteria.	Applying (K3)
CO3	elaborate the device to device (D2D) communication , standardization and MIMO	Applying (K3)
CO4	illustrate the in-depth functioning of 5G radio access technologies	Applying (K3)
CO5	apply interference management, mobility management and spectrumtechniques in 5G.	Applying (K3)
1		

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	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
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ASSESSMENT PATTERN - THEORY								
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %	
CAT1	30	50	20				100	
CAT2	30	50	20				100	
CAT3	30	50	20				100	
ESE	30	50	20				100	
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)								
		22ITE12 - CRYPTOGRAPHY AND NETWORK		RITY				
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Progra Branc	amme & h	B. Tech & Information Technology	Sem.	Category	L	т	P 0 erconnect informatio Wodel for Standard otographic age Authe unctions: H ature Alg stribution o thenticatio on.	Credit
Prerec	quisites	Computer Networks	6	PE	3	0	0	3
Pream	ble	This course describes the explosive growth of security in content of the security and communicated using cryptographic systems.	omputer ations a	systems and nd individuals	thei s on	r inte the in	rconne forma	ections via tion stored
Unit -		Symmetric Ciphers						9
Compu Securit cipher	uter Security ty – Classical operation.	Concepts – The OSI Security Architecture – Security Attacks – encryption techniques – Block ciphers and Data Encryption Sta	- service: andard –	s and mechai Advanced Ei	nism ncryp	s – M otion S	odel f Standa	or Network ard – Block
Unit -	11	Asymmetric Ciphers						9
Public – Ellipt	key cryptogra ic Curve Arith	phy and RSA – Other Public key cryptosystems – Diffie-Hellmar ametic – Elliptic Curve Cryptography.	n Key Exc	change – Elga	imal	Crypt	ograp	hic System
Unit -		Cryptographic Data Integrity Algorithms						9
Crypto Functio Digital Elliptic	graphic hash ons – Requir signatures: I Curve Digita	functions – Message authentication codes: Message Authent ements for Message Authentication Codes – Security of MAC Elgamal Digital Signature Scheme – Schnorr Digital Signature I Signature Algorithm.	ication R s – MA0 e Schem	equirements Cs Based on e – NIST Dig	– M Has jital	essag h Fun Signa	e Aut Ictions ture A	hentication s: HMAC – Algorithm –
Unit -	IV	Mutual Trust and User authentication						9
Key m keys – symme	anagement a X.509 Certif etric and asyn	nd distribution: symmetric key distribution using symmetric an icates – Public key infrastructure – Remote user authenticatio nmetric encryption – Kerberos – Federated identity management	d asymn n princip nt – Pers	netric encrypt les – Remote onal identity	ion - : use /erifi	- Disti er auth cation	ributio nentica	n of public ation using
Unit - '	V	Network and Internet Security						9
Networ securit	rk access co y	ntrol and cloud security - Transport level security - Wireless	network	security – El	ectro	onic m	nail se	ecurity – IP
								Total:45
TEXT	BOOK:							
1.	William Sta	llings, "Cryptography and Network Security", 7 th Edition, Pearso	n Educat	tion, New Del	ni, 2	017.		
REFE	RENCES:							
1.	Behrouz A Education,	. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and N India, 2015.	etwork \$	Security", 3 rd	Editi	on, T	ata M	lcGraw-Hill
2.	Charles P F	Teeger, "Security in Computing", 5 th Edition, Prentice Hall of Ind	ia, New I	Delhi, 2015.				

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	apply symmetric key cryptography techniques to solve real world problems	Applying (K3)
CO2	apply various public key cryptography techniques to real case scenarios	Applying (K3)
CO3	demonstrate hashing and digital signature techniques to solve the problems	Applying (K3)
CO4	illustrate various mutual trust and User authentication mechanisms	Applying (K3)
CO5	make use of the different Security Protocols and standards for various layers of wired and wireless networks	Applying (K3)

						Mappin	g of CO	s with	POs an	d PSOs	6				
	COs/POs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3	2	1	1		3	3	3	2	2	3		3	2
	CO2	3	2	1	1		3	3	3	2	2	3		3	2
	CO3	3	2	1	1		3	3	3	2	2	3		3	2
	CO4	3	2	1	1		3	3	3	2	2	3		3	2
	CO5	3	2	1	1		3	3	3	2	2	3		3	2
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	ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1 20 40 40 11														
CAT2	20	40	40				100							
CAT3	30	40	30				100							
ESE 20 40 40 100														
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)														

		22ITE13 - DEEP LEARNING										
Progra	amme &	D. Task & Information Task as land	0	0-1		-	-	One allit				
Brancl	h	B. Tech & Information Technology	Sem.	Category	L	I	Р	Credit				
Prereq	uisites	Machine Learning	6	PE	3	0	0	3				
Pream	ble	This course provides an introduction to machine learning, ne also helps to understand and solve few real world problems us	ural netw sing deep	orks, and dee	ep le	arnin	g tec	hniques. It				
Unit - I		Overview of Machine Learning						9				
Learning Algorithms – Capacity, Overfitting and Underfitting – Hyperparameters and Validation Sets – Estimators, Bias and Variance – Bayesian Estimates – Maximum Likelihood Estimation – Supervised Learning Algorithms – Unsupervised Learning Algorithms – Stochastic Gradient Descent – Building a Machine Learning Algorithm – Challenges Motivating Deep Learning.												
Unit - II Deep Feed forward Networks 9												
Learning XOR problems – Gradient based learning – Hidden lists – Architecture design – Back propagation and other differential algorithms.												
Unit - I	11	Regularization for Deep Learning						9				
Paramo Stoppin	eter Norm Penne ng – Paramet V Drivolution Opulation Opulation	enalties – Dataset Augmentation – Noise Robustness – Semi-Su ter Tying and Parameter Sharing – Bagging and Other Ensemble Convolution Networks Deration – Motivation – Pooling – Variants of the Basic Convo	pervised e Method lution Fu	Learning – M ls – Dropout - nction – Stru	ulti-1 - Adv	Task ∣ versa ed Ou	Learni rial Tr itputs	ing – Early raining. 9 - Efficient				
Unit - V	V	Sequence Modeling - Recurrent and Recursive Nets	1 1000					9				
Recurr Networ Proces	ent Neural N rks – Recursi ssing.	Vetworks – Bidirectional RNNs – Encoder-Decoder Sequence ve Neural Networks – The Long Short-Term Memory and Othe	-to-Sequer Gated	ence Architeo RNNs. Applic	cture atior	s – I is: Na	Deep atural	Recurrent Language				
								Total:45				
TEXT I	BOOK:											
1. Ian Goodfellow, Yoshua Bengio, and Aaron Courvill, "Deep Learning", 1 st Edition, MIT Press, USA, 2016.												
REFERENCES:												
1.	Josh Patter O'Reilly Me	son and Adam Gibsonosh Patterson and Adam Gibson, "Deep L dia, 2017.	earning -	- A Practitione	r's A	ppro	ach",	1 st Edition,				
2.	Indra Den E	Bakker, "Python Deep Learning Cookbook", 1 st Edition, Packt Pu	ıblishing,	2017.								

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	identify features of machine learning algorithms	Applying (K3)
CO2	explain the fundamentals of deep neural networks and solve simple problems	Applying (K3)
CO3	make use of different regularization methods for Deep learning	Applying (K3)
CO4	exemplify the concepts of CNN models and apply it for solving computer vision related problems	Applying (K3)
CO5	explicate the concepts of RNN models and apply it for solving Natural Language processing	Applying (K3)

	Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

	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	20	60	20				100							
ESE 20 60 20 10														
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)														

		22ITE14 – CODING AND SECUR	RITY								
Progra Branch	mme & N	B. Tech & Information Technology	Sem.	Category	L	Т	Р	Credit			
Prereq	uisites	NIL	6	PE	3	0	0	3			
Preamb	ble	This course provides knowledge on basic concepts, policie secure software systems	es, and mech	nanisms in de	signi	ng ar	nd coo	ding			
Unit – I		Introduction						9			
Software security- Security concepts-Security policy-security flaws – vulnerabilities – exploits – mitigation-Cand C++-Development Platforms-operating systems-compilers. Strings: Common String Manipulation Errors-String Vulnerabilities-Process Memory Organization-Stack Smashing- Code Injection- Arc Injection-Mitigation Strategies.											
Unit – I		Pointer Subterfuge						9			
Data Lo Pointers Manage	Data Locations-Function Pointers- Object Pointers-Modifying the Instruction Pointer-Global OffsetTable-The .dtors Section-Virtual Pointers-atexit(), on-exit(), longjmp()-Exception Handling-Mitigation Strategies. Dynamic Memory Management: Common C Memory Management Errors-Doug Lea's Memory Allocator-RtlHeap Mitigation Strategies.										
Unit – I	11	Integer Security						9			
Integer Integer Output	Data types Logic Errors Functions-St	-Integer Conversions-Integer Error Conditions-Integer Ope -Mitigation Strategies. Formatted Output:Variadic Functions ack Randomization-Mitigation Strategies.	erations – Ir Formatted	nteger Vulner Output Funct	abilit ions-	ies- Expl	Non-e oiting	exceptional Formatted			
Unit – I	IV	Concurrency						9			
Introduc Recom Use/Mis Analysi	ction -Time I mended Pra suse Cases- s-Quality Ass	of Check, Time of Use - Files as Locks and File Lo actices: Secure Software Development Principles-System Q Architecture and Design -Off-the-Shelf Software-Compiler surance-Memory Permissions-Defense in Depth-TSP-Secure	ocking-File S Quality Requi r Checks-In e.	System Explo rements Engi put Validatior	neer neer n-Da	/litiga ing-T ta Sa	tion hreat anitiza	Strategies. Modeling- ation-Static			
Unit – V	V	Proactive Security Development Process						9			
Installin Develoj Privileg	ng a Security pment Proce e-Cryptograp	Culture-The Defender's Dilemma and the Attacker's Advant ss-Security Principles. Language Independent Security Issue phic Foibles Protecting Data-Input checking and canonicaliza	age-Role of es: Appropriation-Databa	Education-In ate Access Co se input.	tegra ontro	ting I-Ru	Secur	rity into the with Least			
								Total:45			
TEXT E	BOOK:										
1.	Robert C. S	eacord, "Secure Coding in C and C++", SEI Series (CERT B	look), Addiso	on-Wesley, 20	006.						
REFER	REFERENCES:										
1.	Mark Dowd Software Vu	, John McDonald, and JustingSchuh, "The ART of Software S Ilnerabilities", Addison Wesley, 2007.	Security Ass	essment: Ide	ntifyi	ng ar	nd Pre	eventing			
2.	Michael Ho	ward and David LeBlanc, "Writing Secure Code", Microsoft P	Press, 2003.								
3.	Tom Gallag	her, Bryan Jeffries, Lawrence Landauer, "Hunting Security B	lugs", Micros	soft Press, 20	06.		_				

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	demonstrate the string manipulation errors, vulnerabilities and mitigation strategies	Applying (K3)
CO2	implement arbitrary memory write exploits, programming defects, vulnerabilities and mitigation strategies in dynamic memory management	Applying (K3)
CO3	interpret the integral security issues, correct and incorrect use of formatted output functions.	Applying (K3)
CO4	demonstrate various vulnerabilities associated with file I/O and specific development practices for improving the overall security in C code	Applying (K3)
CO5	adopt the proactive security development process and language independent security issues	Applying (K3)

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						Mappin	g of CO	s with	POs an	d PSOs	6				
	COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3	2	1	1		3	3	3	2	2	3		3	2
	CO2	3	2	1	1		3	3	3	2	2	3		3	2
	CO3	3	2	1	1		3	3	3	2	2	3		3	2
	CO4	3	2	1	1		3	3	3	2	2	3		3	2
	CO5	3	2	1	1		3	3	3	2	2	3		3	2
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	ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %							
CAT1 10 60 30 1														
CAT2	10	60	30				100							
CAT3	10	60	30				100							
ESE 10 60 30 100														
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)														

22ITE15 - DIGITAL IMAGE PROCESSING FOR COMPUTER VISION											
Progra Branci	imme & n	B.Tech. & Information Technology	Sem.	Category	L	т	Ρ	Credit			
Prereq	uisites	NIL	7	PE	3	0	0	3			
Pream	ole	This course provides the basic knowledge on image processin filtering and wavelet transforms.	g with inf	tensity transfo	orma	tion,					
Unit –		Fundamentals of image processing						9			
What is – elem quantiz	s Digital Image ents of visual ation – some	e Processing (DIP)? – the origins – use of DIP – Fundamental ste perception – Light and the electromagnetic spectrum – Image basic relationship between pixels – Basic mathematical tools us	eps – cor sensing sed in DI	nponents of ir and acquisiti P.	nage ion -	e proc -Imag	cessin je sar	ig systems npling and			
Unit –	11	Intensity transformation and spatial filtering						9			
Backgr – Highp	Background - Basic intensity transformation functions – Histogram processing – Fundamentals of spatial filtering – Lowpass filtering – Highpass filtering –Bandpass and Band reject filtering from lowpass filters – Combining spatial enhancement methods.										
Unit –		Filtering in the frequency domain						9			
Backgr two var filtering	ound – Prelin iables – Prop I – Fast Fouri	ninary concepts – Sampling and the FT of sampled functions – D erties of 2D DFT and 1D DFT – Image smoothing – Filters – Imag er Transforms.	OFT of or ge sharp	ne variable – ening using h	Exte ighp	nsion ass fi	s to fu Iters -	unctions of - Selective			
Unit –	IV	Color image processing and wavelet transforms						9			
Color for Image the tim Transfor	undamentals smoothing an e-frequency orm – Wavele	 Color models – Pseudo-color image processing – Full color im d sharpening – Using colors in image segmentation. Matrix base blane – Basis images – Fourier related transforms – Walsh Ha t Transform 	age proc ed transf adamard	essing – Colo orms – Corre transforms –	or tra latio - Sla	insfor n – B int Tr	matio asis fi ansfo	ns – Color unctions in rm – Haar			
Unit –	V	Image compression and watermarking						9			
Fundar – Bit-pl	mentals – Hul ane coding –	ffman coding – Golomb coding – Arithmetic coding – LZW codin Block transform coding – Predictive coding – Wavelet coding –	ng – Run Digital im	-length codin	g – S arkin	Symb g	ol bas	sed coding			
								Total:45			
TEXT E	BOOK:										
1.	Rafael Gonz	zalez, Richard E. Woods, "Digital Image Processing", 4 th Edition,	, Pearsoi	n Education, I	New	York	, 2018	3			
REFER	RENCES:										
1.	Anil K. Jain,	"Fundamentals of Digital Image Processing", 1st Edition, Pearso	on, India,	2015							
2.	2. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image processing analysis and machine vision", 4 th edition, Cengage Learning, 2015										

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	use basic mathematical tools for image processing operations	Applying (K3)
CO2	apply intensity transformation and perform spatial filtering	Applying (K3)
CO3	illustrate filtering in the frequency domain using Fourier Transforms	Applying (K3)
CO4	manipulate color images and make use of Wavelet transforms	Applying (K3)
CO5	make use of image compression and digital image watermarking	Applying (K3)
1		

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	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	60	20				100		
* ±3% may be varied (C	CAT 1,2,3 – 50 mark	s & ESE – 100 mar	ks)	<u>. </u>					

				2	22ITE	E16 -	- SO	OFT	TW	/AR	ΕT	ES	TING	G									
Progran Branch	nme &	B. Tech &	Informati	ion Teo	chno	ology	у								Sem.	C	ateg	jory	L	т	Р		Credit
Prerequ	isites	Software	Engineeri	ng											7		PE		3	0	0		3
Preambl	e	This course provides an introduction to software testing with an emphasis on how to perform the various testing process and automated testing using open source tools											ous										
Unit - I		Basics of	Software	Testin	ng																		9
Introduct software methodo	tion- Definiti testing-sali ologies – Sk	tion - Testing lient features kills required	Approact of good t by Tester.	hes-Es testing∙	ssentia J- Cha	ials of alleng	of so nges-	oftw s- Te	ware Test	re Te t tea	esti am	ng - app	–Imj proa	porta ch -	int Fe Cost	eatu of t	res o estin	f tes g- Ca	ting p atego	oroce ories	ss- F of de	Prin efec	nciples of ct – Test
Unit - II		Software	Testing E	nviron	nment	nt																	9
Assessir the softw Process	ng Capabiliti vare testing	ties, Staff Co g process –	mpetency Festing Gu	, and L uideline	User S es. O	Satist Overvie	sfacti /iew	tion of t	n-Ci the	Crea e So	iting oftw	g an /are	env Tes	viron sting	ment proc	sup ess	porti The	ve of sev	softv en S	ware tep S	testir Softw	ng are	-Building e Testing
Unit - III		Testing P	rocess																				9
Organizi Procedu	ng for testir re -Validatio	ng- Workber on testing-W	ch- Proce orkbench-	dure, [Proced	Devel dure	eloping	ng th	he te	test	st pla	an-\	Wor	rkbe	nch-	Proc	edu	re, V	erific	atior	test	ng- \	No	orkbench-
Unit - IV		Testing P	rocess																				9
Analyzin Software	g and repo Testing	orting test re	sults-Worl	kbench	n-Proc	cedur	ure, T	Tes	estin	ng s	soft	ware	e sy	/sten	n sec	urity	- Us	ing <i>i</i>	Agile	Metl	nods	to	improve
Unit - V		Testing P	rocess an	d Tool	ls																		9
Testing of finder -E Overview a test su	client/server Basic test so w of Seleniu ite for any to	r systems- T suits -Locato um WebDrive two web sites	esting web Types: Il er. Case S s -Write an	b-based D, Clas tudy - nd test a	d syst issNai Using a prog	stems, ame, l ig Sele ogram	s, Se Nan eleniu m to l	elen me, ium logi	eniur e, Li n IDI gin a	ım: I ₋ink DE, V a sp	Intro Te> Writ peci	oduo xt, > te a ific \	ctior XPa ⁻ test web	h- Hi th-C t suit pag	story- SS S e cor e	Sel elec itain	eniui tor - ing r	m IDI Loca ninim	E- Ba ting um 4	isic II elem I test	DE Sents case	crip in es ·	ot -XPath browser. -Conduct
																							Total:45
TEXT B	OOK:																						
1.	Limaye M.G	G., "Software	Testing -F	Principl	les, T	Techn	nique	les a	and	nd To	ools	s", 1	l st Re	eprin	t, Tat	a Mo	Gra	w-Hil	I, 200)9. (F	or U	nit	I)
2.	Perry Willia	am, "Effective	Methods	for Sof	ftware	re Tes	sting	g", 3	3 rd E	Edit	tion,	, Wi	iley	India	, Rep	orint	2013	8. (Fc	r Un	its II,	III, I\	/, \	√)
REFERE	ENCES:																						
1.	David Burns	s, "Selenium	2 Testing	Tools	– Beę	eginne	iers (Gui	uide'	e", 2'	nd Eo	ditio	on, F	Packt	Pub	ishiı	ng, U	K, 20)12				
2.	RajaniRenu Delhi, 2017	u and Oak Pr	adeep, "S	oftware	e Tes	sting E	Effe	ectiv	ive I	Met	thoc	ds: 1	Tool	s an	d Teo	hnic	lues'	', Tat	a Mo	Grav	/-Hill,	, N	ew
3.	Gopalswam Education, I	ny Ramesh a New Delhi, 2	nd Sriniva 014	isan De	esikar	an, "So	Softw	ware	re T	Festi	ing:	: Pri	incip	les a	and P	ract	ces"	, 6 th I	mpre	ssior	n, Pe	ars	son
1																							

SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
make use of the features, approaches and methodologies of software testing.	Applying (K3)
apply the step by step activities and set up environment for software testing.	Applying (K3)
develop procedures and workbenches for various testing processes.	Applying (K3)
identify the agile methods for improving the testing process and apply testing for client server, web based and software security systems.	Applying (K3)
use selenium tool to perform automated testing.	Applying (K3)
	SE OUTCOMES: mpletion of the course, the students will be able to make use of the features, approaches and methodologies of software testing. apply the step by step activities and set up environment for software testing. develop procedures and workbenches for various testing processes. identify the agile methods for improving the testing process and apply testing for client server, web based and software security systems. use selenium tool to perform automated testing.

	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	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
		_				_								

ASSESSMENT PATTERN - THEORY									
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %		
CAT1	30	50	20				100		
CAT2	20	40	40				100		
CAT3	20	40	40				100		
ESE	20	40	40				100		
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)									

22ITE17 - NATIVE MOBILE APPLICATION DEVELOPMENT											
Progra Branc	amme& h	B.Tech – Information Technology	Sem.	Category	L	т	Ρ	Credit			
Prerec	uisites	Java and Kotlin	7	PE	3	0	0	3			
Preamble This course provides knowledge on developing mobile applications using Android.											
Unit –		Introduction to Android						9			
Introdu - Andro Log me	iction to Kotlir bid virtual dev essages.	 Android Architecture – Environmental setup – Develop simple ice - Application Components –Toast message - Activity – Activit 	e Hello W ty Life cy	/orld applicati /cle - App Ma	ion – nifes	- App st file	Folde – Pei	r structure missions -			
Unit –		Layout and UI						9			
Intent Radio0 Listene	Intent -types - Intent filters - Views - Layouts - Fragments - UI components:TextView,EditText, Button, ToggleButton, RadioGroup,CheckBox,AutoCompleteTextView,ProgressBar,TimePicker,DatePicker,RatingBar - Array adapters - Spinner -Event Listeners and Handlers										
Unit –	III	Resources and Alerts						9			
Resou receive	rces overview ers - WebView	 A Styles and Themes - Menu: Option menu, Context menu –A A Phone call. 	Alert dial	og - Notificati	on –	- Too	l tip –	Broadcast			
Unit –	IV	Storage						9			
Introdu operati	iction to Stora ions– Depend	ages - Bundle - SQL Lite: CRUD operations - Content provide lency injection.	ers – Sl	nared prefere	ences	s – F	ireba	se: CRUD			
Unit –	V	Services and Sensors						9			
Service Animat	es –Send and tions:rotate, fa	d receive SMS –Sensors: Motion and Position -Camera – Acc ade, zoom, slide and move–Google map integration – Best practi	cessing ices.	geo location	– JS	SON	parsi	ng - Basic			
								Total:45			
TEXT	BOOKS:										
1.	Dawn Griffit	hs and David Griffiths, "Head First Android Development", 3 rd Ed	lition, OF	Reilly, 2021.							
REFE	RENCES:										
1.	1. Bill Phillips, Chris Stewart and Kristin Marsicano, "Android Programming", 3 rd Edition, BigNerd Ranch Guides, 2017.										
2.	https://deve	loper.android.com									

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Illustrate the steps to create android application and discuss its activity life cycle	Applying (K3)
CO2	develop an Android application using Layouts, Fragments, UI components with event handling	Applying (K3)
CO3	design styles, themes, alerts and menu	Applying (K3)
CO4	perform CRUD operations on SQLite and firebase.	Applying (K3)
CO5	create applications using services and access data from sensors	Applying (K3)

Mapping of COs with POs and PSOs	
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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	3	3	3	3	2	2	3		3	2
CO2	3	2	1	1	3	3	3	3	2	2	3		3	2
CO3	3	2	1	1	3	3	3	3	2	2	3		3	2
CO4	3	2	1	1	3	3	3	3	2	2	3		3	2
CO5	3	2	1	1	3	3	3	3	2	2	3		3	2

ASSESSMENT PATTERN - THEORY										
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %			
CAT1	30	30	40				100			
CAT2	20	40	40				100			
CAT3	20	40	40				100			
ESE 25 35 40 100										
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)										

22ITE18 - SOFTWARE DEFINED NETWORKS										
Progra Brancł	imme & n	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit		
Prereq	uisites	Computer Networks	7	PE	3	0	0	3		
Pream	ble	This course deals with the concepts of Software Defined Networ	rking and	l its use cases	s in v	ariou	is env	ironments.		
Unit - I		Introduction to SDN						9		
Basic packet switching terminology – The modern data center – Traditional switch architecture – Autonomous and dynamic forwarding table. Why SDN?: Evolution of switches and control planes – Cost-Data center innovation – Data center needs. The Genesis of SDN: The evolution of networking technology – Forerunners of SDN										
Unit - I	I	SDN and OpenFlow						9		
How SDN works: Fundamental characteristics of SDN – SDN operation – SDN devices – SDN controllers – Alternate SDN methods. The OpenFlow specification: OpenFlow overview – OpenFlow 1.0 and OpenFlow basics – OpenFlow 1.1, 1.2 &1.3 Additions – OpenFlow Limitations.										
Unit - I		SDN Definitions & open source						9		
Potenti Functic code – Tools –	al drawbacks ons virtualizat Switch imple - OpenStack	of open SDN – SDN via APIs – SDN via hypervisor-based overla ion – Alternatives overlap and ranking. SDN open source: Ope ementation – Controller implementations – Orchestration and N – Applying SDN open source.	ays – SD en source letwork v	N via opening e licensing is: rirtualization -	g up f sues - Sim	he d – O nulati	evice penFl on, T	 Network ow source esting and 		
Unit - I	V	SDN in Data Center						9		
Data ce SDN a Overlay	enter definitio nd shortest p ys in the data	n – Data center demands – Tunneling technologies for the data ath complexity – Ethernet fabrics in the data center – SDN use center – Real-world data center implementation.	a center- e cases i	Path technole n the data ce	ogies nter	in tł – Op	ne da ben S	ta center – DN versus		
Unit - V	/	SDN Environments and Applications						9		
SDN in other environment: Wide area networks – Service provider and carrier networks – Campus networks – Hospitality networks – Mobile networks – Optical networks. SDN Applications: Reactive versus Proactive applications – A simple reactive Java application – Creating network virtualization tunnels – offloading flows in the data center – Access control for the campus – Traffic engineering for the service providers.										
								Total:45		
TEXT BOOK:										
1. Paul Goransson and Chuck Black, "Software Defined Networks: A Comprehensive Approach", 2 nd Edition, Morgan Kaufmann, USA, 2017.										
REFERENCES:										
1.	Bruce Davie	e, "Software-Defined Networks ", 1 st Edition, Systems Approach I	LLC, 202	21						
2. Thomas D. Nadeau, Ken Gray, "SDN: Software Defined Networks", 1 st Edition, O'Reilly Media, 2013										

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	identify the concepts of traditional networks and software defined networks	Applying (K3))
CO2	model a networking task using OpenFlow	Applying (K3)
CO3	make use of SDN APIs and open-source tools	Applying (K3)
CO4	utilize SDN in the data center	Applying (K3)
CO5	develop various applications of SDN	Applying (K3)
1		

	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	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

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

22ITE19 - VIDEO ANALYTICS										
Progra Branch	mme & 1	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit		
Prereq	uisites	Nil	7	PE	3	0	0	3		
Pream	ole	This course aims to provide a broad view on processing and an	nalyzing	images and v	video).		•		
Unit - I Introduction 9										
Deep Neural Networks – Introduction to Tensor flow – Keras Deep Learning library – OpenCV Library - Hand Written Number Recognition with Keras and OpenCV										
Unit - I	l	Convolutional Neural Network for Computer Vision						9		
Convol and eva	ution Neural I aluating CNN	Network – CNN architectures and drawbacks of DNN- convolutior – model performance optimization – ImageNet – LeNet – AlexN	n and poo let – VG	oling operatio GNet – Goog	ns in leLE	tenso Net -	or flov · Resl	v – training Net.		
Unit - III Feature extraction, object detection and segmentation 9										
detection Fast R segment	on and image -CNN – fast ntation with C	classification - Traditional, nonCNN approaches to object deteregion-based CNN - Faster R-CNN – faster region proposal r	ection - F network-I	R-CNN – Reg based CNN -	ions Mas	with k R-0		features - - Instance		
Unit - I	V	Generative Models						9		
Pix2pix style tra	: - Image-to-Ir ansfer – gene	nage translation - GAN – code example – feature matching –ap rative adversarial networks – visual dialogue model.	plication	s of generativ	e mo	odels	– nei	ural artistic		
Unit - \	1	Video Classification						9		
Unders classify videos.	tanding and ring videos –	classifying videos – exploring video classification dataset – s extending image based approaches to videos: Regressing the	splitting human	videos in to to pose- segme	frame	es – vide	appro os – g	baches for generating		
								Total:45		
TEXT E	BOOK:									
1. Mohit Sewak, Md. Rezaul Karim and Pradeep Pujari, "Practical Convolutional NeuralNetworks", Packt Publishing, 2018. (For Units I,II,III)										
2. Rajalingappaa Shanmugamani, "Deep Learning for Computer Vision", Packt Publishing, 2018. (For Units IV,V)										
REFERENCE BOOKS:										
1.	D. L. Baggio	et al., "Mastering OpenCV with Practical Computer Vision Proje	ects", Pa	ckt Publishing	g, 20	12.				
2.	Jan Erik Solem, "Programming Computer Vision with Python: Tools and algorithms for analyzing images", O'Reilly Media, 2012.									

COUR On co	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	make use of the basic concepts of image processing and its libraries	Applying (K3)
CO2	interpret the various CNN models used for image analytics	Applying (K3)
CO3	apply the various levels of segmentation and interpret the results for object detection and feature extraction.	Applying (K3)
CO4	make use of the GAN model to solve the real world problems.	Applying (K3)
CO5	identify various approaches for classifying and segmenting videos.	Applying (K3)
1		

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	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	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	40	40				100	
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)								

22ITE20 – CONTEMPORARY CRYPTOGRAPHY										
	Programmo 8									
Progra Branch	mme & າ	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit		
Prereq	uisites	Cryptography and Network Security	7	PE	3	0	0	3		
Pream	ble	This course enables the students to focus on how cryptographic them to build provably secure encryption and digital signatures	c algorith	ims and proto	cols	work	and h	now to use		
Unit - I		Cryptographic Protocols						9		
Key Exchange and Entity Authentication- Identification Schemes- Commitment Schemes- Electronic Elections - Digital Cash- Probabilistic Algorithms										
Unit - I	1	One-Way Functions						9		
Discret Formal Pseudo	e Exponentia Definition of prandomness	Function- Uniform Sampling Algorithms- Modular Powers- Mod One-Way Functions- Hard-Core Predicates- Bit Security of C	ular Squ Dne-Way	aring- Quadra	atic F One	Resid -Way	uosity Fund	Property- ctions and		
Unit - I	11	Provably Secure Encryption and Digital Signatures						9		
Eavesc - Uncor -Claw-F Unit - I Target and Cd Improve Securit Comprove Unit - V How Qu The Th Grover Cryptog	Classical Information-Theoretic Security- Perfect Securey and Probabilistic Attacks- Public-Key One-Time Pads- Passive Eavesdroppers - Chosen-Ciphertext Attacks- A Security Proof in the Random Oracle Model - Security Under Standard Assumptions - Unconditional Security of Cryptosystems- The Bounded Storage Model -The Noisy Channel Model- Attacks and Levels of Security -Claw-Free Pairs and Collision-Resistant Hash Functions- Authentication-Tree-Based Signatures - A State-Free Signature Scheme.Unit - IVTransport Layer Security(TLS)9Target Applications and Requirements-The TLS Protocol Suite- The TLS and SSL Family of Protocols- TLS in a Nutshell- Certificates and Certificate Authorities-The Record Protocol-The TLS Handshake Protocol- TLS 1.3 Cryptographic Algorithms-TLS 1.3 Improvements over TLS 1.2- Downgrade Protection-Single Round-Trip Handshake- Session Resumption- The Strengths of TLS Security-Authentication-Forward Secrecy-How Things Can Go Wrong-Compromised Certificate Authority-Compromised Server- Compromised Client-Bugs in Implementations9Unit - VQuantum and Post-Quantum Guantum Bits- Quantum Gates- Quantum Speed-Up-Exponential Speed-Up and Simon's Problem- The Threat of Shor's Algorithm- Shor's Algorithm- The Factoring Problem- Shor's Algorithm and the Discrete Logarithm Problem- Grover's Algorithm- Why Is It So Hard to Build a Quantum Computer?- Post-Quantum Cryptographic Algorithms- Code-Based Cryptography- Lattice-Based Cryptography-Multivariate Cryptography- Hash-Based Cryptography									
TEVT										
	JUON.		A malia - 4		4:	Crari		(arlar		
1.	2007. (For L	Inits I, II, III)	Applicat	lions", Z ^{ha} Edi	tion,	Sprir	nger v	reriag,		
2. Wenbo Mao, "Modern Cryptography: Theory and Practice", Prentice Hall, 2003. (For Units IV,V)										
REFERENCES/ MANUAL / SOFTWARE:										
1.	1. Shaffi Goldwasser and Mihir Bellare, Lecture Notes on Cryptography, Available athttp://citeseerx.ist.psu.edu/.									
2.	2. Oded Goldreich, "Foundations of Cryptography: Volume II Basic Applications", CRC Press, 2009.									

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	interpret the basic principles of cryptographic protocols	Applying (K3)
CO2	determine the ways of generating one way functions	Applying (K3)
CO3	identify the use of provably secure encryption and digital signatures	Applying (K3)
CO4	articulate the cryptographic algorithms to compose, build and analyze transport layer security	Applying (K3)
CO5	express the use of quantum and post quantum algorithms	Applying (K3)
1		

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	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
					<u> </u>	-								

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

	22GEE01 - FUNDAMENTAL	S OF RESEARCH												
	(Common to All BE/BTech branches)													
Programme & Branch	All BE/BTech branches	Sem.	Category	L	т	Ρ	Credit							
Prerequisites	Nil	7	PE	3	0	0	3							
Preamble	Preamble This course familiarizes the fundamental concepts/techniques adopted in research, problem formulation and also disseminate the process involved in collection, consolidation of published literature and rewriting them in a presentable form using latest tools.													
Unit – I	nit – I Introduction to Research 9													
Introduction to Research: Types and Process of Research - Outcomes of Research - Sources of Research Problem - Characteristics														
of a Good Research Problem - Errors in Selecting a Research Problem - Importance of Keywords.														
Unit – II Literature Review 9 Literature Review 9														
Literature Review: Literature Collection - Methods - Analysis - Citation Study - Gap Analysis - Problem Formulation Techniques.														
Dessereb Meth	Mesearch Methodology	aioa/Mathada Data	Collection	Drim	0.000	Data	Jan San San San San San San San San San S							
Experimental Me	thods and Result Analysis - Investigation of Solutions	for Research Problem	- Interpretation	n - F	Resea	arch L	imitations.							
Unit – IV	Journals and Papers		t				9							
Journals and Pa Types of Resear	pers: Journals in Science/Engineering - Indexing and ch Papers - Original Article/Review Paper/Short Comr	Impact factor of Jour munication/Case Stud	nals. Plagiari /.	sm a	and R	lesea	rch Ethics.							
Unit – V	Reports and Presentations		<u> </u>				9							
How to Write a I Sub-Headings - PPTs. Research	Report - Language and Style - Format of Project Report Footnotes - Tables and Figures - Appendix - Bibliog Tools.	ort - Title Page - Abstr raphy etc - Different F	act - Table of Reference Fo	Con mate	tents s. Pre	- Hea esenta	adings and ation using							
							Total:45							
TEXT BOOK:														
1. Wallima	n, Nicholas. "Research Methods: The basics". 2 nd edit	ion, Routledge, 2017.,	for Units I, II,	III, I	V & \	/								
REFERENCES:														
1. Mishra,	S.B. and Alok, S. "Handbook of research methodology	/" Educreation Publish	ing, 2017											
2. Kumar, Ranjit. "Research Methodology: A step-by-step guide for beginners". SAGE Publications Limited, 2019.														
3. Nayak, J.K. and Singh, P. "Fundamentals of Research Methodology Problems and Prospects". SSDN Publishers & Distributors, 2021.														

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	list the various stages in research and categorize the quality of journals	Applying (K3)
CO2	formulate a research problem from published literature/journal papers	Evaluating (K5)
CO3	write, present a journal paper/ project report in proper format	Creating (K6)
CO4	select suitable journal and submit a research paper	Applying (K3)
CO5	compile a research report and the presentation	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	1	3	3	1	1	3	3	3
CO2	3	3	3	3	2	1	1	3	3	3	3	3	3	3
CO3	3	3	3	3	3	1	1	3	3	3	1	3	3	3
CO4	3	2	1	1	2	1	1	3	2	1	1	3	3	3
CO5	3	3	2	2	3	1	1	3	3	3	1	3	3	3
1 – Slight, 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		40	50	10			100						
CAT2		30	50	10	10		100						
CAT3		20	30	30	10	10	100						
ESE		40	40	10	10		100						
* ±3% may be varied (CAT 1.2.3 – 50 mark	s & ESE – 100 mai	rks)										

	22ITE21 - ETHICAL HACKING													
Programme Branch	B. Tech & Information Technology	Sem.	Category	L	Т	Р	Credit							
Prerequisite	Computer Networks	7	PE	3	0	0	3							
Preamble This course provides the fundamental knowledge about risks in computer and network security. It also provides information about various vulnerabilities and countermeasures														
Unit - I	Unit - I Penetration Testing 9 Terminologies Categories of Penetration Test, Writing Penetra Structure of a Depatration Testing Penetra Vulnershilling													
Terminologie Assessment Scheduler -L	 Categories of Penetration Test - Writing Reports - Structure of Summary - Risk Assessment – Methodology - Linux Basics: Major Lisers inside of Linux - Common Applications – BackTrack. 	of a Pene inux Oper	etration Testi ating System	ng l s -	Repoi File S	rt - V Structu	'ulnerability ıre - Linux							
Unit - II Information Gathering, Target Enumeration and Port Scanning Techniques 9														
Active , Pass a Response Fierce, Zone –Problem - Intelligence (ve and Sources of information gathering - Copying Websites Locally – WhatWeb –Netcraft - Basic Parameters -Xcode Exploit Scanner - I Fransfer with Host Command and Automation - DNS Cache Snoopir Sniffing Passwords - SolarWinds Toolset -Sweep, Brute Force and athering using Shodan - Target enumeration and Port Scanning Tech	Traceroute nteracting ng-Attack \$ d Dictiona nniques.	e - NeoTrace with DNS Se Scenario - Au ry – Tools -	- Ch erve tom At	eops- rs –N ating tack -	-ng - li Islook Attac - Enu	ntercepting up – DIG - ks - SNMP imeration -							
Unit - III	Vulnerability Assessment & Network Sniffing	•					9							
– Nessus. S Basics – wor Sniffing Pictu MITM Attack	iffing: Types - Hubs versus Switches -Promiscuous versus Nonpron ing – Attacks -DoS Attacks –Dsnifftool - Using ARP Spoof to Perforr es with Drifnet - Urlsnarf and Webspy - Sniffing with Wireshark –E ARP Poisoning with Cain and Abel - Sniffing Session Cookies with V	niscuous I n MITM A ttercap-Al Vireshark	Modes - MITI ttacks - Sniffi RP Poisoning - Hijacking th	M Af ng ti - F e So	ttacks he Tra lijacki essior	s - AR affic w ng Se n.	P Protocol vith Dsniff - ession with							
Unit - IV	Basics of Exploitation		A.(. 1.: NI				9							
Common Ta Exploitation Loaded on U Identifying ar	B Remote Exploitation -Understanding Network Protocols – Server F get Protocols -Tools for cracking network remote services - Attackin lethods: E-Mails Leading to Malicious Attachments & Malicious Link B Sticks - Postexploitation:Acquiring Situation Awareness - Privilege d Exploiting Further Targets.	ng SMTP s - Compi Escalatio	Attacking Ne - Attacking S romising Clie on - Maintaini	atwo iQL nt S ng A	ide U	ers - (pdate s - Da	Client Side - Malware ta Mining -							
Unit - V	Wireless & Web Hacking						9							
Wireless Hau Airodumping Aircracking- Attacks - Typ Cookie Hand	king - Requirements -Aircracking- Hidden SSIDs - Monitor Mode - Wireless Adapter in Monitor Mode - Determining the Target - C apturing Packets and Four-Way Handshake. Web Hacking:Attacking es of Authentication - Crawling Restricted Links - Testing for the Vu ng - SQL injection - XSS – DOM based XSS,BeEF – CSRF - Bypassi	Monitoring racking a the Auth Inerability ing CSRF	y Tool- Beace WPA/WPA2 entication - B - Authenticat and BeEF wi	on F Wi rute ion th X	rame reless Forc Bypa SS.	es on Netve and ss wit	Wireshark, work using Dictionary h Insecure							
							Total:45							
TEXT BOOK														
1. Rafa	Baloch, "Ethical Hacking and Penetration Testing Guide", 1 st Edition	n, CRC Pre	ess, 2015.											
REFERENC	S:													
1. Sea	Philip Oriyano, "CEH v9: Certified Ethical Hacker Version 9", 3rd Edit	ion, Wiley	publication, 2	2016	δ.									
2. Stua Grav	2. Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed 7: Network Security Secrets & Solutions", Tata Mc Graw Hill Publishers, 7 th Edition, 2012.													
3. EC-	Council, "Ethical Hacking and Countermeasures: Attack Phases", Cer	ngage Lea	rning, 2009.											

COUR On co	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Illustrate about penetration testing, vulnerabilities and risks available in a system and explain about linux operating system	Applying (K3)
CO2	outline about gathering information and execution of enumeration and scanning to identify various types of vulnerabilities and attacks.	Applying (K3)
CO3	interpret various vulnerabilities and apply suitable tools to carry out sniffing in the networks	Applying (K3)
CO4	make use of the exploitation available in network protocols, servers, clients, services and USBs.	Applying (K3)
CO5	demonstrate how to execute wireless and web hacking using appropriate tools	Applying (K3)

Mapping of COs with POs and PSOs													
PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
3	2	1	1	3	3	3	3	2	2	3		3	2
3	2	1	1	3	3	3	3	2	2	3		3	2
3	2	1	1	3	3	3	3	2	2	3		3	2
3	2	1	1	3	3	3	3	2	2	3		3	2
3	2	1	1	3	3	3	3	2	2	3		3	2
	PO1 3 3 3 3 3 3 3	PO1 PO2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2	PO1PO2PO3321321321321321	PO1PO2PO3PO432113211321132113211	PO1 PO2 PO3 PO4 PO5 3 2 1 1 3 3 2 1 1 3 3 2 1 1 3 3 2 1 1 3 3 2 1 1 3 3 2 1 3 3 3 2 1 3 3 3 2 1 3 3 3 2 1 3 3	PO1 PO2 PO3 PO4 PO5 PO6 3 2 1 1 3 3 3 2 1 1 3 3 3 2 1 1 3 3 3 2 1 1 3 3 3 2 1 1 3 3 3 2 1 1 3 3 3 2 1 1 3 3 3 2 1 1 3 3 3 2 1 1 3 3	PO1 PO2 PO3 PO4 PO5 PO6 PO7 3 2 1 1 3 3 3 3 2 1 1 3 3 3 3 2 1 1 3 3 3 3 2 1 1 3 3 3 3 2 1 1 3 3 3 3 2 1 1 3 3 3 3 2 1 1 3 3 3 3 2 1 1 3 3 3 3 2 1 1 3 3 3	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 3 2 1 1 3 3 3 3 3 2 1 1 3 3 3 3 3 2 1 1 3 3 3 3 3 2 1 1 3 3 3 3 3 2 1 1 3 3 3 3 3 2 1 1 3 3 3 3 3 2 1 1 3 3 3 3 3 2 1 1 3 3 3 3 3 2 1 1 3 3 3 3	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 3 2 1 1 3 3 3 2 2 3 2 1 1 3 3 3 3 2 3 2 1 1 3 3 3 2 2 3 2 1 1 3 3 3 2 2 3 2 1 1 3 3 3 2 2 3 2 1 1 3 3 3 3 2 3 2 1 1 3 3 3 3 2 3 2 1 1 3 3 3 3 2 3 2 1 1 3 3 3 3 2	PO1PO2PO3PO4PO5PO6PO7PO8PO9PO10321133322321133322321133322321133322321133322321133322321133322	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 3 2 1 1 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3 3 2 1 1 3 3 <td>PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 3 2 1 1 3 3 3 3 2 2 3 3 2 1 1 3 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3 </td> <td>PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 <</td>	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 3 2 1 1 3 3 3 3 2 2 3 3 2 1 1 3 3 3 3 2 2 3 3 2 1 1 3 3 3 2 2 3	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 3 3 2 1 1 3 3 3 2 2 3 3 <

ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	30	40	30				100						
CAT2	20	40	40				100						
CAT3	20	40	40				100						
ESE	20	40	40				100						
* ±3% may be varied (CAT 1.2.3 – 50 marks & ESE – 100 marks)													

22ITE22 - NATURAL LANGUAGE PROCESSING															
Progra Brancł	mme & າ	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit							
Prereq	uisites	Nil	7	PE	3	0	0	3							
		· ·		L			1	1							
Pream	Preamble This course deals with models which make computers perform useful tasks involving human or natural language - conversational agent - dialogue system - machine translation - question and answering.														
Unit - I	Jnit - I Computer Language Processing and Regular Expressions 9 Describe Expressions 9														
Regular Expressions – words Corpora Text-Normalization Minimum Edit Distance - N-Grams Evaluating Language Models - Sampling sentences from a language model - Generalization and Zeros – SmoothingHuge Language Models and Stupid Backoff - Advanced: Kneser-Ney Smoothing - Advanced: Perplexity's Relation to Entropy															
Unit - I	Unit - II Naïve Bayes Classification and Logistic Regression 9														
Naïve I for othe Cross-v Logistic Logistic Regres	Bayes Classif er text classif validation Sta c Regression c Regression sion - Interpr	 iers - Training the Naïve Bayes Classifier - Worked example - Operation tasks - Naïve Bayesian Language Model - Evaluation: Pretistical Significance Testing - Avoiding Harms in Classification The sigmoid function - Classification with Logistic Regression - The cross-entropy loss function - Gradient Descent - Regeting models. 	otimizing ecision · · Multing ularizati	g for Sentimer - Recall - F-m omial Logistic on - Learning	nt An least Reg g in	alys ire - ress Mul [:]	is - Na Test ion - I tinomi	aïve Bayes sets - and _earning in al Logistic							
Unit - I		Vector Embeddings and Neural Language Models						9							
Lexical Pointwi Seman Neural Feedfo	Semantics - se Mutual In tic properties Networks U rward Neural	Vector Semantics - Words and Vector - Cosine for measuring sin formation (PMI) - Applications of the TD-IDF for PPMI vector m of embeddings - Bias and Embeddings - Evaluating Vector Mod nits - The XOR problem - Feedforward Neural Networks - Fe Language Modeling - Training Neural Nets - Training the neural	nilarity - Iodels - els. edforwa Ianguag	TF-IDF: Weig Word2vec - \ Ird Networks ie model.	phing √isua for I	terr alizin NLP:	ns in t g Em Clas	he vector - beddings - sification -							
Unit - I	V	Sequence Labelling, RNN, and LSTM		, 				9							
English Conditi Models Archite	Word Class onal Random - RNNs for ctures - The	es - Part-of-Speech Tagging - Named Entities and Named Entities (CRFs) and Evaluation of Named Entity Recognition. Re other NLP tasks - Stacked and Bidirectional RNN architectures Encoder-Decoder Model with RNNs - Attention.	tity Tage current - The L	ging - HMM F Neural Netwo STM - Summ	Part- orks - nary:	of-Sp RN Cor	beech Ns as nmon	Tagging - Language RNN NLP							
Unit - \	/	Transformer and Pretrained Language Models						9							
Self-At Models Trainin	tention Netwo - Language g Bidirectiona	orks: Transformers - Transformers as Language Models - Samplin Models for Zero-shot Learning. Potential Harms from Language al Encoders - Transfer Learning through Fine-Tuning - Training C	g - Bear Models orpora.	n Search - Pro - Bidirectiona	etraiı I Tra	ning nsfo	Large rmer	Language Encoders -							
								Total:45							
TEXT E	BOOK:														
1.	 Jurafsky Daniel, Martin, James H, "Speech and Language Processing, An Introduction to Natural Language Processing - Computational Linguistics, and Speech Recognition", 3rd Edition, Pearson Education India, 2023. 														
REFER	REFERENCES:														
1.	1. Eisenstein, Jacob, "Natural Language Processing", 1 st Edition, MIT Press, 2019.														
2.	Palash Goy with python	al, Sumit Pandey, Karan Jain, "Deep Learning for Natural Langua ', 1 st Edition, APress, 2018.	age Proo	cessing: Crea	ting	Neui	al Ne	tworks							

COUR On co	COURSE OUTCOMES: On completion of the course, the students will be able to													BT Mapped (Highest Level)			
CO1	sum othe	marize r statist	the con-	cepts in sp hods to cr	eech a eate La	and langua anguage l	age proo Models.	cessing	and ut	ilize regu	ular expre	essions an	d	Applying (K3)			
CO2	mak accu	e use o iracy th	f the Na rough re	ïve Bayes egularizatio	classi on.	fier and Lo	ogistic re	egressio	on on s	tandard	corpora	and improv	/e	Applying	(K3)		
CO3 apply Vector Embedding to words and build Neural Language models. Applying (K3)													(K3)				
CO4solve sequence labeling problems (Named Entity Tagging and POS tagging) using RNN and LSTM.Applying (K3)													(K3)				
CO5 apply the novel Transformers model to train large Language Models. Applying (K3)													(K3)				
Mapping of COs with POs and PSOs																	
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO	CO1 3 2 1 1		1		3	3	3	2	2	3		3	2				
CO	2	3	2	1	1		3	3	3	2	2	3		3	2		
CO	3	3	2	1	1		3	3	3	2	2	3		3	2		
CO	4	3	2	1	1		3	3	3	2	2	3		3	2		
CO	5	3	2	1	1		3	3	3	2	2	3		3	2		
1 – Slię	ght, 2 ·	– Mode	erate, 3 -	- Substant	ial, BT	- Bloom's	Taxono	my									
						ASSES	SMENT	PATTE	ERN - 1	HEORY	,						
Tes C	at / Blo	oom's ory*	R	ememberi (K1) %	ng	Understa (K2)	anding %	Apply (K3)	ying) %	Analyz (K4) 9	ing l %	Evaluating (K5) %	j C	Creating (K6) %	Total %		
	CAT1 30 50 20										100						
	CAT	2		30		40		30)						100		
	CAT	3		30		40		30)						100		
	ESE 30 40 30								100								

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

22ITE23 - SOCIAL NETWORK ANALYSIS													
Programm Branch	e &	B.Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit					
Prerequisit	tes	Machine Learning	7	PE	3	0	0	3					
					1								
Preamble		The course introduces various methods, models and concept also describes about how to manipulate, analyze and visually c	s behind display se	d social netwo ocial network	ork a data	inaly:	sis. T	nis course					
Unit – I		Introduction and Random Walks in Social Networks:						9					
Statistical Properties of Social Networks – Preliminaries – Static Properties – Dynamic Properties – Random Walks on Graphs: Background – Random Walk based Proximity Measures – Other Graph-based Proximity Measures – Graph-theoretic Measures f Semi-supervised Learning – Clustering with random walk based measures – Algorithms – Applications – Evaluation and datasets													
Unit – II		Community Discovery and Node Classification in Social No	etworks	:				9					
Communities in Context – Core Methods – Quality Functions – The Kernighan-Lin(KL) algorithm – Agglomerative/Divisive Algorithms – Spectral Algorithms – Multi-level Graph Partitioning – Markov Clustering – Node Classification in Social Networks: Problem Formulation – Methods using Local Classifiers – Random Walk based Methods – Applying Node Classification to Large Social Networks.													
Unit – III		Social Influence Analysis and Expert Location in Social Ne	tworks:					9					
Influence R Networks: E related app	elated St Expert Lo roaches.	atistics – Social Similarity and Influence – Influence Maximizatio cation without Graph Constraints – Expert Location with Score P	n in Vira Propagat	I Marketing – ion – Expert ⊺	Exp Fean	ert Lo i Fori	ocatio matio	n in Social n – Other					
Unit – IV		Link Prediction and Privacy In Social Networks:						9					
Feature bas Prediction b Probabilistic breaches in	sed Link by Local I c Relation social ne	Prediction – Feature Set Construction – Classification Models – I Probabilistic Models – Network Evolution based Probabilistic Mod nal Models: Relational Bayesian Network – Relational Markov Ne etworks – Privacy definitions for publishing data – Privacy preser	Bayesiar del – Hie etwork – rving me	n Probabilistic trarchical Pro Privacy in Sc chanisms.	: Moo babil ocial	dels - istic l Netw	- Link Model orks:	_ Privacy					
Unit – V		Visualization and Text Mining in Social Networks:	<u> </u>					9					
Structural V Keyword Se graph data	/isualizati earch: Qu – Classif	on – Semantic and Temporal Visualization – Statistical Visualiza uery Semantics and Answer Ranking – Keyword search over XM ication Algorithms – Clustering Algorithms.	ation – To IL and re	ext Mining in lational data	Soci – Ke	al Ne ywor	twork d sea	s: rch over					
								Total:45					
TEXT BOO	K:												
1. Cha	aru C. Aç	garwal, "Social Network Data Analytics", Springer (e book), 201	11.										
REFERENC	CES:												
1. Pet	ter Mika,	"Social Networks and the Semantic Web", 1 st Edition, Springer,	2007.										
2. Boi	rko Furht	, "Handbook of Social Network Technologies and Applications",	1 st Editic	on, Springer, 2	2010								

COUF On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Summarize statistical properties of Social Networks and apply random walk approaches for social network analysis	Applying (K3)
CO2	Make use of statistical methods for classification and community discovery in Social Networks	Applying (K3)
CO3	identify social influence and expert location in Social Networks	Applying (K3)
CO4	Apply statistical methods for link prediction and describe privacy preservation methods in Social Networks	Applying (K3)
CO5	Summarize visualization techinques and apply text mining techniques in Social Networks	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	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	25	40	35				100						
CAT2	25	40	35				100						
CAT2	30	40	30				100						
ESE	ESE 30 40 30 100												
* ±3% may be varied (CAT 1 ,2 & 3 – 50 marks & ESE – 100 marks)													

	22ITE24 - MOBILE AND WIRELESS	SECUR	ITY									
Programme & Branch	B.Tech & Information Technology	Sem.	Category	L	Т	Ρ	Credit					
Prerequisites	Nil	7	PE	3	0	0	3					
		1			1	1						
Preamble	This course aims to focus on the security issues in wireless ne	tworks										
UNIT – I	Introduction to Mobile and Wireless Networks						9					
Cellular Networks, 1G through 3G, IEEE Network - WLAN IEEE 802.11, WPAN IEEE 802.15, WMAN IEEE 802.16, IEEE 802.20, MIH IEEE 802.21, WRAN IEEE 802.22, Mobile Internet Networks – Macro and Micro mobility – Personal mobility – SIP – Identity based mobility, NEMO and MANETs – Vulnerabilities of Wireless Networks – Review of security basics – symmetric and asymmetric cryptography, Hash functions – Electronic signatures – MAC – PKI and electronic certificate – IPSec – AAA protocol – Firewalls – Intrusion detection.												
UNIT – II	Wi-Fi Security Architectures						9					
Hotspot architecture – DOS attacks – Tr addressing – SCO a	Hotspot architecture – WIDS – Rogue AP detection – IEEE 802.11 geolocation techniques – Honeypots – Passive and Active attacks - DOS attacks – Trojan attack – Dictionary Attack. Bluetooth Security – Protocol architecture – Radio physical layer – Device addressing – SCO and ACL logical transports – Security mode – Authentication and pairing – Attacks – BlueSmack.											
UNIT – III	Security in IEEE 802.11						9					
WEP – WEP2 – IV security policies – R way handshake – ro	collisions – RC4 weakness – 802.1x authentication -802.11i se ADIUS – EAP – PKI – WiMAX security – TEK , KEK, IEEE 802.1 le of smart cards in WiMAX.	ecurity ar 6e – PKI	chitecture – Mv2-RSA – S	polic ecur	y neg ity As	gotiati ssocia	on – radio tion – 3					
UNIT – IV	Security in Ad Hoc Networks						9					
Attacks to routing pu Duckling – Group ke - µTELSA – TinySec	rotocols – Security mechanisms – Auto-configuration – Key ma y management – Wireless Sensor Networks – Attacks – Preven c – key management in WSNs.	nagemei itive mec	nt – Self-man hanisms – In	age trusi	d PK on to	l – Re Ierano	esurrecting ce – SNEP					
UNIT – V	Security in Mobile Telecommunication Networks						9					
SS7 – GSM securit countermeasures– I – NetLMM.	y – GRPS security – UMTS infrastructure and security – H.32 MS architecture – security flaws – 4G security – Protection of in	23 – SIP iterceptic	– Megaco – on – Security	Vol issu	P se es in	curity Mobil	flaws and e IP – HIP					
							Total:45					
TEXT BOOK:												
Hakima Cha	aouchi and Maryline Laurent-Maknavicius, "Wireless and Mobile	Network	Security: Sec	curit	y bas	ics, S	ecurity in					
^{1.} On-the-shel	f and Emerging Technologies", 2 nd Edition, John Wiley & Sons, 2	2009. (Fo	or Units I,II,II	I)								
2. Pallapa Ver (For Units I	Ikataram and Sathish Babu, Wireless and Mobile Network Secur V,V)	rity, 1st E	dition, Tata N	/lcGr	awHi	II, 20′	10.					
REFERENCES:												
1. Lei Chen, Ji Education F	ahuang Ji, and Zihong Zhang, "Wireless Network Security: Theo Press, 2013.	ories and	Applications'	', Sp	ringe	r Higł	ner					
2. Amitabh Mis Press, 2008	shra, "Security and Quality of Service in Ad Hoc and Wireless Ne	etworks",	1 st Edition, C	amt	oridge	e Univ	ersity					
3. S. Kami Ma Springer Sc	kki, Peter Reiher, Kia Makki, Niki Pissinou, Shamila Makki, "Mob ience, 2007.	oile and V	Vireless Secu	irity	and F	Privac	у",					

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	make use of the mathematical models of security algorithms to wireless and mobile environment	Applying (K3)
CO2	identify the specific vulnerabilities in wide range of WiFi systems	Applying (K3)
CO3	develop robust systems against state-of-the-art security attacks	Applying (K3)
CO4	plan for providing security in ad hoc networks	Applying (K3)
CO5	identify the security issues in mobile telecommunication networks	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

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

22ITE25 - CYBER FORENSICS												
Progra Branci	ımme & 1	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit				
Prereq	uisites	Cryptography and Network Security	7	PE	3	0	0	3				
Preaml	ble	This course imparts knowledge on fundamental principles a investigation and security management.	and tech	nniques esse	ntial	for	digital	forensics				
Unit – I Digital Forensics Investigations 9												
Digital Condue	Investigations cting an Inves	S: Overview - Preparing a Digital forensic investigation – Procedu stigation – Completing the case	ires for p	rivate sector	high	-tech	inves	tigations –				
Unit –	11	Data Acquisition						9				
Understanding storage formats for digital evidence – Determining the best acquisition method - Contingency planning for image acquisitions – Using Acquisition tools– Validating Data Acquisitions: Windows Validation Methods – Performing RAID Data Acquisitions – Using Remote Network Acquisition tools – Using other Forensics Acquisition tools.												
Unit –	111	Processing Crime and Incident Scenes						9				
ldentify – Prep Eviden	ring Digital Ev aring for a S ce –Obtaining	vidence – Collecting Evidence in Private Sector Incident Scenes earch –Securing a Digital Incident or Crime Scene –Seizing I g a Digital Hash –Reviewing a Case.	– Proce Digital Ev	ssing Law Er vidence at th	forc e So	emer cene	nt Crin –Stor	ne Scenes ing Digital				
Unit –	IV	Computer Forensic Tools, Analysis and Validation						9				
Evalua Testing Forens	ting Digital F g Forensic So ic Data – Ado	orensics Tool Needs -Digital Forensics Software Tools – Digita oftware - Digital Forensics Analysis and Validation: Determini Iressing Data-Hiding Techniques.	al Foren ng Data	sics Hardwar Collection a	e To nd A	ols - Analy	- Valio sis –	dating and Validating				
Unit –	V	Recovering Graphics Files, Email Investigations						9				
Recogr Format Specia	nizing Graphi s - Understa lized Email Fo	cs File - Understanding Data Compression - Locating And Recov nding Copyright Issues - Investigating Email Crimes And Viola prensic Tools.	vering Gr ations -	aphics Files - Understandir	ldei Ig Ei	ntifyir mail	ng Unl Serve	known File rs - Using				
								Total:45				
TEXT E	BOOK:											
1. Nelson Bill, Phillips Amelia and Steuart Christopher, "Guide to Computer Forensics and Investigations", 6 th Edition, Cengage Learning, USA, 2021.												
REFERENCES:												
1.	Marie-Heler	Mara, "Computer Forensics", 2 nd Edition, Jones and Bartlett Le	arning, 2	2015.								
2.	Dejey, Muru	gan, "Cyber Forensics", 1 st Edition, Oxford University Press, 201	18.									
							-					

COUR On cor	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	apply digital forensic investigation with a systematic approach	Applying (K3)
CO2	make use of various tools for data acquisition	Applying (K3)
CO3	explore the significance of digital evidence in a crime scene	Applying (K3)
CO4	apply forensic tools in forensic examination	Applying (K3)
CO5	build the recovery of graphic files and investigate E-mail crimes	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	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

ASSESSMENT PATTERN - THEORY												
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
CAT1	25	50	25				100					
CAT2	25	50	25				100					
CAT3	25	50	25				100					
ESE 20 50 30 100												
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22ITE26 - MULTICORE ARCHITECTU	IRE					
			T	1	1	1	1	
Progra Branci	amme & h	B. Tech & Information Technology	Sem.	Category	L	Т	Р	Credit
Prereq	uisites	Computer Organization	7	PE	3	0	0	3
Pream	ble	This course focuses on performance improvement of the sys level and request level parallelism.	stems us	ing instruction	ı lev	el, da	ata lev	vel, thread
Unit - I		Fundamentals of Quantitative Design and Analysis						9
Classe Perforr SMT a	s of Compute mance – Qua nd CMP Arch	ers – Trends in Technology, Power, Energy and Cost – Dependa antitative Principles of Computer Design – Classes of Parallelis nitectures – Limitations of Single Core Processors – The Multicor	ability – N m ILP, D e era – C	/leasuring, Re DLP, TLP and Case Studies o	eporti RLF of Mu	ing ai P – M ilticoi	nd Su Iulti TI re Arc	mmarizing hreading – hitectures.
Unit - I	I	Memory Hierarchy Design						9
Introdu Perforr	iction – Basi nance – Virtu	cs of Memory Hierarchies – Memory Technology and Optimiza al Memory and Virtual Machines – Design of Memory Hierarchie	tions – T es – Case	Fen Advance e Studies	d Op	timiz	ations	of Cache
Unit - I	11	TLP and Multiprocessors						9
Introdu Enhan	iction – Vecto cing Loop Le	or Architectures – SIMD Instruction Set Extensions for Multimedi vel Parallelism – Comparison of a GPU and a MIMD With Multir	ia – Grap nedia SII	ohics Process MD – Case S	ing l Studie	Jnits es	– Det	ecting and
Unit - I	V	TLP and Multiprocessors						9
Centra Memor Conne i7 920	lized Shared y and Dired ction Networ Multicore – S	I-Memory Architectures – Performance of Symmetric Shared-Netory-Based Coherence – Synchronization basics – Models of ks – Buses, Crossbar and Multi-stage interconnection networks – Shared Memory Programming with OpenMP	Vemory of Memo - Perform	Multiprocesso ry Consisten nance and En	ors – cy - ergy	Dist intro Effici	ribute oductio ency	d Shared- on – Inter of the Intel
Unit - V	V	RLP and DLP in Warehouse Scale Computers						9
Progra Domain Proces	mming Mode n Specific Ar sing Unit, an	els and Workloads for Warehouse scale Computers – Computer / chitectures: Introduction – Guidelines for DSAs – Example Dor interface Data Center Accelerator	Architecti nain: De	ure of Wareho ep Neural Ne	ouse etwor	- Sca k – (ale Co Google	mputers – e's Tensor
								Total:45
TEXT	BOOK:							
1.	John L. He Kaufmann,	ennessey and David A. Patterson, "Computer Architecture – Elsevier, 2019.	A Quant	itative Approa	ach",	6 th	Editio	n, Morgan
REFE	RENCES:							
1.	Richard Y.	Kain, "Advanced Computer Architecture: A Systems Design App	roach", 1	I st Edition, Pe	arso	n, 20	15.	

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	investigate the limitations of ILP and the need for multicore architectures	Applying (K3)
CO2	analyze the importance of memory hierarchy and benefits of cache memory	Applying (K3)
CO3	explain the architecture of Vector/GPU processor and make use of loop level parallelism to achieve data level parallelism	Applying (K3)
CO4	analyze the cache coherence issues using different memory architectures and different types of inter connection networks	Applying (K3)
CO5	inspect the architectures of GPUs, warehouse scale computers and choose an appropriate model for a given problem	Applying (K3)
1		

	Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	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	60	20				100						
ESE	20	50	30				100						
* ±3% may be varied (C	* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22ITE27 - BUSINESS INTELLIGENCE AND ITS A	PPLICA	TIONS									
				1	1	I	I						
Progra Branch	mme & ז	B. Tech & Information Technology	Sem.	Category	L	т	Р	Credit					
PrerequisitesDatabase Management Systems7PE300													
Pream	ble	This course enables the students to apply Business Intelligence applications for making better decisions.	e conce	pts and techn	ique	s to v	ariou	S					
Unit –		Introduction and Business View of Information Technology	y Applic	ations				9					
Core B ready l Good F Semi-S	usiness Proce T Applications Food Restaur Structured Dat	esses – Baldrige Business Excellence Framework – Purpose of us s – Enterprise Applications – Information users and their requirem ants Inc, TenToTen Retail Stores. Types of Digital Data: Introdu ta – Difference between semi-structured and structured data.	sing IT ir ients. Ca iction –	n Business – (ase Study: Go Structured Da	Chara odLi ata –	acter ie He Unst	istics althC tructu	of Internet- are Group, red Data –					
Unit –	11	Business Intelligence and Data Integration						9					
Busine Applica mart – Techno	ss Intelligenc ations – BI Ro Ralph Kimb ologies – Data	e: Definition – Evolution – Need for BI – BI Value Chain – Busir oles and Responsibilities – Data Integration : Need for Data Ward all's Approach vs. W.H.Inmon's Approach – Goals of Data W a Quality – Data Profiling.	ness Ana ehouse /arehous	alytics – BI Fr – Definition o se – ETL Pro	ame f Dat oces	work a Wa s – I	– BI arehou Data	Users – Bl use – Data Integration					
Unit - I	II	OLTP, OLAP and Multidimensional Data Modeling						9					
OLTP - Types o Life Cy	- OLAP – OL of Data Mode cle – Designi	AP Architectures – Data Models – Role of OLAP Tools in BI – (I – Data Modeling Techniques – Fact Table – Dimension Table - ng the Dimensional Model.	OLAP O – Dimen	perations – E sional Models	Basic s – C	s of I)imer	Data I Isiona	Modeling – al Modeling					
Unit - I	V	Performance Management and Enterprise Reporting						9					
Measur of metr Reporti	res, Metrics, ł ics – KPIs – I ing Character	KPIs and Performance Management: Understanding Measures ar Enterprise Reporting: Reporting Perspectives – Report Standard istics – Balanced Scorecard – Dashboards – Creating Dashboar	nd Perfo ization a rds – Sc	rmance – Me Ind Presentati orecards vs. I	asur ion F Dash	emer Iracti boar	nt Sys ces – ds – A	tem – Role Enterprise Analysis.					
Unit - \	/	Business Intelligence Applications						9					
Unders Securit CRM a	tanding Busi y Concerns f nd Business	ness Intelligence and Mobility– the need for business intelligen or Mobile BI – Business Intelligence and Cloud Computing – B Intelligence.	ce on th usiness	ne move – BI Intelligence f	Mot or E	oility RP s	time I ysterr	ine – Data ns – Social					
								Total:45					
TEXT E	BOOK:												
1.	Prasad R.N	. and Seema Acharya, "Fundamentals of Business Analytics", 2 ⁿ	^{id} Editior	n, Wiley, 2016	i.								
REFER	RENCES:												
1.	Ramesh Sh Perspective	narda, Dursun Delen, Efraim Turban, "Business Intelligence, ", 4 th Edition, Pearson Education, 2017.	Analytic	cs, and Data	Sc	ence	: A I	Managerial					
2.	David Loshi	n, "Business Intelligence: The Savvy Manager's Guide", 2 nd Edit	ion, Mor	gan Kaufman	n, U	SA, 2	2012.						

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	demonstrate the enterprise view of IT applications and identify the different types of digital data	Applying (K3)
CO2	make use of business intelligence concepts and techniques to experiment ETL process	Applying (K3)
CO3	illustrate OLTP, OLAP systems and design their multi-dimensional models	Applying (K3)
CO4	design model dashboard, balanced score card for performance management	Applying (K3)
CO5	apply business intelligence to mobile, cloud, ERP and social CRM systems	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

	ASSESSMENT 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	50	40				100						
CAT3	10	50	40				100						
ESE	10	50	40				100						
* ±3% may be varied (0	* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22ITE28 - CONSTRAINT SATISFACTION P	ROBLE	И									
Progra Branch	mme& າ	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit					
Prerequisites Nil 7 PE 3 0 0													
Pream	ble	The objective of this course is to introduce the concepts of solution of this course discusses about topics such as constraint network consistency, and look ahead and look back strategies.	ving prob ks, constr	lems subject aint propaga	ed to tion,	som direc	e con: tional	straints.					
Unit –		Basics of Constraint Processing: Constraint Networks-Co	nstraint	Propagation				9					
Basic c Binary	oncepts and Constraint Ne	examples - Constraint Networks and Constraint Satisfaction - Networks – Consistency - Enforcing and Constraint Propagation -	lumeric a Propaga	ind Boolean (iting constrair	Cons	traint Arc-c	s - Pro onsist	operties of ency					
Unit –	1	Directional Consistency						9					
Directi Adaptiv	onal Consist ve Consistend	ency - Graph Concepts: Induced Width - Directional Local Co cy and Bucket Elimination	onsistenc	sy - Width Ve	rsus	Loca	al Cor	isistency -					
Unit –		General Search Strategies: Look ahead						9					
Look A Ahead	head - The S for variable o	tate Space Search- Backtracking - Look-Ahead Strategies - Lo rdering - The cycle cut set effect - Extension to Stronger Look Ah	ok Ahea nead - Sa	d Algorithms itisfiability: Lo	for v ok-A	alue head	select in Ba	ion - Look cktracking					
Unit –	IV	General Search Strategies: Look back						9					
Look-B Satisfia	ack - Conflic bility - Integra	t Sets - Backjumping Styles- Complexity of Backjumping - Le ation and Comparison of Algorithms	arning A	lgorithms - L	ook-	Back	Tech	niques for					
Unit – V	V	Constraint Satisfaction Problems with examples						9					
N-Quee	en, - Scene L	abelling - Minimum Width orderings - Value and variable orderin	ng										
								Total:45					
TEXTB	OOK:												
1.	Rina Dechte	er, "Constraint Processing", 1 st Edition, Morgan Kaufmann Publis	shers, 20	03. (For Unit	s I,II,	III, I\	/)						
2.	Deepak Khe	emani, "A First course in Artificial Intelligence", 1 st Edition, Mc G	raw Hill,2	017. (For Un	it V)								
REFER	ENCES:												
1.	Khaled Ghe	edira, "Constraint Satisfaction Problems: CSP Formalisms and te	echnniqu	ies", 1 st Editio	on, W	'iley,	2013.						

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	solve problems using constraint networks, constraint propagation and Arc consistency	Applying (K3)
CO2	make use of directional consistency in Constraint Satisfaction Problems	Applying (K3)
CO3	apply look-ahead strategies to solve problems in state space search.	Applying (K3)
CO4	model constraint satisfiability using lookback and backjumping strategies.	Applying (K3)
CO5	identify and solve typical problems in the domain of constraint satisfaction.	Applying (K3)

Mapping of C	Cos 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	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

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	60	30				100		
CAT3	10	60	30				100		
ESE	10	50	40				100		
* ±3% may be varied (CAT 1, 2& 3 – 50 marks & ESE – 100 marks)									
22GEE02 - TOTAL QUALITY MANAGEMENT									
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		(Common to All BE/BTech branche	es)						
Program Branch	ime &	All BE/BTech branches	Sem.	Category	L	т	Ρ	Credit	
Prerequi	sites	Nil	7	PE	3	0	0	3	
Preamble	9	This course deals with quality concepts and Total Quality Mar quality for customer perspective. It also deals with the basic and standards	nagement modern	(TQM) princip quality manage	eles fo	ocusii tools	ng or s inclu	n process uding ISO	
Unit – I		Quality Concepts and Principles						9	
Definition of Quality - Dimensions of Quality - Quality Planning - Quality Assurance and Control - Quality Costs with Case Studies - Elements / Principles of TQM - Historical Review – Leadership – Qualities / Habits - Quality Council - Quality Statements, Strategic Planning – Importance - Case Studies - Deming Philosophy - Barriers to TQM Implementation – Cases with TQM Success and Failures.									
Unit – II		TQM-Principles and Strategies						9	
Custome – Motiva Juran'sT Rating -	Customer Satisfaction - Customer Perception of Quality - Customer Complaints - Customer Retention, Employee Involvement – Motivation - Empowerment - Teams - Recognition and Reward - Performance Appraisal, Continuous Process Improvement - Juran's Trilogy - PDSA Cycle - 5S - Kaizen, Supplier Partnership - Partnering - Sourcing - Supplier Selection - Supplier Rating - Relationship Development, Performance Measures – Purpose – Methods - Cases.								
Unit – III		Control Charts for Process Control						9	
Basic Se Dispersic Introducti	Basic Seven Tools of Quality and its Role in Quality Control, Statistical Fundamentals - Measures of Central Tendency and Dispersion, Population and Sample - Normal Curve - Control Charts for Variables and Attributes - Process Capability - Case Study - Introduction to Six Sigma.								
Unit – IV		TQM-Modern Tools						9	
New Sev Construc TotalPro – Proces	ven Tools ction - Ca ductive M ss - Case :	of Quality, Benchmarking - Need - Types and Process, Quality se Studies, Introduction to Taguchi's Robust Design - Quality I aintenance (TPM) - Uptime Enhancement, Failure Mode and Effe Studies.	Function Loss Fun ect Analys	Deployment - ction - Design is (FMEA) - Ris	Hous of E sk Prie	e of (xperi ority	Quali ment Numl	ity (HOQ) ts (DOE), per (RPN)	
Unit – V		Quality Systems						9	
Need for - Docume 22000 - I	ISO 9000 entation - SO21001	0 and Other Quality Systems - ISO 9000: 2015 Quality System Quality Auditing, Introduction to ISO 14000 - IATF 16949 - TL 9 . Process of Implementing ISO - Barriers in ISO Implementation.	– Elemer 9000-IEC	nts - Implemen 17025 - ISO 1	tatior 8000	of C - ISC	Qualit D 200	y System 000 - ISO	
								Total:45	
TEXT BC	DOK:								
1.	Besterfie "Total Qu	ld Dale H., Besterfield Carol, Besterfield Glen H., Besterfield Ma iality Management", 5 th Edition, Pearson Education, Noida, 2018.	ıry, Urdhv	vareshe Hema	nt, Ur	dhwa	aresh	eRashmi.	
REFERE	NCES:								
1.	Subburaj	Ramasamy, "Total Quality Management", McGraw Hill Education	n, New De	elhi, 2017.					
2.	James R	. Evans and William M. Lindsay, "The Management and Control o	f Quality"	, 8 th Edition, Ce	engag	e Le	arnin	g, 2012.	
3.	3. David Goetsch & Stanley Davis, "Quality Management for Organizational Excellence: Introduction to Total Quality", 8 th Edition, Pearson, 2017.								

COURS On com	COURSE OUTCOMES: On completion of the course, the students will be able to												(۲	BT Mapped (Highest Level)			
CO1	dem	onstrate	the evo	lution of	TQM pr	inciples								Un	derstandir	ng (K2)	
CO2	illust	rate the	principle	es and s	trategies	s of TQN	1							Un	derstandir	ng (K2)	
CO3	D3 use control charts and identify process capability of a process Applying (K3)											(K3)					
CO4	apply various quality tools and techniques in both manufacturing and service industry Applying (K3)																
CO5 choose appropriate quality standards and implement them in the respective industry Applying (K3										(K3)							
COs/	POs	PO1	PO2	PO3	PO4				POS		POQ	PO10	PO11	PO12	PSO1	PSO2	
003/1	103	1	1 02	105	104	105	2	2	10	•	2	2	1	1	1001	3	
00)2	1	1				- 2	2	3		2	- 2	1	1	2	3	
CO)3	3	2	2	2	2	2		1		2	2	1	1	1	3	
CO)4	2	2	2	2	2	2		1		2	2	1	1	2	3	
CO)5						3	3	2		3	2	1	1		3	
1 – Sligl	ht, 2 –	Moder	ate, 3 –	Substar	ntial, BT	- Bloom	ı's Tax	conomy						1		1	
						ASSE	ESSME	ENT PATT	ΓERN	- TH	IEORY	1					
Test Ca	/ Bloo tegory	m's ′*	Reme (K	mbering 1) %	Uno	derstan (K2) %	ding	Applyin (K3) %	g	Anal (K4	lyzing 4) %	Evalı (K	uating 5) %	Creat (K6)	ing %	Total %	
(CAT1		2	25		45		30								100	
(CAT2		2	20		40		40							100		
(CAT3		2	25		45		30								100	
	ESE		2	20		40		40								100	
* ±3% r	* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)																

22ITE29 - COMPUTER SECURITY, AUDIT AND ASSURANCE										
Progra Brancł	ımme& ı	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit		
Prereq	uisites	NIL	7	PE	3	0	0	3		
								1		
Pream	ble	This course provides a comprehensive introduction to Informati the audit process, ISO standards and certification, implementat	ion Secu tion of IS	urity and discu SO 27001.	isses	s abo	ut leg	al issues,		
UNIT –	UNIT – I Introduction 9									
History	of Information	on Security – What is security? – CNSS Security Model – Cor	nponent	s of Informat	ion S	Syste	ms –	balancing		
Informa	ation Security	and Access - Information Security implementation. Systems of	developn	nent life cycle) – T	he s	ecurit	y systems		
develo	oment life cyc	le – Communities of Interest.								
UNIT – II The Need for Information Security and its Legal, ethical, and professional issues 9										
Busine	ss needs first	- Threats - Attacks - Secure Software Development. Law and	Ethics –	US laws - in	terna	tiona	I laws	and legal		
bodies	- Ethics and	Information Technology – Code of Ethics and Professional Orga	nization	S.						
UNIT -	· III	Audit Planning, Preparation, and Techniques	-					9		
Reason	ns – Audit Pr	inciples – Process of Audit Programme Management – Audit	Compet	ence and eva	aluat	ion n	netho	ds – Audit		
Respon	nsibilities – A	udit time and Process flow – Information Security and Manage	ement S	system (ISMS) Au	dit ci	neckli	st. Auditor		
Quality	and Selectic	on – Audit script – Audit stages – Audit techniques – Collecting	eviden	ce through qu	uesti	ons -		ervation -		
кероп	ing to audit fir	laings – Audit Team meetings – non-conformities and observatio	ons – Co	frective and i	reve	entive	e actic	ons.		
		ISO 27001				4 101	40	9 Islandifiuina		
	ew or an isivi	S - ISO standards that locus on an organization's ISMS - ISO	VIEC Sta	Ricko Acor	pe (וכו וכ ס Dia	VIS —	Obiostivos		
applica	Die legislation	inc. Procedures and documented information on control ricks	Pocour	RISKS - ASSE	train	y Ris	Moni	toring and		
implem	enting ISMS	- Preparing the certification for Audit	Resourc		uam	ing –	WOIN	toning and		
	V	Asset Management						9		
	according to	ISO 27001 – the importance of Assets – Asset inventory –	Asset	Owner – ISC) 27	001/L	SO 2	7005 Risk		
Assess	ment – The	six basic steps – ISO 27001 Controls – ISO2 27001 Statement of	f Applica	ability – ISO 2	700		et Ma	nagement		
– Resp	onsibility for	Assets – Information Classification – Media handling – BYOD.	, applied			, , , , , , , , , , , , , , , , , , , ,		agomon		
		5						Total:45		
TEYT	BOOK									
			·							
1.	Michael E. V 2012. (For U	Whitman and Herbert. J. Mattord, "Principles of Information Secu Jnits I,II)	rity", 4"	Edition, Ceng	jage	Lear	ning,	USA,		
 Rajkumar Banoth, Narasimha Gugulothu, Aruna Kranthi Godishala, "A Comprehensive Guide to Information Security Management and Audit", CRC Press Taylor and Francis Group, USA, 2023. (For Units III,IV,V) 										
REFERENCES:										
1.	Joseph M.K	izza, "Computer Network Security", Springer, 2005								
2.	Matt Bishop	, "Introduction to Computer Security", Addison-Wesley Professio	nal, 200	5.						

COUR On co	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Plan the organization's security needs with the CNSS security model.	Applying (K3)
CO2	apply legal aspects and code of ethics in Information Security.	Applying (K3)
CO3	Organize an audit and use the best practices of ISMS.	Applying (K3)
CO4	apply ISO 27001 and conduct a risk assessment.	Applying (K3)
CO5	illustrate Asset management in compliance with ISO 27001.	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	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

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

	22ITE30 - BUILDING ENTERPRISE APPLICATIONS									
Progra Branc	amme& :h	B. Tech & Information Technology	Sen	า.	Category	L	т	Р	Credit	
Preree	quisites	Object Oriented Programming	8		PE	3				
Pream	Preamble This course provides knowledge about design, development and roll-out of high quality enterprise applications.									
Unit - I Analysis and Modeling S										
Introdu applica - Meas require	uction to enter ation - Introduc suring the suc ements elicitat	rprise applications and their types - Software enginetion to skills required to build an enterprise applications of enterprise applications. Inception of enterprise and analysis - requirements validation - planning	neering methodolo tion - Key determir rise applications: g and estimation.	ogie: ant: Ente	s - Life cycle s of success erprise analy	e of ful e sis -	raisir nterp busi	ng an rise a ness i	enterprise pplications modeling -	
Unit -	II	Architecture and Designing							9	
Archite Desigr	ecture, view ar n Data archi	nd viewpoints - Enterprise application architecture pettecture and design	erspective - Logica	l aro	chitecture - 1	ech	nical	archit	ecture and	
Unit - III Architectural Design 9										
Infrast	ructure archite	ecture and design - Documentation: system archited	ture documentatio	n -	design docu	imer	tatior	٦		
Unit -	IV	Construction							9	
Consti config - cons	ruction readin uration manag tructing the so	ess of enterprise applications: defining a constru ement plan - setting up a development environment lution layers - code review - static code analysis - b	iction plan - defir - introduction to th uild and testing - [ning ne co Dyna	a package oncept of So amic code ar	stru ftwa nalys	cture re Co is.	- se nstruc	tting up a ction Maps	
Unit -	V	Testing and Rolling out Enterprise Application	S						9	
Testin - rollin	g enterprise a g out enterpris	pplications – enterprise application environments - i se application	ntegration testing	- sys	stem testing	- US	er aco	ceptar	nce testing	
									Total:45	
TEXT	BOOK:									
1. Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, Veerakumar Esakimuthu, "Raising Enterprise Applications: A Software Engineering Perspective", 1 st Edition, Wiley India Pvt. Ltd, 2010.										
REFERENCES:										
1.	1. Brian Berenbach, Daniel J. Paulish, Juergen Kazmeier, Arnold Rudorfer, "Software Systems Requirements and Engineering: In Practice", 1 st Edition, McGraw-Hill Education, 2009.									
2.	Srinivasan I 2006.	Desikan, Gopalaswamy Ramesh, "Software Testing	Principles and P	acti	ces ", 1 st Ed	ition	, Pea	rson	Education,	

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	identify challenges in building an enterprise application and build a business model	Applying (K3)
CO2	build a logical, technical and data architecture of an application	Applying (K3)
CO3	design infrastructure architecture of an application and document key elements of architecture	Applying (K3)
CO4	construct application framework components and perform code review and analysis	Applying (K3)
CO5	apply various testing methods and rolling out an enterprise application	Applying (K3)

COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

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

22ITE31- WEB APPLICATION SECURITY									
Programme Branch	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit		
Prerequisit	es Web Technology	8	8 PE 3 0 0						
Preamble	This course deals with various components of web app knowledge of web application testing methodologies.	plication from the	e security poin	t of v	/iew a	and in	nparts		
Unit - I Security Fundamentals and Security Principles 9									
Web Securi Password, I	y Fundamentals- Input Validation, Attack surface reduction, clas Best Practices, Authorization - Access control - Session Manager	sifying and priori ment - Securing	tizing threads web application	, Aut on se	henti essio	catior n mar	n-Securing hagement		
Unit - II	Browser and Database Security Principles						9		
Browser security principles - cross-site scripting - cross-site request forgery- Database security principles – SQL injection - setting database permissions - stored procedure security- Insecure Direct object references									
Unit - III	File security and Security Methodologies						9		
File security security - in-	principles - source code secret - forceful browsing - directory trav Justry standard secure development methodologies and maturity	/ersal - secure de / models - SDL -	evelopment m CLASP- SAN	etho /M -	dolog BSII	jies - a MM	application		
Unit - IV	Web Testing Fundamentals						9		
Web Applica Headers wit with Tampe	ation Testing Fundamentals - Basic Observation -Viewing a Pag n Firebug - Observing Live Post Data with Web Scarab - Seeing H n Data – Web Oriented Data Encoding	e's HTML Sourc Hidden Form Fiel	e, Advanced ds - Observin	- Ob g Liv	servii e Res	ng Liv spons	e Request e Headers		
Unit - V	Bypass client-side input validation and Session Ma	anipulation					9		
Automating Cookies – F Session Ide	with LibWWWPerl, Seeking Design Flaws, Attacking AJAX, I inding Session Identifiers in Requests - Finding Authorization I ntifiers with Burp	Manipulating Se Headers - Analy	ssions -Findi zing Session	ng S ID E	Sessio xpira	on Ide tion -	entifiers in Analyzing		
							Total:45		
ТЕХТ ВООК:									
1. Bryan Sullivan, Vincent Liu, "Web Application Security- A Beginner's Guide", 1 st Edition, McGrawHill Education, New Delhi, 2011. (For Units I, II, III)									
2. Paco Hope, Ben Walther, "Web Security Testing Cookbook", 1 st Edition, O'Reilly Media, 2009. (For Units IV,V)									
REFERENCES:									
1. Geo US	1. Georgia Weidman, "Penetration Testing: A Hands-on Introduction to Hacking", 1 st Edition, No Starch Press, San Francisco, USA, 2014.								

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	illustrate web security fundamentals, authentication and authorization	Applying (K3)
CO2	apply the principles of browser security and database security	Applying (K3)
CO3	make use of file security and secure development methodologies	Applying (K3)
CO4	build various testing techniques for web application	Applying (K3)
CO5	identify client side validation and secure session manipulation for web applications	Applying (K3)

	Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2

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

	22ITE32 - WIRELESS SENSOR NETWO	ORKS											
Programme & Branch	B. Tech & Information Technology	Sem. Category L T P 8 PE 3 0 0											
Prerequisites	Computer Networks	8	PE	3	0	0	3						
		1	1			1							
Preamble	This course provides the fundamental concepts of wireless s different layers. It also helps to devise appropriate node and net light on sensor networks security.	ensor ne work ma	etworks and on agement stra	expla ateg	ains f ies ar	unction d furt	onalities of her throws						
Unit - I	Introduction						9						
Introduction-Motivat	ion and Wireless Sensor Nodes: Definitions and Background	l, Challe	nges and Co	onsti	raints	- Ap	plications:						
Structural Health Me	onitoring, Traffic Control, Health Care, Pipeline Monitoring, Prec	ision Agi	riculture, Activ	/e V	olcan	io, Un	derground						
Svstems: Functiona	tecture: The Sensing Subsystem, The Processor Subsystem, Coll Aspects, Nonfunctional Aspects, Prototypes, Evaluation,	mmunica	ation interface	es, P	rototy	/pes -	Operating						
Unit - II	Basic Architectural Framework and Medium Access Contr	ol					9						
Physical Layer: Bas	ic Components, Source Encoding, Channel Encoding, Modulation	n, Signal	Propagation	Me	dium	Acces	ss Control:						
Overview, Wireless	MAC Protocols, Characteristics of MAC Protocols in Senso	r Netwo	rks, Contenti	on-F	ree	MAC	Protocols,						
Contention-Based N	AC Protocols, and Hybrid MAC Protocols.						1						
Unit - III Routing Protocols and Power Management 9													
Network Layer: Ove Location-Based Rou Management, Conc	rview, Routing Metrics, Flooding and Gossiping, Proactive Routi uting, QoS-based Routing Protocols. Power Management: Local eptual Architecture.	ng, On-E Power N	Demand Rout Management	ing, Asp	Hiera ects,	archica Dyna	al Routing, mic Power						
Unit - IV	Node and Network Management and Localization						9						
Node and Network	Management: Time Synchronization: Clocks and the Synchroniza	tion Prob	olem, Time Sy	'nch	roniza	ation i	n Wireless						
Sensor Networks, E	Basics of Time Synchronization, Time Synchronization Protocols	. Localiz	ation: Overvie	ew, I	Rang	ing Te	echniques,						
Range-Based Local	ization, Range-Free Localization, Event-Driven Localization.						1						
Unit - V	Security and Sensor Network Programming	2					9						
Security: Fundamer	ntals of Network Security, Challenges of Security in Wireless	Sensor	Networks, Se	Curi	ty Atl	acks	In Sensor						
in Sensor Network F	s and Mechanisms for Security, IEEE 802.15.4 and Zigbee Security Programming Dynamic Reprogramming Security S	niy. Sen: onsor Ne	sor network r	tors	amm	iing. c	nallenges						
				1013	•		Total: 45						
							10(a).45						
TEXT BOOK:													
1. Waltenegus John Wiley	S Dargie, Christian Poellabauer, "Fundamentals of Wireless Sens & Sons, 2011.	sor Netwo	orks: Theory	and	Pract	ice", ´	I st Edition,						
REFERENCES:	REFERENCES:												
1. Mohammad S. Obaidat, Sudip Misra, "Principles of Wireless Sensor Networks", 1 st Edition, Cambridge University Press, London, 2014.													
2. Feng Zhao,	2. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks", 1 st Edition, Elsevier, 2004.												

COUR: On cor	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	apply the basic concepts of wireless sensor networks in real life applications	Applying (K3)
CO2	illustrate the basic architectural framework using physical and MAC layer protocols	Applying (K3)
CO3	utilize various ranking layer protocols for inter and intra communication patterns	Applying (K3)
CO4	apply different synchronization and localization algorithms for managing node and network level functions	Applying (K3)
CO5	plan how to tackle various challenges of security in wireless sensor networks	Applying (K3)

COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	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					
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

22ITE33 -	REALTIME PROGRAMMING FOR EMBEDDED SYSTEMS
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Progra Branch	mme & n	B. Tech & Information Technology	Sem.	Category	L	т	Р	Credit			
Prereq	uisites	Python and C Programming, Operating Systems	8	PE	3	0	0	3			
		I	1								
Pream	ble	This course provides knowledge on real-time programming w	vith embed	ded systems	usir	g ras	pberr	y pi.			
Unit - I		Exploring Embedded Linux Systems						9			
Introducing Embedded Linux - Managing Linux Systems - Raspberry Pi Hardware: Introduction to the Platform - RPi Documentation - The RPi Hardware-Raspberry Pi Accessories - HATs - Raspberry Pi Software: Linux on the Raspberry Pi -Connecting to a Network											
- The RPI Hardware-Raspberry PI Accessories - HATS - Raspberry PI Software: Linux on the Raspberry PI -Connecting to a Network											
Unit - I	I	Programming on the Raspberry Pi	poony i i.					9			
Introduction - Scripting Languages - Dynamically Compiled Languages - C and C++ on the RPi - Overview of Object - Oriented Programming - Interfacing to the Linux OS - Improving the Performance of Python - Interfacing to the Raspberry Pi Input/Outputs:											
Unit - III Cross-Compilation and the Eclipse IDE											
Setting up a Cross - Compilation Tool chain - Cross-Compilation using Eclipse - Building Linux - Interfacing to the Raspberry Pi											
Buses: Introduction to Bus Communication - I ² C - SPI - UART - Logic-Level Translation.											
Unit - I	Unit - IV Interacting with the Physical Environment 9										
Interfac	cing to Actuat	ors, Interfacing to Analog Sensors, Interfacing to Local Displays	, Building	C/C++ Librari	es -	Real-	Time	Interfacing			
using th	ne Arduino: T e RPi Comm	he Arduino - An Arduino Serial Slave - An Arduino I2C Slave and Line	An Arduine	o SPI Slave -	Prog	Iramr	ning t	ne Arduino			
linit - V		The Internet of Things						0			
The Int	r ernet of Thin	gs (IoT) - The RDi as an IoT Sensor - The RDi as a Sensor W	lah Sarva		Voh	Clion	t - Th	9 P Diasa			
"Thing"	- Large-Scal	e loT Frameworks - The C++ Client/Server - IoT Device Mana	gement.	I - A 0/0++ V	veb	Cilen	ι - π	e rri as a			
								Total:45			
TEXT	BOOK:										
1.	 Derek Molloy, "Exploring Raspberry Pi: Interfacing to the Real World with Embedded Linux", 1st Edition, John Wiley & Sons Inc., Indianapolis, 2016 										
REFER	REFERENCES:										
1.	Qing Li, Ca	roline L.Yao, "Real-Time Concepts for Embedded Systems", 1	st Edition,	CMP Books,	UK, 2	2003.					
2.	Rajkamal, "Embedded Systems Architecture, Programming and Design", 3 rd Edition, McGraw-Hill, New Delhi, 2014.										

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	interpret various hardware and software features in embedded programming using Raspberry Pi.	Applying (K3)
CO2	experiment with programming and interfacing of Raspberry Pi hardware.	Applying (K3)
CO3	manipulate cross compilation tools and bus communication of Raspberry Pi.	Applying (K3)
CO4	illustrate interfacing concepts with real physical environment and Arduino	Applying (K3)
CO5	apply embedded programming knowledge for IoT applications development	Applying (K3)

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

	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	60	30				100					
CAT3	10	60	30				100					
ESE 10 60 30 100												
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22ITE34 - INFORMATION STORAGE AND MAI	NAGEM	ENT							
Progra Branci	imme & n	B. Tech & Information Technology	Sem.	Category	L	т	Р	Credit			
Prereq	uisites	Database Management Systems	8	PE	3	0	0	3			
			I		11			L.			
Pream	ble	This course provides an insight into the recent technologies operations involved in it.	in Infor	mation storag	le ar	nd d	escrib	es various			
Unit - I		Introduction to Information storage						9			
Introdu	ction to evol	ution of storage architecture - Data center Infrastructure - Virt	tualizatio	on and cloud	com	putiı	ng - d	data center			
enviror	ment: Applic	ation - DBMS – Host (or computer) - connectivity- storage - Dis	sk drive	components ·	Dis	k dri	ve pe	erformance.			
Data P	rotection: RA	ID implementation methods - RAID array components - RAID ter	chniques	s - RAID leve	ls –	RAII) imp	act on Disk			
perform	performance - Components of an intelligent storage system - storage provisioning										
Unit - I	l	Storage Networking Technologies						9			
Fibre c	hannel SAN	components - FC connectivity - Fibre channel architecture - F	abric se	ervices – swit	ched	l fab	ric lo	gin types –			
zoning	- FC SAN top	oologies - virtualization in SAN, IP SAN and FCoE: iSCSI - iSCSI	Topolog	gies – FCIP -	FCoE	E - N	letwo	rk Attached			
Storag	e: purpose -	benefits - components - NAS I/O Operation - NAS Implementation	ations -	NAS file sha	ring	proto	ocols	- File level			
virtuali	zation - Objec	t based storage devices - content addressed storage - CAS Use	Cases	 Unified stora 	ige						
Unit - I	II	Backup, Archive and Replication						9			
Informa	ation Availabi	lity - Business continuity terminology - planning life cycle - fail	ure anal	ysis – busine	ess ir	npa	ct ana	alysis – BC			
techno	logy solution	s – automatic path failover - Backup and archive: Backup p	urpose,	consideration	ns, g	ranı	ularity	, methods,			
archite	cture, backup	and restore operations and topologies. Backup in NAS environr	nents - E	Backup target	s - D	ata	Dedu	olication for			
backup) - Backup ir	n virtualized environments - Data archive - Archiving Solution	n Archite	ecture – Loca	al rep	olica	tion:	Replication			
Termin	ology – Repli	ca Consistency – local replication technologies - Remote replica	tion tech	inologies							
Unit - I	V	Cloud Computing						9			
Cloud	Computing:	Cloud Enabling Technologies - Definition of Cloud computing, Ch	aracteris	stics of cloud o	comp	utin	g, ber	efits, cloud			
service	models - de	bloyment models - Cloud computing infrastructure - cloud challer	nges - Cl	oud adoption	cons	side	ation	s.			
Unit - V	/	Securing and Managing Storage Infrastructure						9			
Securi	ng the Stora	age Infrastructure: Information security Framework – Risk	Triad –	Storage sec	urity	do	main	- Security			
Implen	ientations in	Storage Networking: FC SAN – NAS – IP SAN - Managing the	storage	Infrastructur	e: Mo	onito	oring t	he storage			
infrastr	ucture – Stor	age Infrastructure Management Activities - Information lifecycle r	manager	nent - Storag	e tier	ing					
								Total:45			
TEXT	BOOK:										
 EMC Education Services, "Information Storage and Management: Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments", 2nd Edition, Wiley, 2015. 											
REFERENCES:											
1.	Anthony T \	/elte, "Cloud Computing: A practical Approach", 1st Edition, Tata	McGrav	v-Hill, New De	elhi, 2	2009					
2.	Mark Lippitt	and Erik Smith, "Networked Storage Concepts and Protocols Ter	ch book"	, V2.3 Edition	, EM	СТе	ech bo	ooks, 2014.			

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	outline different implementations of storage systems like virtualization and RAID	Applying (K3)
CO2	illustrate various storage networking technologies and demonstrate the effectiveness of NAS	Applying (K3)
CO3	interpret the concept of storage management and data backup in virtualized environment	Applying (K3)
CO4	outline the cloud architecture and practice on public clouds	Applying (K3)
CO5	interpret the need for security in storage networking	Applying (K3)
1		

	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	1		3	3	3	2	2	3		3	2	
CO2	3	2	1	1		3	3	3	2	2	3		3	2	
CO3	3	2	1	1		3	3	3	2	2	3		3	2	
CO4	3	2	1	1		3	3	3	2	2	3		3	2	
CO5	3	2	1	1		3	3	3	2	2	3		3	2	
		_				_									

ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	40	50	10				100						
CAT2	30	50	20				100						
CAT3	30	50	20				100						
ESE 20 50 30 100													
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)													

22ITE35	- SOFTWARE	PROJECT	MANAGEMENT
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Programme & Branch	B. Tech & Information Technology	Sem.	Category	L	т	Ρ	Credit						
Prerequisites	Software Engineering	8	PE	3	0	0	3						
Preamble This course provides knowledge about project management activities which include project evaluation planning, estimation, monitoring and control essential for software projects.													
Unit - I Introduction to Software Project Management 9													
Introduction - I	portance – Types of project – Activities – Plans, methods and metho	dologies -	-Ways of Cat	egor	izing	softwa	are projects						
 Stakeholder 	- Setting objectives - Business case - Project success and fail	ilure - Ma	anagement a	nd m	nanag	gemer	nt control –						
Traditional vs	Modern project management practices. Project Evaluation: Intro	duction -	- A business	cas	se –	Proje	ct Portfolio						
Management -	Evaluation of Individual Projects – Cost Benefit Evaluation Techniqu	ues – Risł	k Evaluation -	- Pro	gram	me m	anagement						
- Managing th	allocation of resources within programme - Strategic programme	manager	nent – Creati	ng a	prog	ramm	e – Aids to						
programme m	agement – Reservations about programme management – Benefit	S.		0									
Unit - II	Project Planning						9						
Project Planni	: Introduction – Select project - Identify project scope and objective	s, Identify	project infra	struc	ture -	- Ana	lyse project						
characteristics	Identify project products and activities – Estimate effort for each a	ctivitv – Id	lentifv activitv	risks	s - All	ocate	Resources						
 Review plan 	- Execute plan. Software Effort Estimation : Introduction – Estima	tes – Pro	blems with ov	ver a	nd u	nder e	estimates -						
Basis for softw	re estimation – Software effort estimation techniques – Bottom-up	Estimatin	a – Top dowr	n app	oroac	h and	parametric						
models – Exp	t Judgement – Estimating by analogy – Albrecht Function Point A	nalysis –	Function Poi	nts N	Лark	II - CO	DSMIC Full						
Function Point	– COCOMO II.	,											
Unit - III Activity Planning 9													
Activity Planni	: Objectives – Project Schedule – Projects and Activities - Sequence	ing and S	Scheduling Ac	tivitie	es – N	letwo	rk Planning						
Models – Forr	lating a network modes - Time dimension - Forward Pass – Back	ward Pas	s – Identifying	g the	critio	cal pa	th - Activity						
Float - Shorte	ing the Project Duration - Identifying critical activities - Activity	on Arrow	V Networks. F	Risk	Mana	ageme	ent: Risk –						
Categories of	sk – Framework for dealing with risk – Risk Identification – Risk As	ssessmen	ıt – Risk Planı	ning	– Ris	k mar	nagement –						
Evaluating risk	to the schedule - Applying the PERT Technique - Monte Carlo Sir	nulation -	- Critical chair	n cor	ncept	S.							
Unit - IV	Monitoring and Control						9						
Monitoring and	Control: Creating Framework – Collecting the Data – Review - Visua	lizing Pro	gress – Cost	Mon	itoring	g – Ea	arned Value						
Analysis – Pri	itizing Monitoring – Getting Project Back to Target – Change Cont	rol. Mana	iging Contrac	ts: Ir	ntrodu	uction	 Types of 						
Contract – Sta	es In Contract Placement – Typical Terms of a Contract – Contract	Managen	nent – Accept	tance	э.								
Unit - V	Managing People						9						
Managing Peo	e: Introduction – Understanding Behaviour – Organizational Behav	viour: A Ba	ackground –	Sele	cting	the Ri	ight Person						
for The Job –	struction in the best methods – Motivation – The Oldham–Hackmar	n Job Cha	aracteristics M	lode	l – St	ress –	Health and						
Safety. Workir	in Teams: Introduction - Becoming a Team - Decision Making - 0	Organizati	ional & Team	Stru	icture	s – C	oordination						
Dependencies	Dispersed and virtual teams – Communication Generes – Commu	inication F	Plans – Leade	ershi	э.								
							Total:45						
TEXT BOOK:													
1. Bob H 2018.	ghes, Mike Cotterell and Rajib Mall, "Software Project Managemen	t", 6 th Edi	ition, Tata Mc	Grav	v Hill,	New	Delhi,						
REFERENCE					_	_							
1. Panka	Jalote, "Software Project Management in Practice", 8th Edition, Pea	rson Edu	cation, 2002.										
2. Watts	. Humphrey, "PSP: A self-improvement process for software engine	eers", 1 st I	Edition, Addis	on-V	Vesle	y, 200)5.						

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	carry out the process of software project management	Applying (K3)
CO2	build a project plan and calculate the efforts required.	Applying (K3)
CO3	organize planning, schedule and sequence activities and determine the risks.	Applying (K3)
CO4	develop visualization charts to monitor the progress of projects and manage the contracts	Applying (K3)
CO5	outline the methods of managing people and organising teams.	Applying (K3)
Маррі	ng of COs with POs and PSOs	

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
1														

	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														
* ±3% may be varied (0	* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)													

	22ITO01 - ARTIFICIAL INTELLIGEN	CE												
(Offered by Department of Information Technology)														
Programme & Branch	All BE/BTech branches except Information Technology	Sem.	Category	L	Т	Р	Credit							
Prerequisites	Nil	5	OE	3	1	0	4							
Preamble	amble This course focuses on the methodology of how to translate a data driven business problem into an effective solution by using powerful AI technologies and Machine Learning paradigm.													
Unit - I	nit - I Introduction to Artificial Intelligence 9+3													
Introduction– Defini History, Application	tion, Symbolic and Non-Symbolic Representation, Research Foc s, Objectives, Artificial Intelligence Programming and future of Al	us of Arti	ficial Intellige	nce.	Artifi	cial In	telligence:							
Unit - II	Machine Learning Definition and Basics						9+3							
Introduction- Resur of Matrices, Numeri	gence of ML, Relation with Artificial Intelligence (AI), Machine Le cal Methods, Probability and Statistics, Linear Algebra and Diffe	arning Pr	roblems. Math alculus toward	nema Is Ma	atical achin	need e Lea	s – Basics Irning.							
Unit - III	Machine Learning Categories and Tool Box						9+3							
Supervised Learnin Toolbox: Big data –	g – Unsupervised Learning – Reinforcement Learning – ML Toolb Infrastructure – Advanced Algorithms. Machine Learning tool kit	ox: Data	– Infrastructu AB.	re - A	Algori	thms.	Advanced							
Unit - IV	Data Scrubbing and Setting up your Data						9+3							
Data Scrubbing: Fe Variance and Stand of data needed – C	ature Selection – Row Comparison – One hot Encoding – Binning ard Deviation. Setting up your Data: Generalization of Data – Trai ross Validation.	– Handli n and Te	ng Missing Da st segments -	ata – - Deo	Calc	ulatio of tot	n of Mean, al quantity							
Unit - V	Basics of Regression, Clustering and Error Measurements	5					9+3							
Linear Regression and Variance. Error Relative Absolute E	 Multilinear Regression - Logistic Regression – Clustering: K-N calculation: Mean Absolute Error (MAE) - Root Mean Squared rror (RAE) - Coefficient of Determination (R2 or R-squared) 	learest N Error (RN	leighbors – K MSE) - Relativ	Mea /e S	ans – quare	Setti ed Err	ng K. Bias or (RSE) -							
			Lecture:	45, ⁻	Tutor	ial:15	5, Total:60							
TEXT BOOK:														
1. Oliver Theo	bald, "Machine Learning for Absolute Beginners", Independently	/ Publishe	ed, 2 nd Editior	n, 20	17.									
REFERENCES:														
1. Rajendra A	kerkar, "Introduction to Artificial Intelligence", PHI Learning Pvt L	td, 2 nd E	dition, 2014.											
2. Gopinath R	ebala, Ajay Ravi, Sanjay Churiwala, "An Introduction to Machine	Learning	g", Springer, 1	I st E	dition	, 2019	9.							
				-		-	-							

COUR On cor	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	illustrate AI-based problems, and identify its key competitive advantages and issues.	Applying (K3)
CO2	plan to relate machine learning basics and the importance of mathematics towards machine learning technologies.	Applying (K3)
CO3	use toolbox for basic methods for different AI-based applications	Applying (K3)
CO4	organize pre-processing on data to be used in machine learning models	Applying (K3)
CO5	formulate own learning model for a specified AI application.	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	2	1	1		3	3	3	2	2	3			
CO2	3	2	1	1		3	3	3	2	2	3			
CO3	3	2	1	1		3	3	3	2	2	3			
CO4	3	2	1	1		3	3	3	2	2	3			
CO5	3	2	1	1		3	3	3	2	2	3			
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT- I	Bloom's	Taxono	my					1		

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

22ITX01 - NEXT GENERATION DATABASES														
(Offered by Department of Information Technology)														
Programme Branch	&	All BE/BTech branches except Information Technology	Sem.	Category	L	т	Р	Credit						
Prerequisite	S	Web Technology	5	OE	3	0	2	4						
Preamble		This course provides an understanding of how to use Djang dynamic website from scratch very easily. The course also cov order to get a complete application. In addition, the course also	o frame ers the i introduc	work to creat ntegration of ces NoSQL a	te a data nd H	com base IDFS	plete s with data	static and Django in bases.						
Unit - I	International of Diango, remplates and woders 9 Istalling Diango, Starting a project, Views and URLconfs : generating static and dynamic contents –URLConfs and loose couplir													
 Dynamic URLs, Templates : Template System basic – using Template System – Basic template tags and Filters – Limitations – Using templates in views – template loading - Inheritance, Models : MTV Development pattern – Configuring database – defining Models in Python – Installing the Model – Data Access - Adding Model String Representations - Inserting and Updating Data - Selecting Objects - Deleting Objects . 														
Unit - II Forms, Advanced Templates and Models in Django 9 The Diagon Admin Site + Activating the Admin Interface Uning the Admin Site - Adding Very Medale to the Admin Site Output														
Unit - II Forms, Advanced Templates and Models in Django 9 The Django Admin Site : Activating the Admin Interface - Using the Admin Site - Adding Your Models to the Admin Site - Customizing Field Labels - Custom ModelAdmin classes - Users, Groups, and Permissions, Forms : Simple validation - Making a Contact Form Tying Form Objects Into Views – Working with form fields, Advanced Views and URLconf, Advanced Templates : RequestContex and Context Processors - Automatic HTML Escaping -Extending the Template - Writing Custom Template Loaders - Configuring the Template System in Standalone Mode, Advanced Models Formation Standalone Model														
Unit – III		Session Management, caching and Database integration					<u> </u>	9						
Generic View FastCGI, Ge Sessions, us - The Per-Site Unit – IV	vs: Ger neratin sers an e Cach	eric Views of Objects - Extending Generic Views, Deploying Dja g Non-HTML content : views and MIME-types - Producing CS d registration: Framework – Authentication – Permission – Group e -The Per-View Cache - Template Fragment Caching, Integratir NoSQL Databases	ango: I SV and F s – Mess ng with d	Django with A PDFs - Syndi sages, Cachir atabases.	vpac cationg : \$	he, r on F Settii	nod_µ eed F ng Up	bython and Tramework, the Cache						
Introduction t Introduction t and Export –	to Mon to Apac Quervi	goDB – Term used in RDBMS and MongoDB – Data Types the Cassandra – CRUD operations –Collections – Using a coun ng System Tables.	in Mong ter – Tin	oDB – Mong ne to Live – A	oDB Alter	8 Qu Corr	ery L Imano	anguage – Is – Import						
Unit - V	,	Big Data Storage Systems						9						
Introduction t Shell – Datal Implementati	o Hive base – on – U	 Hive Architecture – Hive Data Types – Hive File Format – Hive Tables – Partitions – Bucketing – Views – Subquery – Joins – ser Defined Function. 	Query L Aggrega	anguage – D ation – Group	DL – o by	DM and	L – St Havir	arting Hive ng –RCFile						
LIST OF EXE	PERIM	ENTS / EXERCISES:												
1. Crea	ate a si	nple Django application with static and dynamic content												
2. Deve	elop a l	Django application using templates and models												
3. Imple	ement	form processing in Django												
4. Deve	elop a l	Django Admin site												
5. Crea	ate RSS	and Atom feeds using Syndication Feed Framework												
6. Sess	sion ma	inagement in Django												
7. Implement CRUD operations in MongoDB														
8. Crea	ate and	use collections in MongoDB												
9. Imple	ement	DML and DDL in Hive												
10. Imple	ement	oins, Aggregation and GroupBy/Having in Hive												
				Lecture:4	5, P	racti	cal:3	0, Total:75						

TEXT BOOK:															
1.	Adria	an Holc	ovaty, Jac	ob Kaplar	n Moss,	"The Dj	ango Bo	ok Rele	ease 2.0)", A pre	ess, 2013	. (For Unit	s I,II,III)		
2.	2. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", 1 st Edition, Wiley India Pvt. Ltd, 2015. (For Units IV, V)														
REFEF	REFERENCES/ MANUAL / SOFTWARE:														
1.	1. Andrew Pinkham, "Django unleashed", Sams Publishing, 1 st Edition, 2015														
2.	 Beau Curtin, "Django Cookbook: Web Development with Django Step by Step Guide", 2nd Edition, 2016 														
COURSE OUTCOMES:BT MappedOn completion of the course, the students will be able to(Highest Level)															
CO1	CO1develop static and dynamic web content using Django templates with modelsApplying (K3), Precision (S3)														
CO2	CO2 create Django user models, templates and forms and develop simple web applications Applying (K3), Precision (S3)													K3), (S3)	
CO3	build	l Djang	o applica	tions using	g sessio	ons and o	databas	es						Applying (Precision	K3), (S3)
CO4	iden	tify the	significar	nt features	of NOS	SQL Data	abases							Applying (Precision	K3), (S3)
CO5	appl	y the bi	gdata sto	orage cond	cepts us	ing Hive)							Applying (Precision	K3), (S3)
														1100131011	(00)
						Mappin	g of CO	s with	POs an	d PSOs	5				
COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1	3	3	3	3	2	2	3			
CO	2	3	2	1	1	3	3	3	3	2	2	3			
CO	3	3	2	1	1	3	3	3	3	2	2	3			
CO	4	3	2	1	1	3	3	3	3	2	2	3			
CO	5	3	2	1	1	3	3	3	3	2	2	3			
	wht 2	Mode	rato 3	Substanti	al RT_I	Ricom's	Tayono	mv							

ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	20	20	60				100						
CAT2	20	20	60				100						
CAT3	10	20	70				100						
ESE	15	25	60				100						
* ±3% may be varied (C	CAT 1,2,3 – 50 mark	s & ESE – 100 mar	·ks)										

22GEX02 - NCC STUDIES (AIRWING) – I														
(Offered by Department of Information Technology)														
Prograr Branch	nme &	All BE/BTech branches except Information Technology	Sem.	Category	L	т	Ρ	Credit						
Prerequ	uisites	Nil	5	OE	3	1	0	4						
	l		1	I				1						
Preamb	Preamble This course is designed especially for NCC Cadets. This course will help develop character, camaraderie, discipline, secular outlook, the spirit of adventure, sportsman spirit and ideals of selfless service amongst cadets by working in teams, honing qualities such as self-discipline, self-confidence, self-reliance and dignity of labour in the cadets. Unit-I NCC Organization and National Integration 9+3													
Unit–I NCC Organization and National Integration 9+3														
NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC cadets – Aim and advantages of NCC Training - NCC badges of Rank - Honors' and Awards – Incentives for NCC cadets by central and state govt. History and Organization of IAF - Indo-Pak War-1971 - Operation Safed Sagar. National Integration - Unity in diversity - contribution of youth in nation building - national integration council - Images and Slogans on National Integration.														
Unit–II		Drill and Weapon Training						9+3						
Drill- Words of commands - position and commands - sizing and forming - saluting - marching - turning on the march and wheeling - saluting on the march - side pace, pace forward and to the rear - marking time - Drill with arms - ceremonial drill - guard mounting.(WITH DEMONSTRATION). Main Parts of a Rifle - Characteristics of .22 rifle - loading and unloading – position and holding - safety precautions – range procedure - MPI and Elevation - Group and Snap shooting - Long/Short range firing (WITH DEMONSTRATION).														
Unit–III		Principles of Flight						9+3						
Laws of Aircraft	motion-Fore	ces acting on aircraft – Bernoulli's theorem - Stalling - Primar	y control	surfaces – seco	ndar	y con	trol su	urfaces -						
Unit-IV		Aero Engines						9+3						
Introduc trends.	ction of Aero	engine -Types of engine - piston engine - jet engines - Turbo	o prop en	gines-Basic Flig	ht In	strum	nents ·	- Modern						
Unit–V		Aero Modeling						9+3						
History Radio C	of aeromode Control Mode	eling - Materials used in Aero-modeling - Types of Aero-mode els - Building and Flying of Aero-models.	els – Stat	ic Models - Glide	ers -	Cont	rolline	models -						
					45 -	-		Tatal 00						
				Lecture:	45,	lutor	ial:15	o, Total:60						
TEXT B	OOK:													
1.	"National C	adet Corps - A Concise handbook of NCC Cadets", Ramesh	Publishir	ng House, NewD	elhi,	2014	•							
REFERI	ENCES/ MA	NUAL / SOFTWARE:												
1.	"Cadets Ha	ndbook – Common Subjects SD/SW", DGNCC, New Delhi.												
2.	"Cadets Ha	ndbook – Specialised Subjects SD/SW", DGNCC, New Delhi	i.											
3.	"NCCOTA	Precise", DGNCC, New Delhi.												

COURSE OUTCOMES: On completion of the course, the students will be able to													BT Mapped (Highest Level)		
CO1	buil carr	d sense ry out na	e of pat ation b	riotism, seo uilding thro	ular v ugh na	alues and ational uni	shall be ty and so	transfo ocial col	rmed ir hesion.	nto motiv	ated you	uth who wil	I	Applying	(K3)
CO2	den thei	nonstrat ir use al	te the s nd hand	ense of dis Iling	cipline	e with sma	artness a	nd have	e basic	knowled	dge of we	eapons and	k	Applying	(K3)
CO3	illus	strate va	arious f	prces and r	nome	nts acting	on aircra	aft						Applying	(K3)
CO4	.O4outline the concepts of aircraft engine and rocket propulsionApplying (K3)													(K3)	
CO5	CO5 design, build and fly chuck gliders/model air planes and display static models. Applying (K3)													(K3)	
Manning of COs with POs and PSOs															
COs/P	Os	PO1	PO2	PO3	PO	4 PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1						3	3	3	3	3				
CO2	2					3									
CO	3	3	2	1	1										
CO4	4	3	2	1	1										
CO	5	3	2	1	1										
CO	6														
CO	7														
COS	8														
1 – Slig	ght, 2	– Mode	erate, 3	 Substan 	tial, B	T- Bloom's	s Taxono	my							
						ASSES	SMENT	PATTE	ERN - T	HEOR	1				
Tes	t / Blo	oom's orv*	F	Remember (K1) %	ing	Underst	anding	Appl	ying %	Analyz	ing %	Evaluating (K5) %	g C	Creating (K6) %	Total %
	CAT1												-	-	
	CAT	2		-		-		-		-		-		-	-
	CAT	3		-		-		-		-		-		-	-
	CAT3 -														

22ITX02 - ADVANCED JAVA ROGRAMMING														
		(Offered by Department of Information Tech	nnology)											
Progr Branc	amme & h	All BE/BTech branches except Information Technology	Sem.	Category	L	т	Ρ	Credit						
Prere	quisites	Nil	6	OE	3	0	2	4						
Pream	nble	This course enables the students to develop, test, and deploy establish them as cloud-based applications using Spring Boot.	/ applica	tions ready fo	or p	roduc	tion a	nd how to						
Unit -	I	Spring Boot						9						
Introdi Initializ class,	uction – Featu zr, Build Tools Bootstrap App	res - Advantages, Microservices, System Requirements, Setting – Maven and Gradle, pom.xml and build.gradle, Building applica plication Context , Spring Boot Starter Dependencies - Auto-Cont	up the e ation usir figuratior	nvironment, 1 ng Maven and า	2-fa Gr	actor adle,	app, S entry	Spring point						
Unit -	II	Spring Annotations and Data						9						
Spring Spring and M	Spring Boot Annotations: Java annotations – Existence of Spring Annotations - Spring and Spring Boot Annotations. Working wit Spring Data JPA and Caching: Accessing relational data using JdbcTemplate and Spring Data JPA with the in-memory database and MySQL - Query methods in Spring Data JPA - Caching.													
Unit -	nit - III Learning RESTFul API 9													
Buildir – Exce Authe REST	uilding RESTFul Microservices: Creating and Consuming RESTFul APIs- Spring Boot Actuators – Custom health check indic Exception handling -Service discovery – RestTemplate - Routing a request – Spring Cloud Gateway. Securing a Web Applica uthentication and Authorization concepts – Spring security filters – Enabling and Disabling security – Oauth security – Acce EST secured APIs – REST services													
Unit -	IV	Implementing Resilience4J and Swagger						9						
Buildir Logba Impler	ilding Resilient System: Client-side load balancing – Circuit breaker – Implementing Resilience4J. Logging: Logging Data gback – Spring Cloud Sleuth and Zipkin – ELK. Working with the Swagger API Management Tool: API documentation – plementing Swagger - Swagger UI – Swagger documentation – Swagger Codegen.													
Unit -	V	Testing and Deploying						9						
Introd – Rep Form	uction – Data resenting Patt Processing – [Type Conversion – Operators – Arrays – Strings Comparisons - erns – Finding Matches – Character Classes – Finding Multiple Database Connectivity – Session Tracking.	- String F Instance	Processing: So of a Pattern	ear – R	ching egula	for Ex ar Exp	xpressions ressions –						
LIST	OF EXPERIME	ENTS / EXERCISES:												
1.	Build simple	micro services using Java												
2.	Develop a si	mple web application Maven and Gradle												
3.	Utilize Boots	trap Application Context and Spring Boot Starter Dependencies	to config	ure a web app	olica	ation								
4.	Develop a si	mple web application to access relational data using JdbcTempla	ate in Sp	ringBoot										
5.	Implement ac	dvanced search operations in a relational data from your web ap	plication	using Query	met	thods	in Sp	ring Data						
6.	Create a RE	STFul API using SpringBoot and consume it in your web application	tion											
7.	Create a sec	ured web application using various security features in SpringBo	ot											
8.	Implementati	ion of fault tolerance and load balancing in your microservices us	sing Res	ilience4J										
9.	Testing your	web application and RestFul Web Serives												
10.	Deploying yo	our web application using Docker and Containerization												
				Lecture:4	5, F	racti	cal:30), Total:75						
TEXT	BOOK:													
1.	Shagun Bal Learning RE 2021.	kliwal, "Hands-on Application Development using Spring Boot: ESTFul API, Microservices, CRUD Operations, Unit Testing, ar	Building nd Deplo	Modern Clou yment", BPB	d N Pul	lative blicat	Appli ions, 2	cations by 1 st Edition,						
REFE	RENCES:													
1.	Rajput, D. "I Publishing L	Mastering Spring Boot 2.0: Build modern, cloud-native, and distri .td, 2018.	buted sy	vstems using \$	Spri	ng Bo	oot", F	Packt						
2.	Claudio and	Greg, "Developing Java Applications with Spring and Spring Bo	ot", Pacł	kt Publishing L	_td,	2018	-							

SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
Apply the Spring Boot and all its capabilities.	Applying (K3), Precision (S3)
Demonstrate thecommon annotations of the Spring Data and Spring Data JPA	Applying (K3), Precision (S3)
Build RESTFul Microservices and Secured Web Application	Applying (K3), Precision (S3)
Implement Resilience4J and Swagger API and host the apps on Cloud.	Applying (K3), Precision (S3)
Learn to demonstrate Testing and Deploying a Spring Boot Application	Applying (K3), Precision (S3)
	SE OUTCOMES: Impletion of the course, the students will be able to Apply the Spring Boot and all its capabilities. Demonstrate thecommon annotations of the Spring Data and Spring Data JPA Build RESTFul Microservices and Secured Web Application Implement Resilience4J and Swagger API and host the apps on Cloud. Learn to demonstrate Testing and Deploying a Spring Boot Application

COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1			3	3	3	2	2	3			
CO2	3	2	1			3	3	3	2	2	3			
CO3	3	2	1			3	3	3	2	2	3			
CO4	3	2	3	2	1	3	3	3	2	2	3			
CO5	3	2	3	2	1	3	3	3	2	2	3			
1 – Slight, 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	5	20	75				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 mark	s & ESE – 100 ma	rks)										

	22ITO02 - INTERNET OF THINGS														
	(Offered by Department of Information Tecl	hnology)												
Programme 8 Branch	All BE/BTech branches except Information Technology	Sem.	Category	L	т	Р	Credit								
Prerequisites	Computer Networks	6	OE	3	1	0	4								
Preamble	Preamble This course provides an introduction to Internet of Things and its technologies that enable the students to develop real world applications using it. Unit - I Introduction to Internet of Things														
Unit - I Introduction to Internet of Things 9+3 Introduction to Internet of Things: Definition and Characteristics of IoT. Physical Design of IoT. – IoT Protocols, IoT Communication															
Introduction to Models - IoT C – Communicat	Internet of Things: Definition and Characteristics of IoT, Physical Desonmunication APIs – IoT enabled Technologies – Wireless Sensor Netion Protocols- Embedded Systems – IoT Levels and Templates.	sign of Ic etworks	oT – IoT Proto - Cloud Comp	ocols outing	, Io⊺ g – I	Г Com Big da	munication ta analytics								
Unit - II	Design Methodology and Endpoints						9+3								
M2M – Differe Methodologies serial- SPI- 12 controllers.	ence between M2M &IoT – Software defined networks – Network – Domain Specific IoT – Home Automation – Smart Agriculture. Endpo C- Programming –Interfacing with external gadgets – controlling of	functior pints: In utput – 1	 Virtualizatio troduction to lago reading input 	n – Rasp fron	loT beri n pii	Platfo ry PI – ns – I	orm design Interfaces: Aodern IoT								
Unit - III	IoT Protocols						9+3								
IoT Access To 802.11ah and 6LoWPAN to DataAcquisitio	achnologies: Physical and MAC layers, topology and Security of IL LoRaWAN – Network Layer: IP versions, ConstrainedNodes and Cons 6Lo, Routing overLow Power and Lossy Networks – Application n – Application Layer Protocols: CoAP and MQTT.	EEE 802 strained Transpo	2.15.4,802.15 Networks – C ort Methods:	.4g,)ptim Supe	802 iziną ervis	2.15.4e g IP fo sory C	e, 1901.2a, r IoT: From control and								
Unit - IV	Data Analytics and Supporting Services				_		9+3								
Structured Vs Ecosystem – A Application Fra	Unstructured Data and Data in Motion Vs Data in Rest – Role of Mac spache Kafka, Apache Spark – Edge Streaming Analyticsand Networ mework – Django –AWS for IoT – System Management with NETCO	chine Le k Analyti NF-YAN	arning –No S ics – Xively C G.	SQL I loud	Data for	abases IoT, P	s – Hadoop ython Web								
Unit - V	IoT Seurity and Case Studies						9+3								
Attacks and Co Middleware – C USECASES: A	ountermeasures – Authentication and Authorization at IoT Layers – Ot Cross Layer security – Privacy and Risk Mitigations – Blockchain – 5G Isset Management The Smart Grid Commercial Building Automation S	ther secu 6 – Fog a Smart Ci	urity features and Edge Cor ties.	and i nputi	relat ing.	ted iss IoT	ues –								
			Lecture	:45, 1	Tuto	orial:1	5, Total:60								
TEXT BOOK:															
1. Arshd (For U	eep Bahga and Vijay Madisetti, "Internet of Things – A Hands-on Appi nits I, II, V)	roach", 1	st Edition, Ur	nivers	sity	Press,	2015.								
2. David Techn	Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jeron ologies, Protocols and Use Cases for Internet of Things", Cisco Press	ne Henry , 2017. (y, "IoT Funda For Units III,	ment IV)	tals:	Netwo	orking								
REFERENCES	3:														
1. Honbo	Zhou, "The Internet of Things in the Cloud: A Middleware Perspective	e", 1 st E	dition, CRC F	ress	s, 20	012									
2. Madhu Public	isanka Liyanage, An Braeken, Pradeep Kumar, Mika Ylianttila, "IoT S ations, 2020. (For Unit V)	ecurity: /	Advances in A	Authe	entic	ation"	, Wiley								
3. https:/	/aws.amazon.com/														

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	make use of IoT architecture, infrastructure and constraints of Internet of Things	Applying (K3)
CO2	utilize the design methodologies for IoT applications and experiment with simple applications using Raspberry Pi	Applying (K3)
CO3	apply the IoT protocols for local and global connectivity	Applying (K3)
CO4	develop IoT products with the use of data analytics and supporting services	Applying (K3)
CO5	identify the security challenges and opportunities in the different domains of Internet of Things	Applying (K3)
1		

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	1		3	3	3	2	2	3			
CO2	3	2	1	1		3	3	3	2	2	3			
CO3	3	2	1	1		3	3	3	2	2	3			
CO4	3	2	1	1		3	3	3	2	2	3			
CO5	3	2	1	1		3	3	3	2	2	3			

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	30	40	30				100				
ESE	25	45	30				100				
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)											

	22ITO03 - FUNDAMENTALS OF SOFTWARE DEVELOPMENT										
		(Offered by Department of Information Tecl	hnology)							
Progra Branch	mme & N	All BE/BTech branches except Information Technology	Sem.	Category	L	т	Ρ	Credit			
Prereq	uisites	NIL	6	OE	З	1	0	4			
Pream	ble	This course provides knowledge on basic concepts of softwa coding in software development	are const	truction, Qual	ity o	f cod	e and	Effective			
Unit - I		Foundation on Software Construction						9+3			
Software Construction – Metaphors – Upstream Prerequisites: Importance of Prerequisites-Determining the kind of Software, Problem-Definition, Requirement, Architecture Prerequisites-Amount of time to spend on Upstream Prerequisites – Key Construction Decisions: Choice of Programming Language - Programming Conventions - Selection of Major Construction Practices.											
Unit - I	I	Creating High–Quality Code						9+3			
Design in Construction: Design Challenges and Concepts - Design Building Blocks and Practices - Working Classes: Class Foundation – Interfaces - Design and Implementation Issues - Reason for Class Creation - High-Quality Routines- Defensive Programming: Assertion - Error-Handling Techniques - Exceptions.											
Unit - I		Variables						9+3			
Genera Organiz Boolea	Il Issues in us zing Straight- n Expression	sing Variables -The Power of Variable Names - Fundamental Da Line Code - Using Conditionals - Controlling Loops - Unusua s - Compound and null Statements.	ata Type al Contro	s - Unusual E ol Structures-	ata Ger	Type neral	s – St Contr	atements: ol Issues:			
Unit - I	V	Code Improvements						9+3			
The So Quality Strateg	ftware-Qualit Assurance - ies and Tech	y Landscape: Characteristics - Techniques for improvement - I Collaborative Construction – Developer Testing – Debugging niques.	Relative g – Intro	Effectiveness duction to Re	of (efact	Quali oring	ty Teo – Co	chniques - ode tuning			
Unit - \	1	System Considerations						9+3			
Progra	m size Vs Co	onstruction – Managing Construction – Integration – Programmin	ig Tools.								
				Lecture:	45, 1	Tutor	ial:15	, Total:60			
TEXT E	BOOK:										
1.	Steve McCc	nnell, "Code Complete - A practical handbook of software const	ruction",	2 nd edition, N	licros	soft p	ress,	2006.			
REFER	ENCES:										
1.	Ali Bahrami,	"Object Oriented Systems Development", 1st Edition, Tata McG	raw-Hill,	New Delhi, 2	008.						
2.	Infosys sprir https://infysr	ng board contents provided by Infosys at pringboard.onwingspan.com/web/en/page/home									

COUR On co	SE OI mplet	UTCON	IES: the cour	se, the st	udent	s will be a	able to							BT Mapp (Highest L	oed .evel)	
CO1	plan	for sof	tware co	nstruction	prere	quisites ar	nd key c	onstruc	tion de	cisions				Applying	(K3)	
CO2	deve soft	elop the ware de	e ability to evelopme	o create hi ent	gh-qu	ality code	that adh	neres to	best p	oractices	and star	dards in		Applying (K3)		
CO3	acqu strue	uire a co ctures to	omprehe o write e	nsive und	erstan ganize	ding of va ed, and err	riables, or-free o	data typ code fo	oes, sta r solvir	atements	s, and co ex proble	ntrol ems		Applying (K3)		
 gain a comprehensive understanding of software quality and effective techniques for improving it, including quality assurance, collaborative construction, testing, debugging, refactoring, and code tuning 										it, e	Applying (K3)					
CO5develop skills in managing program size and construction, integrating software components, and using programming tools to develop efficient and scalable software solutions.Applying (K3)									(K3)							
	Mapping of COs with POs and PSOs															
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO	1	3	2	1	1		3	3	3	2	2	3				
CO	2	3	2	1	1		3	3	3	2	2	3				
CO	3	3	2	1	1		3	3	3	2	2	3				
CO	4	3	2	1	1		3	3	3	2	2	3				
CO	5	3	2	1	1		3	3	3	2	2	3				
1 – Slię	ght, 2	– Mode	erate, 3 -	Substant	al, BT	- Bloom's	Taxono	my								
						ASSES	SMENT	PATTE	ERN - T	THEORY	,					
Tes C	t / Blo atego	oom's ory*	Re	ememberi (K1) %	ng	Understa (K2)	anding %	Appl (K3)	ying) %	Analyz (K4) 9	ing l %	Evaluating (K5) %	(Creating (K6) %	Total %	
	CAT	1		10		40		50)						100	
	CAT	2		10		40		50)						100	
	CAT	3		10		40		50)						100	
	ESE	Ξ		10		40		50)						100	
* ±3%	may b	oe varie	d (CAT 1	,2,3 – 50	marks	& ESE -	100 mai	rks)					· · ·			

	22ITO04 - MOBILE APPLICATION DEVELOPMENT									
	(Offered by Department of Information Tec	hnology)							
Programme& Branch	All BE/BTech branches except Information Technology	Sem.	Category	L	т	Ρ	Credit			
Prerequisites	Java Programming	6	OE	3	1	0	4			
Preamble This course provides knowledge on developing mobile applications using Android.										
Unit – I Introduction to Android 9+3										
Introduction – Android Architecture – Environmental setup – Develop simple Hello World application – App Folder structure - Android virtual device - Application Components – Toast message - Activity – Activity Life cycle – Log messages.										
Unit – II	Layout and UI						9+3			
Intent –types - Intent filters - Views – Layouts - UI components: Text View, Edit Text, Button, Toggle Button, Radio Group, Check Box, AutoComplete Text View, Progress Bar, Rating Bar – Event Listeners and Handlers.										
Unit – III	Resources and Alerts						9+3			
Resources overview – Styles and Themes - Menu: Option menu, Context menu – Notification – Broadcast receivers – Web View - Phone call.										
Unit – IV	Storage						9+3			
Introduction to Stor	ages - Bundle - SQL Lite: CRUD operations - Content providers -	 Shared 	preferences	- JS(ON p	arsing	9			
Unit – V	Services and Sensors						9+3			
Services –Sending move.	SMS – Sensors: Motion and Position - Accessing geo location –	Basic An	imations: rota	ate, f	ade,	zoom	, slide and			
			Lecture	:45,	Tuto	rial:1	5,Total:60			
TEXT BOOK:										
1. John Horto	n, "Android Programming for Beginners", 3 rd Edition, Packt Publis	shing, 20	21							
REFERENCES:										
1. Bill Phillips	, Chris Stewart and Kristin Marsicano, "Android Programming", 3	rd Edition	, BigNerd Ra	nch (Guide	es, 20	17.			
2. https://deve	eloper.android.com									
1										

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Illustrate the steps to create android application and discuss its activity life cycle	Applying (K3)
CO2	develop an Android application using Layouts, UI components with event handling	Applying (K3)
CO3	design styles, themes and menu	Applying (K3)
CO4	plan to execute CRUD operations on SQLite	Applying (K3)
CO5	build applications using services, animations and sensors	Applying (K3)

	Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	2	3	3	3	2	2	3			
CO2	3	2	1	1	2	3	3	3	2	2	3			
CO3	3	2	1	1	2	3	3	3	2	2	3			
CO4	3	2	1	1	2	3	3	3	2	2	3			
CO5	3	2	1	1	2	3	3	3	2	2	3			
						_								

	ASSESSMENT PATTERN - THEORY											
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
CAT1	30	30	40				100					
CAT2	20	40	40				100					
CAT2	20	40	40				100					
ESE	25	35	40				100					
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22ITO05 - FUNDAMENTALS OF CLOUD CO	MPUTIN	IG						
		(Offered by Department of Information Tecl	hnology)						
Progra Branch	mme &	All BE/BTech branches except Information Technology	Sem.	Category	L	т	Р	Credit		
Prereq	uisites	Nil	7	OE	3	0	0	3		
				•						
Preamb	ble	This course provides a basic introduction to cloud computing a analyzing a few case studies to appreciate the emergence of the paradigm.	nd utility he cloud	computing. as the next-g	lt als ene	o de ratior	als with the com	th puting		
Unit – I		Introduction						9		
Introduc Benefits	ction to Clou s and Disadv	d Computing – Roots of Cloud Computing – Desired Features antages of Cloud Computing.	of Cloud	Computing -	- Ch	allen	ges a	nd Risks –		
Unit – I	I	Virtualization						9		
Basics Mechar	of Virtualizat nisms – Virtua	ion – Types of Virtualization – Implementation Levels of Virtua alization of CPU – Memory – I/O Devices – Virtualization Suppor	lization - rt and Di	 Virtualizatio saster Recovi 	n St ery.	ructu	res –	Tools and		
Unit – I	11	Cloud Architecture, Services And Storage						9		
NIST C Challen	NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage.									
Unit – I	V	Resource Management and Security In Cloud						9		
InterClo Security	oud Resource y – Application	e Management – Resource Provisioning Methods – Security C n Security – Virtual Machine Security.	Overview	/ – Cloud Se	curit	y Ch	alleng	jes – Data		
Unit – V	V	Case Studies						9		
Google Cloud S	App Engine Software Env	(GAE) – GAE Architecture – Functional Modules of GAE – Ama ironments – Eucalyptus – Open Nebula – Open Stack.	azon We	b Services (A	ws) – N	licroso	oft Azure –		
								Total:45		
TEXT B	BOOK:									
1.	Buyya R., B (For Unit I)	roberg J., Goscinski A., "Cloud Computing: Principles and Parac	digm", 1 ^s	^t Edition, Joh	n W	iley 8	Son	s, 2011.		
2.	Kai Hwang, Internet of T	Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Com hings", Morgan Kaufmann Publishers, 2017. (For Units II,III,IV,V	nputing, /)	From Parallel	Pro	cessi	ng to	the		
REFER	ENCES:									
1.	Rittinghouse Press, 2017	e, John W., and James F. Ransome, "Cloud Computing: Implem	entation,	Managemen	t and	d Seo	curity"	, CRC		
2.	Rajkumar B	uyya, Christian Vecchiola, S. ThamaraiSelvi, "Mastering Cloud C	Computir	ng", Tata McG	iraw	Hill,	2013			
3.	Toby Velte,	Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practic	cal Appro	oach", Tata M	cGra	aw H	ill, 200)9		

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	summarize the main concepts, key technologies, strengths, and limitations of cloud computing and identify suitable scenarios for moving to the cloud platform.	Applying (K3)
CO2	interpret the role of virtualization as the key enabling technology that helped in the development of the cloud platform	Applying (K3)
CO3	develop the ability to understand and use the architecture of compute cloud and storage cloud services and delivery models	Applying (K3)
CO4	examine the core issues of cloud computing architecture namely resource management and security.	Applying (K3)
CO5	experiment with several public cloud offerings and cloud development tools to choose the appropriate service provider for one's requirements.	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	1	1	2	3	3	3	2	2	3			
	CO2	3	2	1	1	2	3	3	3	2	2	3			
	CO3	3	2	1	1	2	3	3	3	2	2	3			
	CO4	3	2	1	1	2	3	3	3	2	2	3			
ĺ	CO5	3	2	1	1	2	3	3	3	2	2	3			
ĺ	4 01:0			0		DI	-								

	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	20	60	20				100				
ESE	30	40	30				100				
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)											

		22ITO06 - INTRODUCTION TO ETHIC	AL HACKING					
		(Offered by Department of Information	on Technology)				
Program Branch	ime &	All BE/BTech branches except Information Technology	Sem.	Category	L	т	Р	Credit
Prerequi	isites	Nil	7	OE	3	0	0	3
Preamble	9	This course provides basic knowledge about different k countermeasures.	kinds of hacking	methods and	l the	ir		
Unit- I		Introduction to Hacking						9
Ethical H - Overvie - Networ Security	lacking Ove w of TCP/IF k and Com	rview - Role of Security and Penetration Testers Penet P- The Application Layer - The Transport Layer - The Inter puter Attacks - Malware - Protecting Against Malware A	tration-Testing N met Layer - IP Ad Attacks Intrude	Nethodologies ddressing - Ne r Attacks - A	s- La umbe ddre	ws of ering ssing	the L Syste Phys	and ms. sical
Unit- II		Foot printing & Scanning						9
What is f	oot printing or Listening	 ? - Internet Foot printing- Scanning – Determining if the s Detecting the operating system – Processing and stori 	system is alive – ing scan data.	Determining	whic	h sei	rvices	are
Unit- III		Enumeration						9
Enumera – Unauth	ation - basic nenticated a	banner grabbing- Enumerating Common Network servic ttacks – authenticated attacks – windows security feature	ces and its coun es.	termeasures.	Had	king	Wind	ows
Unit- IV		Hardware & Wireless Hacking						9
Hacking Engineer DoS Atta	Hardwar ring Hardwa Ick Techniq	e – Physical access – Hacking Devices re. VPN Hacking. Wireless Equipment – Discovery and n ues – DoS- Countermeasures - Encryption attacks –Auth	 Default nonitoring - Den nentication attac 	Configuratic ial of Service k.	ns Attao	_ cks _	Reve Comr	erse non
Unit- V		Application hacking & Countermeasures						9
Web and Databas	l Database e Hacking.	Hacking – Web Server Hacking - Web application Hack Mobile Hacking – Hacking android – iOS.	ting - Common v	web application	on V	ulner	abilitie	es –
								Total:45
TEXT BO	DOK:							
1.	Michael T. S Technology	Simpson, Kent Backman, and James E. Corley, "Hands-o ", Delmar Cengage Learning, 2010. (For Unit I)	on Ethical Hacki	ing and Netwo	ork D)efen	se, Co	ourse
2.	Stuart McC Tata McGr	ure, Joel Scambray, Goerge Kurtz, "Hacking Exposed 7: aw Hill Publishers, 2012. (For Units II,III,IV,V)	: Network Secur	ity Secrets ar	nd So	olutio	ns", 7	th Edition,
REFERE	NCES:							
1. F	Patrick Eng	ebretson, "The Basics of Hacking and Penetration Testin	g", SYNGRESS	, Elsevier, 20	13.			
2. F	Rafay Baloc	h, "Ethical Hacking and Penetration Testing Guide", CR0	C Press, 2014.					
3. ł	Kevin Beave	er, "Ethical Hacking for Dummies", 6 th Edition, Wiley, 201	8.					

COUR On cor	BT Mapped (Highest Level)	
CO1	Organize a computer and network against a variety of attacks	Applying (K3)
CO2	Identify and explain the basic vulnerabilities in any computing system	Applying (K3)
CO3	Enumerate the Computer network services and determine the possible security attacks in Windows machine.	Applying (K3)
CO4	Identify and assess the vulnerabilities in hardware and wireless environment.	Applying (K3)
CO5	formulate research problems in the computer security applications	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	3	3	3	3	2	2	3			
CO2	3	2	1	1	3	3	3	3	2	2	3			
CO3	3	2	1	1	3	3	3	3	2	2	3			
CO4	3	2	1	1	3	3	3	3	2	2	3			
CO5	3	2	1	1	3	3	3	3	2	2	3			

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

22IT007 - BUSINESS CONTINUITY PLANNING												
	(Offered by Department of Information Techn	ology)										
Programme & Branch	All BE/BTech branches except Information Technology	Sem.	Category	L	Т	Ρ	Credit					
Prerequisites	Nil	8	OE	3	0	0	3					
Preamble This course introduces the concept of Business Continuity Process and Recovery from a natural or manmade disaster. It also discusses various aspects like risk evaluation, strategies, awareness and training programmes on business continuity.												
Unit - I Introduction: 9												
Introduction: Vu information-Alte Impact –Image- Business activit	Inerability of today's business organizations-Disaster - Classification of Di rnative Business operations –Loss of information-Indirect impact-rippli Market Position-Growth or decline -Risk management – Building Continui ies-Business Continuity planning Strategy	sasters-D ng effects ty- Rebui	Direct impact: us of business Iding the Infra	unava oper struct	ilabilit ations ure-R	ty and s-Lon esum	d loss of ng Term nption of					
Unit - II Multilateral Continuity Planning:												
Multilateral Con planning-Marke Operational risk Business strate	Multilateral Continuity Planning: Multilateral continuity planning-MCP approach-Project success factors-Benefits of multilateral continuity planning-Marketing protection: a justification for funding of total asset protection programme-Total asset protection-Brand value- Operational risk management-Senior management arrangements, systems and controls- Understanding the organization's business- Business strategy and business continuity planning-BCP within a business strategic context											
Unit - III	Unit - III Business Continuity Planning: 9											
programme mai assessment-Ris strategies for th issues-Salvage	nagement-Understanding the organization - A practical approach-Risk ev sk evaluation and control-Business impact analysis-A walk through a com e business or work areas-Business/work area recovery-Types of conting considerations	aluation a prehensiv jencies-V	and control:pra ve BIA-Develo ital records ar	ictical ping t nd pap	guide ousine oer do	elines ess co ocum	s for risk ontinuity entation					
Unit - IV	Developing Business Continuity Strategies:						9					
Developing Bu strategies-Hard Strategies-Strat Business challe availability-Virtu	siness Continuity Strategies Business continuity for telecommunicat ware strategies-Software strategies- Network service strategies-offsite egies for communications products and services -Understanding the busir nges-Marketplace trends-Planning to recover your data – Availability-Tap alization	ions-Busi e storage ness infor pe backup	ness continu es and facility mation flow-V o – Disk-to-dis	ity st v stra ulnera k-Hig	rategi tegies Ibility h ava	es- s-Call asse ilabili	General centre ssment- ty-WAN					
Unit - V	Awareness and training:						9					
Awareness and testing-BC plan Defining the aud	training-Establish BC policy-Acquiring or developing training aids-Awar testing – Overview – Testing – Maintenance-BC audit-Audit objective-De dit programme-Audit planning – Fieldwork-Analysis	eness thr termining	the maturity l	ance, evel c	f the	ew, au orgar	udit and nization-					
						1	fotal:45					
TEXT BOOK:												
1. And	rew Hiles, "The Definitive Handbook of Business Continuity Management'	', 2 nd Edit	ion, John Wile	y& So	ons, 2	007						
REFERENCES												
1. Snee	daker, Susan, "Business continuity & disaster recovery planning for IT pro	fessional	s", 2 nd Edition	, Synę	gress,	2013	3.					

COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)			
CO1 utilize the significance of Business Continuity Planning in the event of a disaster													Applying (K3)		
CO2	illustrate multilateral continuity planning and describe organization's business process and Strategy Applying (K3)														
CO3	plan to carry out risk evaluation and control guidelines for risk assessment Applying (K3)														
CO4	choose appropriate Business continuity strategies for telecommunications and IT Applying (K3)														
CO5	CO5 make use of training, testing and auditing in Business continuity planning Applying (K3)										ng (K3)				
						Маррі	ng of C	Os with	n POs a	nd PSC)s				
COs/P	Os	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO,	1	3	2	1	1		3	3	3	2	2	3			
CO2	2	3	2	1	1		3	3	3	2	2	3			
CO	3	3	2	1	1		3	3	3	2	2	3			
CO4	4	3	2	1	1		3	3	3	2	2	3			
CO5 3 2 1 1 3 3 3 2 2 3															
1 – Slię	1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														
	ASSESSMENT PATTERN - THEORY														
Toot	Test / Pleam's Demembering Understanding Applying Applying Evoluting Cresting														

٦	est / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %					
	CAT1	20	40	40				100					
	CAT2	20	40	40				100					
	CAT3	20	40	40				100					
	ESE	20	40	40				100					
* ±	* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												
22GEO01 - GERMAN LANGUAGE LEVEL 1													
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(Offered by Department of Electronics and Communication Engineering)													
Progra Branch	imme& 1	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit					
Prereq	uisites	Nil	All	OE	4	0	0	4					
Preamble This course serves as an introduction to the German language and awareness towards German lifestyle and cultural aspects of Germany and German speaking countries. One can learn to introduce oneself and able to gain the basic day to day vocabulary. On keen learning one would be able to understand the sentence structure and be able to reciprocate to basic questions													
Unit – I Good Day (Guten Tag) 12													
Greetin Simple	Greetings, Self-introduction and introducing others, Numbers, Alphabets, Countries and languages spoken. Grammar – W questions, Simple sentences. Verb conjugation and personal pronoun												
Simple sentences, verb conjugation and personal pronoun. Unit – II Friends & Colleague (Freund und Kollegen):													
Hobbie	s, Profession	, Week, Months, Season and Generate Profile. Grammar – Articles,	Plural, Ve	erbs – have an	d to b	e, Ye	s/No d	questions.					
Unit –		n the City (In der Stadt):						12					
Name o Negatio	of places/buil on articles an	dings in the city, asking for directions, Understanding means of tran d Imperative	nsport. G	rammar – defir	nite a	nd ine	definit	e articles,					
Unit –	IV	Food and Appointment (Essen und Termin):						12					
Food, Unders articles	Shopping, ir standing time - mein, dein	itiate conversations to understand and do shopping. Gramma and reciprocating, Appointments, Asking excuse, Family. Gramm , Modal verbs- <i>müssen, können, wollen</i>	ar – Acc ar – Prep	usative case, positions: <i>am,</i>	Verl <i>um, v</i>	os w ron	ith Ao bis, Po	ccusative. ossessive					
Unit –	V	Socializing (Zeit mit Freunden):						12					
Plannir Accusa	ng together, B ative case, Pa	irthday, Invitation, Restaurant, looking for specific information in texi st tense of have and to be, Personal pronoun with Accusative.	ts. Gramn	nar – Separab	le ver	bs, P	repos	itions with					
								Total:60					
TEXT E	BOOK:												
1.	1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deutsch als Fremdsprache A1–ursbuch, Arbeitsbuch und Glossar with 2 CDs", Goyal Publishers, Delhi, 2015.												
REFER	RENCES:												
1.	https://ocw.	nit.edu – Massachusetts Institute of Technology Open Courseware)										
2.	2. https://www.dw.com/en/learn-german - Deutsche Welle, Geramany's International Broadcaster												

COUR On co	COURSE OUTCOMES: On completion of the course, the students will be able to							
CO1	understand structure of language and introducing each other	Remembering (K1)						
CO2	understand vocabulary on seasons and basic verbs	Understanding (K2)						
CO3	ask for directions in a new place and avail transport as required	Understanding (K2)						
CO4	understand food habits of German and ask for appointments.	Understanding (K2)						
CO5	learn to socialize in a German speaking country	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								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	– Mode	erate, 3 –	Substant	ial, BT- I	Bloom's ⁻	Taxonom	ıy							

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

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

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		22GEO02 - JAPANESE LANGUAGE LI	EVEL 1										
		(Offered by Department of Electronics and Communi	cation Eng	gineering)									
Progra Branch	mme& N	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit					
Prereq	uisites	Nil	All	OE	4	0	0	4					
Preamb	ble	The basic level of Japanese which provides understanding o one to greet, introduce oneself and other person and also per conversations	f Hiragana rovides the	a, Katakana ar e ability to unc	nd 55 Iersta	Kanj nd ba	is also asic d	o enables ay to day					
Unit –		Introduction to Hiragana and Katakana:						12					
Chart 1	, Chart 2, Ch	nart 3, Annexures 1 and 2 and basic Japanese rules along with	similar sou	inded vocabul	aries	for ea	ach ch	art.					
Unit – II Introduction to Nouns, various particles and usages: 12													
Formin	g simple sen	tences, asking questions, positioning differentiation and owning	fundamer	ntals – new pa	rticles	and	usage	es					
Unit –		Introduction of Verbs, time and place markers:						12					
Usage particle	of action wor s in a senter	rds in sentences and framing them – place and time markers us nce.	sages – gi	ving and recei	ving -	- omi	ssion	of certain					
Unit –	IV	Introduction of Adjectives, Adverbs and usages:						12					
Describ introdu	oing nouns a ction of the li	nd verbs and framing them to relate day to day conversatio kes and dislikes expressions	ns- positiv	e and negativ	/e en	ding	of the	e same –					
Unit – '	V	Introduction to Counters and Kanji:						12					
How to and qua	use numbei antifiers – 55	s-How to use quantifiers-Present form of adjectives and Noun kanji characters	s-Other ne	ecessary partio	cles-H	low t	o use	numbers					
								Total:60					
TEXT E	BOOK:												
1.	"MINNA NC) NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publis	hers & Dis	tributors Pvt. I	.td., N	lew D	Delhi, 2	2017.					
REFER	ENCES:												
1.	Margherita	Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover, Japan, 2	2017.										
2.	Sayaka Kur	rashina, "Japanese Word Speedmaster", 2 nd Edition, Tankobon	Softcover,	, Japan, 2018.									

COUR On cor	COURSE OUTCOMES: On completion of the course, the students will be able to													BT Mapped (Highest Level)		
CO1	CO1 read and understand typical expression in Hiragana and Katakana														з (К1)	
CO2	CO2 greet and introduce oneself and other														g (K2)	
CO3	CO3 communicate day to day conversations – basic level													erstandin	g (K2)	
CO4 understand the Kanjis in Japanese Script													Und	Understanding (K2)		
CO5	CO5 comprehend concept of numbers, days, months, time and counters													Understanding (K2)		
						Mappi	ng of CO	Os with	POs an	d PSOs						
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	1								1	2	3		3			
CO2	CO2 1 2 3												3			
CO3 1 2 3 3																
CO4 1 2 3 3													3			

CO5

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

22GE003 - DESIGN THINKING FOR ENGINEERS														
	(Offered by Department of Computer Science and	nd Engineerin	ıg)											
Programme & Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit							
Prerequisites	Nil	5	OE	3	1	0	4							
Preamble	Treamble Design Thinking is human-centered problem solving tool which emphasize on empathy, collaboration, co-crea and stakeholder feedback to unlock creativity and innovation, to devises feasible and viable idea/solutions.													
Unit – I	Design Thinking and Explore:						9+3							
Design Thinking : Key Principles and Mindset – Five Phases, Methods and Tools of Design Thinking – User Guide – Foundation Building for Design Thinking – Explore : Methods & Tools – STEEP Analysis – Strategic Priorities – Activity System – Stakeholder Mapping – Opportunity Framing.														
Unit – II	Empathize						9+3							
Empathize: Methor Insights - User Pers	ds & Tools – Field Observation – Deep User Interview – Empath sona Development.	ny Map – Use	er Journey Ma	p - N	eed	Findir	ng – User							
Unit – III	Experiment						9+3							
Experiment: Meth	ods & Tools – Ideation – SCAMPER – Analogous Inspiration ing– Idea Refinement.	 Deconstru 	ct & Reconst	ruct	– Us	er E>	perience							
Unit – IV	Engage						9+3							
Engage: Methods Users.	& Tools – Story Telling – Art of Story Telling – Storyboarding -	- Co-Creatior	n with Users -	- Col	lect F	eedb	back from							
Unit – V	Evolve						9+3							
Evolve : Methods & Viability Analysis –	. Tools – Concept Synthesis – Strategic Requirements –Evolve Innovation Tools using User Needs, CAP, 4S – Change Manag	ed Activity Systement - Quic	stems – Activ k Wins.	ity S	ysten	n Inte	egration –							
			Lecture:4	5, Τι	Itoria	al:15,	Total:60							
TEXT BOOK:														
1. Lee Chong	Hwa, "Design Thinking The Guidebook", Design Thinking Mast	er Trainers of	f Bhutan, 201	7. (E	-Bool	k)								
REFERENCES:														
Jeanne Lie 1. 2011.	dtka and Tim Ogilvie, "Designing for Growth: A Design Thinking	Tool Kit for M	lanagers", Col	umb	ia Un	ivers	ity Press,							
2. Jeanne Lie	dtka, Tim Ogilvie, and Rachel Brozenske, "The Designing for Iniversity Press, 2014.	Growth Field	Book: A Step-	by-S	tep F	Projec	t Guide",							
·														

COUR On cor	SE O nple	UTCO	MES: f the cou	rse, the	studen	ts will	be ab	le to						BT Ma (Highest	oped Level)
CO1	Cor	nstruct	design cl	nallenge	and ref	rame th	ne des	ign challe	enge in	to design op	portunity.			Applying	g (K3)
CO2	Inte unc	rview to	the user, and deep u	and kno ser insig	w the fe hts and	elings o I needs	of usei	rs to foste	er deep	user unders	standing and	be able to)	Applying	g (K3)
CO3	Dev	velop io	deas and	prototyp	es by b	rain sto	orming	using the	e ideatio	on tools.				Applying	g (K3)
CO4	4 Organize the user walkthrough experience using ideal user experience journey. Applying (K3)														
CO5 Develop smart strategies & implementation plan that will deliver/achieve the idea/solution deduced from Applying (K3) earlier phases.															
						Ма	pping	of COs	with PO	Os and PSO	S				
COs/P	Os	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3	3	1					3	2	1		3	1
CO2	2	3	3	3	1					3	2	1		3	1
COS	3	3	3	3	1					3	2	1		3	1
CO4	ļ	3	3	3	1					3	2	1		3	1
CO5	5	3	3	3	1					3	2	1		3	1
1 – Slig	ght, 2	– Moo	derate, 3 ·	 Substa 	antial, B	T- Bloo	m's Ta	axonomy							
						AS	SESS		ATTER	N – THEOR	Y				
Те	ests		Rememl (K1)	bering %	Unde	erstanc (K2) %	ling	Apply (K3)	ving %	Analyzin g (K4) %	Evaluati ng (K5) %	Creat (K6) %	ing ⁄⁄a	Total	%
CA	\T 1		10			20		70)					100)
CA	AT 2		10)		15		75						100)
CA	AT 3		10)		15		75						100)
E	SE		10)		15		75						100)
* ±3% I	may l	be vari	ied (CAT	1,2,3 – 5	50 mark	s & ES	E – 10	0 marks)						

		22GE004 - INNOVATION AND BUSINESS MODEL	DEVELO	PMENT											
		(Offered by Department of Mechatronics Engi	neering)												
Progra Branch	mme & 1	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit							
Prereq	uisites	Nil	6	OE	3	1	0	4							
		· · · · · · · · · · · · · · · · · · ·			1		1								
Pream	ole	This course will inspire the students to think innovation concept	ts and id	eas for busine	ess m	odel	deve	lopments.							
Unit - I	Unit - I Innovation and Design Thinking: 9+														
Innovation and Creativity– Types of innovation – challenges in innovation- steps in innovation management- 7 concerns of design. Design Thinking and Entrepreneurship – Design Thinking Stages: Empathize – Define – Ideate – Prototype – Test. Design thinking tools: Analogies – Brainstorming – Mind mapping															
Unit - II User Study and Contextual Enquiry: 9+3															
Unit - II User Study and Contextual Enquiry: 9+3 Explanatory research – primary and secondary data – classification of secondary data – sources of secondary data – qualitative research – focus groups – depth interviews – analysis of qualitative data – survey methods – observations- Process of identifying customer needs –organize needs into a hierarchy –establish relative importance of the needs- Establish target specifications															
Unit - I		Product Design:						9+3							
prototy interac	ping – tools tion	and techniques- overview of processes and materials - eval	luation t	ools and tech	nniqu	es f	or us	er-product							
Unit - I	V	Business Model Canvas (BMC):						9+3							
Lean C Reasor	anvas and E ns and remed	BMC - difference and building blocks- BMC: Patterns – Design – lies	- Strateg	y – Process–	Busi	ness	mode	el failures:							
Unit - V	1	IPR and Commercialization:						9+3							
Need for	or Intellectual	Property- Basic concepts - Different Types of IPs: Copy Rights, T	Fradema	rks, Patents, 0	Geog	raph	ical Ir	dications,							
Irade	Secrets and I	ndustrial Design– Patent Licensing - Technology Commercializat	tion – Inr	novation Mark	eting										
				Lecture:	45, T	utor	al:15	, Total:60							
TEXT I	300K:														
1.	Rishikesha	T.Krishnan, "8 Steps To Innovation: Going From Jugaad To Exce	ellence",	Collins India,	2013	3.									
REFER	ENCES:														
1.	Peter Druck	ker, "Innovation and Entrepreneurship", Routledge CRC Press, Lo	ondon, 2	014.											
2.	Eppinger,	S.D. and Ulrich, K.T. "Product design and development", 7th editi	ion, McG	Fraw-Hill High	er Ec	lucat	ion, 2	020.							
3.	Alexander	Osterwalder, "Business model generation: A handbook for vision with Wilson and Compare 2010	onaries,	game change	ers, a	and o	halle	ngers", 1 st							
4	edition, Jo	nn wiey and Sons; 2010													
4.	4. Indian Innovators Association, "Patent IPR Licensing – Technology Commercialization – Innovation Marketing: Guide Book for Researchers, Innovators" Notion Press, Chennai, 2017														
	Guide Boo	ok for Researchers, Innovators", Notion Press, Chennai, 2017													

COUR	SE OUTCOMES:	BT Mapped
On co	mpletion of the course, the students will be able to	(Highest Level)
CO1	understand innovation need and design thinking phases	Understanding (K2)
CO2	identify, screen and analyse ideas for new products based on customer needs	Analysing (K4)
CO3	develop and analyse the product concepts based on the customer needs and presents the overall architecture of the product.	Analysing (K4)
CO4	predict a structured business model for MVP	Applying (K3)
CO5	practice the procedures for protection of their ideas' IPR	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			2			2						3		
CO2	3	3	3	3	2	2	2	2	3	3	3	3		
CO3	2	2	3	3	3	3	3	3	3	3	3	3		
CO4				3	2	2	2	3	3	3	3	3		
CO5				3	2	2		3	2	3	3	3		

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	20	30	40	10			100
CAT2	20	30	40	10			100
CAT3	30	30	40				100
ESE	20	30	30	20			100
				1			1

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

		22GEO05 - GERMAN LANGUAGE LEV	/EL 2					
		(Offered by Department of Electronics and Communic	ation Eng	ineering)				
Progra Branci	amme& h	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	Т	Ρ	Credit
Prereq	uisites	German Language Level 1	All	OE	4	0	0	4
Pream	ble	This course aims to help the learner to acquire the vocabulary a German language A1 level competence. This course will help to vocabulary to understand and reciprocate in daily life situations able to gain a comprehensive understanding of the German gra situations	as per the c assimila on a broa ammar an	Common Eur te the basic gr ader sense. A d confidently a	opea amm thoro articul	n fran ar str ugh le ate in	newor ucture earne day t	k of es and gain r will be oday
Unit –	I	Contacts(Kontakte):			• .			12
Unders theme posses	and understa sive articles.	ers, simple instructions, speaking about language learning, findlinding conversations, Making appointments. Grammar – Preposi	ng specifi ition with	c information Dative, Article	in te s in l	xt, Ac Dative	know and	ledging the Accusative
Unit –	II	Accomodation(Die Wohnung):						12
Unders feeling	standing Acco s, Colours. Gr	ommodation advertisements, describing accommodation and di ammar – Adjective with to be verb, Adjective with sehr/zu, Adject	irections, ive with A	responding to ccusative, pre	o an posit	invita ions v	ition, vith D	Expressing ative
Unit –	111	Are you Working?(Arbeiten Sie):						12
Daily S Jobs. (Schedule, spea Grammar – Pe	aking about past, understanding Job openings advertisements, O erfect tense, Participle II – regular and irregular verbs, Conjunction	pinions, T ns <i>– und,</i>	elephonic con oder, aber	versa	ations	, Spea	aking about
Unit –	IV	Clothes and Style(Kleidung und mode):						12
Clothes Gramm Dative,	s, Chats on s nar – Interrog , Verbs with D	shopping clothes, reporting on past, Orienting oneself in Supe ative articles and Demonstrative articles, Partizip II – separable ative	rmarkets, e and nor	Information a n-separable ve	and r erbs,	eseai Pers	rch at onal p	oout Berlin. pronouns in
Unit –	V	Health and Vacation(Gesundheit und Urlaub):						12
Person Modal Tourist	al information verbs – soller destinations.	a, Human Body parts, Sports, Understanding instructions and prom m, müssen, nicht dürfen, dürfen. Suggestions for travel, Path, Pos Grammar – Pronoun: man, Question words – Wer, Wen, Was, W	npts, heal stcards, w <i>Vem</i> , Adve	th tips. Gramn reather, Travel erbs <i>– Zuerst,</i>	nar – I repo <i>dann</i>	Impe orts, P , Spä	rative Problei <i>ter, Z</i> i	with <i>du/lhr</i> , ms in hotel, <i>um Schl</i>
								Total:60
TEXT	BOOK:							
1.	Stefanie De Glossar with	ngler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deuts n 2 CDs", Goyal Publishers, Delhi, 2015.	ch als Fre	mdsprache A1	1–urs	buch,	Arbe	itsbuch und
2.								
REFER	RENCES:							
1.	https://ocw.r	nit.edu – Massachusetts Institute of Technology Open Coursewa	re					
2.	https://www.	dw.com/en/learn-german - Deutsche Welle , Geramany's Interna	tional Bro	adcaster				

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
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)

Mapping of COs with POs and 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	– Mode	erate, 3 -	Substan	tial, BT-	Bloom's	Taxonoi	my							
	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					
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

22GEO06-GERMAN LANGUAGE LEVEL 3													
(Offered by Department of Electronics and Communication Engineering)													
Progra Branc	amme& h	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit					
Prerec	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 a equips one to express opinions and negotiate appointments. With grammatical structure to answer confidently in everyday situation	ay situatic also seek h diligent is.	ons in personal information in learning one c	and those an ca	profe e situa pture	ssiona ations all ba	al life and . It also asic					
Unit –	l	All about food (Rund Ums Essen):						9					
Unders someth Articles	Understand information about person, Speak about food, Introduce self and others, Understand and explain a picture base story, To justify something, To speak about feelings, To express opinions, To answer questions on a text, To describe a restaurant. Grammar: Possessive Articles in Dative, Yes/No questions, Reflexive verbs, Sentence with 'weil'												
Unit –	<u> </u>	School days (Nach der Schulzeit):					<u></u>	9					
Unders Unders in Dativ	stand School r stand School t v and Akkusat	eports, Speak and write comments about schooldays, To speak abo ypes in Germany and speak about it. Grammar: Modal verbs in Pa iv.	out habits ast tense,	, Understand a Positional Ver	nd pi bs, Ti	ovide wo-wa	e City- ay pre	Tipps, To positions					
Unit –	111	Media in everyday life (Medien in Alltag):						9					
To spe Unders with 'da	eak about adv stand and Writ ass', Superlati	vantages and disadvantages of Media, formulate comparisons, e Movie reviews. Grammar: Comparative degree, Comparative Se ve degree.	Express entences	your own opir with 'Als' and	nion, 'Wie',	Talk Subo	abou [:] ordina	t Movies, ite clause					
Unit –	IV	Feelings and expressions (Gefühle):						9					
Expres Expres Adjecti	s thanks and s joy and reg ves to be use	congratulations, Talk about feelings, To understand information abo rets, Understand and write Blog entries, Write appropriate headir d along with definite articles.	out festiva ng. Gran	ls and speak a nmar: Subordi	bout i nate	t, To Claus	descr se witl	ibe a city, n 'Wenn',					
Unit –	V	Profession and Travel (Beruf und Reisen):		· - · ·				9					
To hav career Expres Descril Prepos listenin	e a conversa preferences, l s uncertainty, be a statistic, sitions, verb – ig.	tion at ticket counter, To talk about leisure activities, To gather inf deate the dream job, To prepare and make telephone calls, To unde Understand and give directions, Understand a newspaper article, S Understand information about a trip, Talk about travel. Grammar: <i>A</i> 'werden', Subordinate clause – indirect questions, All units will inc	formation rstand tex Say your c Adjective clude eler	from Texts, Ir At about Workp own opinion, Ta to be used alo nents for readi	ntrodu lace. alk ab ng wi ng, w	Ask out th th inc	eople for inf ne way definit , spea	Express ormation, y to work, e articles, aking and					
								Total:45					
TEXT	BOOK:												
1.	1. Stefanie Dengler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deutsch als Fremdsprache A1–ursbuch, Arbeitsbuch und Glossar with 2 CDs", Goyal Publishers, Delhi, 2015												
2.													
REFER	RENCES:												
1.	Rosa-Maria	Dallapiazza , Eduard von Jan, Till Schonherr, "Tangram 2 (Germar	n)" , Goya	l Publishers, D	elhi,	2011.							
2.	https://www.	dw.com/en/learn-german - Deutsche Welle , Geramany's Internatio	onal Broa	dcaster									

COUR On co	COURSE OUTCOMES: On completion of the course, the students will be able to										(1	BT Mapped (Highest Level)				
CO1	unde	erstand	German	food style	e, restau	rant and	be able	express	oneself.				Remembering (K1)			
CO2	unde	erstand	German	school s	ystem ar	nd discus	s about	habits a	nd provi	de City-	Tipps		Und	Understanding (K2)		
CO3	D3 analyze and compare media in everyday life. Understanding (K:										g (K2)					
CO4	CO4 express feelings, describe a city and write blog entries. Understanding (K2)															
CO5 seek and provide information in a professional setup, give directions to others and talk about travel Understanding (K2)																
						Маррі	ng of Co	Os with	POs an	d PSOs						
COs/F	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	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	1								1	2	3		3			
CO	5								1	2	3		3			
1 – Slię	9ht, 2 -	- Mode	rate, 3 –	Substant	ial, BT- E	3loom's ⁻	Faxonom	ıy								

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

22GEO07-GERMAN LANGUAGE LEVEL 4												
(Offered by Department of Electronics and Communication Engineering)												
Progra Branc	amme& h	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit				
Prerec	uisites	German Language Level 3	All	OE	3	0	0	3				
Pream	ble	This course imparts knowledge about interacting with external we behaviour and addressing relationships in personal and profession various media and at work. Enhance learner's grammatical exposi- concepts which would lay the foundation to have a better hold of be able to read and respond to reports, write simple formal and in engage in simple conversations in known situations.	orld, unde onal front. sure and o the langu nformal le	rstanding vario It helps one to cover the core lage. With focu tters and text r	bus cu bus cu basic basic sed la nessa	ultura erstai gran earnii ages	l aspe nd rep nmation ng ono and b	ects, ports from cal e should e able to				
Unit –		Learning (Lernen):						9				
Unders everyd Gramn	standing and ay work life, T nar: Conjunctio	describing learning problems, Understanding and giving advice Falking about everyday working life, Understanding a radio report, ons- denn,weil, Konjuntiv II: Sollte(suggestions), Genitive, Tempor	, Giving Understa al preposi	reasons, Unde anding and ma itions – bis, üb	erstar Iking er + /	nding a mir Akkus	repo ni-pres sativ,a	rts about sentation. b+dativ				
Unit –	II	Athletic (Sportlich):						9				
Expres and re attracti	sing enthusia acting, Making on. Grammar	sm, hope, disappointment, Understanding and writing fan comme g an appointment, Understanding a report about an excursion, U : Conjunctions – deshalb, trotzdem, Verbs with Dativ and Akkusativ	ents, Form Inderstand v	nulating follow- ding difficult te	ups, exts, l	Makii ntrod	ng su lucing	ggestions a tourist				
Unit –	111	Living Together (Zusammen Leben):						9				
To con informa	nplain, apolog ation, Write an	ize & give in, As for something, Understand experience reports, Re d correct a story. Grammatik: Konjunctiv II- könnte, Subordinate c	port on th lauses – a	e past, Talk at als and Wenn.	pout p	oets, l	Respo	ond to				
Unit –	IV	Good Entertainment (Gute Unterhaltung):						9				
Talk at about a Articles	pout music sty a person, Unde s: Was fuer ei	le, Buy concert tickets, Introduce a musician / band, Understand ne erstand information about painting, Understand description of a pictu ne? . Pronouns – man/iemand/niemand and alles/etwas/nichts . Re	ewspaper ure, Descr lative sen	reports, Give ibe a picture. itences in Nom	more Grar hinativ	detai nmati /	led in ik: Inte	formation errogative				
Unit –	v	Passage of time and Culture (Zeitablauf & Kultur):						9				
Talk at Unders behavi informa Gramn Suborc	bout wishes, E stand a text, E or, Express in ation, Discuss natik: Konjunc linate clauses	Express wishes, Give Suggestions, Understand a conversation, Pla xchange information, Talk about proverbs, write a story. Understan tentions, Use the appropriate salutation, Understand tips in a text, about clichés and write about them. All units will include element tiv II (Wishes, Suggestions), Verbs with prepositions, W- questions w with damit and UmZu.	an someth d informa Talk abou ents for re with prepo	ning together, tion about othe t forms of addr eading, writing sitions, Relativ	To as er cult ressir , spe re ser	k oth ures, g oth aking tence	ers so Disc ers, C and es in A	omething, uss about Bive more listening. Akkusativ,				
								Total:45				
TEXT	BOOK:											
1.	Stefanie De Goyal Publis	ngler, Paul Rusch, Helen Schmitz, Tanja Sieber, "Netzwerk Deuts shers, Delhi, 2015.	sch als Fr	emdsprache A	1–urs	sbuch	ı, Arb	eitsbuch",				
REFE	RENCES:											
1.	Rosa-Maria	Dallapiazza, Eduard von Jan, Till Schonherr, "Tangram 2 (German)", Goyal	Publishers, De	lhi, 2	011.						
2.	https://www.	dw.com/en/learn-german - Deutsche Welle, Geramany's Internatio	nal Broad	lcaster								

COUR On cor	COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)			
CO1	leve	rage lea	arning in \	Norkplac	e, under	standing	reports	and mak	e prese	ntation.			Rer	Remembering (K1)		
CO2	CO2 reciprocate to different situations, make appointment and understand texts.												Und	Understanding (K2)		
CO3	CO3 handle relationships and respond appropriately to exchange information											Und	Understanding (K2)			
CO4	fami	iliarize to	o various	channels	s of enter	tainmen	t						Und	derstandin	g (K2)	
CO5 know about various cultural aspects, usage of proverbs and cliches.										Und	Understanding (K2)					
						Mappi	ng of CO	Os with	POs an	d PSOs						
COs/P	Os	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	CO3 1 2 3 3															
CO4	4								1	2	3		3			
COS	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					
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22GE008 - JAPANESE LANGUAGE LE	VEL 2					
		(Offered by Department of Electronics and Communic	ation Engir	neering)				
Progra Branch	ımme& า	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit
Prereq	uisites	Japanese Language Level 1	All	OE	4	0	0	4
Pream	ble	The basic level of Japanese which provides understanding of H the ability to understand basic conversations and also enables Casual form	liragana, K one to requ	atakana and 1 Jest other pers	10 Ka on ar	injis a id als	and pr o und	ovides erstand
Unit –	I	Introduction to groups of verbs:						12
tai form nouns-	-Verb groups Basic Questic	-te form-Give and ask permission to do an action-Present continue ons	ous form-Re	estrict other pe	rson f	rom (doing	an action-
Unit –		Introduction to Casual Form:						12
nai forr Casual	n-Dictionary f style	orm-ta form-Polite style and Casual style differences-Conversati	on in plain	style-Place of	usag	e of I	Polite	style and
Unit –		Express opinions and thoughts:						12
Introdu right -N	ction to new p loun modificat	particle-Express someone one's thought-Convey the message of tions	one person	to another-As	k som	eone	e if sor	nething is
Unit –	IV	Introduction to If clause and remaining Kanjis:						12
If claus 50 Kan	e tara form-E jis	xpress gratitude for an action done by other person-Hypothetica	l situation-l	Particles to use	e in ca	ase o	f Moti	on verbs-
Unit –	V	Introduction to giving and receiving with te form and "when	n, even if"	usages:				12
Providi	ng to and gett	ting from differences - Understanding of situations and framing se	entences us	sing when and	even	ifeto	C .	
								Total:60
TEXT E	BOOK:							
1.	"MINNA NO	NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publishe	rs & Distrib	outors Pvt. Ltd.	, New	Dell	ni, 201	7
REFER	RENCES:							
1.	Margherita F	Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover, Japan, 20	17.					
2.	Sayaka Kura	ashina, "Japanese Word Speedmaster", 2 nd Edition, Tankobon Sc	oftcover, Ja	pan, 2018.				

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	differentiate groups of verbs and its forms	Remembering (K1)
CO2	understand Polite form and Casual form of Japanese	Understanding (K2)
CO3	comprehend personal communication and express greetings	Understanding (K2)
CO4	understand the Kanjis in Japanese Script and If clause	Understanding (K2)
CO5	comprehend concept of "even if", "when" and job-related information	Understanding (K2)
	Mapping of COs with POs and PSOs	

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	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						
* ±3% may be varied (C	CAT 1,2,3 – 50 mark	s & ESE – 100 mark	s)										

	22GEO09 - JAPANESE LANGUAGE LEVEL 3												
		(Offered by Department of Electronics and Commun	nication Engir	neering)									
Progra Branch	ımme& n	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit					
Prereq	uisites	Japanese Language Level 2	All	OE	3	0	0	3					
Pream	ble	The intermediate level of Japanese which provides understar which includes 150 Kanji's and provides the ability to compre	nding of all fo hend convers	rms ofverbs, a sations encour	dverb nterec	s, co I in da	njunct aily life	ions, etc.					
Unit –		Introduction to Potential verbs:						9					
Causes Custon	Causes and Reasons-Favouring Expressions-Expressing a State-Potential Verb Sentences-Simultaneous actions-Verb Groups-te Form- Customary Actions-Nouns-Basic Questions and Kanji's.												
Unit –	Unit – II Introduction to Transitive and Intransitive verbs: 9												
Consec	quence of ver	bs- Embarrassment about Facts- Consequence of Verbs with	n an Intentior	s-Affirmative	Sente	nces	- Con	junctions-					
Basic C	Questions and	kanji's.											
Unit –	Unit – III Introduction to Volitional forms: 9												
Expres	sions of Spea	kers Intention-Expressing Suggestion or Advice-Usage of Adve	erbs and Qua	ntifiers-Basic (Quest	ions a	and ka	anji's.					
Unit –	IV	Introduction to Imperative and Prohibitive verbs:						9					
Comma States	anding persor Basic Questic	n- Interrogatives-Expressions of Third Person-Actions and its ons and Kanji's.	Occurrence	- Possibilities	of an	Actio	on-Ch	anging of					
Unit –	V	Introduction to Conditional form and Passive verbs:						9					
Descrip Questio	otion of Requ ons and Kanji	irement and Speaker's Judgement, HabitualActions, Directions.	ons and sug	gestions-Passi	ive fo	orms	of Ve	rbs-Basic					
								Total:45					
TEXT E	BOOK:												
1.	"MINNA NO	NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publish	hers & Distrib	outors Pvt. Ltd.	, New	/ Delh	ni, 201	7.					
REFER	RENCES:												
1. Margherita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover, Japan, 2017.													
2.	Sayaka Kura	ashina, "Japanese Word Speedmaster", 2 nd Edition, Tankobon	Softcover, Ja	pan, 2018.									

COUR On co	SE Ol mplet	UTCOM ion of t	IES: he cour	se, the st	udents	will be a	ble to							(1	BT Mapp Highest L	oed .evel)	
CO1	read	l and un	derstan	d BasicVo	cabular	ies.								Re	memberir	ng (K1)	
CO2	unde	erstand	Convers	ations us	ed in da	ily life.								Un	derstandi	ng (K2)	
CO3	com	preheno	d person	al commu	inicatior	and exp	ress gree	etings.						Un	derstandi	ng (K2)	
CO4	unde	erstand	the Kan	ji's in Japa	anese S	cript.								Understanding (K2)			
CO5 comprehend Coherent conversations in everyday situations.														Understanding (K2)			
Mapping of COs with POs and PSOs																	
COs/I	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	0 PO11	P	012	PSO1	PSO2	
CO	1								1	2	3			3		-	
CO	2								1	2	3			3			
СО	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 - ⁻	THEORY							
Te: (st / Blo Catego	oom's ory*	Re	ememberi (K1) %	ing	Understa (K2)	anding %	Apply (K3)	/ing %	Analyzi (K4) %	ing %	Evaluating (M	(5)	Cr (I	eating K6) %	Total %	
	CAT	1		75		25										100	
	CAT	2		25		75										100	

 ESE
 25
 75

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

CAT3

	22GEO10 - JAPANESE LANGUAGE LEVEL 4													
		(Offered by Department of Electronics and Communicat	ion Engir	eering)										
Progra Branc	amme& h	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit						
Prerec	uisites	JAPANESE LANGUAGE LEVEL 3	All	OE	3	0	0	3						
Pream	ble	The intermediate level of Japanese provides understanding of ex which also includes 150 Kanji's and also provides the ability to ur	pressions	s of verbs, its p I relationship a	mong	n, Re j the j	lations people	ships Ə.						
Unit –	I	Introduction to Reasoning:						9						
Causes and Sequences-Causes and Effects-Interrogative Patterns-Adjective as a Noun -Basic Questions and Kanji's														
Unit – II Introduction to Exchanging of things: 9														
Expres Questi	Expressions for Giving and Receiving of Things-Polite Expression of Request-Indicating a Purpose of Actions-Basic Quantifiers-Basic Questions and kanji's.													
Unit –	Unit – III Introduction to States of an Action: 9													
Senter kanji's.	nce Pattern to	Indicate Appearance-Degree of Action and State-Adjectives as Ad	lverbs- Co	onvey informat	tion -E	Basic	Ques	tions and						
Unit –	IV	Introduction to Causative Verbs:						9						
Causa Questi	tive Forms of ons and Kanji'	Verbs-Asking Opportunity to do something-Hypothetical Questic 's.	ons-Judge	ement and Co	urse	of ar	n actio	ons-Basic						
Unit –	V	Introduction to Relationship in Social Status:						9						
Honori	fic expression	s- Respectful expressions- Humble expressions-Polite expressions	-Basic Q	uestions and K	(anji's	-								
								Total:45						
TEXT	BOOK:													
1.	"MINNA NO	NIHONGO–Japanese for Everyone", 2 nd Edition, Goyal Publishers	& Distrib	utors Pvt. Ltd.	, New	Delh	i, 201	7.						
REFE	RENCES:													
1.	1. Margherita Pezzopane, "Try N5", 2 nd Edition, Tankobon Softcover, Japan, 2017.													
2.	2. Sayaka Kurashina, "Japanese Word Speedmaster", 2 nd Edition, Tankobon Softcover, Japan, 2018.													

COUR On co	SE OI mplet	UTCOM ion of t	ES: he cours	e, the st	udents v	vill be a	ble to						(BT Mapped (Highest Level)				
CO1	read	I and Ur	nderstand	Relation	ship of a	a Person							Ren	nembering	(K1)			
CO2	unde	erstand	Convers	ations Us	ed in Ev	eryday A	ctivities.						Unc	Understanding (K2)				
CO3	3 comprehend Contents at Near Natural Speed.														g (K2)			
CO4	unde	erstand	the Kanji	's in Japa	nese Sc	ript							Unc	Understanding (K2)				
CO5	com	prehend	d Orally F	resented	Materia	ls.							Understanding (K2)					
						Маррі	ng of CO	Os with	POs an	d PSOs								
COs/F	Os/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11													PO12 PSO1 PSO2				

000,100	 	 	 	 			 	
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						
* ±3% may be varied (0	CAT 1,2,3 – 50 mark	s & ESE – 100 mark	s)										

22GEO11 - FRENCH LANGUAGE LEVEL 1														
		(Offered by Department of Electronics and Communicat	ion Engir	neering)										
Progra Branci	imme& n	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit						
Prereq	uisites	Fundamentals of French Language	All	OE	4	0	0	4						
Pream	ble	This course provides a foundation of the French language as wel lifestyle of France and other French-speaking nations. The stude and acquire basic everyday vocabulary. By following the structure learning process, one can comprehend the structure of sentence	l as an ur nt will be ed curricu s and res	nderstanding o learning how t lum and pract pond to basic	f the o intro icing f comn	Frence oduce the sa nunica	ch cult e him/ ame a ations	ure and herself s per the						
Unit –	Unit – I Introduction 12													
French	French and French culture, alphabets, pronunciation, accents, rules, and terms for pronunciation (mas-fem), Salutations, numbers.													
Unit –	Unit – II Daily Life 12													
Subjec	t Pronoun, Fra	ancophonie's, adjectives – colors, week, months, seasons.												
Unit - III Articles and Verbs 12														
Articles	s - Indefinite, o	definite, partitive, and contracted, (examples), introductions to verbs	s, 1 st grou	ip of verb										
Unit –	IV	In the City	15					12						
2 nd gro	up of verbs, iri	regular verbs (avoir, etre, faire) present yourself & negative sent	ences. (fa	aire and Jouer	/erb v	vith tr	ie exp	ressions)						
Unit –	V	Food and Culture						12						
Prepos future)	sitions – prepo	sition of places (country, cities and etc), Imperative mode, invitation	s, culture	– food (wine, d	chees	e) Futu	re (recent						
								Total:60						
TEXT	BOOK:													
1.	A1 – saison													
REFEF	RENCES:													
1.	1. Apprenons les francais – 0 and 1													
2.	2. Grammaire – langue et de civilization francaises – Mauger G, Les idees – 0 and 1													

COUR On co	SE O mplet	UTCOM ion of t	IES: he cour	se, the st	udents	will be a	ble to						(BT Mapp Highest L	oed evel)
CO1	Und	erstand	the grai	nmatical s	structur	e of the la	nguage a	and intro	duce s	elf to othe	ers.		Rem	nembering	(K1)
CO2	Und	erstand	basic ve	erbs and a	appropr	ate vocab	oulary.						Und	erstanding	g (K2)
CO3	Ask	for dire	ctions ar	nd arrange	e for tra	nsportatio	n, etc, as	s needeo	d.				Und	erstanding	g (K2)
CO4	Und	erstand	the food	habits of	France	and ask	for appo	intments					Und	erstanding	g (K2)
CO5	Lea	rn to so	cialize in	French-s	peakinę	countries	6						Und	erstanding	g (K2)
	Manning of COs with POs and PSOs														
COs/F	Mapping of COs with POs and PSOs COs/POs PO1 PO12 PSO1 PSO1														
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	Taxonom	iy	r						
-						ASSE	SSMEN		ERN - 1	THEORY		-	-		T ()
l es	st / Bl	oom′s ory*	Re	emember (K1) %	ing	Understa (K2)	inding %	Apply (K3)	/ing %	Analyzi (K4) %	ing %	Evaluating (K5) %	(I	reating K6) %	l otal %
	CAT	1		75		25									100
	CAT	2		25		75									100
	CAT3 25 75 100														
	ESE 25 75 100														
* ±3%	may b	e varie	d (CAT 1	,2,3 – 50	marks	& ESE – 1	00 mark	s)							

22GEO12 -FRENCH LANGUAGE LEVEL 2											
	(Offered by Department of Electronics and Communica	ation 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 vocabu Framework of Reference for Languages at the A2 level. This co structures as well as the acquisition of vocabulary necessary to circumstances. The learner will be able to develop a thorough co confidently express themselves in everyday circumstances.	lary in aco urse will a comprehe ompreher	cordance with aid in the integ end and respo nsion of Frenc	the C ratior nd in h gra	Comm n of b ever mma	non E asic g yday r and	uropean Irammar				
Unit – I	Unit – I French and You 12										
world, Verbs (Reg	& Weakness, Recommendations, Sentiments, Motivations, about f ulars and irregulars), Reflexive Verbs, Prepositions	avorite fil	ms and Types	s of s	creen	is in t	he movie				
Unit – II	Eat and Repeat						12				
Favorite foods, R pronouns, Presen	ecopies, Types of meals, Describing House and Kitchen, Presen t continuous tense, Simple conditional form	tation of t	the recipe, Co	ompa	rative	es, Po	ssessive				
Unit – III	Vacation						12				
Invitations, preser on various tours,	ntation, Greetings, Goodbyes, Activities on vacation, past experience Past perfect, Past imperfect tense	es, Descri	ibing favorite p	lace,	Rec	omme	endations				
Unit – IV	Likes and Views						12				
Favorite persons Tourist, Pharmaci	& things, Giving advice, Experience, Moods, Illness, Discomforts, \$ st & Patient), Past perfect, Past indefinite, Imperative	Symptoms	s, Roleplay (D	octor	& Pa	atient,	Guide &				
Unit – V	Then and Now						12				
Habits, customs, Past perfect and I	circumstances of the past and present, Debates on past and prese Present comparatives.	ent situatio	ons and feeling	gs. Pa	ast in	nperfe	ct tense,				
							Total:60				
TEXT BOOK:											
1. A2 – Sais	1. A2 – Saison										
REFERENCES:											
1. Apprenor	s les francais – 0 and 1										
2. Grammaire – langue et de civilization francaises – Mauger G .Les idees – 0 and 1											

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Understand the French language in deep and its usage	Remembering (K1)
CO2	Preparation of their Favorite recipes, Know the Objects used in Kitchen and house.	Understanding (K2)
CO3	Converse about their vacation, their Favorite Destination	Understanding (K2)
CO4	Understand complex verbs and be able to communicate about their past experiences	Understanding (K2)
CO5	Know the difference between Past and Present and Compare them.	Understanding (K2)
		•

Mapping of CO	s with	POs and	d PSOs
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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	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	ESE 25 75 100										
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)											

		22GEO13- FRENCH LANGUAGE LEVE	EL 3								
		(Offered by Department of Electronics and Communica	ation Engir	neering)							
Progra Branc	amme& h	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit			
Prerec	quisites	Fundamentals of French Language	All	OE	3	0	0	3			
Pream	ble	This course gives knowledge regarding a variety of personal and improving vocabulary and speaking abilities to reply to and seek the ability to articulate yourself and arrange appointments. With grammatical structures needed to respond confidently in everyda how Natives communicate.	d professio informatio persevera ay circums	onal circumsta on in those set nce, one can r stances. It alm	nces, tings. naste ost gi	as w It als er all o ves y	ell as so give of the rou an	es you essential idea of			
Unit –	<u> </u>	Start Over						9			
Use of situation	periphrases, ons, Imperfect	Discuss a day in life, work, problems in the world, Predictions abo and future tense.	ut the futu	ire (actions and	d situ	ation	s), Hy	pothetical			
Unit –	11	Prohibitions and More						9			
Prohib Debate	itions, Obligat e on books vs	ions, Habits to change, social customs, Use of the subjunctive, Des movies, usage of connectors, Object Direct and Indirect.	scribe syn	opsis of Movie	and it	ts rela	ation t	o real life,			
Unit –	III	Let's be Creative						9			
Write a Create	a letter by des an Advertise	scribing the problem, talk about desires and Necessities, proposiment, Give Instructions, Imperative negative, Use of Object Direct,	e solution and Indire	s, Recommen ect	datior	ns an	d Sug	gestions,			
Unit –	IV	Travel and Communication						9			
Talk al and G	bout Tours, Ty uide, Tourists	/pes of tourism and communication, Send messages, petitions, Ta and Travel agents), Past Pluscumperfect, All Past tenses.	alk to peop	ole on the tele	ohone	e, Ro	leplay	(Tourists			
Unit –	V	Let's Talk						9			
Expres superla	ssion of Inter atives, Exclam	ests, Sentiments, Feelings, Sensations, Manias etc. Certain sunatory phrases, subjunctives.	uggestions	s to make a	bettei	futu	ire, th	e use of			
								Total:45			
TEXT	BOOK:										
1.	B1 – Saison										
REFE	REFERENCES:										
1.	Apprenons I	es francais – 0 and 1									
2.	Grammaire	– langue et de civilization francaises – Mauger G Les idees – 0 an	d 1								

COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)					
CO1	Lea	rn on Fu	uture	tens	e.									Re	membering	J (K1)	
CO2	Und	erstand	Perm	nissi	ons and	Prohib	itions.							Un	derstandin	g (K2)	
CO3	Kno	wing ab	out L	.etter	writing,	Creati	ng Ads, Ex	pressing	Desires	s, and Ir	nstructing	g Others.		Un	Understanding (K2)		
CO4 Understanding rules for travel and Enhancing communications.											Un	Understanding (K2)					
CO5 Expressing the feelings and emotions using advanced grammar											Un	derstandin	g (K2)				
	Manning of COa with DOa and DSOa																
COs/F	POs	PO1	PC)2	PO3	PO4	PO5	PO6	PO7	POS al	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		3		2	
1 – Slię	ght, 2	– Mode	rate,	3 – 3	Substant	ial, BT	- Bloom's	Taxonom	iy								
							ASSE	SSMEN	Γ ΡΑΤΤ	FRN - 1	HEORY						
Tes	st / Bl Catego	oom's ory*		Rer	nemberi (K1) %	ing	Understa (K2)	anding %	Appl (K3)	ying)%	Analyzi (K4) %	ing %	Evaluating (K5) %	(Creating (K6) %	Total %	
	CAT	1			75		25									100	
	CAT	2			25		75									100	
	CAT	3			25		75									100	
	ESE 25 75 100																

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

22GEO14 - SPANISH LANGUAGE LEVEL 1											
		(Offered by Department of Electronics and Communica	tion Engir	neering)							
Program Branch	nme&	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit			
Prerequi	isites	Fundamentals of Spanish Language	All	OE	4	0	0	4			
Preambl	е	This course provides a foundation of the Spanish language as we lifestyle of Spain and other Spanish-speaking nations. The stud and acquire basic everyday vocabulary. By following the structure learning process, one can comprehend the structure of sentences.	ell as an u dent will b red curricu es and res	nderstanding on le learning how alum and pract pond to basic	of the v to in icing comn	Spar ntrod the s nunic	nish cu uce hi ame a ations	ulture and m/herself as per the			
Unit – I		Greetings and Good byes (Los Saludos y Despidirse):						12			
Greeting Spoken,	s,Self-Introc Parts of Gra	duction , Formal and Informal ways of introducing oneself and others ammar – Noun, Personal Pronoun, Describe surroundings and its v	s, Alphabe /ocabulary	ts& Numbers, /	Coun	tries	and La	anguages			
Unit – II		Vida Cotidiana (Daily Life):						12			
Time of t physical	the day, Day description,	ys of the week, Months of the year, Seasons, Verb (To be, To Ha simple sentences	ve), Adve	rbs, Likes and	Disli	kes, l	Person	nality and			
Unit – III		Friends and Family (Amigos y La Familia):						12			
Vocabula Regular	ary of family and Irregula	 Animals, Professions, Parts of the body, Opinions on family cul ir verbs. 	tures, Art	icles – Definite	e and	Inde	finite,	Hobbies,			
Unit – IV	1	In the City (En la Cuidad):						12			
Buildings Transpor	s in the city, rt, Grammar	Name of the places, asking for directions, Helping each other, De - Possessive articles, prepositions	escription	of house and i	ts co	mpor	ents,	Modes of			
Unit – V		Food and Culture(La comida y cultura):						12			
Food (ty custome	pes and va retc.) Pas	rieties), shopping, ordering at a restaurant, inviting to parties, F t tense (all three tenses-Past Participle, Indefinite past and past im	Roleplay (perfect- (t	(as diner and to be and to ha	custo ive)	omer,	sales	man and			
								Total:60			
TEXT BO	DOK:										
1.	1. Chicos Chicas Libro de Alumno nivel 1, Ma Angeles Palomino , edelsa, GRUPO DIDASCALIA, S.A., plaza cuidad de salta,3- 28043 MADRID(ESPANA).										
REFERE	NCES:										
1. <u>I</u>	https://nueva	adelhi.cervantes.es/en/spanish_courses/students/spanish_general	courses/	spanish_cours	ses_le	evel_a	a1.htm	<u>1</u>			

COURSE OUTCOMES: On completion of the course, the students will be able to													BT Mapı (Highest L	ped .evel)			
CO1	und	erstand	the gr	amr	natical s	tructur	e of the la	nguage a	and intro	duce se	elf to othe	ers.		Rei	membering	g (K1)	
CO2	und	erstand	basic	verb	os and a	ppropr	ate vocab	ulary.						Und	Understanding (K2)		
CO3	ask	for direc	ctions	and	arrange	for tra	nsportatio	n, etc, as	needeo	d.				Und	derstanding	g (K2)	
CO4 understand the food habits of Spain and Latin countries and ask for appointments											Und	Understanding (K2)					
CO5 learn to socialize in Spanish speaking countries Ur											Und	derstanding	g (K2)				
	Mapping of COs with POs and PSOs																
COs/F	POs	PO1	PO	2	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 – Slię	ght, 2	– Mode	rate, 3	3 – S	Substant	ial, BT∙	Bloom's	Taxonom	ıy								
							ASSE	SSMEN		ERN - T	HEORY						
Tes	st / Bl Categ	oom's ory*		Ren	nemberi (K1) %	ng	Understa (K2)	anding %	Apply (K3)	ying %	Analyzi (K4) %	ng %	Evaluating (K5) %	C	reating (K6) %	Total %	
	CAT	1			75		25				. /				. ,	100	
	CAT	2			25		75									100	
	CAT	3			25		75									100	
	ES	3			25		75									100	

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

22GEO15 - SPANISH LANGUAGE LEVEL 2									
		(Offered by Department of Electronics and Communica	tion Engir	neering)					
Progra Brancl	ımme& n	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit	
Prereq	uisites	Fundamentals of Spanish Language	All	OE	4	0	0	4	
Pream	ble	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 con	as per thef ammar str ense. A th fidently art	ramework of S ructures and g orough learne ticulate in day	panis ain vo r will today	sh lar bcabu be at situa	iguage ilary to ole to g itions.	e A2 o gain a	
Unit –		Spanish and You (El Español y tú)						12	
Habits, Verbs(Strengths & V Regulars and	Veakness, Recommendations, Sentiments, Motivations, About favo irregulars), Reflexive Verbs, Prepositions	orite films a	and Types of s	creen	s in tl	ne mo	vie world,	
Unit –	II	Eat and Repeat (Comer y repetir)						12	
Favorit Presen	e foods, Reci it continuous t	pies, Types of meals, Describing House and Kitchen, Presentatio ense, Simple conditional form	n of recipe	e, Comparative	es, Po	osses	sive p	oronouns,	
Unit –	111	Its Vacation Time (Tiempo de vacaciones)						12	
Invitatio various	ons, presentat s tours, Past p	tion, Greetings, Goodbyes, Activities on vacation, past experiences erfect, Past imperfect tense, Usage of Todavia or No	s, Describi	ng favorite pla	ce, R	ecom	mend	ations on	
Unit –	IV	Likes and Views (Gustasyvistas)						12	
Favorit Tourist	e persons & , Pharmacist &	things, 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)						12	
Habits, perfect	customs, circ and Present	cumstances of the past and present, Debates on past and present a comparatives.	situations	and feelings. F	Past i	nper	fect te	nse, Past	
								Total:60	
TEXT I	BOOK:								
1.	AULA INTE Distributors	RNACIONAL 2 (A2) Jaime Corpas, AgusinGarmendia, Nuria S Pvt LTD, 86, UB Jawahar Nagar, Kamla Nagar, Delhi-110007.	anchez, (Carmen Soria	no G	oyal	Publis	hers and	
REFEF	RENCES:								
1.	https://nueva	adelhi.cervantes.es/en/spanish_courses/students/spanish_general	_courses/	spanish_cours	ses_le	evel_a	a1.htm	<u>ı</u>	
	-								

COURSE OUTCOMES: On completion of the course, the students will be able to											(BT Mapped (Highest Level)			
CO1	unde	erstand	the Spa	nish langu	age in o	deep and	its usage	e					Rem	nembering	(K1)
CO2	prep	are for	their Fa	vorite recij	oes, Kno	ow the Ob	jects us	ed in Kit	chen a	nd house			Und	erstanding	g (K2)
CO3	con	verse ab	out the	r vacation	, their F	avorite De	estinatior	า					Und	erstanding	g (K2)
CO4	unde	erstand	comple	x verbs an	d be ab	le to com	municate	e about t	heir pa	st experie	ences		Und	erstanding	g (K2)
CO5	CO5 know the difference between Past and Present and Comparing them. Understanding (K2)														
						Monni	ng of Ci	Do with	POc o	nd BSOa					
COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	POS a	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1								1	2	3		3		2
CO2	2								1	2	3		3		2
COS	3								1	2	3		3		2
CO4	4								1	2	3		3		2
COS	5								1	2	3		3		2
1 – Slig	ght, 2	– Mode	rate, 3 -	- Substant	ial, BT-	Bloom's ⊺	Taxonom	ıy							
Tos	+ / PI	oom'e	D	mombor	na	ASSE	SSMEN		ERN -		ing	Evaluating	C.	ooting	Total
C	atego	ory*		(K1) %	iig	(K2)	%	(K3)	%	(K4) %	%	(K5) %	(6) %	%
	CAT1 75 25											100			
	CAT	2		25		75									100
	CAT	3		25		75									100
	ESE	Ē		25		75									100
* ±3% ı	* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)														

22GEO16 - SPANISH LANGUAGE LEVEL 3										
		(Offered by Department of Electronics and Communic	cation Engin	eering)						
Progra Branch	imme& า	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit		
Prereq	uisites	Fundamentals of Spanish Language	All	OE	3	0	0	3		
Pream	ble	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 situation speak.	lay situation also seek ir th diligent le ns. It almost	s in personal a nformation in tl arning one car gives a basic	and pr hose h capi idea	rofess situat ture a on ho	sional tions. all bas ow Na	life and It also ic tives		
Unit –		Start Over(Volver a Empezar)						9		
Use of situatio	periphrases ns, Imperfec	b, Discuss a day in life, work, problems in the world, Predictions and future tense.	about futur	re (actions and	d situ	ation	s),Hy	oothetical		
Unit –		Prohibitions and More(Prohibiciones y mas)						9		
Prohibi Debate	tions, Obliga on books ve	ations, Habits to change, social customs, Use of subjunctive, Des s movies, usage of connectors, Object Direct and Indirect.	cribe synop	sis of Movie a	nd its	relat	tion to	real life,		
Unit –		Let's be Creative (Seamoscreatives)						9		
Write a Create	a letter by de an Advertise	escribing the problem,talk about desires and Necessities, propo- ement, Give Instructions, Imperative negative, Use of Object Direc	se solutions t and Indired	, Recommend ct.	lation	s and	d Sug	gestions,		
Unit –	IV	Travel and Communication (Viajar y comunicar)						9		
Talk ab Guide,	out Tours, T Tourists and	Types of tourism and communication, Send messages, petitions, T d Travel agents), Past Pluscumperfect, All Past tenses.	Falk to peop	le on telephon	e, Ro	le pla	ay(Tou	urists and		
Unit –	V	Let's Talk(Hablemos)						9		
Expres Exclam	sion of Interentation of Interentation	ests, Sentiments, Feelings, Sensations, Manias etc. Certain suggees, subjunctive.	estions to m	ake a better fu	uture,	use	of sup	erlatives,		
								Total:45		
TEXT E	BOOK:									
1. Aula International 3 (B1) [Paperback] Jaime Corpas, Agusin Garmendia, Nuria Sanchez, Carmen Soriano Goyal Publishers and Distributors Pvt LTD, 86, UB Jawahar Nagar, Kamla Nagar, Delhi-110007.										
REFER	RENCES:									
1.	https://nue	vadelhi.cervantes.es/en/spanish_courses/students/spanish_generation	al_courses/s	spanish_cours	es_le	vel_a	1.htm	<u> </u>		

COUR On co	SE C mple	UTCON tion of t	IES: the co	urse	, the stud	dents	will be ab	le to						(BT Mapp Highest L	oed .evel)	
CO1	leai	rn on Fu	ture te	nse.										Rer	Remembering (K1)		
CO2	und	lerstand	about	Pern	nissions a	and Pr	ohibitions.							Und	lerstandin	g (K2)	
CO3	knowing about Letter writing, Creating Ads, Expressing Desires and Instructing Others. Understanding (K2)												g (K2)				
CO4	understanding rules for travel and Enhance communications. Understanding												g (K2)				
CO5	expressing the feelings and emotions using advanced grammar Understanding (K2)																
Mapping of COs with POs and PSOs																	
COs/F	os	P01	PO	2	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 – Sli	ght, 2	2 – Mode	erate, 3	3 – S	ubstantia	I, BT-	Bloom's Ta	axonomy	/			I		I		L	
							ASSES	SMENT	PATTE	RN - TH	IEORY					1	
Τe	est / E Cate	Bloom's gory*	i	Re	memberi (K1) %	ing	Understa (K2)	anding %	Apply (K3)	/ing %	Analyzi (K4) 9	ing %	Evaluating (K5) %	C (reating K6) %	Total %	
	CA	AT1			75		25									100	
	CA	AT2			25		75									100	
	CA	AT3			25		75									100	
	E	SE			25		75									100	

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

22GEO17 - ENTREPRENEURSHIP DEVELOPMENT												
		(Offered by Department of Mechatronics Eng	jineering	g)								
Prograi Branch	mme &	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit				
Prerequ	uisites	Engineering Economics & Management	& Management 7 OE 3 0 0									
Preamb	le	The purpose of this course to create entrepreneurial awareness	s among	engineering s	stude	nts.						
Unit – I		Entrepreneurship Concepts:						9				
Entrepreneurship & Entrepreneur- Role in Economic Development - Factors affecting Entrepreneurship- Creativity and Innovation - Entrepreneurship vs Intrapreneurship- Entrepreneurial Motivation factors – Types of Entrepreneurship & Entrepreneurs - Characteristics of Entrepreneurs - Entrepreneurship Development in India												
Unit – II Entrepreneurial Ventures and opportunity assessment: 9												
New venture creation – Bootstrapping, Minipreneurship, Start-ups, Acquiring, Franchising & Social venturing - Venture development stages - Models of market opportunity- Opportunity assessment: Critical Factors In Opportunity Assessment, Idea vs Opportunity, Evaluation process, Global opportunities for entrepreneurs.												
Unit – III Business Plan: 9												
Designing Business Model- Business Model Canvas- Objectives of a Business Plan - Business Planning Process – Structure of a Business Plan – Technical, Marketing, Financial Feasibility assessment - Competitive analysis - Common errors in Business Plan formulation - Presentation of the Business Plan: The 'Pitch'- case studies												
Unit – ľ	V	Financing and accounting:						9				
Forms of entrepreneurial capital – Sources of Financial capital: debt financing- Commercial banks and other sources, equity financing: Initial Public offering (IPO), Private placement - Venture capitalists - Angel investors-New forms of financing: Impact investors, Micro-financing, Peer-to-Peer Lending, Crowd funding - Natural capital. Preparing Financial Budget, Break even analysis, Taxation-Direct and indirect taxes. Insolvency and Bankruptcy- Case Study												
Unit – \	/	Small Business Management:						9				
Definitic Indian S Scale E	on of Small S Startup Ecos nterprises -	cale Industries: Strengths and Weaknesses, Sickness in Small E /stem – Institutions supporting small business enterprises, Busin Growth Strategies in small industry – Expansion, Diversification, J	Enterpris less Incu loint Ven	es: Symptoms ubators – Gov ture, Merger,	s -Ca ernm FDI a	uses nent l and S	and Policy Sub-C	remedies- / for Small contracting				
								Total:45				
TEXT B	00K:											
1.	Donald F. K	uratko,"Entrepreneurship: Theory, Process, Practice", 11 th Edition	n, Cenga	age Learning,	Bost	on, 2	2020.					
REFER	ENCES:											
1.	Robert D. H Hill, Noida, 3	isrich, Michael P. Peters & Dean A. Shepherd, Sabyasachi Sinha 2020.	a "Entrep	preneurship",	11 th	Editi	on, M	lcGraw				
2.	Charantima Education, I	th Poornima .M, "Entrepreneurship Development and Small Busin Noida, 2018.	ness En	terprises", 3 rd	Editi	on, F	Pearso	on				
3.	Gordon E &	Natarajan K, "Entrepreneurship Development", 6th Edition, Hima	laya Put	olishing House	e, Mu	imba	i, 201	7.				

COUR On co	COURSE OUTCOMES: On completion of the course, the students will be able to							
CO1	understand the importance of entrepreneurship and demonstrate the traits of an entrepreneur	Applying (K3)						
CO2	identify suitable entrepreneurial ventures and business opportunity	Applying (K3)						
CO3	assess the components of business plan	Analyzing (K4)						
CO4	appraise the sources of finance and interpret accounting statements	Applying (K3)						
CO5	interpret the causes of sickness of small scale enterprises and its remedies	Understanding (K2)						

mapping of COS with FOS and FSO	Mapping	of COs	with POs	and PSC)s
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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2	2	1	1		3	2		
CO2	1	2	2	2		2	2	1	1		3	2		
CO3	2	2	2	2	2	2	2	2	2	2	3	2		
CO4	1	1	2	1		2	1	1	1	2	3	2		
CO5	1	1	2	1		2	1	1	1	2	3	2		

ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %						
CAT1	20	40	40				100						
CAT2	20	30	30	20			100						
CAT3	30	30	40				100						
ESE	10	30	40	20			100						
* ±3% may be varied (* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22GEX01 – NCC Studies (Army Wing) – I										
		(Offered by Department of Electrical and Electron	ics Engi	neering)									
Progra Branch	imme & h	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit					
Prereq	uisites	Nil	5/6	OE	3	4							
Preaml	ble	This course is designed especially for NCC Cadets. This cour discipline, secular outlook, the spirit of adventure, sportsman cadets by working in teams, learning military subjects includin	se will he spirit and Ig weapor	lp develop ch ideals of selfl n training.	arac ess	ter, c servio	amar ce am	aderie, iongst					
Unit - I	NCC Organisation & National Integration 9 Operational Integration NOO Training NOO Uniform Departure of NOO whether the second												
NCC C advanta Nationa Nationa	Drganisation - ages of NCC al Integration- al Integration.	 History of NCC- NCC Organisation- NCC Training- NCC U Training- NCC badges of Rank- Honours and Awards – Incenti Unity in diversity- contribution of youth in nation building- nation 	niform – ves for No onal integ	Promotion of CC cadets by ration council	NC cen - Ima	C ca tral a ages	dets nd sta and S	 Aim and ate govt. Blogans on 					
Unit - II Basic physical Training & Drill 9													
Basic physical Training – various exercises for fitness(with Demonstration)-Food – Hygiene and Cleanliness. Drill- Words of commands- position and commands- sizing and forming- saluting- marching- turning on the march and wheeling- saluting on the march- side pace, pace forward and to the rear- marking time- Drill with arms- ceremonial drill- guard mounting. (WITH DEMONSTRATION)													
Unit - III Weapon Training													
Main Parts of a Rifle- Characteristics of 5.56mm INSAS rifle- Characteristics of .22 rifle- loading and unloading – position and holding- safety precautions – range procedure- MPI and Elevation- Group and Snap shooting- Long/Short range firing(WITH PRACTICE SESSION) - Characteristics of 7.62mm SI B- LMG- carbine machine gun													
Unit - I	V	Social Awareness and Community Development						9					
Aims of Social service-Various Means and ways of social services- family planning – HIV and AIDS- Cancer its causes and preventive measures- NGO and their activities- Drug trafficking- Rural development programmes - MGNREGA-SGSY-JGSY-NSAP-PMGSY-Terrorism and counter terrorism- Corruption – female foeticide -dowry –child abuse-RTI Act- RTE Act- Protection of children from sexual offences act- civic sense and responsibility.													
Unit - V	V	Specialized Subject (ARMY)						9					
Basic s forces-	structure of Ai Service tests	med Forces- Military History – War heroes- battles of Indo-Pak and interviews-Fieldcraft and Battlecraft-Basics of Map reading	war- Para g includin	am Vir Chakra g practical.	a- Ca	areer	in the	e Defence					
				Lecture :4	5, P	racti	cal:30), Total:75					
TEXT E	BOOK:												
1.	National Ca	det Corps- A Concise handbook of NCC Cadets by Ramesh Pu	ublishing H	House, New D	Delhi	, 201	4						
REFER	RENCES:												
1.	Cadets Han	dbook – Common Subjects SD/SW published by DG NCC, New	v Delhi.										
2.	Cadets Han	dbook- Specialized Subjects SD/SW published by DG NCC, Ne	ew Delhi										
3.	NCC OTA F	Precise published by DG NCC, New Delhi.											

COUR On cou	SE O	UTCOI	MES: the cours	se, the sti	udents	will be a	able to							BT Mapp Highest L	ed evel)	
CO1	disp	lay ser	nse of pat towards n	riotism, se	cular va	alues and ough nati	d shall b ional un	e transfity and	formec social	l into mo cohesior	tivated y	outh who w	vill	Applying (K3)		
CO2	dem dev	onstra	te Health e quality c	Exercises of immedia	, the se ate and	ense of di implicit c	scipline bediena	, improv	/e bea ders	ring, sma	artness, t	turnout,		Applying	(K3)	
CO3	basic knowledge of weapons and their use and handling.												Applying (K3)			
CO4	understanding about social evils and shall inculcate sense of whistle blowing against such evils Applying (K3) and ways to eradicate such evils															
CO5	acquaint, expose & provide knowledge about Army/Navy/ Air force and to acquire information Applying (K3) about expansion of Armed Forces, service subjects and important battles.															
Mapping of COs with POs and PSOs																
COs/P	os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2	
CO	1						3	3	3	3	3					
CO	2					3										
CO:	3	3	2	1	1											
CO	4	3	2	1	1											
CO	5	3	2	1	1	-										
1 – Sliç	ght, 2	– Mod	erate, 3 –	Substanti	al, BT-	Bloom's	Taxono	my			1		1	1	1	
	-							-								
						ASSES	SMENT	PATTE	RN - 1	THEORY	,					
Test / Cate	Bloo eqory	m's /*	Remem	bering (K %	(1) L	Jndersta (K2)	nding %	Apply (K3)	/ing %	Analyz (K4) 9	ing %	Evaluating (K5) %	C	reating (K6) %	Total %	
С	AT1	·		-		-		-		-		-		-	-	
С	AT2			-		-		-		-		-		-	-	
С	AT3			-		-		-		-		-	-		-	
	-		The exar	nination a	nd awa	rd of mar	·ks will t	be done	by the	Ministry	of Defe	nce, Gover	nment of	India whic	h	
ESE includes all K1 to K6 knowledge levels. The maximum marks for the End Semester Examination is 500 m									marks.							

It will be converted to 100 marks.
	22GEX02 - NCC STUDIES (AIR WING) – I										
	(Offered by Department of Information 1	Fechnold	ogy)								
Programme & Branch	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit				
Prerequisites	Nil	5/6	OE	3	0	2	4				
		1	I		1	1					
Preamble	This course is designed especially for NCC Cadets. This co discipline, secular outlook, the spirit of adventure, sportsma cadets by working in teams, honing qualities such as self-di of labour in the cadets.	ourse will in spirit a iscipline,	help develop cha nd ideals of selfl self-confidence,	arac ess s self	ter, c servic relia	amara ce amo nce ar	aderie, ongst nd dignity				
Unit–I	NCC Organization and National Integration						9+3				
NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC cadets – Aim and advantages of NCC Training - NCC badges of Rank - Honors' and Awards – Incentives for NCC cadets by central and state govt. History and Organization of IAF - Indo-Pak War-1971 - Operation Safed Sagar. National Integration - Unity in diversity - contribution of youth in nation building - national integration council - Images and Slogans on National Integration.											
Unit–II Drill and Weapon Training 9+3											
Drill- Words of commands - position and commands - sizing and forming - saluting - marching - turning on the march and wheeling - saluting on the march - side pace, pace forward and to the rear - marking time - Drill with arms - ceremonial drill - guard mounting.(WITH DEMONSTRATION). Main Parts of a Rifle - Characteristics of .22 rifle - loading and unloading – position and holding - safety precautions – range procedure - MPI and Elevation - Group and Snap shooting - Long/Short range firing (WITH PRACTICE SESSION).											
Unit–III Principles of Flight 9+3											
Laws of motion-Fo Aircraft recognition	rces acting on aircraft – Bernoulli's theorem - Stalling - Primar	y control	surfaces – seco	ndar	y cor	ntrol s	urfaces -				
Unit-IV	Aero Engines						9+3				
Introduction of Aer trends.	o engine -Types of engine - piston engine - jet engines - Turbo	o prop er	igines-Basic Flig	ht In	strun	nents	- Modern				
Unit–V	Aero Modeling						9+3				
History of aeromoo Radio Control Moo	deling - Materials used in Aero-modeling - Types of Aero-mode lels - Building and Flying of Aero-models.	els – Stat	ic Models - Glide	ers -	Cont	rolline	models -				
				45							
TEXT BOOK:			Lecture:	45,	lutoi	1a1:30), 10tal:75				
1. "National Cadet Corps - A Concise handbook of NCC Cadets". Ramesh Publishing House. NewDelhi. 2014.											
REFERENCES/ MANUAL / SOFTWARE:											
1. "Cadets Handbook – Common Subjects SD/SW", DGNCC, New Delhi.											
2. "Cadets ⊢	andbook – Specialised Subjects SD/SW", DGNCC, New Delh	i.									
3. "NCCOTA	Precise", DGNCC, New Delhi.										

COUR On co	COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapı (Highest L	oed .evel)				
CO1	buil carr	d sense ry out na	e of par ation b	riotism uilding	n, secu I throu	ular va gh na	alues and itional uni	shall be ty and so	transfo ocial col	rmed i nesion	nto motiv	vated you	uth who wil	I	Applying	(K3)	
CO2	den thei	nonstrat ir use al	te the s nd han	ense dling	of disc	cipline	with sma	artness a	nd have	e basic	knowled	lge of we	eapons and	ł	Applying (K3)		
CO3 illustrate various forces and moments acting on aircraft												Applying	(K3)				
CO4 outline the concepts of aircraft engine and rocket propulsion											Applying (K3)						
CO5 design, build and fly chuck gliders/model air planes and display static models.										Applying	(K3)						
	Manning of CO2 with DO2 and DSO2																
C0c/5	20-	PO1	BO		002	PO						S PO10	PO11	PO12	BSO1	DSO2	
CUS/F	-US	PUI	PU		-03	P04	4 PO5	P06	P07	PU	PU9	POIU	PUTT	PUIZ	P301	P302	
CO	1							3	3	3	3	3					
CO	2						3										
CO	3	3	2		1	1											
CO	4	3	2		1	1											
CO	5	3	2		1	1											
1 – Slig	ght, 2	– Mode	erate, 3	– Sub	ostanti	al, BT	- Bloom's	Taxono	my								
							ASSES	SMENT	ΡΔΤΤΕ	RN -	THEORY	,					
Tes	t / Blo atego	oom's ory*		Remer (K ^r	nberii 1) %	ng	Underst (K2)	anding	Apply (K3)	ying %	Analyz (K4)	ing %	Evaluating (K5) %) C	Creating (K6) %	Total %	
	CAT	1			-		-		-		-		-		-	-	
	CAT	2			-		-		-		-		-				
	CAT	3			-		-		-		-		-		-	-	
	ESE The examination and award of marks will be done by the Ministry of Defence, Government of India which includes all K1 to K6 knowledge levels. The maximum marks for the End Semester Examination is 500 marks. It will be converted to 100 marks.							which 500									

22MBO01 - COST ACCOUNTING FOR ENGINEERS									
		(Offered by Department of Management S	Studies)						
Progra Branch	mme& ז	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Р	Credit	
Prereq	uisites	NIL	5	OE	3	1	0	4	
Pream	ole	To provide an In-depth study of the Cost Accounting principles a classification of costs components to facilitate decision Making.	and techni	ques for iden	tifica	tion, a	inalys	is and	
Unit –	I	Introduction to Cost Accounting						9 + 3	
Introduction to Cost Accounting: Meaning - Scope, objectives and significance of Cost Accounting its relationship with financial accounting and management accounting– cost centres – cost units – Elements of cost – classification of cost – preparation of cost sheet.									
Unit – II Cost Ascertainment – Elements of cost 9 + 3									
Material Costs: Procurement of materials – Inventory management and control – scrap, spoilage, defectives and wastage Labour Costs: Time Keeping, Time booking and payroll – Labour turnover – principles and methods of remuneration and incentive schemes. Overheads: Collection, classification and apportionment and allocation of overheads. Unit – III Basic Costing Methods									
Unit – III Basic Costing Methods 9 + 3									
Operating Costing - Meaning - Preparation of Operating Cost Sheet - Transport Costing - Power Supply Costing - Hospital Costing.									
Unit – IV Advanced Costing Methods 9 + 3									
Feature Proces	es of Job (s Loss - N	Costing - Batch Costing - Preparation of Cost Sheet Under Job Co lormal and Abnormal Loss.	osting, an	d Batch Costi	ng -	Proce	ss Co	sting -	
Unit –	V	Cost Accounting Techniques						9 + 3	
Budge classifie Standa costing varianc	t and Buc cation of b ard Costin as a mar ces – Sale	Igetary Control: Budgetary control as a management Tool – Inst budgets – Fixed and Flexible Budgeting. Ing and Variance Analysis: Budgetary control and standard costin agement Tool – Cost variances – Direct material cost variances – s variance.	allation of ng – Suita - Direct la	Budgetary co ability of stand bour cost vari	ard ance	l syste costin es – C	em g – St verhe	andard ad	
				Lecture:	45, ⁻	Tutori	ial: 15	, Total:60	
TEXT E	BOOKS								
1.	Jawahar Educatio	Lal, SeemaSrivastava, Manisha Singh, " Cost Accounting, Text, F m, New Delhi, 2020.	Problems	and Cases", 6	6th E	dition	, McG	raw Hill	
2.	William I Educatio	∟anen, Shannon Anderson and Michael Maher, "Fundamentals of on, New Delhi, 2020.	cost Acco	ounting",7th E	ditio	n, Mc	Graw	Hill	
REFERENCES									
1.	M.N.Aro	ra and PriyankaKatyal, "Cost Accounting", 5th Edition, Vikas publi	ishing Hou	use, New Dell	ni, 20)23.			
2.	Ravi M.H	Kishore, " Cost and Management Accounting", 6th Edition, Taxma	nn, New	Delhi, 2021					
3. M.N.Arora, "Cost and Management Accounting",11th Edition, Vikas Publishing, New Delhi, 2021.									

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	understand the conceptual frame work of cost accounting	Understanding (K2)
CO2	understand the basic concepts and process in determination of cost of product and services	Understanding (K2)
CO3	use the basic costing methods in different business situation	Applying (K3)
CO4	demonstrate the advanced costing methods in various decision making situation	Applying (K3)
CO5	prepare various types of budgets and determine variance in different situations.	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										2	3	1		
CO2										2	3	1		
CO3										2	3	1		
CO4										2	3	1		
CO5										2	3	1		

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	15	35	50				100			
CAT 3	15	35	50				100			
ESE	25	25	50				100			
* ±3% may be varied (CAT 1,2 & 3 – 50 marks & ESE – 100 marks)										

22MB002 - ECONOMIC ANALYSIS FOR DECISION MAKING									
		(Offered by Department of Management St	udies)						
Programr Branch	me&	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	Т	Ρ	Credit	
Prerequis	sites	Basic understanding of differential calculus	6	OE	3	1	0	4	
Preamble	!	The course aims at introducing a few vital techniques required for informed managerial decisions.	carrying	out economic	ana:	alysis	for m	aking	
Unit – I		Economic Optimization						9 + 3	
Economic Optimization: Theory of firm – Business versus Economic profit – Revenue relations – Cost relations – Profit relations – Marginal versus incremental concept.									
Unit – II		Forecasting						9 + 3	
Forecasting: Forecasting applications – Techniques –Naire method – Moving average – Exponential smoothing - Trend analysis – Linear Trend – Growth Trend – Sales, cost and revenue forecasting.									
Unit – IIIProduction and Cost Analysis9 + 3									
 Production: Production function – Returns to scale and returns to factor – Total, managerial and average product – Law of diminishing returns – Optimal input usage – Production function estimation. Cost Analysis: Economic and Accounting costs – Time in cost analysis – Short run cost – Long run cost – cost relations – cost volume – profit analysis. 									
Unit – IV		Competitive Market Analysis						9 + 3	
Competitiv competitiv	i ve Ma /e mark	rket Analysis: Characteristics of competitive markets – Profit maxies et supply curve – Equilibrium in competitive markets - Monopoly –	imisation Monopol	 Marginal ar istic competit 	alys ion.	is in	compe	etition –	
Unit – V		Game theory and Competitive Strategy						9 + 3	
Game The Dominanc	eory Ba ce Rule	sics - Prisoner's Dilemma - Saddle Point - Two Person Zero Sum (- Mixed Strategies.	Game - G	ames without	Sac	ldle F	Points	-	
				Lecture: 4	15, T	utori	al: 15	, Total:60	
TEXT BO	OKS								
1. M	1ark Hir	schey, "Managerial Economics", 12 th Edition, Cengage Learning, N	lew Delhi	, 2022.					
2. Geetika, PiyaliGhosh, Purba Roy Choudhury, "Managerial Economics", 3rd Edition, McGraw Hill Education, New Delhi, 2019.									
REFERENCES									
1. Gupta. G, "Managerial Economics", 2nd Edition, McGraw Hill Education, New Delhi, 2019.									
2. A	huja. H	. L, "Principles of Microeconomics", 22nd Edition, S. Chand Publish	ning, New	/ Delhi, 2019.					
3. P D	anneer Ielhi, 20	Selvam R, P. Sivasankaran, P. Senthilkumar., "Managerial Econor 18.	mics", 1st	Edition, Cen	gage	e Lea	rning,	New	

COUR	SE OUTCOMES:	BT Mapped (Highest Level)
On co		(Ingliest Level)
CO1	Understand revenue, cost and profit relations and apply techniques to find best course of action.	Applying (K3)
CO2	Apply appropriate forecasting techniques for estimating sales, cost and revenue.	Applying (K3)
CO3	Understand the relation between inputs and output of production system and perform cost – volume – profit analysis	Applying (K3)
CO4	Apply market equilibrium concepts in monopoly and monopolistically competitive markets.	Applying (K3)
CO5	Understand game theory and apply in different strategic decisions	Applying (K3)
1		

Mapping of COs with POs and PSOs

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					2					1	3			
CO4					2					1	3			
CO5					2					1	3			

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	35	35	30				100		
CAT2	15	45	40				100		
CAT 3	15	35	50				100		
ESE	5	40	55				100		
* ±3% may be varied (CAT 1,2 & 3 – 50 marks & ESE – 100 marks)									

		22MBO03 - MARKETING ANALYT	TICS							
		(Offered by Department of Management	Studies)							
Progran Branch	nme&	All BE/BTech Engineering and Technology Branches	Sem.	Category	L	т	Ρ	Credit		
Prerequ	lisites	Basic understanding of differential calculus	7	OE	3	1	0	4		
Preambl	le	Marketing analytics enables marketers to measure, manage an effectiveness and optimize return on investment (ROI). This cou measure customer value and apply analytic tools to various ma	d analyze r urse expose rketing dec	narketing per es the studen isions.	form ts wi	ance th the	to ma tools	ximize its to		
Unit – I		Market & Marketing Analytics						9 + 3		
Introduction - Introduction to marketing analytics, Models & Metrics Market Insight - Market sizing. Market Segmentation –Segmentation, Targeting & Positioning										
Unit – II Business & Competition 9 + 3										
Competitive Analysis - Competitor identification, analysis, and actions Business Strategy –Scenarios, Decision Model, Metrics Business Operations - Forecasting										
Unit – III Product and Price 9 + 3										
Product Price Ar	t and Sei nalytics	 rvice Analytics - Conjoint analysis and product/service metrics Pricing techniques and assessment 								
Unit – IV	V	Distribution & Promotion						9 + 3		
Distribu Promoti	ition Ana	alytics –Characteristics, Channel evaluation and selection, Multic ytics - Promotion budget estimation and allocation, Metrics	channel dis	tribution and	metr	ics.				
Unit – V	1	Sales						9 + 3		
Sales A	nalytics	- Metrics for sales, profitability, and support								
				Lecture:	45, T	utor	ial: 15	i, Total:60		
TEXT B	OOKS									
1. Stephen Sorger, "Marketing Analytics: Strategic Models and Metrics", 1st Edition, Admiral Press, UK, 2016.										
2. Wayne L. Winston, "Marketing Analytics: Data-Driven Techniques with Microsoft Excel", 1st Edition, Wiley, New Delhi, 2018.										
REFERENCES										
1.	Tommy I	Blanchard, "Data Science for Marketing Analytics", 1st Edition, Pa	ackt Publis	hing, UK, 201	9.					
2.	Mike Gri	gsby, "Marketing Analytics", 2nd Edition, Kogan Page, UK, 2018.								
3. David A. Aaker, V. Kumar, Robert P. Leone, George S. Day., "Marketing Research", 1st Edition, Wiley, New Delhi, 2019.										

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	Understand the importance of Analytics in Marketing, size and segment the market	Understanding (K2)
CO2	Understand the Business, competition and its related decisions.	Understanding (K2)
CO3	Identify important features of a product and suitable pricing methods.	Applying (K3)
CO4	Assess Channel performance and Promotion Metrics.	Applying (K3)
CO5	Assess sales performance.	Applying (K3)
		1

Mapping of	f COs 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										2	3	1		
CO2										2	3	1		
CO3										2	3	1		
CO4										2	3	1		
CO5										2	3	1		

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

		ASSESSME	NT PATTER	N - THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	35	65					100
CAT2	15	35	50				100
CAT 3	15	15	70				100
ESE	25	25	50				100
* ±3% may be varied	(CAT 1,2 & 3 – 50	marks & ESE - 10	0 marks)		·		

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE-638060

(AUTONOMOUS)

BOARD OF INFORMATION TECHNOLOGY

DEGREE & PROGRAMME: BTECH & INFORMATION TECHNOLOGY

HONOURS DEGREE TITLE: CYBER SECURITY

The following courses are identified to earn additional 18 credits to get a Honours degree with specialization in **Cyber Security**

S.No.	Course Code	Course Title	Credits	Prerequisites	Semester
1.	22ITH01	Mathematical Foundations for Information Security	4	Nil	5
2.	22ITH02	Secure Coding	4	Nil	5
3.	22ITH03	Modern Cryptography	4	Nil	6
4.	22ITH04	Mobile and Wireless Security	3	Nil	6
5.	22ITH05	Computer Security Audit and Assurance	3	Nil	7
		TOTAL	18		

	22ITH01 - MATHEMATICAL FOUNDATIONS FOR INFO	ORMATI	ON SECURIT	Υ			
	(Common to IT, AI&DS, AI&ML, CSE and CSD) Branch	nes)				
Programme&	B. Tech – IT, AI&DS, AI&ML,	Sem.	Category	L	т	Р	Credit
Branch	BE – CSE and CSD Branches		category	_	-	•	oroun
Prerequisites	NIL	5/6/7	HN	3	1	0	4
Preamble	This course describes the explosive growth of security in co	omputer	systems and	thei	r inte	rconn	ections via
	networks that have increased the dependence of both organiz	ations a	nd individuals	on	the ir	forma	ation stored
	and communicated using cryptographic systems.						
Unit – I	Elementary Number Theory						9+3
Divisibility and the E	uclidean algorithm- Linear Diophantine equations – Congruences	s: Definit	ions and prop	ertie	s– lin	ear co	ongruences
and Quadratic cong	gruences- residue classes- Euler's phi function – Fermat'sLittl	le Theor	em – Chines	e R	emai	nder	Theorem –
Exponentiation and	Discrete logarithm- Quadraticresidues – Legendre symbol – Jac	obi symt	ool – Algebrai	c stru	ucture	es: gro	oups, rings,
fields, GF(p)fields,G	F(2")fields, (Theorems without proof)						
Unit – II	Simple Cryptosystems		0 1 11 11				9+3
Enciphering Matrice	es – Encryption Schemes – Symmetric and AsymmetricCrypto	systems	– Substitutio	on C	ipher	: Affir	ne cipher –
Vigenere Cipher- M	odern Stream Ciphers: Onetime pad- LFSR -Block ciphers -Us	se of Blo	ck Ciphers -		Jiphe	er - Ira	ansposition
Cipher – MultipleEi	Cryption — Secure Cryptosystem – Problems in Advanced	Encrypti	on Standard	AES) — I	Proble	emsin Data
Encryption Standard	A. (Theorems without proof)						0.0
	Public Key Cryptosystems		<u> </u>				9+3
The idea of public k	ey cryptography – The Diffie – Hellman Key Agreement Protoc	OI - RSA	Cryptosyste	n –	Rabir	n cryp	tosystem –
ElGamai cryptosyste	Zero Knowledge Brotecole - Eist Shamir protocol - Cuillou Quine	Schnorr	Signature- D	igita vod N		ature	standard –
SHA and HMAC (Th	- Zero-Kilowiedge Frotocols : Flat Shamii protocol- Guillou Quist	qualei pi	010001-1185118		NAC (aigoni	
Unit – IV	Brime Generation, Testing and Eactoring						0+3
Concretion: Moreov	Prime Ceneration, resting and ractoring	not toot	Squara roa	+ +04	5+ N/	lillor I	Dobin toot
Factorization: Trial	divisionmethod-Fermat method – Pollard rho (v) method – co	ntinued f	fraction meth	נופ: http://www.com/	tha	unaqı unaqı	atic spieve
method (Theorems	without proof)	nunueu i	nacion metri	Ju –	uie	quaui	
Unit – V	Number Theory and Algebraic Geometry						9+3
Elliptic curves – ba	sic facts – elliptic curvectivitosystems – elliptic curve primality	test _ e		acto	rizati	on-l e	nstra's ecc
factorization -elliptic	curve confidentiality and signature (Theorems without proof)	1631 - 6		acio	nzau		
	source connuclitainty and signature. (Theorems without proof)						
			Lecture	:45,	Tuto	rial:1	5, Total:60
TEXT BOOK:							
1. William Sta	llings, "Cryptography and Network Security", 7 th Edition, Pearson	n Educati	ion, New Delł	i, 20	17.		
REFERENCES:							
1. Behrouz A. Education,	Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Ne India, 2015.	twork Se	ecurity", 3 rd I	Editio	on, T	ata N	IcGraw-Hill
2. Charles P F	Fleeger, "Security in Computing", 5 th Edition, Prentice Hall of India	a, New D	Delhi, 2015.				
3. Victor S University F	houp, "A Computational Introduction to Number Press, 2005.	r The	ory and	Alç	gebra	",	Cambridge

COURS On cor	SE OUTCOMES: npletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	construct number theory concepts in various security applications	Applying (K3)
CO2	apply symmetric key cryptography techniques for real world problems	Applying (K3)
CO3	build various public key cryptography, hashing and digital signature techniques for real case scenarios	Applying (K3)
CO4	Illustrate the techniques to generate, test and factories prime numbers	Applying (K3)
CO5	make use of elliptic curve, properties for security services	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	1		3	3	3	2	2	3			3	2
CO2	3	2	1		3	3	3	2	2	3			3	2
CO3	3	2	1		3	3	3	2	2	3			3	2
CO4	3	2	1		3	3	3	2	2	3			3	2
CO5	3	2	1		3	3	3	2	2	3			3	2
4 01 1 4 0			<u> </u>			-								

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	30	50				100
CAT2	20	30	50				100
CAT3	20	30	50				100
ESE	20	30	50				100
* ±3% may be varied (0	CAT 1,2,3 – 50 mark	s & ESE – 100 mai	rks)				

	22ITH02 - SECURE CODING						
	(Common to IT, AI&DS, AI&ML, CSE and C	SD Branch	ies)				
Programme	B. Tech – IT, AI&DS, AI&ML,	Sem	Category	1	т	Р	Credit
Branch	BE – CSE and CSD Branches	Jeni.	Category		•	•	orean
Prerequisite	s NIL	5/6/7	HN	3	1	0	4
Preamble	This course provides knowledge on basic concepts, policies secure software systems	, and mech	nanisms in de	signi	ng ar	nd coo	ding
Unit – I	Introduction						9+3
Software sec Platforms-op Organization	urity- Security concepts-Security policy-security flaws – vulnerabilitie erating systems-compilers. Strings: Common String Manipulatio Stack Smashing- Code Injection- Arc Injection-Mitigation Strategies.	es – exploi n Errors-S	ts – mitigation String Vulnera	i-Car abiliti	nd C- es-P	⊦+-De roces	evelopment s Memory
Unit – II	Pointer Subterfuge						9+3
Data Locatio	s-Function Pointers- Object Pointers-Modifying the Instruction Poir	nter-Global	OffsetTable-	The	.dtors	s Sec	tion-Virtual
Pointers-atex	t(), on-exit(), longjmp()-Exception Handling-Mitigation Strategies.	Dynamic	Memory Ma	anag	eme	nt: C	common C
Memory Man	agement Errors-Doug Lea's Memory Allocator-RtlHeap Mitigation St	rategies.					
Unit – III	Integer Security						9+3
Integer Data	types -Integer Conversions-Integer Error Conditions-Integer Oper	ations – Ii	Output Funct	abilit	Ies-	Non-e	Exceptional
Output Eunct	Errors-Miligation Strategies. Formatted Output: variable Functions-	Formatteo	Output Funct	ions-	Expl	oning	Formatted
Unit – IV							9+3
Introduction	Time of Check. Time of Use - Files as Locks and File Loc	kina-File	System Explo	oits-N	/itiga	tion	Strategies.
Recommend	ed Practices: Secure Software Development Principles-System Qu	ality Requ	rements Engi	neer	ing-T	hreat	Modeling-
Use/Misuse	Cases-Architecture and Design -Off-the-Shelf Software-Compiler	Checks-In	put Validation	n-Da	ta Sa	anitiza	ation-Static
Analysis-Qua	lity Assurance-Memory Permissions-Defense in Depth-TSP-Secure.						
Unit – V	Proactive Security Development Process						9+3
Installing a S	ecurity Culture-The Defender's Dilemma and the Attacker's Advanta	ge-Role of	Education-In	tegra	ting	Secu	rity into the
Development	Process-Security Principles. Language Independent Security is	sues: App	propriate Acce	ess (₁	Contr	ol-Ru	inning with
Least Privile	e-Cryptographic Foldies Protecting Data-Input checking and canonic	calization-L	batabase inpu	τ.			
			Lecture	:45, "	Tuto	ial:1	5, Total:60
TEXT BOOK							
1. Robe	rt C. Seacord, "Secure Coding in C and C++", SEI Series (CERT Bo	ok), Addis	on-Wesley, 20	006.			
REFERENCI	S:						
1. Mark Softv	Dowd, John McDonald, and JustingSchuh, "The ART of Software S vare Vulnerabilities", Addison Wesley, 2007.	ecurity Ass	essment: Ide	ntifyi	ng ar	nd Pre	eventing
2. Mich	ael Howard and David LeBlanc, "Writing Secure Code", Microsoft Pr	ess, 2003.					
3. Tom	Gallagher, Bryan Jeffries, Lawrence Landauer, "Hunting Security Bu	igs", Micros	soft Press, 20	06.			

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	demonstrate the string manipulation errors, vulnerabilities and mitigation strategies	Applying (K3)
CO2	implement arbitrary memory write exploits, programming defects, vulnerabilities and mitigation strategies in dynamic memory management	Applying (K3)
CO3	interpret the integral security issues, correct and incorrect use of formatted output functions.	Applying (K3)
CO4	demonstrate various vulnerabilities associated with file I/O and specific development practices for improving the overall security in C code	Applying (K3)
CO5	adopt the proactive security development process and language independent security issues	Applying (K3)
	Mapping of COs 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	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		3	2
			0 1 1 1			Ŧ								

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	60	30				100						
CAT3	10	60	30				100						
ESE	10	60	30				100						
* ±3% may be varied (C	CAT 1,2,3 – 50 mark	s & ESE – 100 mar	·ks)										

22ITH03 - MODERN CRYPTOGRAPHY													
(Common to IT, AI&DS, AI&ML, CSE and CSD Branches)													
Progra	mme &	B. Tech – IT, AI&DS, AI&ML,	Sem.	Category	I	т	Р	Credit					
Branch	1	BE – CSE and CSD Branches		eatogery	-	•	-	oroun					
Prereq	uisites	NIL	5/6/7	HN	3	1	0	4					
Preamb	ble	This course enables the students to focus on how cryptographic them to build provably secure encryption and digital signatures	c algorith	ims and proto	cols	worł	k and	how to use					
Unit - I		Cryptographic Protocols						9+3					
Key Ex Probabi	change and ilistic Algorith	Entity Authentication- Identification Schemes- Commitment S ms	Schemes	- Electronic	Elect	tions	- Dig	gital Cash-					
Unit - II		One-Way Functions						9+3					
Discrete Formal Pseudo	e Exponentia Definition of randomness	I Function- Uniform Sampling Algorithms- Modular Powers- Mod One-Way Functions- Hard-Core Predicates- Bit Security of C	ular Squ One-Way	aring- Quadra y Functions-	atic F One	Resio -Wa	duosit y Fun	y Property- ctions and					
Unit - II	I	Provably Secure Encryption and Digital Signatures						9+3					
Classica Eavesd - Uncon -Claw-F	al Informatic roppers - Ch Inditional Secu Free Pairs an	on-Theoretic Security- Perfect Secrecy and Probabilistic Att osen-Ciphertext Attacks- A Security Proof in the Random Oracle urity of Cryptosystems- The Bounded Storage Model -The Noisy d Collision-Resistant Hash Functions- Authentication-Tree-Based	tacks- F Model - Channel d Signati	Public-Key O Security Und I Model- Attac ures - A State	ne-T er St ks a -Fre	ime tanda nd L e Sig	Pade ard As evels gnatur	s- Passive ssumptions of Security e Scheme.					
Unit - I	V	Transport Layer Security(TLS)	-					9+3					
and Ce Improve Security Compro	ertificate Aut ements over y-Authenticat	horities-The Record Protocol-The TLS Handshake Protocol- TLS 1.2- Downgrade Protection-Single Round-Trip Handshake ion-Forward Secrecy-How Things Can Go Wrong-Compromise -Bugs in Implementations	TLS 1. - Sessic ed Certi	3 Cryptogra on Resumptio ficate Author	n- T	Algo he S omp	orithm Streng romis	ths of TLS ed Server-					
Unit - V	1	Quantum and Post-Quantum						9+3					
How Qu The Thi Grover's Cryptog	uantum Comp reat of Shor's s Algorithm- graphy- Lattic	outers Work- Quantum Bits- Quantum Gates- Quantum Speed-Up s Algorithm- Shor's Algorithm- The Factoring Problem- Shor's A Why Is It So Hard to Build a Quantum Computer?- Post-Qua e-Based Cryptography-Multivariate Cryptography- Hash-Based	p-Expon Algorithm antum C Cryptogr	ential Speed- and the Disc ryptographic raphy	Up a crete Algo	nd S Log prithn	imon' arithn ns- C	s Problem- n Problem- ode-Based					
				Lecture: 4	5, Tı	utori	al: 15	, Total: 60					
TEXT B	BOOK:												
1.	Hans Delfs 2007. (For L	and Helmut Knebl, "Introduction to Cryptography: Principles and Jnits I, II, III)	Applicat	tions", 2 nd Edi	tion,	Spri	nger \	Verlag,					
2.	Wenbo Mac	, "Modern Cryptography: Theory and Practice", Prentice Hall, 20	03. (For	Units IV,V)									
REFER	ENCES/ MA	NUAL / SOFTWARE:											
1.	Shaffi Goldv	vasser and Mihir Bellare, Lecture Notes on Cryptography, Availa	ble athtt	p://citeseerx.i	st.ps	su.ed	lu/.						
2.	Oded Goldr	eich, "Foundations of Cryptography: Volume II Basic Application	s", CRC	Press, 2009.									

COUR On co	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	interpret the basic principles of cryptographic protocols	Applying (K3)
CO2	determine the ways of generating one way functions	Applying (K3)
CO3	identify the use of provably secure encryption and digital signatures	Applying (K3)
CO4	articulate the cryptographic algorithms to compose, build and analyze transport layer security	Applying (K3)
CO5	express the use of quantum and post quantum algorithms	Applying (K3)

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

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

(Common to IT, Al&DS, Al&ML, CSE and CSD Branches) Programme & Baranch B.E rech – IT, Al&DS, Al&ML, BE – CSE and CSD Branches Sem. Category L T P Credit Prerequisites NIL 5/6/7 HN 3 0 0 3 Preamble This course aims to focus on the security issues in wireless networks 9 0 3 Cellular Networks, 1G through 3G, IEEE Network - WLAN IEEE 802.11, WPAN IEEE 802.15, WMAN IEEE 802.16, IEEE 802.20, 14, IEEE 802.21, MRAN IEEE 802.21, WRAN IEEE 802.21, WRAN IEEE 802.21, WRAN IEEE 802.21, MIH IEEE 802.21, WRAN IEEE 802.21, MIH IEEE 802.21, WRAN IEEE 802.21, WILL SUBLE 802.21, MIH IEEE 802.21, WRAN IEEE 802.21, MIH IEEE 802.21, WILL SUBLE Networks - AGA protocol – Firewalls – Intrusion detection. 9 Hotsport architecture WIDS – Rogue AP detection – IEEE 802.11 geolocation techniques – Honeyoots – Passive and Active attacks – DOS attacks – Trojan attack – Dictionary Attack. Bluetooth Security – Protocol architecture – Policy negotiation – radio security moleices – RAAD PCI / WIMAX Security in IEEE 802.11 geolocation techniques – Honeyoots – Passive and Active attacks – DOS attacks – Role PCI / WIGN = RADIUS – SECURITY in RAM HADE Networks 9 WINT – II Security management – Security matches excurity matche excurity architecture – Policy negotiation – radio security policies – RADIUS – EXCURATION – RESURCARA – Security matches – Security matche excurity matche excurity architecture – Policy negotiation		22ITH04 - MOBILE AND WIRELESS SEC	URITY											
Programme & Branch B. Tech – IT, Al&DS, Al&ML, BF – CSE and CSD Branches Sem. Category L T P Credit Prerequisites NIL 5/677 HN 3 0 0 3 Preadble This course aims to focus on the security issues in wireless networks 9 Cellular Networks, 10 through 3G, IEEE Network - WLAN IEEE 802.11, WPAN IEEE 802.15, WLAN IEEE 802.22, Mobile Internet Networks 9 Cellular Networks, 10 through 3G, IEEE Network - WLAN IEEE 802.21, WRAN IEEE 802.22, Mobile Internet Networks - Macro and Micro mobility – Personal mobility – SIP – Identity based mobility, NEMO and MANETs – Vulnerabilities of Wireless Networks – Review of security basics – symmetric and asymmetric cryptography. Hash functions – Electronic signatures – MAC – PKI and electronic certificate – IPSec – AAA protocol – Firewalls – Intrusion delection. 9 UNIT – II Wi-FI Security Architectures 9 Hotspot architecture – WIDS – Rogue AP delection – IEEE 802.11 geolocation techniques – Honepots – Passiv and Aclive attacks 9 WIT – II Security in IEEE 802.21 9 WPC – WEP2 – IV collisions – RC4 weakness – 802.11 autoch apairing – Attacks – Blues/Fixal – 3 9 WIT – II Security in Ad Hoc Networks 9 MURT – II Security in MAMA 9 1 UNIT – V Security in M	(Common to IT, AI&DS, AI&ML, CSE and CSD Branches)													
Prerequisites NIL 5/6/7 HN 3 0 0 3 Preamble This course aims to focus on the security issues in wireless networks 9 Cellular Networks, 1G through 3G, IEEE Network / WLAN IEEE 802.11, WPAN IEEE 802.16, WMAN IEEE 802.22, Mobility – Personal mobili	Programme & Branch	B. Tech – IT, AI&DS, AI&ML, BE – CSE and CSD Branches	Sem.	Category	L	т	Р	Credit						
Preamble This course aims to focus on the security issues in wireless networks 9 Oellular Networks, 1G through 3G, IEEE Network - WLAN IEEE 802.11, WPAN IEEE 802.15, WMAN IEEE 802.20, MIH IEEE 802.22, Mohle Internet Networks – Macro and Micro mobility – Personal mobility – SIP – Identity based mobility, NEMO and MANETs – Vulmerabilities of Wireless Networks. – Review of security basics – symmetric and asymmetric arryptography, Hash functions – Electronic signatures – MAC – PKI and electronic certificate – IPSec – AAA protocol – Firewalls – Intrusion detection. 9 UNIT – II WI-F1 Security Architectures 9 Hotspot architecture – WIDS – Rogue AP detection – IEEE 802.11 geolocation techniques – Honeypots – Passive and Active attacks – Ducota attacks – Torjan attack – Dictionary Attack, Bluetooth Security – Protocol architecture – Radio physical layer – Device addressing – SCO and ACL logical transports – Security mode – Authentication and pairing – Attacks – Bluesmack. 9 WEP – WEP = VICE - IV collisions – RC4 weakness – 802.11 security architecture – policy negoliation – radio security policies – RADIUS – EAP – PKI – WIMAX security – TEK, KEK, IEEE 802.116e – PKMv2-RSA – Security Association – 3 way handshake – role of smart cards in WIMAX. 9 UNIT – V Security in Aldoe Networks 9 Attacks to routing protocols – Security mechanisms – Auto-configuration – Key management – Self-managed PKI – Resurrecting Duckling – Group key management in WSNs. 9 UNIT – V Security in Mobile Telecommunication Networks 9 SS7 – GSM sec	Prerequisites	NIL	5/6/7	HN	3	0	0	3						
Preamble This course aims to focus on the security issues in wireless networks 9 UNIT - I Introduction to Mobile and Wireless Networks 9 Cellular Networks, 1G through 3G, IEEE Notwork, VLAN IEEE 802.11, WPAN IEEE 802.15, WMAN IEEE 802.20, WMAN IEEE 802.20, Mobile Internet Networks – Macro and Micro mobility – Personal mobility – SIP – Identity based mobility, NEMO and MANETs – Vulnerabilities of Wireless Networks – Review of security basics – symmetric and asymmetric on dynamic on the security. Hash functions – Electronic signatures – MAC – PKI and electronic certificate – IPSec – AAA protocol – Firewalls – Intrusion detection. 9 UNIT – II Wi-Fi Security Architectures 9 Hotspot architecture – WIDS – Rogue AP detection – IEEE 802.11 geolocation techniques – Honeypots – Passive and Active attacks – Dogo attack – Dictionary Attack. Bluetooth Security – Protocol architecture – Radio physical layer – Device addressing – SCO and ACL logical transports – Security mode – Authentication and pairing – Attacks – BlueSmack. 9 VINT – III Security in IEEE 802.11 9 9 VINT – With Vollisions – RC4 weakness – 802.11 authentication -802.111 security architecture – policy negotiation – radio security policies – RADIUS – EAP – PKI – WiIMX security – TEK, KEK, IEEE 802.16e – PKMv2-RSA – Security Association – 3 way handshake – role of smart cards in WIMAX. 9 UNIT – V Security in Ad Hoc Networks – Attacks – Preventive mechanisms – Intrusion tolerance – SNEP + 1/ELSA – TinySec – key management in WSNs. 9			1					1						
UNIT Introduction to Mobile and Wireless Networks 9 Cellular Networks, 1G through 3G, IEEE Network - WLAN IEEE 802.11, WPAN IEEE 802.21, WRAN IEEE 802.21 WIDS - Electronic signatures - MAC - PKI and electronic certificat - IPSec - AAA protocol - Firewalls - Intrusion detector. 9 Hotspot architecture - WIDS - Rogue AP detection - IEEE 802.11 geolocation techniques - Honeypots - Passive and Active attacks - DOS attacks - Trojan attack - Dictionary Attack. Bluetooth Security - Protocol architecture - policy negotiation - radio security policies - RADIUS - EAP - PKI - WIMAX security - TEK, KEK, IEEE 802.16e - PKMv2-RSA - Security association - radio security policies - RADIUS - EAP - PKI - WIMAX security - TEK, KEK, IEEE 802.16e - PKMv2-RSA - Security association - adv and tradrs in WIMAX. 9 UNIT - IV Security in Ad Hoc Networks 9 Attacks to routing protocols - Security mechanisms - Auto-configuration - Key management - Self-managed PKI - Resurceting Duckling - Group key management - WIMAX. 9 UNIT - V Security in Mobile Telecommunication Networks - Preventive mechanisms - Intrusion tolerance - SNEP + 2TLSA - TinySec - key management in WSNs. 9 UNIT - V Security in Mobile Telecommunication Networks - Attacks - Preventive mechanisms - Intrusion tolerance - SNEP + 2TLSA - TinySec - key management in	Preamble	This course aims to focus on the security issues in wireless ne	tworks											
Cellular Networks, 1G through 3G, IEEE Network - WLAN IEEE 802.11, WPAN IEEE 802.15, WMAN IEEE 802.16, IEEE 802.20, MIH IEEE 802.21, WRAN IEEE 802.22, Mobile Internet Networks - Macro and Micro mobility - Personal mobility - SIP - Identity Neade mobility, NEMO and MANETs - Vulnerabilities of Wireless Networks - Review of security basics - symmetric and asymmetric and asymmetric Intrusion detection WIRT - II WIRT - III WI-Fi Security Architectures JOS attacks - Trojan attack - Dictionary Attack. Bluetooth Security - Protocol architecture - Radio physical layer - Device addressing - SCO and ACL logical transports - Security mode - Authentication and pairing - Attacks - BlueSmack. UNIT - III Security in IEEE 802.11 9 WEP - WEP2 - IV collisions - RC4 weakness - 802.1x authentication - 802.11i security architecture - policy negotiation - radio security policies - RADIUS - EAP - PKI - WIMAX security - TEK, KEK, IEEE 802.16e - PKMv2-RSA - Security association - 3 Way handshake - role of smart cards in WIMAX. 9 UNIT - V Security in Ad Hoc Networks 9 SS7 - GSM security - GRPS security - UNTS Infrastructure and security - His2a - Slor - VoIP security flaws and count=measures - IIMS architecture - security flaws - 4G security - Protection of interception - Security issues in Mobile IP - HIP NIT - V Security in Mobile Telecommunication Networks 9 SS7 - GSM security - GRPS security - UMTS infrastructure and security - Hi323 - SIP - Megaco - VoIP security flaws	UNIT – I	Introduction to Mobile and Wireless Networks						9						
UNIT - II Wi-Fi Security Architectures 9 Hotspot architecture - WIDS - Rogue AP detection - IEEE 802.11 geolocation techniques - Honeypots - Passive and Active attacks - DOS attacks - Trojan attack - Dictionary Attack. Bluetooth Security - Protocol architecture - Radio physical layer - Device addressing - SCO and ACL logical transports - Security mode - Authentication and pairing - Attacks - BlueSmack. UNIT - III Security in IEEE 802.11 9 WEP - WEP2 - IV collisions - RC4 weakness - 802.1x authentication and pairing - Attacks - BlueSmack. 9 WIT - III Security in IEEE 802.11 9 WEP - WEP2 - IV collisions - RC4 weakness - 802.1x authentication - 802.11i security architecture - policy negotiation - radio security picities - RADIUS - EAP - PKI - WiMAX security - TEK , KEK, IEEE 802.16e - PKMv2-RSA - Security Association - 3 way handshake - role of smart cards in WiMAX. 9 Attacks to routing protocols - Security mechanisms - Auto-configuration - Key management - Self-managed PKI - Resurrecting Duckling - Group key management in WiNes. 9 VIT - V Security in Mobile Telecommunication Networks 9 SS7 - GSM security - GRPS security - UMTS infrastructure and security - H.323 - SIP - Megaco - VoIP security flaws and countermeasures - IMS architecture - security flaws - 4G security - Protection of interception - Security basics, Security in On-the-shelf and Emerging Technologies', 2 nd Edition, John Wiley & Sons, 2009.(For UNITS I,I,III) 1 On-the-shelf and Emerging Technologies', 2 nd	Cellular Networks, 1 MIH IEEE 802.21, V based mobility, NEM cryptography, Hash Intrusion detection.	G through 3G, IEEE Network - WLAN IEEE 802.11, WPAN IEE VRAN IEEE 802.22, Mobile Internet Networks – Macro and Mic IO and MANETs – Vulnerabilities of Wireless Networks – Review functions – Electronic signatures – MAC – PKI and electronic of	EE 802.1 ro mobili of secur certificate	5, WMAN IE ity – Persona ity basics – s – IPSec – A	EE 8 I mol ymm AA p	802.1 bility etric proto	6, IEI – SIF and a col –	EE 802.20, P – Identity asymmetric Firewalls –						
Hotspot architecture – WIDS – Rogue AP detection – IEEE 802.11 geolocation techniques – Honeypots – Passive and Active attacks – DCS attacks – Trojan attack – Dictionary Attack. Bluetooth Security – Protocol anchitecture – Radio physical layer – Device addressiru – SCO and ACL logical transports – Security mode – Authentication and pairing – Attacks – BlueSmack. UNIT – II Security in IEEE 802.11 9 WEP – WEP2 – IV collisions – RC4 weakness – 802.1x authentication -802.11i security architecture – policy negotiation – radio security policies – RADIUS – EAP – PKI – WiIMAX security – TEK, KEK, IEEE 802.16e – PKMv2-RSA – Security Association – 3 way handshake – role of smart cards in WiIMAX. 9 UNIT – IV Security in Ad Hoc Networks 9 Attacks to routing protocols – Security mechanisms – Auto-configuration – Key management – Self-managed PKI – Resurrecting Duckling – Group key management in WISNs. 9 UNIT – V Security in Mobile Telecommunication Networks – Attacks – Preventive mechanisms – Intrusion tolerar-ce – SNEP – NetLEVAT 9 SS7 – GSM security – GRPS security – UMTS infrastructure and security – H.323 – SIP – Megaco – VoIP security flaws and countermeasures – INS architecture – security flaws – 4G security – Protection of interception – Security issues in Mobile IP - NetLEX 9 SS7 – GSM security – GRPS security – UMTS infrastructure and security – H.323 – SIP – Megaco – VoIP security flaws and countermeasures – INS architecture – security flaws – 4G security – Protection of interception – Security issues in Mobile IP + IPP – NetLEX NetEX = VEX VEX 9	UNIT – II	Wi-Fi Security Architectures						9						
UNIT - III Security in IEEE 802.11 9 WEP - WEP2 - IV collisions - RC4 weakness - 802.1x authentication -802.11 is ecurity architecture - policy negotiation - radio security rolicis - RADIUS - EAP - PKI - WiMAX security - TEK , KEK, IEEE 802.16e - PKMv2-RSA - Security Association - 3 away handshake - role of smart cards in WiMAX. 9 UNIT - IV Security in Ad Hoc Networks 9 Attacks to routing protocols - Security mechanisms - Auto-configuration - Key management - Self-managed PKI - Resurrecting Duckling - Group key management - Wireless Sensor Networks - Attacks - Preventive mechanisms - Intrusion tolerarce - SNEP uttacks - ITIN/Sec - Key management in WSNs. 9 UNIT - V Security in Mobile Telecommunication Networks 9 SS7 - GSM security - GRPS security - UMTS infrastructure and security - H.323 - SIP - Megaco - VoIP security flaws and countermeasures - IMS architecture - security flaws - 4G security - Protection of interception - Security issues in Mobile IP - HIP - NetLUM. Total:45 TEXEVENCES: Total:45 1. Hakima Chaouchi and Maryline Laurent-Maknavicius, "Wireless and Mobile Network Security: Security basics, Security of UNITS IV, II, III) Vo. (For UNITS I, II, III) 2. Pallapa Venkataram and Sathish Babu, Wireless Network Security: Theories and Applications", Springer Higher Educator Press, 2013. Lei Chen, Jiahuang Ji, and Zihong Zhang, "Wireless Network Security: Theories and Applications", Springer Higher Press, 2008. S. Kami Makki, Peter Reiher, Kia Makki, N	Hotspot architecture – WIDS – Rogue AP detection – IEEE 802.11 geolocation techniques – Honeypots – Passive and Active attacks – DOS attacks – Trojan attack – Dictionary Attack. Bluetooth Security – Protocol architecture – Radio physical layer – Device addressing – SCO and ACL logical transports – Security mode – Authentication and pairing – Attacks – BlueSmack.													
WEP - WEP2 - IV collisions - RC4 weakness - 802.1x authentication -802.11i security architecture - policy negotiation - radio security policies - RADIUS - EAP - PKI - WiMAX security - TEK , KEK, IEEE 802.16e - PKMv2-RSA - Security Association - 3 way handshake - role of smart cards in WiMAX. UNIT - IV Security in Ad Hoc Networks 9 Attacks to routing protocols - Security mechanisms - Auto-configuration - Key management - Self-managed PKI - Resurrecting Duckling - Group key management - Wireless Sensor Networks - Attacks - Preventive mechanisms - Intrusion tolerance - SNEP - µTELSA - TinySec - key management in WSNs. 9 UNIT - V Security in Mobile Telecommunication Networks 9 SS7 - GSM security - GRPS security - UMTS infrastructure and security - H.323 - SIP - Megaco - VoIP security flaws and countermeasures - IMS architecture - security flaws - 4G security - Protection of interception - Security basics, Security in On-the-shelf and Emerging Technologies", 2 nd Edition, John Wiley & Sons, 2009.(For UNITS I,II,III) 1. Hakima Chaouchi and Maryline Laurent-Maknavicius, "Wireless and Mobile Network Security: Security basics, Security in On-the-shelf and Emerging Technologies", 2 nd Edition, John Wiley & Sons, 2009.(For UNITS I,II,III) 2. Palapa Venkataram and Sathish Babu, Wireless Network Security. 1st Edition, Tata McGrawHill, 2010.(For UNITS IV,V) REFERENCES: 1. Lei Chen, Jiahuang Ji, and Zihong Zhang, "Wireless Network Security: Theories and Applications", Springer Higher Education Press, 2013. 2. Amitabh Mishra, "Security and Quality of Service in Ad Hoc and Wireless Networks", 1 st	UNIT – III	Security in IEEE 802.11						9						
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	3. S. Kami Ma Springer Sc	kki, Peter Reiher, Kia Makki, Niki Pissinou, Shamila Makki, "Mob ience, 2007.	oile and V	Vireless Secu	urity a	and I	Privac	с у ",						

COUR	SE OUTCOMES:	BT Mapped			
On co	mpletion of the course, the students will be able to	(Highest Level)			
CO1	make use of the mathematical models of security algorithms to wireless and mobile environment	Applying (K3)			
CO2	identify the specific vulnerabilities in wide range of WiFi systems	Applying (K3)			
CO3	develop robust systems against state-of-the-art security attacks	Applying (K3)			
CO4	plan for providing security in ad hoc networks	Applying (K3)			
CO5	identify the security issues in mobile telecommunication networks	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	1	1		3	3	3	2	2	3		3	2
CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		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	40	40	20				100					
CAT2	40	40	20				100					
CAT3	40	40	20				100					
ESE 40 40 20 100												
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)												

		22ITH05 - COMPUTER SECURITY, AUDIT AND A	ASSURA	NCE										
	(Common to IT, AI&DS, AI&ML, CSE and CSD Branches)													
Program Branch	nme&	B. Tech – IT, AI&DS, AI&ML, BE – CSE and CSD Branches	Sem.	Category	L	т	Credit							
Prerequi	isites	NIL	5/6/7	HN	3	0	0	3						
							1							
Preamble	Э	This course provides a comprehensive introduction to Informat the audit process, ISO standards and certification, implementation	ion Secu tion of IS	urity and discu SO 27001.	isses	s abo	out leç	gal issues,						
UNIT – I		Introduction						9						
History c Informati developn	of Information on Security nent life cyc	on Security – What is security? – CNSS Security Model – Cor and Access – Information Security implementation. Systems of the – Communities of Interest.	mponent developr	s of Informat nent life cycle	ion \$ e – T	Syste The s	ems – securi	 balancing ty systems 						
UNIT – II		The Need for Information Security and its Legal, ethical, ar	nd profe	ssional issu	es			9						
Business needs first – Threats – Attacks – Secure Software Development. Law and Ethics – US laws – international laws and legal bodies – Ethics and Information Technology – Code of Ethics and Professional Organizations.														
UNIT – III Audit Planning, Preparation, and Techniques 9														
Respons Quality a Reporting UNIT – I Overview	Reasons – Audit Principles – Process of Audit Programme Management – Audit Competence and evaluation methods – Audit Responsibilities – Audit time and Process flow – Information Security and Management System (ISMS) Audit checklist. Auditor Quality and Selection – Audit script – Audit stages – Audit techniques – Collecting evidence through questions – Observation – Reporting to audit findings – Audit Team meetings – non-conformities and observations – Corrective and Preventive actions. UNIT – IV ISO 27001 Overview of an ISMS – ISO standards that focus on an organization's ISMS – ISO/IEC standards – Scope of ISMS													
applicabl and Cont impleme	e legislation trols - Polic nting ISMS	 n – Risk Assessment – Information Assets and Protection – Ide ies, Procedures and documented information on control risks – Preparing the certification for Audit. 	entifying Resourd	Risks – Asse ces and staff	ssin train	g Ri: ing -	sks – - Mon	Objectives itoring and						
UNIT – V	1	Asset Management						9						
Assets a Assessm – Respor	according to aent – The s asibility for a	 ISO 27001 – the importance of Assets – Asset inventory – six basic steps – ISO 27001 Controls – ISO2 27001 Statement o Assets – Information Classification – Media handling – BYOD. 	- Asset f Applica	Owner – ISC ability – ISO 2) 27(700 ⁻	001/ I Ass	ISO 2 set Ma	27005 Risk anagement						
								Total:45						
TEXT BO	DOK:													
1. [1]	Vichael E. \ 2012.	Nhitman and Herbert. J. Mattord, "Principles of Information Secu	rity", 4 th	Edition, Ceng	lage	Lea	rning,	USA,						
2. Rajkumar Banoth, Narasimha Gugulothu, Aruna Kranthi Godishala, "A Comprehensive Guide to Information Security Management and Audit", CRC Press Taylor and Francis Group, USA, 2023.														
REFERE	NCES:													
1. 、	Joseph M.K	izza, "Computer Network Security", Springer, 2005												
2.	Vatt Bishop	, "Introduction to Computer Security", Addison-Wesley Professio	nal, 200	5.										

SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
Plan the organization's security needs with the CNSS security model.	Applying (K3)
apply legal aspects and code of ethics in Information Security.	Applying (K3)
Organize an audit and use the best practices of ISMS.	Applying (K3)
apply ISO 27001 and conduct a risk assessment.	Applying (K3)
illustrate Asset management in compliance with ISO 27001.	Applying (K3)
	SE OUTCOMES: mpletion of the course, the students will be able to Plan the organization's security needs with the CNSS security model. apply legal aspects and code of ethics in Information Security. Organize an audit and use the best practices of ISMS. apply ISO 27001 and conduct a risk assessment. illustrate Asset management in compliance with ISO 27001.

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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CO2	3	2	1	1		3	3	3	2	2	3		3	2
CO3	3	2	1	1		3	3	3	2	2	3		3	2
CO4	3	2	1	1		3	3	3	2	2	3		3	2
CO5	3	2	1	1		3	3	3	2	2	3		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 %					
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ESE 40 40 20 1												
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