

KONGU ENGINEERING COLLEGE

(Autonomous Institution Affiliated to Anna University, Chennai)

PERUNDURAI ERODE – 638 060

TAMILNADU INDIA



REGULATIONS, CURRICULUM & SYLLABI - 2022

(CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION)

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

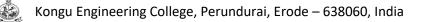
BACHELOR OF ENGINEERING DEGREE

IN

MECHATRONICS ENGINEERING

DEPARTMENT OF MECHATRONICS ENGINEERING





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KONGU ENGINEERING COLLEGE PERUNDURAI ERODE – 638 060 (Autonomous)

INSTITUTE VISION

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

INSTITUTE MISSION

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

QUALITY POLICY

We are committed to

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

DEPARTMENT OF MECHATRONICS ENGINEERING

VISION

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

MISSION

Department of Mechatronics Engineering is committed to:

- MS1: Disseminate knowledge through effective teaching-learning process to develop technically competent and ethically strong Mechatronics professionals.
- MS2: Foster continuous interdisciplinary learning and research to meet real-world challenges by nurturing innovation through state-of-the-art facilities.
- MS3: Promote societal based consultancy and training services in collaboration with Industries and R&D organizations.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of Mechatronics Engineering will

- PEO1: Utilize the fundamental knowledge of basic sciences and engineering to succeed in their profession
- PEO2: Design and Develop Mechatronics products and processes for real world applications
- PEO3: Exhibit professional and managerial capabilities with ethical conduct and have an aptitude for continuous learning

MS\PEO	PEO1	PEO2	PEO3
MS1	3	3	3
MS2	3	3	2
MS3	2	2	2

MAPPING OF MISSION STATEMENTS (MS) WITH PEOs

1 -Slight, 2 -Moderate, 3 -Substantial

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



	PROGRAM SPECIFIC OUTCOMES (PSOs)						
Gradua	Graduates of Mechatronics Engineering will:						
PSO1	PSO1 Design and develop Mechatronic systems by synergistic combination of mechanical engineering,						
	electronic controls and systems						
PSO2	Adapt multidisciplinary approach to solve real world industrial problems						

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

MAPPING OF PEOs WITH POs AND PSOs

1 – Slight, 2 – Moderate, 3 – Substantial



KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE - 638060

(Autonomous)

REGULATIONS 2022

CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION

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

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

1. DEFINITIONS AND NOMENCLATURE

In these Regulations, unless otherwise specified:

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

2. PROGRAMMES AND BRANCHES OF STUDY



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

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

3. ADMISSION REQUIREMENTS

3.1 First Semester Admission

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

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

(OR)

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

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

3.2 Lateral Entry Admission

The candidates who hold a Diploma in Engineering / Technology awarded by the State Board of Technical Education, Tamilnadu or its equivalent are eligible to apply for

Lateral entry admission to the third semester of BE / BTech.

(OR)

The candidates who hold a BSc degree in Science(10+2+3 stream) with mathematics as one of the subjects at the BSc level from a recognised University are eligible to apply for Lateral entry admission to the third semester of BE / BTech. Such candidates shall undergo two additional Engineering course(s) in the third and fourth semesters as prescribed by the College.

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

4. STRUCTURE OF PROGRAMMES

4.1 Categorisation of Courses

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

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

4.2 Credit Assignment and Honours Degree

4.2.1. Credit Assignment

Each course is assigned certain number of credits as follows:

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

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

4.2.2 Honours Degree

If a candidate earns 18 to 20 additional credits in an emerging area, then he/she can be awarded with Honours degree mentioning that emerging area as his/her specialization. The respective board of studies shall recommend the specializations for honours degree and appropriate additional courses to be studied by the candidate which shall get approval from Academic Council of the institution. A candidate shall have not less than 7.5 CGPA and no history of arrears to opt for the honours degree and has to maintain the same during the entire programme.

Various specializations for various branches recommended by the respective boards of studies are given below:

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

*Title by KEC

The courses specified under Honours degree in the emerging area may include theory, theory cum practical, 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 B.E.– Mechatronics Engineering, Regulation, Curriculum and Syllabus – R2022 10

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.

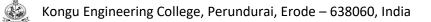
- **7.5.1** The assessment pattern for awarding continuous assessment marks for each course shall be decided by the course coordinator based on rubrics of that particular course, and shall be based on rubrics for each experiment.
- **7.5.2** The end semester examination shall be conducted for a maximum 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.

		End Semester Examination (Max. 50 Marks)							
Zeroth Review		Review I (Max 20 Marks)		Review II (Max. 30 Marks)		Report Evaluation (Max. 20 Marks)	Viva - Voce (Max. 30 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.
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- **7.6.5** If a candidate fails to secure 50% of the continuous assessment marks in the project work, he / she shall not be permitted to submit the report for that particular semester and shall have to redo it in the subsequent semester and satisfy attendance requirements.
- **7.6.6** The end semester examination of the project work shall be evaluated based on the project report submitted by the candidate in the respective semester and viva-voce examination by a committee consisting of two examiners and supervisor of the project work.
- **7.6.7** If a candidate fails to secure 50 % of the end semester examination marks in the project work, he / she shall be required to resubmit the project report within 30 days from the date of declaration of the results and a fresh viva-voce examination shall be conducted as per clause 7.6.6.
- **7.6.8** A copy of the approved project report after the successful completion of viva-voce examination shall be kept in the department library.

7.7 Project Work I / Industrial Training

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

Continuous Assessment (Max. 100 Marks)										
						Review III (Max. 50 Marks)				
Zeroth	Review	Review I (Max 20 Marks)		Review II Max 30 Marks)		eview II Report				
Review	Super	Review	Super	Review	Super	Review	Super	Review		
Commi ttee	visor	Committee (excluding supervisor)	Committee visor (excluding		visor	Committee	visor	Committee		
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

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

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

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

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

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

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

16. ELIGIBILITY FOR THE AWARD OF DEGREE

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



- i. Successfully completed all the courses under the different categories, as specified in the regulations.
- ii. Successfully gained the required number of total credits as specified in the curriculum corresponding to the candidate's programme within the stipulated time (vide clause 5).
- iii. Successfully passed any additional courses prescribed by the respective Board of Studies whenever readmitted under regulations other than R-2022 (vide clause 11.3)
- iv. No disciplinary action pending against him / her.

17. CLASSIFICATION OF THE DEGREE AWARDED

17.1 First Class with Distinction:

- **17.1.1.** A candidate who qualifies for the award of the degree (vide clause 16) and who satisfies the following conditions shall be declared to have passed the examination in First class with Distinction:
 - Should have passed the examination in all the courses of all the eight semesters (six semesters for lateral entry candidates) in the **First Appearance** within eight consecutive semesters (six consecutive semesters for lateral entry candidates) excluding the authorized break of study (vide clause 11) after the commencement of his / her study.
 - Withdrawal from examination (vide clause 10) shall not be considered as an appearance.
 - Should have secured a CGPA of not less than 8.50

(OR)

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

17.2 First Class:

A candidate who qualifies for the award of the degree (vide clause 16) and who satisfies the following conditions shall be declared to have passed the examination in First class:

• Should have passed the examination in all the courses of all eight

semesters (six semesters for lateral entry candidates) within ten consecutive semesters (eight consecutive semesters for lateral entry candidates) excluding authorized break of study (vide clause 11) after the commencement of his / her study.

- Withdrawal from the examination (vide clause 10) shall not be considered as an appearance.
- Should have secured a CGPA of not less than 6.50

17.3 Second Class:

All other candidates (not covered in clauses 17.1 and 17.2) who qualify for the award of the 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.



B.E. MECHATRONICS ENGINEERING CURRICULUM - R2022 (For students admitted during 2022-23)

CURRICULUM BREAKDOWN STRUCTURE

Category				Sem	ester				Total number of credits	Curriculum Content (% of total number of credits of the program)	
	I	Ш	ш	IV	v	VI	VII	VIII			
HS	4	4	2			2	3		15	8.92	
BS	8	8		4					20	11.90	
ES	8	8	4						20	11.90	
PC	3	4	16	16	15	8			62	36.91	
PE					3	3	9	3	18	10.72	
OE					4	4	3	3	14	8.34	
EC				2	2	6	5	4	19	11.31	
Semester wise Total	23	24	22	22	24	23	20	10	168	100.00	
				(Categor	у				Abbreviation	
Lecture hours p	er week									L	
Tutorial hours p	er week									Т	
Practical, Proje	ct work, I	nternsh	ip, Profe	essional	Skill Tra	aining, Ir	ndustrial	Trainin	g hours per wee	reek P	
Credits										С	

CATEGORISATION OF COURSES

HUMANITIES AND SOCIAL SCIENCE INCLUDING MANAGEMENT (HS)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Pre- requisites	Sem
1.	22EGT11	Communication Skills - I	3	0	0	3	Nil	Ι
2.	22VEC11	Yoga and Values for Holistic Development				1	Nil	Ι
3.	22EGT21	Communication Skills - II	3	0	0	3	Nil	II
4.	22TAM01	Heritage of Tamils	1	0	0	1	Nil	II
5.	22TAM02	Tamils and Technology	1	0	0	1	Nil	Ξ
6.	22EGL31	Communication Skills Development Laboratory	0	0	2	1	Nil	III
7.	22GET31	Universal Human Values	2	0	0	2	Nil	VI
8.	22GCT71	Engineering Economics and Management	3	0	0	3	Nil	VII
		Total Credits to be earned				15		



BASIC SCIENCE (BS)

SI.No.	Course Code	Course Name	L	Т	Р	С	Pre- requisites	Sem
1.	22MAC11	Matrices and Ordinary Differential Equations	3	1*	2*	4	Nil	
2.	22PHT13	Physics for Mechatronics Engineering	3	0	0	3	Nil	Ι
3.	22PHL13	Physics Laboratory for Mechatronics Engineering	0	0	2	1	Nil	I
4.	22MAC21	Multivariable Calculus and Complex Analysis	3	1*	2*	4	Nil	II
5.	22CYT23	Chemistry for Mechatronics Engineering	3	0	0	3	Nil	II
6.	22CYL22	Chemistry Laboratory for Mechanical Engineering	0	0	2	1	Nil	II
7.	22MAT41	Numerical Methods for Engineers	3	1	0	4	Nil	IV
		Total Credits to be earned				20		

ENGINEERING SCIENCE (ES)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Pre- requisites	Sem
1.	22CSC11	Problem Solving and Programming in C	3	0	2	4	Nil	Ι
2.	22MET11	Engineering Drawing	2	1	0	3	Nil	Ι
3.	22MEL11	Engineering Practices Laboratory	0	0	2	1	Nil	I
4.	22CSC21	Data Structures using C	3	0	2	4	Nil	Ξ
5.	22MTT22	Electron Devices and Digital Circuits	3	0	0	3	Nil	П
6.	22MTL21	Electron Devices and Digital Circuits Laboratory	0	0	2	1	Nil	Π
7.	22ITC32	Introduction to Python	3	0	2	4	Nil	III
		Total Credits to be earned				20		

PROFESSIONAL CORE (PC)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Sem	Domain/ Stream
1.	22MET12	Engineering Mechanics	3	0	0	3	I	PD
2.	22MTT21	Fluid Mechanics and Thermodynamics	3	1	0	4	II	PS
3.	22MTT31	Strength of Materials	3	1	0	4		PD
4.	22MTT32	Theory of Machines	3	1	0	4		PD
5.	22MTT33	Systems and Control Engineering	3	0	0	3		AE
6.	22MTT34	Electrical Machines	3	0	0	3		PD
7.	22MTL31	Electrical Machines and Control Laboratory	0	0	2	1		AE
8.	22MTL32	Computer Aided Drafting Laboratory	0	0	2	1		PD
9.	22MTC41	Computer-Aided Design and Analysis	3	0	2	4	IV	PD
10.	22MTT41	Manufacturing Processes	3	0	0	3	IV	PS
11.	22MTT42	Sensors and Signal Conditioning	3	0	0	3	IV	AE
12.	22MTC42	Graphical System Design	3	0	2	4	IV	AS
13.	22MTL41	Sensors and Signal Conditioning Laboratory	0	0	2	1	IV	AE
14.	22MTL42	Manufacturing Processes Laboratory	3	0	0	3	IV	PS
15.	22MTC51	Fluid Power Systems	2	0	2	3	V	PS
16.	22MTC52	Power Electronics and Drives	3	0	2	4	V	AE
17.	22MTT51	CNC and Metrology	3	0	0	3	V	AE



18.	22MTT52	Microcontroller Programming and Applications	3	0	0	3	V	AE
19.	22MTL51	CNC and Metrology Laboratory	0	0	2	1	V	AE
20.	22MTL52	Microcontroller Programming and Applications Laboratory	0	0	2	1	V	AE
21.	22MTT61	Programmable Automation Controllers	3	0	0	3	VI	AE
22.	22MTT62	Mechanics of Serial Manipulator	3	0	0	3	VI	AS
23.	22MTL61	Programmable Automation Controllers Laboratory	0	0	2	1	VI	AE
24.	22MTL62	Robotics and Control Laboratory	0	0	2	1	VI	AS
	Total Credits to be earned					62		

PROFESSIONAL ELECTIVE (PE)

			L	т	Ρ	С	Domain/ Stream
		Semester V					
		Elective - I					
1	22MTE01	Design of Mechanical Elements	3	0	0	3	PD
2	22MTE02	Heat and Mass Transfer	3	0	0	3	PD
3	22MTE03	Operations Research	3	0	0	3	PS
4	22MTE04	Machine Drawing	3	0	0	3	PD
5	22MTE05	Introduction to Industrial Internet of Things	3	0	0	3	AE
6	22MTE06	Advanced Control Theory	3	0	0	3	AS
7	22MTE07	Automotive Engineering	3	0	0	3	PD
8	22MTE08	Virtual Instrumentation: Theory and Applications	3	0	0	3	AE
9	22MTE09	Power Converters and Electric Drives	3	0	0	3	AE
		Semester VI					
		Elective - II					
10	22MTE10	Applied Finite Element Method	3	0	0	3	PD
11	22MTE11	Precision Equipment Design	3	0	0	3	PS
12	22MTE12	Computer Integrated Manufacturing	3	0	0	3	PS
13	22MTE13	Embedded Programming for Mechatronics	3	0	0	3	AE
14	22MTE14	Machine Learning	3	0	0	3	AS
15	22MTE15	Process Control and Instrumentation	3	0	0	3	AE
16	22MTE16	Automotive Electronics	3	0	0	3	AE
		Semester VII					
		Elective - III					
17	22GEE01	Total Quality Management	3	0	0	3	GE
18	22MTE17	Bio Mechatronics	3	0	0	3	AS
19	22MTE18	Precision Manufacturing	3	0	0	3	PS
20	22MTE19	Digital Twin and Industry 5.0	3	0	0	3	AE
21	22MTE20	Optimal and Adaptive Control	3	0	0	3	AS
		Elective - IV					
22	22GEE02	Fundamentals of Research	3	0	0	3	GE
23	22MTE21	Electric and Hybrid Vehicles	3	0	0	3	PD
24	22MTE22	Machine Tool Control and Condition Monitoring	3	0	0	3	PS
25	22MTE23	Additive Manufacturing	3	0	0	3	PS
26	22MTE24	Industrial Automation Protocols	3	0	0	3	AE
		Elective - V					
27	22MTE25	Robot Programming	3	0	0	3	AS

28	22MTE26	Drone Technology	3	0	0	3	AS
29	22MTE27	Maintenance Engineering	3	0	0	3	PS
30	22MTE28	Machine Vision and Image Processing	3	0	0	3	AE
31	22MTE29	MEMS and NEMS	3	0	0	3	PD
		Semester VIII					
		Elective – VI					
32	22MTE30	Mobile Robotics	3	0	0	3	AS
33	22MTE31	Product Design and Development	3	0	0	3	PD
34	22MTE32	Battery Management System	3	0	0	3	PS
35	22MTE33	Production Management	3	0	0	3	PS
36	22MTE34	Cyber Physical Systems	3	0	0	3	AE
37	22MTE35	Agricultural Robotics and Automation	3	0	0	3	AE
38	22MTE36	Aircraft Mechatronics	3	0	0	3	AS
		Total Credits to be earned				18	

* Domain/Stream Abbreviations: AE- Automation Engineering, AS – Autonomous Systems, PD – Product Design, PS – Production System, GE – General Engineering

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Sem
1.	22GCL41	Professional Skills Training I / Industrial Training I*				2	IV
2.	22GCL51	Professional Skills Training II / Industrial Training II*				2	V
3.	22MTP61	Project Work I	0	0	8	4	VI
4.	22GEP61	Comprehensive Test and Viva				2	VI
5.	22MTP71	Project Work II Phase I	0	0	10	5	VII
6.	22MTP81	Project work II Phase II	0	0	8	4	VIII
		Total Credits to be earned				19	

EMPLOYABILITY ENHANCEMENT COURSES (EC)

MANDATORY COURSES (MC)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Sem
1.	22MNT11	Student Induction Program #				0	I
2.	22MNT31	Environmental Science	2	0	0	0	
		Total Credits to be earned					

OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS (OE) (Common to all departments except offering department)

	LIST OF OPEN ELECTIVES TO OTHER DE	PARTM	ENTS							
Course Code	Course Code Course Title Hours/Week									
Course Code	Course Title	L	Т	Р	Credit	CBS				
	SEMESTER V									
22MTO01	Design of Mechatronics Systems	3	1	0	4	OE				
22MTX01	Data Acquisition and Virtual Instrumentation	3	0	2	4	OE				
22MTX02	Factory Automation	3	0	2	4	OE				



	SEMESTER VI							
22GEO04	Innovation and Business Model Development	3	1	0	4	OE		
22MTO02	Robotics	3	1	0	4	OE		
22MTO03	3D Printing and Design	3	1	0	4	OE		
	SEMESTER VII							
22GEO05	Entrepreneurship Development	3	0	0	3	OE		
22MTO04	Drone System Technology	3	0	0	3	OE		
	SEMESTER VIII							
22MTO05	Micro and Nano Electromechanical Systems	3	0	0	3	OE		



B.E. MECHATRONICS ENGINEERING CURRICULUM - R2022 (For students admitted during 2023-24)

			С	URRIC	JLUM B	REAKD	OWN S	TRUCT	URE	
Summary of C	redit Dis	tributic	n							
Category				Sem	ester				Total number of credits	Curriculum Content (% of total number of credits of the program)
	I	П	ш	IV	v	VI	VII	VIII		
HS	5	4	1			2	3		15	8.93
BS	8	8		4					20	11.90
ES	10	7	4						21	12.50
PC		3	15	17	16	8	3		62	36.90
PE					3	3	6	3	15	8.93
OE					4	4	3	3	14	8.34
EC				2	2	7	6	4	21	12.50
Semester wise Total	23	22	20	23	25	24	21	10	168	100.00
				(Categor	у				Abbreviation
Lecture hours p	er week									L
Tutorial hours p	er week									Т
Practical, Project	ct work, I	Internsh	ip, Profe	essional	Skill Tra	aining, Ir	ndustria	Trainin	g hours per wee	ek P
Credits										С

CATEGORISATION OF COURSES

HUMANITIES AND SOCIAL SCIENCE INCLUDING MANAGEMENT (HS)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Pre- requisites	Sem
1.	22EGT11	Communication Skills - I	3	0	0	3	Nil	Ι
2.	22TAM01	Heritage of Tamils	1	0	0	1	Nil	Ι
3.	22VEC11	Yoga and Values for Holistic Development				1	Nil	I
4.	22EGT21	Communication Skills - II	3	0	0	3	Nil	II
5.	22TAM02	Tamils and Technology	1	0	0	1	Nil	II
6.	22EGL31	Communication Skills Development Laboratory	0	0	2	1	Nil	III
7.	22GET31	Universal Human Values	2	0	0	2	Nil	VI
8.	22GCT71	Engineering Economics and Management	3	0	0	3	Nil	VII
		Total Credits to be earned				15		



BASIC SCIENCE (BS)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Pre- requisites	Sem
1.	22MAC11	Matrices and Ordinary Differential Equations	3	1*	2*	4	Nil	
2.	22PHT13	Physics for Mechatronics Engineering	3	0	0	3	Nil	Ι
3.	22PHL13	Physics Laboratory for Mechatronics Engineering	0	0	2	1	Nil	I
4.	22MAC21	Multivariable Calculus and Complex Analysis	3	1*	2*	4	Nil	II
5.	22CYT23	Chemistry for Mechatronics Engineering	3	0	0	3	Nil	II
6.	22CYL22	Chemistry Laboratory for Mechanical Engineering	0	0	2	1	Nil	II
7.	22MAT41	Numerical Methods for Engineers	3	1	0	4	Nil	IV
	·	Total Credits to be earned	-			20		

ENGINEERING SCIENCE (ES)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Pre- requisites	Sem
1.	22CSC11	Problem Solving and Programming in C	3	0	2	4	Nil	I
2.	22MET11	Engineering Drawing	2	1	0	3	Nil	Ι
3.	22GCL12	Foundation Lab – Electrical, IoT and Web	0	0	6	3	Nil	I
4.	22CSC21	Fundamentals of Data Structures	3	0	2	4	Nil	П
5.	22GCL11	Foundation Lab - Manufacturing, Design and Robotics	0	0	6	3	Nil	П
6.	22ITC32	Introduction to Python	3	0	2	4	Nil	III
		Total Credits to be earned				21		

PROFESSIONAL CORE (PC)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Sem	Domain/ Stream
1.	22MET12	Engineering Mechanics	3	0	0	3	II	PD
2.	22MTT21	Fluid Mechanics and Thermodynamics	3	1	0	4		PS
3.	22MTT33	Systems and Control Engineering	3	0	0	3		AE
4.	22MTT41	Manufacturing Processes	3	0	0	3		PS
5.	22MTT22	Electron Devices and Digital Circuits	3	0	0	3		AE
6.	22MTL42	Manufacturing Processes Laboratory	0	0	2	1		PS
7.	22MTL21	Electron Devices and Digital Circuits Laboratory	0	0	2	1		AE
8.	22MTC41	Computer-Aided Design and Analysis	3	0	2	4	IV	PD
9.	22MTT31	Strength of Materials	3	1	0	4	IV	PD
10.	22MTT32	Theory of Machines	3	1	0	4	IV	PD
11.	22MTT34	Electrical Machines	3	0	0	3	IV	PD
12.	22MTL31	Electrical Machines and Control Laboratory	0	0	2	1	IV	AE
13.	22MTL32	Computer Aided Drafting Laboratory	0	0	2	1	IV	PD
14.	22MTT51	CNC and Metrology	3	0	0	3	V	AE
15.	22MTT52	Microcontroller Programming and Applications	3	0	0	3	V	AE
16.	22MTC53	Fluid Power System Design	3	0	2	4	V	PS
17.	22MTC54	Sensors and Signal Processing	3	0	2	4	V	AE
18.	22MTL51	CNC and Metrology Laboratory	0	0	2	1	V	AE



19.	22MTL52	Microcontroller Programming and Applications Laboratory	0	0	2	1	V	AE
20.	22MTT61	Programmable Automation Controllers	3	0	0	3	VI	AE
21.	22MTT62	Mechanics of Serial Manipulator	3	0	0	3	VI	AS
22.	22MTL61	Programmable Automation Controllers Laboratory	0	0	2	1	VI	AE
23.	22MTL62	Robotics and Control Laboratory	0	0	2	1	VI	AS
24.	22MTT71	Industrial Internet of Things	3	0	0	3	VII	AE
		Total Credits	to be	e ear	ned	62		

PROFESSIONAL ELECTIVE (PE)

SI. No.	Course Code	Course Name	L	т	Р	С	Domain/ Stream
		Semester V					
		Elective - I					
1	22MTE01	Design of Mechanical Elements	3	0	0	3	PD
2	22MTE02	Heat and Mass Transfer	3	0	0	3	PD
3	22MTE03	Operations Research	3	0	0	3	PS
4	22MTE04	Machine Drawing	3	0	0	3	PD
5	22MTE05	Introduction to Industrial Internet of Things	3	0	0	3	AE
6	22MTE06	Advanced Control Theory	3	0	0	3	AS
7	22MTE07	Automotive Engineering	3	0	0	3	PD
8	22MTE08	Virtual Instrumentation: Theory and Applications	3	0	0	3	AE
9	22MTE09	Power Converters and Electric Drives	3	0	0	3	AE
		Semester VI					
		Elective - II					
10	22MTE10	Applied Finite Element Method	3	0	0	3	PD
11	22MTE11	Precision Equipment Design	3	0	0	3	PS
12	22MTE12	Computer Integrated Manufacturing	3	0	0	3	PS
13	22MTE13	Embedded Programming for Mechatronics	3	0	0	3	AE
14	22MTE14	Machine Learning	3	0	0	3	AS
15	22MTE15	Process Control and Instrumentation	3	0	0	3	AE
16	22MTE16	Automotive Electronics	3	0	0	3	AE
		Semester VII					
		Elective - III					
17	22GEE01	Total Quality Management	3	0	0	3	GE
18	22MTE17	Bio Mechatronics	3	0	0	3	AS
19	22MTE18	Precision Manufacturing	3	0	0	3	PS
20	22MTE19	Digital Twin and Industry 5.0	3	0	0	3	AE
21	22MTE20	Optimal and Adaptive Control	3	0	0	3	AS
		Elective - IV					
22	22GEE02	Fundamentals of Research	3	0	0	3	GE
23	22MTE21	Electric and Hybrid Vehicles	3	0	0	3	PD
24	22MTE22	Machine Tool Control and Condition Monitoring	3	0	0	3	PS
25	22MTE23	Additive Manufacturing	3	0	0	3	PS
26	22MTE24	Industrial Automation Protocols	3	0	0	3	AE
27	22MTE25	Robot Programming	3	0	0	3	AS
28	22MTE26	Drone Technology	3	0	0	3	AS
29	22MTE27	Maintenance Engineering	3	0	0	3	PS

30	22MTE28	Machine Vision and Image Processing	3	0	0	3	AE
31	22MTE29	MEMS and NEMS	3	0	0	3	PD
		Semester VIII					
		Elective – V					
32	22MTE30	Mobile Robotics	3	0	0	3	AS
33	22MTE31	Product Design and Development	3	0	0	3	PD
34	22MTE32	Battery Management System	3	0	0	3	PS
35	22MTE33	Production Management	3	0	0	3	PS
36	22MTE34	Cyber Physical Systems	3	0	0	3	AE
37	22MTE35	Agricultural Robotics and Automation	3	0	0	3	AE
38	22MTE36	Aircraft Mechatronics	3	0	0	3	AS
		Total Credits to be earned				18	

* Domain/Stream Abbreviations: AE- Automation Engineering, AS – Autonomous Systems, PD – Product Design, PS - Production System, GE - General Engineering

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Sem
1.	22GCL41	Professional Skills Training I / Industrial Training I*				2	IV
2.	22GCL51	Professional Skills Training II / Industrial Training II*				2	V
3.	22MTP62	Project Work I	0	0	4	5	VI
4.	22GEP61	Comprehensive Test and Viva				2	VI
5.	22MTP72	Project Work II Phase I	0	0	8	6	VII
6.	22MTP81	Project work II Phase II	0	0	14	4	VIII
		Total Credits to be earned	-			21	

EMPLOYABILITY ENHANCEMENT COURSES (EC)

MANDATORY COURSES (MC)

SI.No.	Course Code	Course Name	L	Т	Ρ	С	Sem
1.	22MNT11	Student Induction Program #				0	Ι
2.	22MNT31	Environmental Science	2	0	0	0	III
		Total Credits to be earned				0	

OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS (OE)

(Common to all departments except offering department)

	LIST OF OPEN ELECTIVES TO OTHE	R DEPARTM	ENTS			
		Но	urs/We	ek	One dit	000
Course Code	Course Title	L	Т	Р	Credit	CBS
	SEMESTER V					
22MTO01	Design of Mechatronics Systems	3	1	0	4	OE
22MTX01	Data Acquisition and Virtual Instrumentation	3	0	2	4	OE
22MTX02	Factory Automation	3	0	2	4	OE
	SEMESTER VI	·				
22GEO04	Innovation and Business Model Development	3	1	0	4	OE
B.E.– N	lechatronics Engineering, Regulation, Curriculum and	Syllabus – R2	022	•	33	3

iginee lics ing, regi Iduc I, UL Synabus



22MTO02	Robotics	3	1	0	4	OE			
22MTO03	3D Printing and Design	3	1	0	4	OE			
SEMESTER VII									
22GEO05	Entrepreneurship Development	3	0	0	3	OE			
22MTO04	Drone System Technology 3 0 0 3								
SEMESTER VIII									
22MTO05	22MTO05 Micro and Nano Electromechanical Systems				3	OE			

B.E. – MECHATRONICS ENGINEERING (Total Credit: 168) - R2022 (For Students admitted during 2022-23)

Sem	Course1	Course2	Course3	Course4	Course5	Course6	Course7	Course8	Course9	Course10	Cre dits
I	22EGT11 Communication Skills - I (3-0-0-3)	22MAC11 Matrices and Ordinary Differential Equations (3-1-2-4)	22PHT12 Physics for Mechanical Engineering (3-0-0-3)	22MET12 Engineering Mechanics (3-0-0-3)	22CSC11 Problem Solving and Programming in C (3-0-2-4)	22MET11 Engineering Drawing (2-1-0-3)	22MEL11 Engineering Practices Laboratory (0-0-2-1)	22PHL12 Physics Laboratory for Mechanical Engineering (0-0-2-1)	22VEC11 Yoga and Values for Holistic Development (0-0-0-1)		23
11	22EGT21 Communication Skills - II (3-0-0-3)	22MAC21 Multivariable Calculus and Complex Analysis (3-1-2-4)	22CYT23 Chemistry for Mechanical Engineering (3-0-0-3)	22MTT21 Fluid Mechanics & Thermodynamics (3-1-0-4)	22CSC21 Data Structure Using C (3-0-2-4)	22MTT22 Electron Devices and Digital Circuits (3-0-0-3)	22TAM01 Heritage of Tamils (1-0-0-1)	22MTL22 Electron Devices and Digital Circuits Laboratory (0-0-2-1)	22CYL22 Chemistry Laboratory for Mechanical Systems (0-0-2-1)		24
111	22ITC32 Introduction to Python (3-0-2-4)	22MTT31 Strength of Materials (3-1-0-4)	22MTT32 Theory of Machines (3-1-0-4)	22MTT33 Systems and Control Engineering (3-0-0-3)	22MTT34 Electrical Machines (3-0-0-3)	22TAM02 Tamils and Technology (1-0-0-1)	22MTL31 Electrical Machines and Control Laboratory (0-0-2-1)	22MTL32 Computer Aided Drafting Laboratory (0-0-2-1)	22EGL31 Communication Skills Development Laboratory (0-0-2-1)	22MNT31 Environmen tal Science (2-0-0-0)	22
IV	22MAT41 Numerical Methods for Engineers (3-1-0-4)	22ITC32 Computer Aided Design and Analysis (3-0-2-4)	22MTT41 Manufacturing Processes (3-0-0-3)	22MTT42 Sensors and Signal Conditioning (3-0-0-3)	22MTC42 Graphical System Design (3-0-2-4)	22MTL41 Sensors and Signal Conditioning Laboratory (0-0-2-1)	22MTL42 Manufacturing Processes laboratory (0-0-2-1)	22GCL41 Professional Skills Training I/Industrial Training I* (0-0-0-2)			22
v	22MTC51 Fluid Power Systems (2-0-2-3)	22MTC52 Power Electronics and Drives (3-0-2-4)	22MTT51 CNC and Metrology (3-0-0-3)	22MTT52 Microcontroller Programming and Applications (3-0- 0-3)	Professional Elective I (3-0-0-3)	Open Elective I (3-1/0-0/2-4)	22MTL51 CNC and Metrology Laboratory (0-0-2-1)	22MTL52 Microcontroller Programming and Applications Laboratory (0-0-2-1)	22GCL51 Professional Skills Training II/ Industrial Training II* (0-0-0-2)		24
VI	22MTT61 Programmable Automation Controllers (3-0-0-3)	22MTT62 Mechanics of Serial Manipulator (3-0-0-3)	Professional Elective II (3-0-0-3)	Open Elective II (3-1/0-0/2-4)	22MTL61 Programmable Automation Controllers Laboratory (0-0-2-1)	22MTL62 Robotics and Control Laboratory (0-0-2-1)	22MTP61 Project Work I (0-0-8-4)	22GCT31 Universal Human Values (2-0-0-2)	22GEP61 Comprehensive Test and Viva (0-0-0-2)		23
VII	22GCT71 Economics and Management for Engineers (3-0-0-3)	Professional Elective III (3-0-0-3)	Professional Elective IV (3-0-0-3)	Professional Elective V (3-0-0-3)	Open Elective III (3-0-0-3)	22MTP71 Project Work II Phase I (0-0-10-5)					19

		13
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B.E. – MECHATRONICS ENGINEERING (Total Credit: 168) - R2022 (For Students admitted during 2023-24)

Sem	Course1	Course2	Course3	Course4	Course5	Course6	Course7	Course8	Course9	Course10	Cre dits
I	22EGT11 Communication Skills - I (3-0-0-3)	22MAC11 Matrices and Ordinary Differential Equations (3-1-2-4)	22PHT12 Physics for Mechanical Engineering (3-0-0-3)	22CSC11 Problem Solving and Programming in C (3-0-2-4)	22MET11 Engineering Drawing (2-1-0-3)	22TAM01 Heritage of Tamils (1-0-0- 1)	22PHL12 Physics Laboratory for Mechanical Engineering (0-0-2-1)	22GCL11 Foundation Lab- Manufacturing, Design & Robotics (0-0-6-3)	22VEC11 Yoga and Values for Holistic Development (0-0-0-1)		23
11	22EGT21 Communication Skills - II (3-0-0-3)	22MAC21 Multivariable Calculus and Complex Analysis (3-1-2-4)	22CYT23 Chemistry for Mechanical Engineering (3-0-0-3)	22CSC21 Fundamentals of Data Structure (3-0-2-4)	22MET12 Engineering Mechanics (3-0-0-3)	22CYL22 Chemistry Laboratory for Mechanical Systems (0-0-2- 1)	22GCL12 Foundation Lab- Electrical, IoT & Web (0-0-6-3)	22TAM02 Tamils and Technology (3-0-0-3)			22
	22ITC32 Introduction to Python (3-0-2-4)	22MTT21 Fluid Mechanics & Thermodynamics (3-1-0-4)	22MTT33 Systems and Control Engineering (3-0-0-3)	22MTT41 Manufacturing Processes (3-0-0-3)	22MTT22 Electron Devices and Digital Circuits (3-0-0-3)	22MTL42 Manufacturing Processes laboratory (0-0-2-1)	22MTL22 Electron Devices and Digital Circuits Laboratory (0-0-2-1)	22MNT31 Environmental Science (2-0-0-0)	22EGL31 Communication Skills Development Laboratory (0-0-2-1)		20
IV	22MAT41 Numerical Methods for Engineers (3-1-0-4)	22ITC32 Computer Aided Design and Analysis (3-0-2-4)	22MTT31 Strength of Materials (3-1-0-4)	22MTT32 Theory of Machines (3-1-0-4)	22MTT34 Electrical Machines (3-0-0-3)	22MTL31 Electrical Machines and Control Laboratory (0-0-2-1)	22MTL32 Computer Aided Drafting Laboratory (0-0-2-1)	22GCL41 Professional Skills Training I/Industrial Training I* (0-0-0-2)			23
v	22MTT51 CNC and Metrology (3-0-0-3)	22MTT52 Microcontroller Programming and Applications (3-0-0-3)	22MTC53 Fluid Power System Design (3-0-2-4)	22MTC54 Sensors and Signal Processing (3-0-2-4)	Professional Elective I (3-0-0-3)	Open Elective I (3-1/0-0/2-4)	22MTL51 CNC and Metrology Laboratory (0-0-2-1)	22MTL52 Microcontroller Programming and Applications Laboratory (0-0-2-1)	22GCL51 Professional Skills Training II/ Industrial Training II* (0-0-0-2)		25

VI	22MTT61 Programmable Automation Controllers (3-0-0-3)	22MTT62 Mechanics of Serial Manipulator (3-0-0-3)	Professional Elective II (3-0-0-3)	Open Elective II (3-1/0-0/2-4)	22MTL61 Programmable Automation Controllers Laboratory (0-0-2-1)	22MTL62 Robotics and Control Laboratory (0-0-2-1)	22MTP62 Project Work I (0-0-4-5)	22GCT31 Universal Human Values (2-0-0-2)	22GEP61 Comprehensive Test and Viva (0-0-0-2)	24
VII	22GCT71 Economics and Management for Engineers (3-0-0-3)	22MTT71 Industrial Internet of Things (3-0-0-3)	Professional Elective III (3-0-0-3)	Professional Elective IV (3-0-0-3)	Open Elective III (3-0-0-3)	22MTP72 Project Work II Phase I (0-0-8-6)				21
VIII	Professional Elective VI (3-0-0-3)	Open Elective IV (3-0-0-3)	22MTP81 Project Work II Phase II (0-0-14-4)							10

COURSE MAPPING WITH PO & PSO

Sem	Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	22EGT11	Communication Skills - I						✓			✓	✓	✓	✓		
	22MAC11	Matrices and Ordinary Differential Equations	✓	✓	✓		✓									
	22PHT13	Physics for Mechatronics Engineering	✓	✓	✓						✓	✓		✓	✓	✓
	22MET12	Engineering Mechanics	✓	✓	✓	✓								✓	✓	✓
	22CSC11	Problem Solving and Programming in C	✓	✓	✓	✓	✓				✓	✓		✓		
I	22MET11	Engineering Drawing	✓	✓	✓		✓					✓		✓		
	22MEL11	Engineering Practices Laboratory	✓		✓	✓	✓	✓			✓	✓		✓	✓	✓
	22PHL13	Physics Laboratory for Mechatronics Engineering	✓	✓	✓	✓					✓	✓		✓	✓	✓
	22VEC11	Yoga and Values for Holistic Development						✓		✓	✓					
	22TAM01	Heritage of Tamils						✓		✓	✓	✓		✓		
	22GCL11	Foundation Lab – Manufacturing, Design & Robotics	✓	✓	✓		✓				✓	✓		✓		
	22EGT21	Communication Skills - II						✓			✓	✓	✓	✓		
	22MAC21	Multivariable Calculus and Complex Analysis	✓	✓	✓	✓	✓							✓	✓	✓
	22CYT23	Chemistry for Mechatronics Engineering	✓	✓	✓	✓										
	22MTT21	Fluid Mechanics and Thermodynamics	✓	✓	✓	✓								✓	✓	✓



	22CSC21	Data Structures using C	✓	√	 ✓ 	√										
	22MTT22	Electron Devices and Digital Circuits	↓ ↓	· ✓	· ·	•	✓							1	✓	\checkmark
	22TAM02	Tamils and Technology						✓		✓	✓	✓		✓		
	22MTL21	Electron Devices and Digital Circuits Laboratory	1	✓	✓		1				1	1		1	1	
	22GCL12	Foundation Lab – Electrical, IoT & Web	· •	· ·	· ·	✓						-		, ,	-	
	22CYL22	Chemistry Laboratory for Mechanical Systems	· ✓	· ✓	✓ ✓	√			1		•					
	22ITC32	Introduction to Python	· •	· ✓	· ✓	· ✓										
	22MTT31	Strength of Materials	1	1	1	1	✓							✓	✓	✓
	22MTT32	Theory of Machines	✓	✓	✓	✓	✓							✓	✓	✓
	22MTT33	Systems and Control Engineering	✓	✓	✓	✓	✓							 ✓ 	✓	✓
	22MTT34	Electrical Machines	1	✓	✓	✓					✓	✓		✓	✓	✓
III	22GCL12	Foundation Lab – Electrical, IoT & Web	1	✓	✓	1					✓					
	22MTL31	Electrical Machines and Control Laboratory	1	✓	✓	✓	✓				✓	✓		✓	✓	✓
	22MTL32	Computer Aided Drafting Laboratory	✓	✓	✓	✓	✓				✓	✓		✓	✓	✓
	22EGL31	Communication Skills Development Laboratory									✓	✓		✓		
	22MNT31	Environmental Science	1	✓	✓				1							
	22MAT41	Numerical Methods for Engineers	✓	✓	✓											
	22MTC41	Computer-Aided Design and Analysis	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
	22MTT41	Manufacturing Processes	✓	✓	✓	✓								✓	✓	✓
IV	22MTT42	Sensors and Signal Conditioning	✓	✓		✓								✓	✓	✓
IV	22MTC42	Graphical System Design	✓	✓	✓	✓	✓							✓	✓	✓
	22MTL41	Sensors and Signal Conditioning Laboratory	✓	✓	✓	✓	✓				✓	✓		✓	✓	✓
	22MTL42	Manufacturing Processes Laboratory	✓	✓	✓	✓					✓	✓		✓	✓	✓
	22GCL41	Professional Skills Training I / Industrial Training I*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	22MTC51	Fluid Power Systems	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	22MTC52	Power Electronics and Drives	✓	✓	✓		✓							✓	✓	✓
	22MTT51	CNC and Metrology	✓	✓	✓	✓	✓							✓	✓	✓
V	22MTT52	Microcontroller Programming and Applications	✓	✓	✓		✓							✓	✓	✓
	22MTC53	Fluid Power System Design	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
	22MTC54	Sensors and Signal Processing	✓	✓	✓	✓								✓	✓	✓
	22MTL51	CNC and Metrology Laboratory	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓



														1		
	22MTL52	Microcontroller Programming and Applications Laboratory	~	~	~	~	~				~			~	1	✓
	22GCL51	Professional Skills Training II / Industrial Training II *	✓	✓	1	1	1	1	✓	✓	1	~	1	✓		
	22MTT61	Programmable Automation Controllers	✓	✓	✓	✓	✓							1	✓	✓
	22MTT62	Mechanics of Serial Manipulator	✓	✓	✓	✓	✓							✓	✓	\checkmark
	22MTL61	Programmable Automation Controllers Laboratory	~	~	~	1	1				~	1		~	~	✓
VI	22MTL62	Robotics and Control Laboratory	✓	✓	✓	✓	✓				✓	✓		1	1	✓
	22MTP61	Project Work I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	✓
	22MTP62	Project Work I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	1	✓
	22GET31	Universal Human Values						✓		✓						
	22GCT71	Engineering Economics and Management	✓	✓	✓			✓	✓	✓	✓	✓	✓	1	1	✓
VII	22MTT71	Industrial Internet of Things	✓	✓	✓	✓	✓							1	1	✓
VII	22MTP71	Project Work II Phase I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	1	✓
	22MTP72	Project Work II Phase I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	1	✓
VIII	22MTP81	Project Work II Phase II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	✓	✓
		PROFESSIONAL ELECTIVES														
	22MTE01	Design of Mechanical Elements	✓	✓	✓	✓	✓							1	1	✓
	22MTE02	Heat and Mass Transfer	✓	✓		✓		✓						1	✓	✓
	22MTE03	Operations Research	✓	✓	✓	✓	✓						✓	✓	✓	✓
	22MTE04	Machine Drawing	✓	✓	✓	1	1							✓	1	✓
V																
	22MTE05	Introduction to Industrial Internet of Things	✓	✓	✓	✓	✓							✓	✓	✓
	22MTE05 22MTE06	Introduction to Industrial Internet of Things Advanced Control Theory	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓							✓ ✓	✓ ✓	✓ ✓
		<u> </u>		-	· ·			✓	✓	✓ ×						
	22MTE06	Advanced Control Theory	✓	✓	 ✓ 	√ ✓	✓	✓ ✓	✓ ✓	✓ ✓				 ✓ 	✓	 ✓
	22MTE06 22MTE07	Advanced Control Theory Automotive Engineering	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓	✓ ✓	✓ 				✓ ✓	✓ ✓	✓ ✓
	22MTE06 22MTE07 22MTE08	Advanced Control Theory Automotive Engineering Virtual Instrumentation: Theory and Applications	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓	✓ ✓				✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
	22MTE06 22MTE07 22MTE08 22MTE09	Advanced Control Theory Automotive Engineering Virtual Instrumentation: Theory and Applications Power Converters and Electric Drives				✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓	✓ ✓	✓ ✓				✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓
	22MTE06 22MTE07 22MTE08 22MTE09 22MTE10	Advanced Control TheoryAutomotive EngineeringVirtual Instrumentation: Theory and ApplicationsPower Converters and Electric DrivesApplied Finite Element MethodPrecision Equipment DesignComputer Integrated Manufacturing	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	· · · · · · · · · · · · · · · · · · ·	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓	✓ ✓	*				✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓
VI	22MTE06 22MTE07 22MTE08 22MTE09 22MTE10 22MTE11	Advanced Control TheoryAutomotive EngineeringVirtual Instrumentation: Theory and ApplicationsPower Converters and Electric DrivesApplied Finite Element MethodPrecision Equipment Design	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	· · · · · · · · · · · · · · · · · · ·	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓	✓ ✓	✓ 				✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
VI	22MTE06 22MTE07 22MTE08 22MTE09 22MTE10 22MTE11 22MTE12	Advanced Control TheoryAutomotive EngineeringVirtual Instrumentation: Theory and ApplicationsPower Converters and Electric DrivesApplied Finite Element MethodPrecision Equipment DesignComputer Integrated Manufacturing	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	· · · · · · · · · · · · · · · · · · ·	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓	✓ ✓	*				✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓



	22MTE16	Automotive Electronics	1	✓	1	1	 ✓ 							√	1	 ✓
	22GEE01	Total Quality Management	· ✓	√ 	· •	· ✓	√ 	✓	✓	✓	✓	1	✓	· ✓	· •	· ✓
	22MTE17	Bio Mechatronics	1	1	1	1	1	✓						1	1	✓
	22MTE18	Precision Manufacturing	1	✓	✓	1	1						 ✓ 	✓	✓	✓
	22MTE19	Digital Twin and Industry 5.0	1	✓	✓	1	1						✓	1	✓	✓
	22MTE20	Optimal and Adaptive Control	✓	✓	✓	✓	✓							✓	✓	✓
	22GEE02	Fundamentals of Research	1	✓	✓	1	1	✓	✓	✓	✓	✓	1	1	✓	✓
VII	22MTE21	Electric and Hybrid Vehicles	1	✓	✓	1	1	✓	✓	✓				1	✓	✓
	22MTE22	Machine Tool Control and Condition Monitoring	1	✓	✓	✓	✓							1	✓	✓
	22MTE23	Additive Manufacturing	✓	✓	✓	✓	✓						✓	1	✓	✓
	22MTE24	Industrial Automation Protocols	✓	✓	✓	✓	✓							✓	✓	✓
	22MTE25	Robot Programming	✓	✓	✓	✓	✓							1	✓	✓
	22MTE26	Drone Technology	✓	✓	✓	✓	✓							1	✓	✓
	22MTE27	Maintenance Engineering	✓	✓	✓			✓					1	✓	✓	✓
	22MTE28	Machine Vision and Image Processing	✓	✓	✓	✓	✓							✓	✓	✓
	22MTE29	MEMS and NEMS	✓	✓	✓	1								✓	✓	✓
	22MTE30	Mobile Robotics	✓	✓	✓	1	✓							✓	✓	✓
	22MTE31	Product Design and Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VIII	22MTE32	Battery Management System	✓	✓	✓	✓	✓						✓	✓	✓	✓
VIII	22MTE33	Production Management	✓	✓	✓	1	✓						✓	✓	✓	✓
	22MTE34	Cyber Physical Systems	✓	✓	✓	1	✓							✓	✓	✓
	22MTE35	Agricultural Robotics and Automation	✓	✓	✓	✓	✓							✓	✓	✓
	22MTE36	Aircraft Mechatronics	✓	✓	✓	✓	✓		✓					✓	✓	✓
		OPEN ELECTIVES														
	22MTO01	Design of Mechatronics Systems	✓	✓	✓	✓	✓							✓		
	22MTX01	Data Acquisition and Virtual Instrumentation	✓	✓	✓	✓	✓							✓		
	22MTX02	Factory Automation	✓	✓	✓	✓	✓				✓	✓		✓		
	22GEO04	Innovation and Business Model Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	22MTO02	Robotics	✓	✓	✓	✓	✓							✓		
	22MTO03	3D Printing and Design	✓	✓	✓	✓	✓						✓	✓		
	22GEO05	Entrepreneurship Development	✓	\checkmark	\checkmark	✓	✓	✓	✓	✓	✓	✓	✓	✓		



22MTO04	Drone System Technology	✓	✓	✓	✓	✓				✓	
22MTO05	Micro and Nano Electromechanical Systems	✓	~	<	✓					✓	

SEMESTER	I								
Course	Course Title	Но	ours/	Week	Credit	Max	imum N	larks	Categ
Code	Course The	L	Т	Ρ	Credit	CA	ESE	Total	ory
Theory / The	eory 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
22PHT13	Physics for Mechatronics Engineering	3	0	0	3	40	60	100	BS
22MET12	Engineering Mechanics	3	0	0	3	40	60	100	PC
22CSC11	Problem Solving and Programming in C	3	0	2	4	50	50	100	ES
22MET11	Engineering Drawing	2	1	0	3	40	60	100	ES
Practical / E	mployability Enhancement								
22MEL11	Engineering Practices Laboratory	0	0	2	1	60	40	100	ES
22PHL13	Physics Laboratory for Mechatronics Engineering	0	0	2	1	60	40	100	BS
22VEC11	Yoga and Values for Holistic Development				1	100	0	100	HS
22MNT11	Student Induction Program				0	100	0	100	MC
	Total Cred	its to	be e	earned	23				

* Alternate Weeks

SEMESTER Course		Но	urs/W	eek	Credi	Max	imum M	arks	Categ
Code	Course Title	L	Τ	Р	t	CA	ESE	Total	ory
Theory / The	eory with Practical								
22EGT21	Communication Skills – II	3	0	0	3	40	60	100	HS
22MAC21	Multivariable Calculus and Complex Analysis	3	1*	2*	4	50	50	100	BS
22CYT23	Chemistry for Mechatronics Engineering	3	0	0	3	40	60	100	BS
22MTT21	Fluid Mechanics and Thermodynamics	3	1	0	4	40	60	100	PC
22CSC21	Data Structures using C	3	0	2	4	50	50	100	ES
22MTT22	Electron Devices and Digital Circuits	3	0	0	3	40	60	100	ES
22TAM01	Heritage of Tamils	1	0	0	1	100	0	100	HS
Practical / E	mployability Enhancement								•
22MTL21	Electron Devices and Digital Circuits Laboratory	0	0	2	1	60	40	100	ES
22CYL22	Chemistry Laboratory for Mechanical Systems	0	0	2	1	60	40	100	BS
	Total Cre	dits to	be ea	rned	24				

* Alternate Weeks

SEMESTER	111								
Course	Course Title	Но	ours/	Week	Credit	Ma	ximum N	/larks	Cate
Code	Course The	L	Т	Р	Credit	CA	ESE	Total	gory
Theory / The	eory with Practical								
22ITC32	Introduction to Python	3	0	2	4	50	50	100	ES
22MTT31	Strength of Materials	3	1	0	4	40	60	100	PC
22MTT32	Theory of Machines	3	1	0	4	40	60	100	PC
22MTT33	Systems and Control Engineering	3	0	0	3	40	60	100	PC
22MTT34	Electrical Machines	3	0	0	3	40	60	100	PC
22TAM02	Tamils and Technology	1	0	0	1	100	0	100	HS
Practical / E	mployability Enhancement								
22MTL31	Electrical Machines and Control Laboratory	0	0	2	1	60	40	100	PC
22MTL32	Computer Aided Drafting Laboratory	0	0	2	1	60	40	100	PC
22EGL31	Communication Skills Development Laboratory	0	0	2	1	60	40	100	HS
22MNT31	Environmental Science	2	0	0	0	100	0	100	MC
	Total Cree	dits to	be e	earned	22		-	-	

Course		Ηοι	urs/We	ek	Creadit	Max	cimum I	Marks	Categ
Code	Course Title	L	Т	Ρ	Credit	СА	ESE	Total	ory
Theory / Th	neory with Practical								
22MAT41	Numerical Methods for Engineers	3	1	0	4	40	60	100	BS
22MTC41	Computer-Aided Design and Analysis	3	0	2	4	100	0	100	PC
22MTT41	Manufacturing Processes	3	0	0	3	40	60	100	PC
22MTT42	Sensors and Signal Conditioning	3	0	0	3	40	60	100	PC
22MTC42	Graphical System Design	3	0	2	4	50	50	100	PC
Practical /	Employability Enhancement	•							
22MTL41	Sensors and Signal Conditioning Laboratory	0	0	2	1	60	40	100	PC
22MTL42	Manufacturing Processes Laboratory	0	0	2	1	60	40	100	PC
22GCL41	Professional Skills Training I / Industrial Training I *				2	100	0	100	EC
	Total Cre	dits to	be ear	med	22				

* 80hrs of Training

SEMESTER	V								
Course	Course Title	Ho	urs/We	eek	Credit	Max	imum Ma	rks	Categ
Code	Course Title	L	Т	Ρ	Cledit	CA	ESE	Total	ory
Theory / Th	eory with Practical								
22MTC51	Fluid Power Systems	2	0	2	3	50	50	100	PC
22MTC52	Power Electronics and Drives	3	0	2	4	50	50	100	PC
22MTT51	CNC and Metrology	3	0	0	3	40	60	100	PC
22MTT52	Microcontroller Programming and Applications	3	0	0	3	40	60	100	PC
	Professional Elective - 1	3	0	0	3	40	60	100	PE
	Open Elective – 1	3	1/0	0/2	4	40/50	60/50	100	OE
Practical / E	Employability Enhancement								
22MTL51	CNC and Metrology Laboratory	0	0	2	1	60	40	100	PC
22MTL52	Microcontroller Programming and Applications Laboratory	0	0	2	1	60	40	100	PC
22GCL51	Professional Skills Training II / Industrial Training II *				2	100	0	100	EC
	Total Cree	dits to	be ea	rned	24				

* 80hrs of Training

SEMESTER Course		Ho	ours/W	/eek	Credit	Max	imum Ma	rks	Categ
Code	Course Title	L	Τ	P		CA	ESE	Total	ory
Theory / Th	eory with Practical								
22MTT61	Programmable Automation Controllers	3	0	0	3	40	60	100	PC
22MTT62	Mechanics of Serial Manipulators	3	0	0	3	40	60	100	PC
	Professional Elective – 2	3	0	0	3	40	60	100	PE
	Open Elective - 2	3	1/0	0/2	4	40/50	60/50	100	OE
Practical / E	Employability Enhancement	•		•					
22MTL61	Programmable Automation Controllers Laboratory	0	0	2	1	60	40	100	PC
22MTL62	Robotics and Control Laboratory	0	0	2	1	60	40	100	PC
22MTP61	Project Work I	0	0	8	4	50	50	100	EC
22GET31	Universal Human Values	2	0	0	2	100	0	100	HS
22GEP61	Comprehensive Test and Viva				2	100	0	100	EC
	Total Cred	its to	be ea	arned	23			•	

SEMESTER	R VII								
Course	Course Title	Hou	's/Wee	ek	Credit	Maxim	num Mai	'ks	Cate
Code	Course little	L	Т	Р		CA	ESE	Total	gory
Theory / Th	eory with Practical								
22GCT71	Engineering Economics and Management	3	0	0	3	40	60	100	HS
	Professional Elective 3	3	0	0	3	40	60	100	PE
	Professional Elective 4	3	0	0	3	40	60	100	PE
	Professional Elective 5	3	0	0	3	40	60	100	PE
	Open Elective 3	3	0	0	3	40	60	100	OE
Practical / I	Employability Enhancement	·	•	•			•		
22MTP71	Project Work II Phase I	0	0	10	5	50	50	100	EC
	Total Cr	edits to	be ea	arned	19			•	

SEMESTER	VIII								
Course	Course Title	Hours/Week			Credit	Ma	Categ		
Code	Course Title	L	Т	Ρ	Cleuit	CA	ESE	Total	ory
Theory / Th	eory with Practical								
	Professional Elective 6	3	0	0	3	40	60	100	PE
	Open Elective 4	3	0	0	3	40	60	100	OE
Practical / E	Employability Enhancement								
22MTP81	Project Work II Phase II			8	4	50	50	100	EC
				Total	13				

Total Credits: 168

SI. No.	Course Code	Course Name	L	т	Р	С	Domain/ Stream
110.	Oode	Semester V					Otream
		Elective - I					
23	22MTE01	Design of Mechanical Elements	3	0	0	3	PD
24	22MTE02	Heat and Mass Transfer	3	0	0	3	PD
25	22MTE03	Operations Research	3	0	0	3	PS
26	22MTE04	Machine Drawing	3	0	0	3	PD
27	22MTE05	Introduction to Industrial Internet of Things	3	0	0	3	AE
28	22MTE06	Advanced Control Theory	3	0	0	3	AS
29	22MTE07	Automotive Engineering	3	0	0	3	PD
30	22MTE08	Virtual Instrumentation: Theory and Applications	3	0	0	3	AE
31	22MTE09	Power Converters and Electric Drives	3	0	0	3	AE
		Semester VI					
		Elective - II					
32	22MTE10	Applied Finite Element Method	3	0	0	3	PD
33	22MTE11	Precision Equipment Design	3	0	0	3	PS
34	22MTE12	Computer Integrated Manufacturing	3	0	0	3	PS
35	22MTE13	Embedded Programming for Mechatronics	3	0	0	3	AE
36	22MTE14	Machine Learning	3	0	0	3	AS
37	22MTE15	Process Control and Instrumentation	3	0	0	3	AE
38	22MTE16	Automotive Electronics	3	0	0	3	AE
		Semester VII					
		Elective - III					
39	22GEE01	Total Quality Management	3	0	0	3	GE
40	22MTE17	Bio Mechatronics	3	0	0	3	AS
41	22MTE18	Precision Manufacturing	3	0	0	3	PS
42	22MTE19	Digital Twin and Industry 5.0	3	0	0	3	AE
43	22MTE20	Optimal and Adaptive Control	3	0	0	3	AS
		Elective - IV					
44	22GEE02	Fundamentals of Research	3	0	0	3	GE
23	22MTE21	Electric and Hybrid Vehicles	3	0	0	3	PD
24	22MTE22	Machine Tool Control and Condition Monitoring	3	0	0	3	PS
25	22MTE23	Additive Manufacturing	3	0	0	3	PS
26	22MTE24	Industrial Automation Protocols	3	0	0	3	AE
		Elective - V					
32	22MTE25	Robot Programming	3	0	0	3	AS
33	22MTE26	Drone Technology	3	0	0	3	AS
34	22MTE27	Maintenance Engineering	3	0	0	3	PS
35	22MTE28	Machine Vision and Image Processing	3	0	0	3	AE
36	22MTE29	MEMS and NEMS	3	0	0	3	PD
		Semester VIII					
		Elective – VI					
32	22MTE30	Mobile Robotics	3	0	0	3	AS

PROFESSIONAL ELECTIVE (PE)



39	22MTE31	Product Design and Development	3	0	0	3	PD
40	22MTE32	Battery Management System	3	0	0	3	PS
41	22MTE33	Production Management	3	0	0	3	PS
42	22MTE34	Cyber Physical Systems	3	0	0	3	AE
43	22MTE35	Agricultural Robotics and Automation	3	0	0	3	AE
44	22MTE36	Aircraft Mechatronics	3	0	0	3	AS
		Total Credits to be earned				18	

* Domain/Stream Abbreviations: AE- Automation Engineering, AS – Autonomous Systems, PD – Product Design, PS – Production System, GE – General Engineering

OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS (OE)

(Common to all departments except offering department)

S.No	Course	Course Title	Но	urs/W	Cred	Sem	
•	Code	Course True	L	Т	Р	it	UCIII
1	22MTO01	Design of Mechatronics Systems	3	1	0	4	V
2	22MTX01	Data Acquisition and Virtual Instrumentation	3	0	2	4	V
3	22MTX02	Factory Automation	3	0	2	4	V
4	22GEO04	Innovation and Business Model Development	3	1	0	4	VI
5	22MTO02	Robotics	3	1	0	4	VI
6	22MTO03	3D Printing and Design	3	1	0	4	VI
7	22GEO05	Entrepreneurship Development	3	0	0	3	VII
8	22MTO04	Drone System Technology	3	0	0	3	VII
9	22MTO05	Micro and Nano Electromechanical Systems	3	0	0	3	VIII

SEMESTER	I								
Course	Course Title	Hou	irs/We	ek	Credit		ximum	Marks	Categ
Code	Course Title	L	Т	Ρ	Credit	CA	ESE	Total	ory
Theory / The	eory 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
22PHT13	Physics for Mechatronics Engineering	3	0	0	3	40	60	100	BS
22CSC11	Problem Solving and Programming in C	3	0	2	4	50	50	100	ES
22MET11	Engineering Drawing	2	1	0	3	40	60	100	ES
22TAM01	Heritage of Tamils	1	0	0	1	100	0	100	HS
Practical / E	mployability Enhancement								
22PHL13	Physics Laboratory for Mechatronics Engineering	0	0	2	1	60	40	100	BS
22GCL12	Foundation Laboratory – Electrical, IoT and Web	0	0	6	3	100	0	100	ES
22VEC11	Yoga and Values for Holistic Education				1	100	0	100	HS
22MNT11	Student Induction Program				0	100	0	100	MC
	Total Cred	its to I	be ear	ned	23				

* Alternate Weeks

Course	Course Title	Ηοι	ırs/We	ek	Credit	Ma	ximum l	Marks	Categ
Code	Course Thie	L	Т	Ρ	Credit	CA	ESE	Total	ory
Theory / Th	eory with Practical								
22EGT21	Communication Skills - II	3	0	0	3	40	60	100	HS
22MAC21	Multivariable Calculus and Complex Analysis	3	1*	2 [*]	4	50	50	100	BS
22CYT23	Chemistry for Mechatronics Engineering	3	0	0	3	40	60	100	BS
22CSC21	Fundamentals of Data Structures	3	0	2	4	50	50	100	ES
22MET12	Engineering Mechanics	3	0	0	3	40	60	100	PC
22TAM02	Tamils and Technology	1	0	0	1	100	0	100	HS
Practical / E	Employability Enhancement		•			•			
22CYL22	Chemistry Laboratory for Mechanical Systems	0	0	2	1	60	40	100	BS
22GCL11	Foundation Laboratory – Manufacturing, Design and Robotics	0	0	6	3	100	0	100	ES
	Total Credi	ts to	be ear	ned	22				

* Alternate Weeks

SEMESTER									
Course	Course Title	Ho	ours/	Week	Credit	Ма	iximum	Marks	Cate
Code	Course Title	L	Т	Р	Credit	CA	ESE	Total	gory
Theory / The	ory with Practical								
22ITC32	Introduction to Python	3	0	2	4	50	50	100	ES
22MTT21	Fluid Mechanics and Thermodynamics	3	1	0	4	40	60	100	PC
22MTT33	Systems and Control Engineering	3	0	0	3	40	60	100	PC
22MTT41	Manufacturing Processes	3	0	0	3	40	60	100	PC
22MTT22	Electron Devices and Digital Circuits	3	0	0	3	40	60	100	PC
Practical / E	mployability Enhancement								
22MTL42	Manufacturing Processes Laboratory	0	0	2	1	60	40	100	PC
22MTL21	Electron Devices and Digital Circuits Laboratory	0	0	2	1	60	40	100	PC
22MNT31	Environmental Science	2	0	0	0	100	0	100	MC
22EGL31	Communication Skills Development Laboratory	0	0	2	1	60	40	100	HS
	Total Cre	dits to	be e	earned	20				

Course		Но	urs/\	Veek		Max	imum	Marks	Categ	
Code	Course Title	L	т	Ρ	Credit	CA	ES E	Total	ory	
Theory / Th	neory with Practical									
22MAT41	Numerical Methods for Engineers	3	1	0	4	40	60	100	BS	
22MTC41	Computer-Aided Design and Analysis	3	0	2	4	100	0	100	PC	
22MTT31	Strength of Materials	3	1	0	4	40	60	100	PC	
22MTT32	Theory of Machines	3	1	0	4	40	60	100	PC	
22MTT34	Electrical Machines	3	0	0	3	40	60	100	PC	
Practical /	Employability Enhancement				•			1	L	
22MTL31	Electrical Machines and Control Laboratory	0	0	2	1	60	40	100	PC	
22MTL32	Computer Aided Drafting Laboratory	0	0	2	1	60	40	100	PC	
22GCL41	Professional Skills Training I / Industrial Training I *				2	100	0	100	EC	
	Total Credi	ts to	be e	arned	23					

* 80hrs of Training

SEMESTER	V							_	-
Course	Course Title	Ho	ours/W		Credit		Maximum Marks		Categ
Code		L	Т	Р	oroun	CA	ESE	Total	ory
Theory / Th	eory with Practical								
22MTT51	CNC and Metrology	3	0	0	3	40	60	100	PC
22MTT52	Microcontroller Programming and Applications	3	0	0	3	40	60	100	PC
22MTC53	Fluid Power System Design	3	0	2	4	50	50	100	PC
22MTC54	Sensors and Signal Processing	3	0	2	4	50	50	100	PC
	Professional Elective 1	3	0	0	3	40	60	100	PE
	Open Elective 1	3	1/0	0/2	4	40/50	60/50	100	OE
Practical / E	Employability Enhancement								
22MTL51	CNC and Metrology Laboratory	0	0	2	1	60	40	100	PC
22MTL52	Microcontroller Programming and Applications Laboratory	0	0	2	1	60	40	100	PC
22GCL51	Professional Skills Training II / Industrial Training II *				2	100	0	100	EC
	Total Cred	its to	be ea	arned	25				

* 80hrs of Training

SEMESTER	VI								
Course	Course Title	Ho	ours/W	/eek	Credit	Maxi	mum Ma	rks	Categ
Code	Course Title	L	Т	Ρ		CA	ESE	Total	ory
Theory / Th	eory with Practical								
22MTT61	Programmable Automation Controllers	3	0	0	3	40	60	100	PC
22MTT62	Mechanics of Serial Manipulator	3	0	0	3	40	60	100	PC
	Professional Elective 2	3	0	0	3	40	60	100	PE
	Open Elective 2	3	1/0	0/2	4	50/40	50/60	100	OE
Practical / E	Employability Enhancement								
22MTL61	Programmable Automation Controllers Laboratory	0	0	2	1	60	40	100	PC
22MTL62	Robotics and Control Laboratory	0	0	2	1	60	40	100	PC
22MTP62	Project Work I	0	0	4	5	50	50	100	EC
22GET31	Universal Human Values	2	0	0	2	100	0	100	HS
22GEP61	Comprehensive Test and Viva				2	100	0	100	EC
	Total Cred	its to	be ea	rned	24				

SEMESTER	R VII								
Course	Course Title	Hou	rs/Wee	k	Credit	Maxi	mum M	arks	Cate
Code	Course Title	L	Т	Р		CA	ESE	Total	gory
Theory / Th	eory with Practical								
22GCT71	Engineering Economics and Management	3	0	0	3	40	60	100	HS
22MTT71	Industrial Internet of Things	3	0	0	3	40	60	100	PC
	Professional Elective 3	3	0	0	3	40	60	100	PE
	Professional Elective 4	3	0	0	3	40	60	100	PE
	Open Elective 3	3	0	0	3	40	60	100	OE
Practical / I	Employability Enhancement								
22MTP72	Project Work II Phase I	0	0	8	6	50	50	100	EC
	Total Cre	dits to	be ea	rned	21				

SEMESTER	2 VIII								
Course	Course Title	Ηοι	urs/We	ek	Credit	Ma	ximum	Marks	Categ
Code	Course The	L	Т	Ρ	Credit	CA	ESE	Total	ory
Theory / Th	eory with Practical								
	Professional Elective 5	3	0	0	3	40	60	100	PE
	Open Elective 4	3	0	0	3	40	60	100	OE
Practical / E	Employability Enhancement								
22MTP81	Project Work II Phase II			14	4	50	50	100	EC
	Total Cred	lits to	be ea	rned	10				

Total Credits: 168

SI. No.	Course Code	Course Name	L	т	Р	С	Domain/ Stream
		Semester V					
		Elective - I					
23	22MTE01	Design of Mechanical Elements	3	0	0	3	PD
24	22MTE02	Heat and Mass Transfer	3	0	0	3	PD
25	22MTE03	Operations Research	3	0	0	3	PS
26	22MTE04	Machine Drawing	3	0	0	3	PD
27	22MTE05	Introduction to Industrial Internet of Things	3	0	0	3	AE
28	22MTE06	Advanced Control Theory	3	0	0	3	AS
29	22MTE07	Automotive Engineering	3	0	0	3	PD
30	22MTE08	Virtual Instrumentation: Theory and Applications	3	0	0	3	AE
31	22MTE09	Power Converters and Electric Drives	3	0	0	3	AE
		Semester VI					
		Elective - II					
32	22MTE10	Applied Finite Element Method	3	0	0	3	PD
33	22MTE11	Precision Equipment Design	3	0	0	3	PS
34	22MTE12	Computer Integrated Manufacturing	3	0	0	3	PS
35	22MTE13	Embedded Programming for Mechatronics	3	0	0	3	AE
36	22MTE14	Machine Learning	3	0	0	3	AS
37	22MTE15	Process Control and Instrumentation	3	0	0	3	AE
38	22MTE16	Automotive Electronics	3	0	0	3	AE
		Semester VII					
		Elective - III					
39	22GEE01	Total Quality Management	3	0	0	3	GE
40	22MTE17	Bio Mechatronics	3	0	0	3	AS
41	22MTE18	Precision Manufacturing	3	0	0	3	PS
42	22MTE19	Digital Twin and Industry 5.0	3	0	0	3	AE
43	22MTE20	Optimal and Adaptive Control	3	0	0	3	AS
		Elective - IV					
44	22GEE02	Fundamentals of Research	3	0	0	3	GE
23	22MTE21	Electric and Hybrid Vehicles	3	0	0	3	PD
24	22MTE22	Machine Tool Control and Condition Monitoring	3	0	0	3	PS
25	22MTE23	Additive Manufacturing	3	0	0	3	PS
26	22MTE24	Industrial Automation Protocols	3	0	0	3	AE
32	22MTE25	Robot Programming	3	0	0	3	AS
33	22MTE26	Drone Technology	3	0	0	3	AS
34	22MTE27	Maintenance Engineering	3	0	0	3	PS
35	22MTE28	Machine Vision and Image Processing	3	0	0	3	AE
36	22MTE29	MEMS and NEMS	3	0	0	3	PD
		Semester VIII					
		Elective – V					
32	22MTE30	Mobile Robotics	3	0	0	3	AS
39	22MTE31	Product Design and Development	3	0	0	3	PD

PROFESSIONAL ELECTIVE (PE)



40	22MTE32	Battery Management System	3	0	0	3	PS
41	22MTE33	Production Management	3	0	0	3	PS
42	22MTE34	Cyber Physical Systems	3	0	0	3	AE
43	22MTE35	Agricultural Robotics and Automation	3	0	0	3	AE
44	22MTE36	Aircraft Mechatronics	3	0	0	3	AS
		Total Credits to be earned				18	

* Domain/Stream Abbreviations: AE- Automation Engineering, AS – Autonomous Systems, PD – Product Design, PS – Production System, GE – General Engineering

OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS (OE)

(Common to all departments except offering department)

S.No	Course	Course Title	Но	urs/We	eek	Cred	Sem
-	Code	Course ride	L	Т	Р	it	Jein
1	22MTO01	Design of Mechatronics Systems	3	1	0	4	V
2	22MTX01	Data Acquisition and Virtual Instrumentation	3	0	2	4	V
3	22MTX02	Factory Automation	3	0	2	4	V
4	22GEO04	Innovation and Business Model Development	3	1	0	4	VI
5	22MTO02	Robotics	3	1	0	4	VI
6	22MTO03	3D Printing and Design	3	1	0	4	VI
7	22GEO05	Entrepreneurship Development	3	0	0	3	VII
8	22MTO04	Drone System Technology	3	0	0	3	VII
9	22MTO05	Micro and Nano Electromechanical Systems	3	0	0	3	VIII

	(Common to All Engineering and Technology Brai	nches)					
Programme & Branch	All B.E./B.Tech. Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	I	HS	3	0	0	3
Preamble	This course is designed to impart required levels of Communication necessary for different professional contexts.	Skills a	and Proficien	cy in Ei	nglisl	n lan	guage
Unit – I	Grammar, Vocabulary, Listening, Speaking, Reading & Writing						9
- Listening to sh Types of Readin Unit – II Grammar: Voic listening - List	nds & Infinitives - Vocabulary: Affixes - Synonyms & Antonyms - Lister ort talks - TV shows - Speaking: Verbal & Non-verbal communication g – Intensive: scanning, word by word, survey - Writing: Dialogue writ Grammar, Vocabulary, Listening, Speaking, Reading & Writing es - Impersonal passives - Vocabulary: Homonyms, Homophones ening to announcements & radio broadcasts - Speaking: Persuasi ng comprehension - Articles from Newspapers/Magazines - Cloze e	i - Pair ting, Inf & Hor ive & I	ronversation formal Letters nographs - L mpromptu ta	n - Role <u>- Para</u> -istenir	e pla grap ng: l i larrat	y - F h wri mpor	Reading iting 9 rtance c a story
sentences				,			
Unit – III	Grammar, Vocabulary, Listening, Speaking, Reading & Writing ositions - Vocabulary: Compound Nouns - Listening: Listening to						9
- Formal letters	eading: Extensive: speed, skimming - Identifying lexical & contextual r Seeking permission for Industrial visits & Inviting guests	meanir	ngs - Writing	: Instru		s & \	Varning
 Formal letters Unit – IV 					ction	s & \	Warning 9
 Formal letters Unit – IV Grammar: Artic Listening: Liste 	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing	- Unscr N	ambling word	ds - L Readin	ogica	s & V al rea ote	Warning 9 asoning making
- Formal letters Unit – IV Grammar: Artic Listening: Liste Paraphrasing & placing orders Unit – V	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing les & Determiners - Vocabulary: Technical Vocabulary - Analogy - ning to conversations - Speaking: Tongue twisters - Skill Sharing - Summarizing - Writing: Recommendations & Suggestions - Busine Grammar, Vocabulary, Listening, Speaking, Reading & Writing	- Unscr N ess lette	rambling word ote-taking - ers: Enquiry,	ds - L Readin Callinç	ogica ogica g: N g for	al rea ote quot	9 asoning making tations 8 9
- Formal letters Unit – IV Grammar: Artic Listening: Liste Paraphrasing & placing orders Unit – V Grammar: Caus personalities - S	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing les & Determiners - Vocabulary: Technical Vocabulary - Analogy - ning to conversations - Speaking: Tongue twisters - Skill Sharing - Summarizing - Writing: Recommendations & Suggestions - Busine	- Unscr N ess lette Definit	rambling word ote-taking - ers: Enquiry, tions Listeni address & V	ds - L Readin Calling ng: Lis ote of t	ogica ogica g: N g for tenin	al rea ote quot	Warning 9 asoning making tations & 9 eminer
- Formal letters Unit – IV Grammar: Artic Listening: Liste Paraphrasing & placing orders Unit – V Grammar: Caus personalities - S	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing les & Determiners - Vocabulary: Technical Vocabulary - Analogy - ning to conversations - Speaking: Tongue twisters - Skill Sharing - Summarizing - Writing: Recommendations & Suggestions - Busine Grammar, Vocabulary, Listening, Speaking, Reading & Writing e and effect expressions - Vocabulary: Abbreviations & acronyms, Speaking: Commonly mispronounced words - Welcome address, Chief	- Unscr N ess lette Definit	rambling word ote-taking - ers: Enquiry, tions Listeni address & V	ds - L Readin Calling ng: Lis ote of t	ogica ogica g: N g for tenin	s & V al rea ote quot g to s -	9 asoning making tations 8 9 eminen Reading
- Formal letters Unit – IV Grammar: Artic Listening: Liste Paraphrasing & placing orders Unit – V Grammar: Caus personalities - S	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing les & Determiners - Vocabulary: Technical Vocabulary - Analogy - ning to conversations - Speaking: Tongue twisters - Skill Sharing - Summarizing - Writing: Recommendations & Suggestions - Busine Grammar, Vocabulary, Listening, Speaking, Reading & Writing e and effect expressions - Vocabulary: Abbreviations & acronyms, Speaking: Commonly mispronounced words - Welcome address, Chief	- Unscr N ess lette Definit	rambling word ote-taking - ers: Enquiry, tions Listeni address & V	ds - L Readin Calling ng: Lis ote of t	ogica ogica g: N g for tenin	s & V al rea ote quot g to s -	9 asoning making tations 8 9 eminen
- Formal letters Unit – IV Grammar: Artic Listening: Liste Paraphrasing & placing orders Unit – V Grammar: Caus personalities - S - IELTS type pas TEXT BOOK:	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing les & Determiners - Vocabulary: Technical Vocabulary - Analogy - ning to conversations - Speaking: Tongue twisters - Skill Sharing - Summarizing - Writing: Recommendations & Suggestions - Busine Grammar, Vocabulary, Listening, Speaking, Reading & Writing e and effect expressions - Vocabulary: Abbreviations & acronyms, Speaking: Commonly mispronounced words - Welcome address, Chief	- Unscr N Ss lette Definit f guest articles	rambling word lote-taking - ers: Enquiry, tions Listeni i address & V & advertisem	ds - L Readin Calling ng: Lis ote of the nents	ogica ogica g: N for tenin hank	s & V al rea ote quot g to s -	Varning 9 asoning making tations 9 eminer Readin
- Formal letters Unit – IV Grammar: Artic Listening: Liste Paraphrasing & placing orders Unit – V Grammar: Caus personalities - S - IELTS type pas TEXT BOOK:	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing les & Determiners - Vocabulary: Technical Vocabulary - Analogy - ning to conversations - Speaking: Tongue twisters - Skill Sharing - Summarizing - Writing: Recommendations & Suggestions - Busine Grammar, Vocabulary, Listening, Speaking, Reading & Writing ee and effect expressions - Vocabulary: Abbreviations & acronyms, Speaking: Commonly mispronounced words - Welcome address, Chief sages - Writing: Preparing transcript for a speech - Interpreting news a	- Unscr N Ss lette Definit f guest articles	rambling word lote-taking - ers: Enquiry, tions Listeni i address & V & advertisem	ds - L Readin Calling ng: Lis ote of the nents	ogica ogica g: N for tenin hank	s & V al rea ote quot g to s -	Varning 9 asoning making tations 9 eminer Readin
- Formal letters Unit – IV Grammar: Artic Listening: Liste Paraphrasing & placing orders Unit – V Grammar: Caus personalities - S - IELTS type pas TEXT BOOK: 1. Sanjay k REFERENCES:	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing les & Determiners - Vocabulary: Technical Vocabulary - Analogy - ning to conversations - Speaking: Tongue twisters - Skill Sharing - Summarizing - Writing: Recommendations & Suggestions - Busine Grammar, Vocabulary, Listening, Speaking, Reading & Writing ee and effect expressions - Vocabulary: Abbreviations & acronyms, Speaking: Commonly mispronounced words - Welcome address, Chief sages - Writing: Preparing transcript for a speech - Interpreting news a	- Unscr N Ss lette Definit f guest articles	rambling word lote-taking - ers: Enquiry, tions Listeni i address & V & advertisem ess, New Del	ds - L Readin Calling ng: Lis ote of the nents	ogica ogica g: N for tenin hank	s & V al rea ote quot g to s -	Varning 9 asoning making tations 9 eminer Reading
- Formal letters Unit – IV Grammar: Artic Listening: Liste Paraphrasing & placing orders Unit – V Grammar: Caus personalities - S - IELTS type pas TEXT BOOK: 1. Sanjay P REFERENCES: 1. Ashraf F 2 S. P. Dh	Seeking permission for Industrial visits & Inviting guests Grammar, Vocabulary, Listening, Speaking, Reading & Writing les & Determiners - Vocabulary: Technical Vocabulary - Analogy - ning to conversations - Speaking: Tongue twisters - Skill Sharing - Summarizing - Writing: Recommendations & Suggestions - Busine Grammar, Vocabulary, Listening, Speaking, Reading & Writing e and effect expressions - Vocabulary: Abbreviations & acronyms, Speaking: Commonly mispronounced words - Welcome address, Chief sages - Writing: Preparing transcript for a speech - Interpreting news a	- Unscr N ess lette Definit f guest articles	rambling word ote-taking - ers: Enquiry, ions Listenin address & V & advertisem ess, New Del 7.	ds - L Readin Calling ng: Lis ote of the nents	ogica ogica g: N g for tenin hank 8.	al reaction of the second seco	Varning 9 asoning making tations a 9 eminer Readin Total:4



		UTCON		the stu	dents will b	e able to)					T Mappe ghest Lev	
CO1	use	langua	ge effectively	y by acc	quiring vocab	ulary an	d syntax in o	context			A	oplying (K	(3)
CO2	liste	en and c	omprehend	differen	t spoken disc	courses f	from a varie	ty of situatio	ns		A	oplying (K	(3)
CO3	spe	ak confi	dently in diff	erent p	rofessional co	ontexts a	and with pee	ers			С	reating (K	6)
CO4	con	nprehen	d different g	enres o	f texts by add	opting va	rious readir	ig strategies	i.		Unde	erstanding	j (K2)
CO5			/ and flawles	te choice	C	reating (K	6)						
					Марр	oing of C	COs with P	Os and PSC)s				
COs/F	POs	PO1	PO2	PO3	3 PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12
CO	1						2			1	3	1	1
CO	2									2	3		1
CO	3									2	3		2
CO	4						1				3	1	1
CO	5										3		2
1 – Sli	ght, 2	2 – Mode	erate, 3 – Su	bstantia	al, BT- Bloom	i's Taxor	nomy			1	L	1	
					ASSI	ESSMEN		N – THEOR	Y				
	/ Blo atego		Remembe (K1) %		Understand (K2) %	ing	Applying (K3) %	Analyzin (K4) %		aluating K5) %	Creating (K6) %	То	tal %
	CAT1				37		30				33		100
	CAT2	2			30		30				40		100
	САТЗ	;			33		34				33		
		-						1	-	-	1		100



	(Common to all Engineering and	Technology brancl	nes)				
Programme & Branch	All BE/BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	1	BS	3	1*	2 *	4
Preamble	To provide the skills to the students for solving ordinary differential equations.	g different real time	problems by	/ ap	plyinę	g mat	rices and
Unit – I	Matrices:						9
Eigen vectors Orthogonal tra	Characteristic equation – Eigen values and Eigen ve (without proof) – Cayley – Hamilton theorem (Statinsformation of a symmetric matrix to diagonal form – C to canonical form by orthogonal transformation – Applinbrane.	itement and applica Quadratic form – Na	tions only) - ture of Quadra	Ort atic f	hogo orms	nal m s - Re	natrices - duction o
Unit – II	Ordinary Differential Equations:						9
	Solutions of First order differential equations: Exa- uation –Clairaut's equation - Applications: Law of natura			itz's	Line	ar E	quation -
Unit – III	Ordinary Differential Equations of Higher Ord						9
cosax / sinax -	ntial equations of second and higher order with const - x ⁿ - e ^{ax} x ⁿ , e ^{ax} sinbx and e ^{ax} cosbx - x ⁿ sinax and x ⁿ s equation - Legendre's equation.						
Unit – IV	Applications of Ordinary Differential Equation	าร:					9
Method of var	riation of parameters - Simultaneous first order linea		potont opoffi		1	Annli	ontions o
differential equ	uations: Simple harmonic motion – Electric circuits (Dif						
differential equ given).	uations: Simple harmonic motion – Electric circuits (Dif						
differential equ given). Unit – V Laplace Trans	uations: Simple harmonic motion – Electric circuits (Dif Laplace Transform: sform: Conditions for existence – Transform of elen	fferential equations	and associate Basic prope	d co	onditio	ons n Deriva	eed to be 9 tives and
differential equ given). Unit – V Laplace Trans integrals of tra	uations: Simple harmonic motion – Electric circuits (Dif Laplace Transform: sform: Conditions for existence – Transform of elen ansforms –Transforms of derivatives and integrals –	fferential equations mentary functions – Transform of unit s	and associate Basic prope	d co rties – Tr	onditio	Deriva	eed to b 9 tives an f periodi
differential equ given). Unit – V Laplace Trans integrals of tra functions. Inve	uations: Simple harmonic motion – Electric circuits (Dif Laplace Transform: sform: Conditions for existence – Transform of elen	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to b 9 tives an f periodi nethod
differential equ given). Unit – V Laplace Trans integrals of tra functions. Inve Convolution th	Laplace Transform: Sform: Conditions for existence – Transform of elen ansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform ueorem (Statement only) – Applications: Solution of line	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Inve Convolution th	Laplace Transform: sform: Conditions for existence – Transform of elen ansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform wearer (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES:	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Inve Convolution th LIST OF EXPE 1. Introdu	Laplace Transform: Sform: Conditions for existence – Transform of elen ansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform leorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: Juction to MATLAB	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Comp	Laplace Transform: sform: Conditions for existence – Transform of elenansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform leorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Compo 3. Plottin	Laplace Transform: sform: Conditions for existence – Transform of elenansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform eorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors g and visualizing single variable functions	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Compo 3. Plottin	Laplace Transform: sform: Conditions for existence – Transform of elenansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform leorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Compo 3. Plottin 4. Solving	Laplace Transform: sform: Conditions for existence – Transform of elenansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform eorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors g and visualizing single variable functions	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Compo 3. Plottin 4. Solving 5. Solution	Laplace Transform: sform: Conditions for existence – Transform of elenansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform leorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors g and visualizing single variable functions g first and second order ordinary differential equations	fferential equations mentary functions – Transform of unit s of elementary fur	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Compo 3. Plottin 4. Solving 5. Solution 6. Solving	Laplace Transform: sform: Conditions for existence – Transform of elenansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform eorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors g and visualizing single variable functions g first and second order ordinary differential equations on of Simultaneous first order ODEs	fferential equations a mentary functions – Transform of unit s of elementary fur ear ODE of second o	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans integrals of tra functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Compo 3. Plottin 4. Solving 5. Solution 6. Solving 7. Detern	Laplace Transform: sform: Conditions for existence – Transform of elenansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform eorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors g and visualizing single variable functions g first and second order ordinary differential equations on of Simultaneous first order ODEs g second order ODE by variation of parameters	fferential equations in the formation of	and associate Basic prope step function actions – Pa	d co rties - Tr rtial	onditio	Deriva Deriva	eed to be 9 tives and f periodic method -
differential equ given). Unit – V Laplace Trans- integrals of tra- functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Compo 3. Plottin 4. Solving 5. Solution 6. Solving 7. Determ 8. Solution	Laplace Transform: sform: Conditions for existence – Transform of elenansforms –Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform eorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors g and visualizing single variable functions g first and second order ordinary differential equations on of Simultaneous first order ODEs g second order ODE by variation of parameters mining Laplace and inverse Laplace transform of basic	fferential equations a mentary functions – Transform of unit s a of elementary fur ear ODE of second o functions	and associate Basic prope step function actions – Pa	d cc rties – Tr rtial ttant	a – E ansfo fract coef	Deriva Deriva Dorm c tion r ficien	eed to be 9 tives and f periodic method ts.
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differential equ given). Unit – V Laplace Trans integrals of tra- functions. Invo Convolution th LIST OF EXPE 1. Introdu 2. Compl 3. Plottin 4. Solving 5. Solution 6. Solving 7. Determ 8. Solution TEXT BOOK: 1. Raman Delhi, REFERENCES	uations: Simple harmonic motion – Electric circuits (Dif Laplace Transform: sform: Conditions for existence – Transform of elentansforms – Transforms of derivatives and integrals – erse Laplace transform: Inverse Laplace transform eorem (Statement only) – Applications: Solution of line ERIMENTS / EXERCISES: uction to MATLAB utation of eigen values and eigen vectors g and visualizing single variable functions g first and second order ordinary differential equations on of Simultaneous first order ODEs g second order ODE by variation of parameters nining Laplace and inverse Laplace transform of basic on of Second order ODE by employing Laplace transform na B V, "Higher Engineering Mathematics", 1st Edition	fferential equations a mentary functions – Transform of unit s of elementary fur ear ODE of second o functions rms Lecture:45,	and associate Basic prope step function nctions – Pa rder with cons	d cc rties – Tr rtial tant	actic	Deriva Deriva Dorm c tion r ficien	eed to be 9 tives and f periodi method - ts.



2.	Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics For First Year Edition 2014, S.Chand and Co., New Delhi.	B.E/B.Tech", Reprir
3.	Duraisamy C., Vengataasalam S., Arun Prakash K. and Suresh M., "Engineering Mathema Pearson India Education, New Delhi, 2018.	atics - I", 2 nd Editior
4.	Grewal B.S., "Higher Engineering Mathematics" 44thEdition, Khanna Publishers, New Delhi, 201	8.
5.	MATLAB – Laboratory Manual	
	SE OUTCOMES: mpletion of the course, the students will be able to	BT Mapped (Highest Level)
CO1	solve engineering problems which needs matrix computations.	Applying (K3)
CO2	identify the appropriate method for solving first order ordinary differential equations.	Applying (K3)
CO3	solve higher order linear differential equations with constant and variable coefficients.	Applying (K3)
CO4	apply the concept of ordinary differential equations for modeling and finding solutions to engineering problems.	Applying (K3)
CO5	apply Laplace Transform to find solutions of Linear Ordinary Differential Equations	Applying (K3)
CO6	understand the basics of MATLAB, solve ordinary differential equations and compute Laplace transforms using MATLAB.	Applying (K3), Manipulation (S2)

					Mappin	g of CC)s with	POs a	nd PSC)s				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2											
CO2	3	3	2											
CO3	3	3	2											
CO4	3	3	2											
CO5	3	3	3											
CO6					3									
1 – Slight 2	2 – Mod	erate 3	– Substa	ntial BT	- Bloom	i's Taxo	nomv							

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

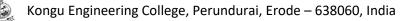
		ASSESSMENT	PATTERN	- THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	10	20	70	-	-	-	100
CAT2	10	20	70	-	-	-	100
CAT3	10	20	70	-	-	-	100
ESE	10	20	70	-	-	-	100

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

*Alternate week



Programme & Branch	BE- Mechatronics Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	1	BS	3	0	0	3
Preamble	This course aims to impart the knowledge on elasticity, to conducting materials and semiconducting materials. It also do topics in mechatronics engineering.						
Unit – I	Properties of matter:						9
uniform bending n	g of beams – Expression for bending moment – Depression at f nethod – Thermal properties – Modes of heat transfer – Thermal co h compound media (series and parallel).						
	ption – Spontaneous emission – Stimulated emission – Einstein's	e cooffi	vionte and th	oir r	Jatio	ne	•
inversion - Pump	ing – Nd:YAG laser – CO_2 laser – Homojunction semiconductor r drilling – Holography.	laser –	Industrial ap	oplica	ations	ns – : lase	er welding
Unit – III	Quantum physics and Applications:						9
Blackhody radiati							
Diackbouy laulati	on - Planck's theory - Compton scattering - Matter waves - F	Propertie	es – Heisenł	berg	unce	ertaint	y principle
(qualitative) – Scl Particle in a one-d	nrodinger's time-independent and time-dependent wave equation imensional box.	Propertions – Ph	es – Heisent ysical signific	berg cance	unce e of v	ertaint wave	y principle function
(qualitative) – Scl Particle in a one-d Unit – IV	nrodinger's time-independent and time-dependent wave equation imensional box. Conducting materials:	ns – Ph	ysical signific	cance	e of v	wave	function ·
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla	nrodinger's time-independent and time-dependent wave equation limensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con-	ns – Phi	ysical signific	nann	e of v	vave z law	function 9 - Lorent
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b	hrodinger's time-independent and time-dependent wave equation limensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita	ns – Ph ductiviti ative) –	ysical signific	nann	e of v	vave z law	function 9 - Lorent
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b temperature on Fe	hrodinger's time-independent and time-dependent wave equation imensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita ermi function – Density of energy states – Carrier concentration in n	ns – Ph ductiviti ative) –	ysical signific	nann	e of v	vave z law	function 9 – Lorent – Effect o
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b temperature on Fe Unit – V	hrodinger's time-independent and time-dependent wave equation limensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita ermi function – Density of energy states – Carrier concentration in n Semiconducting materials and Devices:	ns – Ph ductiviti ative) – netals.	ysical signific es – Wiedem Fermi distrib	nann	e of v -Fran n fund	vave z law	function 9 - Lorent - Effect c 9
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b temperature on Fe Unit – V Intrinsic semicond Carrier concentrat	hrodinger's time-independent and time-dependent wave equation imensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita ermi function – Density of energy states – Carrier concentration in n	ns – Ph ductiviti ative) – metals. ty and b	ysical signific es – Wiedem Fermi distrib pand gap – E	nanno	e of v -Fran n fund sic se	vave z law ction -	function 9 - Lorent - Effect c 9 nductors
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b temperature on Fe Unit – V Intrinsic semicond Carrier concentrat	hrodinger's time-independent and time-dependent wave equation limensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita ermi function – Density of energy states – Carrier concentration in n Semiconducting materials and Devices: luctor – Carrier concentration – Fermi level – Electrical conductivit tion in n-type and p-type semiconductors – Hall effect – Determini	ns – Ph ductiviti ative) – metals. ty and b	ysical signific es – Wiedem Fermi distrib pand gap – E	nanno	e of v -Fran n fund sic se	vave z law ction -	function - 9 - Lorent - Effect c 9 nductors -
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b temperature on Fe Unit – V Intrinsic semicond Carrier concentrat	hrodinger's time-independent and time-dependent wave equation limensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita ermi function – Density of energy states – Carrier concentration in n Semiconducting materials and Devices: luctor – Carrier concentration – Fermi level – Electrical conductivit tion in n-type and p-type semiconductors – Hall effect – Determini	ns – Ph ductiviti ative) – metals. ty and b	ysical signific es – Wiedem Fermi distrib pand gap – E	nanno	e of v -Fran n fund sic se	vave z law ction -	function 9 - Lorent - Effect c 9 nductors ns - Sola
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b temperature on Fe Unit – V Intrinsic semicond Carrier concentrat cell: Principle, con TEXT BOOK:	hrodinger's time-independent and time-dependent wave equation limensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita ermi function – Density of energy states – Carrier concentration in n Semiconducting materials and Devices: luctor – Carrier concentration – Fermi level – Electrical conductivit tion in n-type and p-type semiconductors – Hall effect – Determini	ns – Ph ductiviti ative) – netals. ty and b ation of	ysical signific es – Wiederr Fermi distrib pand gap – E Hall coefficie	ance nann- outior xtrins	e of v -Fran i fund sic se App	z law ction - emico licatio	function 9 - Lorent Effect of nductors ns - Sola Total:4
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b temperature on Fe Unit – V Intrinsic semicond Carrier concentrat cell: Principle, con TEXT BOOK: 1. Avadhanu Company	hrodinger's time-independent and time-dependent wave equation limensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita ermi function – Density of energy states – Carrier concentration in n Semiconducting materials and Devices: luctor – Carrier concentration – Fermi level – Electrical conductivit tion in n-type and p-type semiconductors – Hall effect – Determina struction and working.	ns – Ph ductiviti ative) – netals. ty and b ation of	ysical signific es – Wiederr Fermi distrib pand gap – E Hall coefficie	ance nann- outior xtrins	e of v -Fran i fund sic se App	z law ction - emico licatio	function 9 - Lorent Effect of nductors ns - Sola Total:4
(qualitative) – Scl Particle in a one-d Unit – IV Conductors – Cla number – Draw b temperature on Fe Unit – V Intrinsic semicond Carrier concentrat cell: Principle, con TEXT BOOK: 1. Avadhanu Company REFERENCES:	hrodinger's time-independent and time-dependent wave equation limensional box. Conducting materials: ssical free electron theory of metals – Electrical and thermal con- acks of classical theory – Quantum free electron theory (qualita ermi function – Density of energy states – Carrier concentration in n Semiconducting materials and Devices: luctor – Carrier concentration – Fermi level – Electrical conductivit tion in n-type and p-type semiconductors – Hall effect – Determina struction and working.	ns – Ph ductiviti ative) – netals. ty and b ation of	ysical signific es – Wiedem Fermi distrib pand gap – E Hall coefficie	nann- nann- utior xtrins ent –	Fran Fran func Sic se App	z law ction - emico licatio	function 9 - Lorent Effect of 9 nductors ns - Sola Total:4
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		UTCON ion of t		se, the st	udent	ts will be a	able to						(BT Mapı Highest L	
CO1	use	the con	cepts of	elasticity	and b		oment of					nodulus. Al media.	so	Applying	(K3)
CO2						nission of ngineering				e working	of lase	s and also	to	Applying	(K3)
CO3				of quantun 's wave ec			describ	be the t	pehavio	or of ele	ctrons in	n a metal	by	Applying	(K3)
CO4	elec	trical a mi funct	nd thern	nal condu	ctivitie	es of met	als. To	compre	hend	the effect	t of ten	compute the comput	on	Applying	(K3)
CO5	and sem	band g	ap of int	rinsic sem	icond	uctors and	to com	pute the	e carri	er conce	entration	l conductiv of extrins ne working	sic	Applying	(K3)
						Mappin	g of CO	s with	POs a	nd PSOs	6				
Cos/	POs	PO1	PO2	PO3	PO	4 PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CC	01	3	2	2						2	2		2	1	1
CC)2	3	2	2						2	2		2	1	2
CC)3	3	2	2						2	2		2	1	2
CC)4	3	2	2						2	2		2	1	2
CC)5	3	2	2						2	2		2	1	2
1 – SI	ight, 2	– Mode	erate, 3 -	Substanti	al, B	- Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	RN –	THEORY	'				
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyzi (K4) %		Evaluating (K5) %		reating (K6) %	Total %
	CAT	1		20		40)	40)						100
	CAT	2		20		40		40)						100
	CAT	3		20		40		40)						100
	ESE	Ξ		20		40)	40)						100

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



	22MET12 - ENGINEERING MECH						
	(Common to Mechanical & Mechatronics Engi	ineering brar	iches)	1	1		1
Programme & Branch	B.E Mechanical Engineering, B.E Mechatronics Engineering branches	Sem.	Category	L	т	Р	Credit
Prerequisites	-	1/2	PC	3	0	0	3
Preamble	This course provides introduction to the basic concept with their effects. It introduces the phenomenon of fric learning in applied mechanics and develops problem-so	ction and its e					
Jnit - I	Statics of Particles						ç
Forces – Resoluti	ws of Mechanics – Parallelogram and Triangular Law of ion and Composition of Force - Free Body Diagram – Eo tationof Forces – Equilibrium of a Particle in Space.						
Jnit - II	Statics of Rigid Bodies						ę
Theorem – Equiva Stable Equilibrium Equilibrium of Rigi	It of a Force about a Point and about an Axis – Vectorial F alent Systems of Forces – Single Equivalent Force. Type n – Equilibrium of Rigid Bodies in Two Dimensions – d Bodies in Three Dimensions.	s of Support	s and their Rea	action	s – R	equire	ements o Sections
Jnit - III	Properties of Surfaces and Solids						9
Determination of A	Areas and Volumes — First Moment of Area and Centroid	of Sections	– T Section - I	Secti	on - A	Angle	Section
Hollow Section Fro Axis Theorem - T Moment of Inertia Jnit - IV Friction: Surface F	Areas and Volumes — First Moment of Area and Centroid om Primary Simpler Sections — Second Moment of Plan Section - I Section - Angle Section - Hollow Section — Po of Plane Area - Mass Moment of Inertia – Relation to Area I Friction and Rectilinear motion of particles Friction – Laws of Dry Friction – Sliding Friction – Static a	e Areas — F olar Moment Moments of Ir nd Kinetic Fr	Parallel Axis Th of Inertia — Pro nertia. iction – Ladder	eoren oduct Fricti	n and of Ine on – \	Perp ertia - Wedg	Section pendicula Principa
Hollow Section Fro Axis Theorem - T <u>Moment of Inertia</u> Jnit - IV Friction: Surface F - Belt Friction. Re	Areas and Volumes — First Moment of Area and Centroid om Primary Simpler Sections — Second Moment of Plan Section - I Section - Angle Section - Hollow Section — Po of Plane Area - Mass Moment of Inertia – Relation to Area I Friction and Rectilinear motion of particles	e Areas — F olar Moment Moments of Ir nd Kinetic Fr	Parallel Axis Th of Inertia — Pro nertia. iction – Ladder	eoren oduct Fricti	n and of Ine on – \	Perp ertia - Wedg	Section pendicula Principa
Hollow Section Fre Axis Theorem - T Moment of Inertia Jnit - IV Friction: Surface F - Belt Friction. Re Curvilinear Motion Jnit - V	Areas and Volumes — First Moment of Area and Centroid om Primary Simpler Sections — Second Moment of Plan Section - I Section - Angle Section - Hollow Section — Po of Plane Area - Mass Moment of Inertia – Relation to Area I Friction and Rectilinear motion of particles Friction – Laws of Dry Friction – Sliding Friction – Static a ectilinear Motion of Particles: Displacement - Velocity and — Projectile Motion. Dynamics of Particles and Kinematics of Rigid body	e Areas — F olar Moment Moments of Ir nd Kinetic Fr Acceleration	Parallel Axis Th of Inertia — Pro- nertia. iction – Ladder and their Relat	eoren oduct Frictie ionshi	n and of Ine on – \ p – R	Perp ertia - Wedg Relativ	Section pendicula Principa e Friction re Motion
Hollow Section Fre Axis Theorem - T Moment of Inertia Jnit - IV Friction: Surface F - Belt Friction. Re Curvilinear Motion Jnit - V Dynamics of Par	Areas and Volumes — First Moment of Area and Centroid om Primary Simpler Sections — Second Moment of Plan Section - I Section - Angle Section - Hollow Section — Po of Plane Area - Mass Moment of Inertia – Relation to Area I Friction and Rectilinear motion of particles Friction – Laws of Dry Friction – Sliding Friction – Static an ectilinear Motion of Particles: Displacement - Velocity and — Projectile Motion.	e Areas — F olar Moment Moments of Ir nd Kinetic Fr Acceleration y Momentum	Parallel Axis Th of Inertia — Pro- nertia. iction – Ladder and their Relat Principles — I	eoren oduct Frictionshi	n and of Ine on – \ p – R	Perp ertia - Wedg Relativ	Section pendicula Principa e Friction re Motion
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Hollow Section Fraction Axis Theorem - T Moment of Inertia Jnit - IV Friction: Surface F - Belt Friction. Re Curvilinear Motion Jnit - V Dynamics of Par Kinematics of Rigid TEXT BOOK: 1	Areas and Volumes — First Moment of Area and Centroid om Primary Simpler Sections — Second Moment of Plan Section - I Section - Angle Section - Hollow Section — Po of Plane Area - Mass Moment of Inertia – Relation to Area I Friction and Rectilinear motion of particles Friction – Laws of Dry Friction – Sliding Friction – Static an ectilinear Motion of Particles: Displacement - Velocity and — Projectile Motion. Dynamics of Particles and Kinematics of Rigid body ticles: Newton's Law, Work - Energy and Impulse - d Body: Translation - Rotation about a Fixed Axis – General	e Areas — F olar Moment Moments of Ir nd Kinetic Fr Acceleration y Momentum Plane Motion.	Parallel Axis Th of Inertia — Pro- nertia. iction – Ladder and their Relat Principles — I Kinetics of Rigi	eoren oduct Frictiv ionshi mpact d Bod	n and of Ine on – \ p – R t of I ly.	Perp ertia - Wedg Relativ	Section pendicula Principa le Friction re Motion c Bodies Total:4
Hollow Section Fraction Axis Theorem - T Moment of Inertia Jnit - IV Friction: Surface F Belt Friction. Recurvilinear Motion Jnit - V Dynamics of Par Kinematics of Rigid TEXT BOOK: 1. Rajaseka Chennai, REFERENCES: 1 Beer Fer	Areas and Volumes — First Moment of Area and Centroid om Primary Simpler Sections — Second Moment of Plan Section - I Section - Angle Section - Hollow Section — Po of Plane Area - Mass Moment of Inertia – Relation to Area I Friction and Rectilinear motion of particles Friction – Laws of Dry Friction – Sliding Friction – Static an ectilinear Motion of Particles: Displacement - Velocity and — Projectile Motion. Dynamics of Particles and Kinematics of Rigid body ticles: Newton's Law, Work - Energy and Impulse - d Body: Translation - Rotation about a Fixed Axis – General	e Areas — F olar Moment <u>Moments of Ir</u> nd Kinetic Fr Acceleration y Momentum Plane Motion. Engineering M	Parallel Axis Th of Inertia — Pro- nertia. iction – Ladder and their Relat Principles — I Kinetics of Rigi flechanics", 3 rd Sanjeev Sang	eoren oduct Frictie ionshi mpact d Bod	n and of Ine on – \ p – R t of I ly.	Perpertia - Wedg Relativ Elastic	Section pendicula Principa le Friction re Motion c Bodies Total:4
Hollow Section Fraction Axis Theorem - T Moment of Inertia Jnit - IV Friction: Surface F Belt Friction. Recurvilinear Motion Jnit - V Oynamics of Par Kinematics of Rigid Textr BOOK: 1. Rajaseka Chennai, REFERENCES: 1. Beer Fer Engineer 2.	Areas and Volumes — First Moment of Area and Centroid om Primary Simpler Sections — Second Moment of Plan Section - I Section - Angle Section - Hollow Section — Po of Plane Area - Mass Moment of Inertia – Relation to Area I Friction and Rectilinear motion of particles Friction – Laws of Dry Friction – Sliding Friction – Static an ectilinear Motion of Particles: Displacement - Velocity and — Projectile Motion. Dynamics of Particles and Kinematics of Rigid body ticles: Newton's Law, Work - Energy and Impulse - d Body: Translation - Rotation about a Fixed Axis – General aran S and Sankarasubramanian G, "Fundamentals of E 2017.	e Areas — Folar Moment Moments of Ir nd Kinetic Fr Acceleration Momentum Plane Motion. Engineering M J. Cornwell, n, Chennai, 2 tion, New Dell	Parallel Axis Th of Inertia — Pro- nertia. iction – Ladder and their Relat Principles — I Kinetics of Rigi Iechanics", 3 rd Sanjeev Sang 019. ni, 2017.	eoren oduct Frictie ionshi mpact d Bod	n and of Ine on – \ p – R t of I ly.	Perpertia - Wedg Relativ Elastic	Section Dendicula Principa le Friction re Motion c Bodies Total:4



COURS On com			-	se, the s	tudent	s will be a	ble to						(۲	BT Mapp lighest L	
CO1	repre	esent	the force	es in vecto	or comp	onents (bo	th 2D ai	nd 3D) a	and apply	y equilibri	um cono	ditions	Ap	plying (K3	()
CO2				nent proc body sys		oy various	force s	ystems	and co	nclude th	e static	equilibriu	m Ar	nalyzing (K	.4)
CO3		pute t ective		roid, centi	re of g	ravity and i	moment	of iner	tia of ge	ometrica	shapes	and solic	ls Ar	oplying (K3	5)
CO4	man	ipulate	e the eff	ect of dry	friction	and its app	lications	6					Ap	oplying (K3	s)
CO5	appl	y the o	different	principles	to stud	dy the motio	on of a b	ody and	d analyse	e their co	nstitutive	equations	s Ar	alyzing (K	4)
						Mapping	of CO	s with	POs an	d PSOs					
COs/P	D P	PO1	PO2	PO3	PO4		PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	2	2	1								1		3
CO2		3	2	2	1								1		3
CO3		3	2	2	1								1		3
CO4		3	2	2	1								1		3
CO5		3	2	2	1								1		3
1 – Sligl	nt, 2 -	- Mod	lerate, 3	3 – Subst	tantial,	BT- Bloor	n's Tax	konomy	/		1	1	ш		
						ASSESS	MENT	PATTE	ERN – T	HEORY					
	Test / Bloom's Remembering Category* (K1) %			Underst (K2)			plying (3) %	Analy (K4	•	Evaluat (K5) %	U U	reating (K6) %	Tota %		
	CAT1			5		5			70	2	D				100
	CAT2			5		5			70	2	D				100
	CAT3			5		5			70	2	0				100
	ESE			5		5			70	2	0				100
* ±3% n	nay b	e var	ied (CA	T 1,2,3 -	- 50 m	arks & E	SE – 10	0 mar	ks)				. <u></u>		



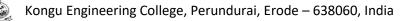
	(Cc	mmon to All Engineering and Technology branches exce	pt CSE. IT	CSD, AIDS	& A	IML)		
Progra Branc	amme &	All BE/BTech Engineering & Technology branches, except CSE, IT, CSD, AIDS & AIML	Sem.	Category	L	т	Р	Credit
Prere	quisites	Nil	1	BS	3	0	2	4
Pream	nble	The course aims to provide exposure to problem-solvin fundamental concepts of C Programming. This course provi C						
Unit –	•1	Introduction to C and Operators:						9
		C program – Compiling and executing C program – C Toker Variables – constants – Input / Output statements – Operators		cter set in C	– Ke	eywoi	rds –	identifiers
Unit –	·II	Control Statements and Arrays:						9
		d looping statements, Arrays: Declaring, initializing and a and their operations.	ccessing a	arrays – oper	atior	ns on	arra	ys — Two
Unit –	· 111	Functions:						9
		on- Using functions, function declaration and definition – func ata types and arrays – storage classes – recursive functions	tion call –	return statem	ent -	- pas	sing p	barameter
Unit –	١V	Strings and Pointers:						9
		n – operations on strings: finding length, concatenation, on strings. Pointers : declaring pointer variables – p						
	, pointers and			ression and a		ietic,	pointe	ers and 1
	, pointers and			ression and a			pointe	ers and 11
arrays Unit – User-c enume	, pointers and • V defined data t erated data ty	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of be. File Handling : Introduction - opening and closing files – i	of structure	e – structure	and	l func	ctions	9 -unions
arrays Unit – User-c enume positic	 pointers and V defined data t perated data type point indicator : fs 	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of	of structure	e – structure	and	l func	ctions	9 -unions
arrays Unit – User-c enume positic LIST (pointers and V defined data t parated data type point indicator : fs DF EXPERIMINATION 	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of the Handling : Introduction - opening and closing files – is the seek(), ftell() and rewind() ENTS / EXERCISES:	of structure reading an	e – structure	and	l func	ctions	9 -unions
arrays Unit – User-c enume positic LIST (e, pointers and V defined data t erated data ty on indicator : fs OF EXPERIMI Programs fo	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of be. File Handling : Introduction - opening and closing files – n seek(), ftell() and rewind()	of structure reading an	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
arrays Unit – User-c enume positic LIST (1. 2.	e, pointers and V defined data t erated data typon indicator : fs DF EXPERIMI Programs fo Programs fo	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of be. File Handling : Introduction - opening and closing files – i beek(), ftell() and rewind() ENTS / EXERCISES: br demonstrating the use of different types of format Specifiers	of structure reading an	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
arrays Unit – User-c enume positic LIST (pointers and V defined data t erated data ty on indicator : fs DF EXPERIMI Programs fo Programs fo Programs fo	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of be. File Handling : Introduction - opening and closing files – ne seek(), ftell() and rewind() ENTS / EXERCISES: br demonstrating the use of different types of format Specifiers br demonstrating the use of different types of operators like ari	of structure reading an	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
unit – User-c enume positic LIST (1. 2. 3. 4.	 pointers and V defined data terreted data type on indicator : fs OF EXPERIMI Programs fo Programs fo Programs fo Programs fo 	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of be. File Handling : Introduction - opening and closing files – i seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like ari or demonstrating the use of using decision making statements	of structure reading an	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
unit – User-cenume positic LIST (1. 2. 3. 4. 5.	pointers and V defined data t erated data ty on indicator : fs DF EXPERIMI Programs fo Program fo Program fo Program fo Program fo Program fo Program fo	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of be. File Handling : Introduction - opening and closing files – ne seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like ari- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures	of structure reading an	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
arrays Unit – User-c enume positic LIST (1. 2. 3. 4. 5. 6.	pointers and v defined data t erated data ty on indicator : fs DF EXPERIMI Programs fo	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of the teach of teach of the teach of teac	of structure reading an	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
arrays Unit – User-cenume positic LIST (1. 2. 3. 4. 5. 6. 7.	pointers and V defined data t erated data ty on indicator : fs DF EXPERIMI Programs fc Program	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of be. File Handling : Introduction - opening and closing files – is seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like ariser demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating the use of repetitive structures or demonstrating the use of arrays	of structure reading an	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
arrays Unit – User-c enume positic 1. 2. 3. 4. 5. 6. 7. 8.	pointers and v defined data t erated data ty on indicator : fs DF EXPERIMI Programs fo Programs Programs fo Programs fo Pr	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of be. File Handling : Introduction - opening and closing files – if seek(), ftell() and rewind() ENTS / EXERCISES: or demonstrating the use of different types of format Specifiers or demonstrating the use of different types of operators like ari- or demonstrating the use of using decision making statements or demonstrating the use of repetitive structures or demonstrating one-dimensional arrays or demonstrating two-dimensional arrays o demonstrate modular programming concepts using function	of structure reading an s thmetic, log	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
arrays Unit – User-cenume positic LIST (1. 2. 3. 4. 5. 6. 7. 8. 9.	pointers and V defined data t erated data ty on indicator : fs DF EXPERIMI Programs fc Programs fc Programs fc Programs fc Programs fc Programs fc Programs t Program	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of the transformed closing files – transformed closing the use of different types of format Specifiers for demonstrating the use of different types of operators like arrition of the use of different types of operators like arrition of the use of using decision making statements for demonstrating the use of repetitive structures for demonstrating one-dimensional arrays for demonstrating two-dimensional arrays for demonstrate modular programming concepts using function of demonstrate recursive functions.	of structure reading an s thmetic, log	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
arrays Unit – User-cenume positic LIST (1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	pointers and v	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of the teach of teach of the teach of teach o	of structure reading an s thmetic, log	e – structure d writing data	and to f	l func iles -l	ctions Manip	9 -unions pulating fil
arrays Unit – User-c enume positic LIST (1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	pointers and v	strings User-defined Data Types and File Handling: ypes: Structure: Introduction – nested structures– arrays of the transformed structures and closing files – the transformed structure introduction - opening and closing files – the transformed structure intervention of the transformed structure intervention interventinterventinterventintere	of structure reading an s thmetic, log	e – structure d writing data gical, relationa	and to f	I func iles -l	mary o	9 -unions pulating fil
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1.	Yas	havant	Kanetkar	, "Let us (C", 16 [.]	th Edition,	BPB Pu	ublicatio	ns, 20	18.					
2.	Sum	nitabha	Das, "Co	mputer F	undan	nentals an	d C Prog	grammi	ng", 1s	t Edition,	McGra	aw Hill, 2018	3.		
3.	Bala	agurusa	my E., "F	Programm	ing in	ANSI C",	7th Editi	on, Mc	Graw H	lill Educa	ation, 2	017.			
4.		rouz A. gage,2(n & Richa	rd F.G	Gilberg, "C	omputer	Scienc	e A St	ructured	Progra	mming Appr	oach Usi	ng C", 3 rd	Edition,
5.				mming.co	m/tuto	orial/c-tuto	rial.html								
		UTCOM		se, the st	udent	s will be	able to						(BT Map Highest L	
CO1		elop sim			Applying Precision	(K3),									
CO2		tify the se stater		ate loopii	ng and	d control s	statemer	nts in C	and o	develop a	applica	tions using		Applying Precision	(K3),
CO3				ograms u	sing th	ne concep	ts of arra	ays and	modul	ar progra	amming	9		Applying Precision	(K3),
CO4	appl	ly the co	oncepts o	of pointers	and o	develop C	program	ns using	g string	s and po	inters			Applying Precision	(K3),
CO5	mak	e use o	f user-de	fined data	a type:	s and file (concepts	s to solv	e give	n probler	ns			Applying Precision	(K3),
														11000001	(00)
						Mappin	g of CO	s with	POs a	nd PSOs	5				
COs/	POs	PO1	PO2	PO3	PO	4 PO5	PO6	P07	PO8	PO9	P010	PO11	PO12	PSO1	PSO2
CO)1	3	2	2	2	1				1	1		1		
CO	2	3	2	2	2	1				1	1		1		
CO	3	3	2	2	2	1				1	1		1		
CO	94	3	2	2	2	1				1	1		1		
CO	95	3	2	2	2	1				1	1		1		
1 – Sli	ght, 2	– Mode	rate, 3 –	Substant	ial, BT	- Bloom's	Taxono	my							
Tes	st / Blo	oom's	Re	memberi	na	ASSES				THEORY Analyzi		Evaluating	ı C	reating	Tota
C	Catego			(K1) %	0	(K2)		(K3)	%	(K4) %		(K5) %		(K6) %	%
	CAT			10		30		60							100
	CAT			10		30		60							100
	CAT ESE			10 10		30		60 60							100
			1	111		.50	,	0	1		1		1		100



	(Common to All Engineering a	nd Technology	Branches)				
Programme & Branch	All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	1	ES	2	1	0	3
Preamble	To impart knowledge on orthographic, isometric solving different application oriented problems.	c projections, s	sectional views	and deve	elopmen	it of su	rfaces by
Unit – I	General Principles of Orthographic Projection	:					6+3
Orthographic Pro Located in the Fi Surface and Circ	Drawing Sheets - Lettering and Dimensioning - Pr ojection - First Angle Projection - Layout of Views - rst Quadrant - Determination of True Lengths and T ular Lamina Inclined to both Reference Planes.	Projection of F	oints Located ir	n all Qua	drant ar	nd Strai	ght Line Polygona
Unit – II	Projections of Solid:						6+3
Projections of S Change of Posit	imple Solids Like Prisms, Pyramids, Cylinder and on Method.	Cone when the	ne Axis is inclir	ned to O	ne Refe	erence	Plane by
Unit – III	Sectioning of Solids:						6+3
Sectioning of So Plane and Perpe	ids - Prisms, Pyramids, Cylinder and Cone in Simpl ndicular to the other - Obtaining True Shape of Section	e Vertical Posi m.	tion by Cutting I	Planes in	clined to	o One F	Reference
	Development of Surfaces:						6+3
Unit – IV							
Development of	Lateral Surfaces of Simple Solids Like Prisms, Pyra Prisms, Pyramids, Cylinders and Cones.	mids, Cylinder	s and Cones -E	Developm	ent of S	Simple ⁻	Truncated
Development of		· •	s and Cones -E)evelopm	ent of S	Simple ⁻	Truncated
Development of Solids Involving F Unit – V Principles of Ison	Prisms, Pyramids, Cylinders and Cones.	CAD: actions of Simp	ble and Truncate	ed Solids	Like P		6+3
Development of Solids Involving F Unit – V Principles of Ison	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to AutoOmetric Projection - Isometric Scale - Isometric Projection Projection - Isometric Scale - Isometric Projection - Isometric Projection - Isometric Scale - Isometric Projection - Isomet	CAD: actions of Simp	ble and Truncate	ed Solids	Like P D.	risms,	6+3 Pyramids
Development of Solids Involving F Unit – V Principles of Ison	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to AutoOmetric Projection - Isometric Scale - Isometric Projection Projection - Isometric Scale - Isometric Projection - Isometric Projection - Isometric Scale - Isometric Projection - Isomet	CAD: actions of Simp	ble and Truncate	ed Solids	Like P D.	risms,	6+3 Pyramids
Development of Solids Involving F Unit – V Principles of Ison Cylinders and Co TEXT BOOK:	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to AutoOmetric Projection - Isometric Scale - Isometric Projection Projection - Isometric Scale - Isometric Projection - Isometric Projection - Isometric Scale - Isometric Projection - Isomet	CAD: ections of Simp aphic Projection	ble and Truncate - Introduction to L	ed Solids AutoCA Lecture: 3	Like P D. 30, Tutc	risms, prial:15	6+3 Pyramids
Development of Solids Involving F Unit – V Principles of Ison Cylinders and Co	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to Autoor metric Projection - Isometric Scale - Isometric Proje nes - Conversion of Isometric Projection into Orthogra	CAD: ections of Simp aphic Projection	ble and Truncate - Introduction to L	ed Solids AutoCA Lecture: 3	Like P D. 30, Tutc	risms, prial:15	6+3 Pyramids
Development of Solids Involving F Unit – V Principles of Iso Cylinders and Co TEXT BOOK: 1. Natara REFERENCES:	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to Autoor metric Projection - Isometric Scale - Isometric Proje nes - Conversion of Isometric Projection into Orthogra	CAD: ections of Simp aphic Projection	ole and Truncate - Introduction to L akshmi Publisher	ed Solids AutoCA Lecture: :	Like P D. 30, Tutc ai, 2022	risms, prial:15 2,	6+3 Pyramids , Total:4
Development of Solids Involving F Unit – V Principles of Iso Cylinders and Co TEXT BOOK: 1. Natar REFERENCES: 1. Venug	Prisms, Pyramids, Cylinders and Cones. Isometric Projection and Introduction to Auto(metric Projection - Isometric Scale - Isometric Projection en sometric Projection into Orthogra	CAD: ections of Simp aphic Projection dition, Dhanala 16 th Edition, Ne	ole and Truncate a - Introduction to kshmi Publisher ew Age Internati	ed Solids AutoCA -ecture: : rs, Chenn onal Publ	Like P D. 30, Tutc ai, 2022	risms, prial:15 2,	6+3 Pyramids , Total:4



COURSE On comp			: course, the	e studer	nts will I	be able	to							Mapped lest Leve	
CO1	interp plane		rnational s	tandards	s of draw	ings an	d sketch	the pro	jections	of points	s, lines an	d	Арр	lying (K3)
CO2	draw	the pro	jections of	3D prim	itive obje	ects like	prisms,	pyramie	ds, cylind	ders and	cones		Арр	lying (K3	6)
CO3	const	ruct the	e various se	ectional	views of	solids li	ke prism	ns, pyra	mids, cy	linders a	nd cones		Арр	lying (K3)
CO4	devel	op the	lateral surfa	aces of s	simple a			Арр	lying (K3)					
CO5		develop the lateral surfaces of simple and truncated solids sketch the isometric projections of simple and truncated solids and convert iso drawing into orthographic projection											Арр	lying (K3	;)
					Ма	apping	of COs	with PC)s and F	SOs					
COs/P	os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO
CO	1	3	2			2					3		2		
CO	2	3	2	1		2					3		2		
CO	3	3	2	1		2					3		2		
CO	4	3	2	1		2					3		2		
CO	5	3	2	1		2					3		2		
1 – Slight	t, 2 – Mo	oderate	e, 3 – Subs	tantial, E	BT- Bloor	n's Tax	onomy				•				
					AS	SESS	IENT P	ATTER	N – THE	ORY					
Test / Bl Catego			embering K1) %		erstandi K2) %	ng /	Applyin (K3) %	-	Analyziı (K4) %	-	Evaluat (K5) %	•	Creatin (K6) %		otal %
CAT	1		6		9		85								100
CAT	2		6		9		85								100
CAT	3		6		9		85								100
ESE	Ξ		10		10		80								100
* ±3% ma	ay be va	ried (C	AT 1,2,3 –	50 mark	ks & ESE	E – 100	marks)								



Programme &	• • •	மரபு					
Programme &	(Common to All Engineering and Te	chnology Branch	es)			1	
Branch	All BE / BTech Branches	Sem.	Category	L	Т	Р	Credit
Prerequisites	Nil	1/2	HS	1	0	0	1
Preamble	தமிழர்களின் மொழி, இலக்கியம், ஓவியங் வீர விளையாட்டுக்கள், திணைக் கோட்பா பங்களிப்பைப் பற்றிய அறிவை வழங்குவ	டுகள், இந்திய	ப பண்பாட்	цġ	த்த	் தமீ	
அல ரு – I	மொழி மற்றும் இலக்கியம்						3
அறம் – திருசு சமயங்களின் தமிழில் நவீன ஆகியோரின் 1 அலகு – 11	பங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பு க்குறளில் மேலாண்மைக் கருத்துக்கள் – தமி தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் ப றலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய பங்களிப்பு. 	ழ் காப்பியங்க மற்றும் நாயல் வளர்ச்சியில் வியங்கள் வல	ள், தமிழச ாமார்கள் - பாரதியார ரை – சிற்ப ு	த்தில் - சிர ர மர க் கல	ல் ச ற்றில ற்றுட லை	ம்ண லக்கி ம் பா	பௌத்த பங்கள் ரதிதாசன் 3
தயாரிக்கும் எ நாட்டுப்புறத் (கைவினைப் பொருட்கள், பொம்மைகள் – ஆே தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவ , யாழ், நாதஸ்வரம் – தமிழாகளின் சமூக பெ	தர் செய்யும் பர் சிலை – ப	ക്കെറ്റ് – இசைக் கழ	சுடுப நவிச	वर्ळ्ज ऊना	்சிற் – மி	பங்கள் ருதங்கம்
ച്ചാര്ര – 111	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளைய	பாட்டுக்கள்					3
தெருக்கூத்து,		<u>கத்து</u> , ஒயில	ரட்டம், (தால	ப்பாச	തഖദ്	ந ஆ த்த
புறக் கோட்பா கல்வியும் – ச	தாவரங்களும், விலங்குகளும் – தொல்காப்பிய டுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு சங்ககால நகரங்களும் துறை முகங்களும் – ச ாடுகளில் சோழர்களின் வெற்றி. இந்திய தேசிய இயக்கம் மற்றும் இந்திய ப	– சங்க கால சங்ககாலத்தில்	த்தில் தமி ஏற்றுமதி	ழக்த் மற்	தில்	តម្ម	<u>த்தறி</u> வுப்
916)/75 – V			ЭшЭною				5
அலகு – v	பங்களிப்பு						
ு இந்திய விடு தாக்கம் – சுய	பங்களிப்பு தலைப்போரில் தமிழர்களின் பங்கு – இந்த மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு	் சித்த மருத்					
இந்திய விடு தாக்கம் – சுய கையெழுத்துப்	தலைப்போரில் தமிழா்களின் பங்கு – இந்த மரியாதை இயக்கம் – இந்திய மருத்துவத்தில்	் சித்த மருத்					வட்டுகள்
இந்திய விடு தாக்கம் – சுய கையெழுத்துப் TEXT BOOK:	தலைப்போரில் தமிழர்களின் பங்கு – இந்தீ மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாற	் சித்த மருத்					் எபாட்டில் வட்டுகள் Total: 1
இந்திய விடு தாக்கம் – சுய கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப	தலைப்போரில் தமிழா்களின் பங்கு – இந்த மரியாதை இயக்கம் – இந்திய மருத்துவத்தில்	் சித்த மருத்					வட்டுகள்
இந்திய விடு தாக்கம் – சுய கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப REFERENCES:	தலைப்போரில் தமிழர்களின் பங்கு – இந்தீ மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாற ாலன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 2022.	் சித்த மருத் _த ற	நுவத்தின் ப	лы́æ	, – <i>k</i>	கல்ெ	வட்டுகள் Total: 1
இந்திய விடு தாக்கம் – சுய கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப REFERENCES: 1 தமிழக	தலைப்போரில் தமிழர்களின் பங்கு – இந்தீ மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாற	் சித்த மருத் _த ற	நுவத்தின் ப	лы́æ	, – <i>k</i>	கல்ெ	வட்டுகள் Total: 1
இந்திய விடு தாக்கம் – சுய கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப REFERENCES: 1. தமிழக கல்விய	தலைப்போரில் தமிழர்களின் பங்கு – இந்தீ மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாற ாலன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 2022. வரலாறு- மக்களும் பண்பாடும்- கே கே பிள்ளை	் சித்த மருத்த பி. (வெளியீடு தப	நுவத்தின் ப	лы́æ	, – <i>k</i>	கல்ெ	வட்டுகள் Total: 1
இந்திய விடு தாக்கம் – சுய கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப REFERENCES: 1. தமிழக கல்விய 2. கணினி	தலைப்போரில் தமிழா்களின் பங்கு – இந்தீ மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாற ாலன், தமிழா் மரபு, VRB Publishers Pvt Ltd, 2022. வரலாறு- மக்களும் பண்பாடும்- கே கே பிள்ளை பியல் பணிகள் கழகம்)	் சித்த மருத்த று. (வெளியீடு தப சுரம்)	துவத்தின் ப ிழ்நாடு பாட	_நூ	, – ۶	கல்ெ	வட்டுகள் Total: 1
இந்திய விடு தாக்கம் – சுய கையெழுத்துப் TEXT BOOK: 1. ஆ. பூப REFERENCES: 1. தமிழக கல்விய 2. கணினி 3. கீழடி - 6	தலைப்போரில் தமிழர்களின் பங்கு – இந்தி மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாற ாலன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 2022. வரலாறு- மக்களும் பண்பாடும்- கே கே பிள்ளை பியல் பணிகள் கழகம்) 1த்தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரச	் சித்த மருத்த று. (வெளியீடு தப சுரம்) (தொல்லியல்	துவத்தின் ப ிழ்நாடு பாட	_நூ	, – ۲	கல்ெ	வட்டுகள் Total: 1



COUR			-	, மாண	வர்கள்									BT Map Highest	•
CO1	தமி		ாழி ம	ற்றும் (் மதி	ப்புமிக்	ቆ ቆጡ	ுத்துக் க	ണെ ഒ	பிளக்க		erstanding	
CO2	தமி	ழர்க	றின் சி	ற்பம் மற்	ற்றும் ச	அவர்க	ரின் ஒ	வியங்	கள் ப	ற்றி வி	ளக்க பு	றடியும்.	Unde	erstanding	g (K2)
CO3		ழர்க (மடி		ட்டுப்புற	ற மற்ற	றம் தற்க	காப்புக்	கலை	ക്തണ	ப் பற்றி) சுருக்க	கமாகக்	Unde	erstanding	g (K2)
CO4	தமி	ழர்க	றின் தி		Unde	erstanding	g (K2)								
CO5				இயக்கம் 1 விளக்க			திய பல	ன்பாட்	டிற்கு	த் தமிழ	ர்களில்	Π	Unde	erstanding	g (K2)
						Марр	ing of C	COs wit	h POs	and PS	Os				
COs/P	os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1						3		3	2	2		3		
CO2	2						3		3	2	2		3		
COS	3						3		3	2	2		3		
CO4	1						3		3	2	2		3		
CO5	5						3		3	2	2		3		
1 – Slię	ght, 2	– Mod	erate, 3	 Substa 	ntial, B	T- Bloom	's Taxoi	nomy							
						ASSE	SSMEN	IT PAT	TERN	- THEO	RY				
	Test / Bloom's Category*Remembering (K1) %Understanding (K2) %Applying (K3) %Analyzing (K4) %Evaluating (K5) %											eating <6) %	Total %		
	CAT	1		40		60									100
	CAT2	2		40		60									100
	CAT	3		40		60									100
	ESE									NA					
* ±3%	may b	e varie	ed (CAT	1,2&3	– 50 ma	arks)									

	22TAM01 - HERITAG	GE OF TAMILS					
	(Common to All Engineering an	d 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 arts, heroic games, doctrines, contribution of Tan		ge, literature,	, pain	tings,	sculp	otures, folk
UNIT I	Language and Literature						3
sangam literatur buddhism & jair literature in tamil	es in india - dravidian languages – tamil as a classi e – distributive justice in sangam literature - man- ism in tamil land - bakthi literature azhwars and n - contribution of bharathiyar and bharathidhasan.	agement principles ir ayanmars - forms of	thirukural -	tamil	epic	s and	d impact o
UNIT II	Heritage - Rock Art Paintings to Modern Art –	 Sculpture 					3
	e deities, thiruvalluvar statue at kanyakumari, maki m - role of temples in social and economic life of tam		ients - mriana	angai	, թա		
and nadhaswara UNIT III Therukoothu – k	m - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam	nils.					3 nce - sport
and nadhaswara UNIT III Therukoothu – k and games of ta	m - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam	nils.					-
and nadhaswara UNIT III Therukoothu – k and games of ta UNIT IV Flora and fauna	 m - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam mils. Thinai Concept of Tamils a of tamils & aham and puram concept from tholk teracy during sangam age - ancient cities and por 	nils. - leather puppetry – si kappiyam and sangai	ilambattam – n literature -	valar	i - tig	er dar	nce - sport
and nadhaswara UNIT III Therukoothu – k and games of ta UNIT IV Flora and fauna education and li	 m - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam mils. Thinai Concept of Tamils a of tamils & aham and puram concept from tholk teracy during sangam age - ancient cities and por 	nils. - leather puppetry – s kappiyam and sangar ts of sangam age - e	lambattam – n literature - export and im	valar	i - tig	er dar	nce - sport
and nadhaswara UNIT III Therukoothu – k and games of ta UNIT IV Flora and fauna education and li overseas conque UNIT V Contribution of	m - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - mils. Thinai Concept of Tamils of tamils & aham and puram concept from tholk teracy during sangam age - ancient cities and por est of cholas.	hils. - leather puppetry – si kappiyam and sangar ts of sangam age - e vement and Indian Cu luence of tamils over	lambattam – n literature - export and im liture the other pa	valar arar	i - tigo n cor durin	er dar ncept g sar ia – s	ance - sport 3 of tamils ngam age 3 self-respen nil books.
and nadhaswara UNIT III Therukoothu – k and games of ta UNIT IV Flora and fauna education and li overseas conque UNIT V Contribution of movement - role	 m - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam mils. Thinai Concept of Tamils of tamils & aham and puram concept from tholk teracy during sangam age - ancient cities and por est of cholas. Contribution of Tamils to Indian National Mov tamils to indian freedom struggle - the cultural infl 	hils. - leather puppetry – si kappiyam and sangar ts of sangam age - e vement and Indian Cu luence of tamils over	lambattam – n literature - export and im liture the other pa	valar arar	i - tigo n cor durin	er dar ncept g sar ia – s	ace - sport
and nadhaswara UNIT III Therukoothu – k and games of ta UNIT IV Flora and fauna education and li overseas conque UNIT V Contribution of movement - role	 m - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam mils. Thinai Concept of Tamils a of tamils & aham and puram concept from tholk teracy during sangam age - ancient cities and por est of cholas. Contribution of Tamils to Indian National Mov tamils to indian freedom struggle - the cultural infl of siddha medicine in indigenous systems of medicine 	nils. - leather puppetry – si kappiyam and sangar ts of sangam age - e vement and Indian Cu luence of tamils over ne – inscriptions & ma	ilambattam – m literature - export and im Ilture the other pa nuscripts – pi	valar aran nport	i - tigo n cor durin	er dar ncept g sar ia – s	of tamils of tamils ngam age 3 self-respenil books.
and nadhaswara UNIT III Therukoothu – k and games of ta UNIT IV Flora and fauna education and li overseas conque UNIT V Contribution of movement - role TEXT BOOK: 1. S.Muthu	 m - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam mils. Thinai Concept of Tamils of tamils & aham and puram concept from tholk teracy during sangam age - ancient cities and por est of cholas. Contribution of Tamils to Indian National Mov tamils to indian freedom struggle - the cultural infl 	nils. - leather puppetry – si kappiyam and sangar ts of sangam age - e vement and Indian Cu luence of tamils over ne – inscriptions & ma	ilambattam – m literature - export and im Ilture the other pa nuscripts – pi	valar aran nport	i - tigo n cor durin	er dar ncept g sar ia – s	of tamils of tamils ngam age 3 self-respenil books.
and nadhaswara UNIT III Therukoothu – k and games of ta UNIT IV Flora and fauna education and li overseas conque UNIT V Contribution of movement - role TEXT BOOK: 1. S.Muthu REFERENCES: 1. Historica Tamil St	Folk and Martial Arts Aragattam - villu pattu - kaniyan koothu – oyillattam - mils. Thinai Concept of Tamils of tamils & aham and puram concept from tholk teracy during sangam age - ancient cities and por est of cholas. Contribution of Tamils to Indian National Mov tamils to indian freedom struggle - the cultural infl of siddha medicine in indigenous systems of medicir rramalingam, M.Saravanakumar, Heritage of Tamils, al Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.k rudies).	 Ieather puppetry – si kappiyam and sangar ts of sangam age - e rement and Indian Co luence of tamils over ne – inscriptions & ma Yes Dee Publishing F K.D. Thirunavukarasu 	lambattam – m literature - export and im ulture the other pa nuscripts – pr Pvt Ltd, 2023.	valar arar aport arts c rint hi	i - tig n cor durin of ind story	er dar ncept g sar ia – : of tar	ace - sport of tamils agam age 3 self-respen nil books. Total: 1
and nadhaswara UNIT III Therukoothu – k and games of ta UNIT IV Flora and fauna education and li overseas conque UNIT V Contribution of movement - role TEXT BOOK: 1. S.Muthu REFERENCES: 1. Historica Tamil St	Im - role of temples in social and economic life of tam Folk and Martial Arts aragattam - villu pattu - kaniyan koothu – oyillattam - mils. Thinai Concept of Tamils of tamils & aham and puram concept from tholk teracy during sangam age - ancient cities and por est of cholas. Contribution of Tamils to Indian National Mov tamils to indian freedom struggle - the cultural infl of siddha medicine in indigenous systems of medicir uramalingam, M.Saravanakumar, Heritage of Tamils, al Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.Hudies). ntribution of Tamil of the Tamils to Indian Culture(I	 Ieather puppetry – si kappiyam and sangar ts of sangam age - e rement and Indian Co luence of tamils over ne – inscriptions & ma Yes Dee Publishing F K.D. Thirunavukarasu 	lambattam – m literature - export and im ulture the other pa nuscripts – pr Pvt Ltd, 2023.	valar arar aport arts c rint hi	i - tig n cor durin of ind story	er dar ncept g sar ia – : of tar	ace - sport of tamils agam age 3 self-respen nil books. Total: 1

		OUTCOI etion of		ourse, the	studen	ts will be	e able to	D						BT Map Highest	
CO1	exp	olain val	uable	concepts i	n langu	age and	literatur	e of tam	nils.				Und	erstanding	g (K2)
CO2	illu	strate al	bout th	he tamils so	culpture	and their	paintin	gs.					Und	erstanding	g (K2)
CO3	sur	nmarize	e abou	it the tamils	folk and	d martial	arts.						Und	erstanding	g (K2)
CO4	exp	plain the	thina	i concept o	f tamils.								Und	erstanding	g (K2)
CO5	exp	plain the	e contr	ibution of T	amils to	the India	an Natic	onal Mov	vement	and Inc	lian cultu	re.	Und	erstanding	g (K2)
						Маррі	ing of C	Os witl	h POs	and PS	Os				
COs/F	os	PO1	PO	2 PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1						3		3	2	2		3		
CO2	2						3		3	2	2		3		
COS	3						3		3	2	2		3		
CO4	4						3		3	2	2		3		
COS	5						3		3	2	2		3		
1 – Sli	ght, 2	2 – Mod	erate,	3 – Substa	ntial, B	T- Bloom	's Taxor	nomy						I	
						ASSE	SSMEN		FERN -	THEOF	RY				
	ateg	loom's ory*		Remembe (K1) %	•	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		eating (6) %	Total %
	CA	T1		40		60									100
	CA	T2		40		60									100
	CA	ТЗ		40		60									100
	ES	E						÷		NA	·		·		

				(Comm	ion to A	ll Engin	eering a	and Tec	chnology	y Branch	es)				
Programm Branch	e &	All BE	E/BTech	n Branc	ches					Sem.	Category	L	т	Ρ	Credi
Prerequisi	tes	Nil								1	ES	0	0	2	1
Preamble			course eering p			o provid	de a ha	ands-on	ı experi	ence in	basic of r	nechar	nical a	and e	electrica
LIST OF E	XPERI	IENTS	/ EXER	CISES:											
					PA	RT A –	MECH	ANICAI	L ENGI	NEERING	3				
1.											t for Mating Plates using				
2.	Prepa	repare T / L / Lap Joint from given Wooden Work Piece and Make a Box / Tray out of Plywood using Modern ower Tools. erform the Thread Formation on a GI/PVC Pipe and Prepare a Water Line from the Overhead Tank that is													
3.		rform the Thread Formation on a GI/PVC Pipe and Prepare a Water Line from the Overhead Tank that is ak-Proof.													
4.	Make														
5.		ake a Butt / Lap / Tee Joint of MS Plate using Arc Welding Process and Welding Simulator. tivity: Prepare an Innovative Model with the Knowledge from Fitting / Carpentry / Plumbing / Weldin volving Modern Power Tools.													
				Р	ART B	– ELEC	TRICA	L AND	ELECT	RONICS	ENGINEE	RING			
6.	Wiring	g circuit	for fluor	escent	lamp ai	nd Stair	case w	iring							
7.	Wiring	g Circuit	of Inca	ndesce	nt lamp	using l	mpulse	Relay							
8.	Meas	urement	t of Eart	h Resis	stance										
9.	Solde	ring of S	Simple (Circuits	and tro	uble sh	ooting								
10.	Imple	mentatio	on of ha	lf wave	and ful	l wave l	Rectifie	using o	diodes						
														•	Total:3
REFEREN	CES/ M	ANUAL	/SOFT	WARE											
1.	Engin	eering F	Practice	s Labor	atory M	anual.									
COURSE O			urco th	o otud	onto wi	ll ha ah	la ta							Map	ped .evel)
On comple								ompletio	on of th	ne plann	ed models	1	Creat		
CO1	innov	ative art	icles					•		•		Μ	anipul	ation	(Ś2)
CO2	identi accur		use app	ropriate	e modei	n powe	er tools	and cor	mplete	the exerc	sises/mode		Apply anipul		
CO3		m hous	o wiring	and re	aliza the	aimpor	tance of	Aarthir					Appl	ying	(K3),
003	peno	mnous	e winng	anu ie				Carum	ig						n (S2)
CO4	solde	ring with	simple	electro	nics cir	cuits								ying ulatio	(rs), n (S2)
CO5	troubl	e shoot	the elec	ctrical a	nd elec	tronic c	ircuits							ying ulatio	(K3), n (S2)
					Марр	ing of (COs wit	h POs	and PS	Os					
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	2 PS	601	PSO
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
									2	2			1 -	3	2



			(Common to all BE/E	BTech branches)					
Prog Bran	ramme& ch	All BE/BTech brand	ches	Sem.	Category	L	т	Р	Credi
Prere	equisites	Nil		1 /2	ES	0	0	6	3
Prea	nble		ned to provide a founda Internet of Things and		engineering wi	th ha	inds-o	on exp	cerience
LIST	OF EXPER	MENTS / EXERCISES							
		Р	ART A – Electrical Ins	stallation (30 Hours)					
1.	Develop	wiring diagrams using s	oftware tools.						
2.	Identify a	nd select suitable comp	oonents for Energy Mea	surement and Circuit	Protection				
3.	Design a	wiring circuit integrating	g Energy Meter, MCB a	Ind RCCB					
4.	Develop	a wiring circuit for incan	descent lamp and fluor	escent lamp					
5.	Develop	and Investigate Simple	and Staircase Wiring fo	or Residential Applicat	ions				
6.	Design th	ne Wiring Circuits for Ca	alling Bell System and D	Dimmable Light					
7.	Create w	iring circuits for power I	oads						
8.	Measure	ment of Earth Resistand	ce and its connections.						
			PART B – Internet of	Things (30 Hours)					
1.	Design a	Single layer PCB layou	it designing						
2.	Fabricate	e Single layer PCB print	ing						
3.	Assembl	ng, soldering and deso	Idering practice on sing	le layer PCB					
4.	GPIO pro	ogramming in ESP8266							
5.	Sensor a	nd actuator interfacing	with internet enabled m	icrocontroller device					
6.	Sensor a	nd actuator calibration							
7.	Integratio	on of microcontroller bas	sed system with Cloud	platform					
			PART C – Web Techno	• • •					
1.		••	ion using HTML and CS						
2.		-	to responsive website u						
3.	-	-	vusing JavaScript and e	embed the Social Med	lia component	s to t	the w	ebsite).
4.	Incorpora	ate database interaction	to the website.						
5.	Deploy the	ne developed website in	the server.						



1.	Laboratory Manual																
2.	Eric T.Freeman, Elisabeth Robson, "Head First JavaScript Programming A Brain-Friendly Guide", 1st Edition, O'Reilly, 2014.																
3.	Eric T.Freeman,Elisabeth Robson, "Head First HTML and CSS",2nd Edition, O'Reilly , 2012																
4.	Lynn Beighley,"Head First SQL",1st Editin, O'Reilly,2007.																
	1																
COUR	COURSE OUTCOMES:														BT Mapped		
On cor	On completion of the course, the students will be able to (Highest Level																
CO1	design electrical wiring circuits for buildings based on their requirement													Applying(K3), Precision (S3)			
CO2	develop IoT based solutions and PCB for real world use cases.													Applying (K3), Precision (S3)			
CO3	design and host an interactive dynamic website.													Applying(K3), Precision (S3)			
						Марр	ing of (COs wi	th POs	and PS	SOs						
COs/F s	° 0	PO1	PO2	PO3	РО 4	PO 5	PO 6	РО 7	PO 8	РО 9	PO1 0	PO11	PO12	PSO1	PSO2		
CO1		3	2	2	1					1							
CO2		3	2	2	1					1							
CO3		3	2	2	1					1							
1 – Slig	ght, 2	2 – Mod	erate, 3	– Subs	stantial,	BT- Blo	om's T	axonon	ny		1	1	1		1		

Dream	0 m m = -	. 0														
Progra Branc		Ğ.	BE - N	Nechat	ronics I	Engine	ering				Sem.	Catego	ry L	Т	Ρ	Credit
Prerec	quisite	es	Nil								1	BS	0	0	2	1
Pream			Young size, t thickn to soc	g's mod hermal ess of a ietal rec	ulus, rig conduc a thin fil quireme	pidity m tivity, s m, and	odulus, pecific ı	wavele resistan	ngth of ice, bar	laser, and gap,	angle of Hall coe	of the ph divergence fficient, wa / developir	e of a avelen	laser gth o	beam f Hg s	n, particle spectrum
			IENTS /													
1.	Dete	ermina	ition of t	he You	ng's mo	dulus o	f the ma	aterial o	f a give	n beam	using ur	niform ben	ding m	netho	d.	
2.	Dete	ermina	tion of t	he rigid	ity mod	ulus of t	the give	n metal	lic wire	using to	orsional p	pendulum.				
3.	Dete	ermina	ition of t	he wav	elength	and the	e angle o	of diver	gence c	of semic	onductor	r laser.				
4.	Dete	ermina	ition of t	he parti	cle size	of a giv	ven pow	/der usi	ng lase	r.						
5.	Dete	ermina	ition of t	he theri	mal con	ductivity	y of a ba	ad conc	luctor u	sing Lee	e's disc.					
6.	Dete	ermina	ition of t	he spec	cific resi	stance	of the g	iven me	etallic w	ire usin	g Carey l	Foster's br	idge.			
7.			tion of t of a ma						ng mate	erial usir	ng post-o	office box /	Deter	minat	ion of	Hall
8.	Dete	ermina	tion of t	he wav	elength	of merc	cury spe	ectrum u	using sp	ectrom	eter grati	ng.				
9.	Dete	ermina	ition of t	he thick	ness of	a thin f	ilm usin	ng air-w	edge ar	rangem	ient.					
10.	Writ	ing co	ding for	any on	e of the	above	experim	nents / c	levelopi	ing a pr	oject / a j	product.				
	L.															Total:30
REFE	RENC	ES/ M	ANUAL	/SOFT	WARE:											
1.	Phy	sics La	aborator	y Manu	al / Rec	ord, De	epartme	nt of Ph	iysics, 1	I st Editio	on, 2020.					
COUR On co			MES: the cou	urse, th	e stude	ents wil	ll be ab	le to							T Map ghest	ped Level)
CO1	dete mon coup	ermine nent o ole. To	the You f a bea	ung's m im, and mine th	odulus the rig e wav	of a ma idity m elength	aterial us odulus 1 and a	sing the of a wi angle of	re usin f diverg	g the jence o	concepts of the las	and bendir s of twistir ser and th	ng		plying ecisior	
CO2	conc of V varia usin	ductior Vheats ation o g the o	n throug stone bio of resista	h mater ridge. 1 ance wi of Hall	ials and o dete th temp effect.	I the sp rmine t erature	ecific re the ban or to c	esistanc Id gap determir	e of a g of a s ne the l	iven wi emicon Hall coe	re using ductor b efficient c	ept of he the princip y means of a mater	ole of ial		plying ecisior	
CO3	the	conce	pt of d	iffractio	n of lig	ht. To	determ	ine the	thickn	ess of		trum) usir s using th oduct.			plying ecisior	
			1	T	T	Маррі	ing of C	Cos wit	h POs a	and PS	Os	1				T
COs/P	POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO1	2 I	PSO1	PSO2
CO		3	2	2	3					2	2		2		1	2
CO2		3	2	2	3					2	2		2		1	2
CO	3	3	2	2	3					2	2		2		1	2

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

B.E.– Mechatronics Engineering, Regulation, Curriculum and Syllabus – R2022



	22VEC11 - YOGA AND VALUES						
	(Common to All Engineering	g and Technology Bran	ches)	1			
Programme & Branch	All B.E./B.Tech. Branches	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Nil	1	HS	1	0	1	1
Preamble	Yoga or yogasanas are considered as art and harmony of body and mind for general wellbei Indians for healthy living. Students in particula	ng. Yoga is considered	as one of the				
Unit – I	Introduction:	*	~ ~ ~				2
Asanas – Classi	oga – Definitions - Concepts - Aims and objective fications of Yogasanas – Patanjali's Ashtanga Y ns of Yoga – Modern Trends in yoga.						
Unit – II	Yoga and Mind:						2
The Nature of Mi problems: Mood	nd - Five Elements and the Mind - Meditation and Disorders, Major Depressive Disorder, Cyclothym	d the Mind - Functions ic Disorder.	of the Mind - R	Role of	Yoga	in P	sychologica
Unit – III	Yoga and Values, Diet:						2
	Social Values – Role of Yoga in Personality Inte Diet – Constructive Diet.	gration - Concepts of N	latural Diet - N	aturop	athy	Diet -	- Eliminativ
Unit – IV	Asanas:						2
	g & Closing - Preparatory practices – Loosenir cticing Asanas. Asanas: Standing – Sitting – Pron			and C	bject	ives	of Asanas
Unit – V	Pranayama and Meditation:						2
	ces for awareness - Definitions and Objectives Kapalabathi – Sitali – Sitkari – Bhranari – Ujjayi –			ing Pra	anaya	ama.	Pranayama
			Lecture	ə: 10, I	Pract	ical:	10, Total:20
TEXT BOOK:							
	atyananda saraswathi, "Asana pranayama mudra	handha" Bihar school	of voga, 4th Ec	dition,	1969.		
1. Swami s	atyananda salaswatni, Asana pranayana mudra						
	nukthi Bodhanandha, "Hatha yoga pradipika", Bih						
2. Swami n		ar school of yoga, 4 th E					



COURSE On comp			-	the stud	ents will	be able t	to							apped at Level)
CO1	realiz	ze the im	portance	e of yoga	in physic	al health.							Applyii	ng (K3)
CO2	realiz	ze the im	portance	e of yoga	in menta	l health.							Applyii	ng (K3)
CO3	realiz	ze the ro	le of yog	a in pers	onality de	velopme	nt and diet						Applyii	ng (K3)
CO4	do th	ne looser	ning pract	tices, Asa	anas and	realize its	s benefits.						Applyii	ng (K3)
CO5	do th	ne practio	ce of Prai	nayama,	meditatio	on and rea	alize its be	nefits					Applyii	ng (K3)
					Ма	pping of	COs with	POs a	and F	SOs				
COs/PC	Ds	PO1	PO2	PO3	PO4	PO5	PO6	PO	7	PO8	PO9	PO10	PO11	PO12
CO1							3			2	1			
CO2							3			2				
CO3							3			3				
CO4							3			2	3			
CO5							3			3				
1 – Slight	t, 2 – I	Moderate	e, 3 – Sul	bstantial,	BT- Bloc	om's Taxo	nomy						· · ·	
					AS	SESSME		ERN –	THE	ORY				
Test / Bloom Catego	om's Remembering Understanding Applying Analyzing Ev												Creating (K6) %	Total %
CAT1			-		-		-			-		-	-	-
CAT2	2		-		-		-			-		-	-	-
CAT3	5		20		30		50			-		-	-	100
ESE			-		-		-			-		-	-	-

* ±3% may be varied (CAT3 - 100 marks)



	22EGT21 - COMMUN	NICATION SKILLS II					
	(Common to All Engineering	and Technology Branche	es)				-
Programm Branch	e & All B.E./B.Tech. Branches	Sem.	Category	L	т	Р	Credit
Prerequisi	tes Communication Skills I	2	HS	3	0	0	3
Preamble	This course is designed to equip students with develop their linguistic and communicative co		isten, read, w	rite a	and s	peak s	o as to
Unit – I	Grammar, Vocabulary, Listening, Speaking	g, Reading & Writing					9
substitutior	Sentence Patterns - Simple, Compound & Comple - Listening: Speeches from company CEOs - TV Reading for Gist - Writing: Job application letter with r	/ debates Speaking: Ju					
Unit – II	Grammar, Vocabulary, Listening, Speaking						9
Talking ab	Concord - Vocabulary: Phrasal verbs - Idioms & F out celebrities - Practicing Pronunciation through v ng principles of a machine - Writing: Description: Pers	web tools - Reading:	Company c	orre			
Unit – III	Grammar, Vocabulary, Listening, Speakin	ng, Reading & Writing					9
Listening:	Degrees of Comparison - Punctuations – Fragments & Listening to global accents - listening to motivational ries - Movie Enactment - Reading: Narrative passage eports	I speeches - Speaking:	Narrating per	sona	al mile	estones	s - Sport
i commodi i	Grammar, Vocabulary, Listening, Speaking						
Unit – V							9
Unit – V Grammar: Listening to speeches/o	Purpose and Function - If clause - Error detection - b sample HR Interviews - Speaking: Introduction to conversations - Giving feedback – Debate - Reading: Is Writing: Circulars - Critical Appreciation of a non-de	Vocabulary: Coding & phonetics - Stress, rhyth Key Note speeches - Net	nm & Intonati wspaper rep	ion -	- Gui	ded &	istening unguided nical texts
Unit – V Grammar: Listening tr speeches/of from journa	b sample HR Interviews - Speaking: Introduction to conversations - Giving feedback – Debate - Reading: als Writing: Circulars - Critical Appreciation of a non-de- description - Critical Appreciation - Critical - Cri	Vocabulary: Coding & phonetics - Stress, rhyth Key Note speeches - Net	nm & Intonati wspaper rep	ion -	- Gui	ded &	istening unguideo
Unit – V Grammar: Listening to speeches/c from journa	o sample HR Interviews - Speaking : Introduction to conversations - Giving feedback – Debate - Reading : Ils Writing : Circulars - Critical Appreciation of a non-de	Vocabulary: Coding & phonetics - Stress, rhyth Key Note speeches - Ne etailed text - Technical pro	nm & Intonati ewspaper rep oposals	ion - orts	- Gui - sho	ded & rt techr	istening unguided nical texts
Unit – VGrammar:Listening trspeeches/cfrom journaTEXT BOC1.	o sample HR Interviews - Speaking : Introduction to conversations - Giving feedback – Debate - Reading : ils Writing : Circulars - Critical Appreciation of a non-de WK : njay Kumar & Pushp Lata, "Communication Skills", 2 nd	Vocabulary: Coding & phonetics - Stress, rhyth Key Note speeches - Ne etailed text - Technical pro	nm & Intonati ewspaper rep oposals	ion - orts	- Gui - sho	ded & rt techr	istening unguided nical texts
Unit – V Grammar: Listening t speeches/c from journa TEXT BOC 1. Sa REFEREN	b sample HR Interviews - Speaking: Introduction to conversations - Giving feedback – Debate - Reading: als Writing: Circulars - Critical Appreciation of a non-de K: njay Kumar & Pushp Lata, "Communication Skills", 2 nd CES:	Vocabulary: Coding & phonetics - Stress, rhyth Key Note speeches - Ne etailed text - Technical pro	hm & Intonati ewspaper rep oposals y Press, New	orts	- Gui - sho hi, 20	ded & rt techr	istening unguide nical text Total:4
Unit – V Grammar: Listening tr speeches/c from journa TEXT BOC 1. Sa REFEREN	o sample HR Interviews - Speaking : Introduction to conversations - Giving feedback – Debate - Reading : ils Writing : Circulars - Critical Appreciation of a non-de WK : njay Kumar & Pushp Lata, "Communication Skills", 2 nd	Vocabulary: Coding & phonetics - Stress, rhyth Key Note speeches - Ne etailed text - Technical pro	hm & Intonati ewspaper rep oposals y Press, New	orts	- Gui - sho hi, 20	ded & rt techr	istening unguide nical text Total:4
Unit – V Grammar: Listening tr speeches/c from journa TEXT BOC 1. Sa REFEREN 1. 1.	 b sample HR Interviews - Speaking: Introduction to conversations - Giving feedback – Debate - Reading: als Writing: Circulars - Critical Appreciation of a non-demoksible with the second state of th	Vocabulary: Coding & phonetics - Stress, rhyth Key Note speeches - Ne etailed text - Technical pro	hm & Intonati ewspaper rep oposals y Press, New es and Practio	Del	- Gui - sho hi, 20 4 th Ec	ded & rt techr 118. lition, C	istening unguide nical text Total:4

	SE OUTC		-	the stu	lents will be	able to						lapped est Leve	I)
CO1	use fur	nctional	l gramma	ar for im	proving comr	nunicatio	n skills				Apply	ring (K3)	
CO2	listen a	and con	nprehen	d differe	nt accents an	d infer ir	nplied me	anings			Apply	ring (K3)	
CO3	•		y, initiate /e strateg		sustain a dis	scussion	and neg	gotiate usi	ng app	oropriate	Creat	ing (K6)	
CO4	read o evalua		•	s of tex	ts, infer imp	olied mea	anings a	nd criticall	y analy	ze and	Understa	anding (ł	(2)
CO5	•		21		narrative, de l evaluative v	•	exposito	ry texts a	ind und	lerstand	Creat	ing (K6)	
					Mappin	g of COs	s with PC	s and PS	Os				
COs/PC	Os PO	1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	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 – M	oderate	e, 3 – Su	bstantia	, BT- Bloom'	s Taxono	my	•					
					ASSES	SMENT	PATTER	N - THEOF	RY				
	Bloom's gory*		nemberir (K1) %	ng Un	derstanding (K2) %		lying 3) %	Analyzin (K4) %		/aluating (K5) %	Creating (K6) %	То	otal %
CA	AT1				37	3	30				33		100
CA	AT2				7	Ę	50				43		100
CA	AT3				17	5	50				33		100
E	SE				15	2	15				40		100

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



	(Common to CIVIL, MECH, MTS, ECE, EEE, EI	E & FT bran	ches)				
Programm		Sem.	Category	L	т	Р	Credit
Branch						2*	
Prerequisi	tes Nil	2	BS	3	1*	2	4
Preamble	To impart the knowledge of partial derivatives, evaluation analytic functions to the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the problems relations are supported as the students for solving the students fo						culus and
Unit – I	Functions of Several Variables:		· • .				9
	of two or more variables – Partial derivatives – Total differential – Taylor' d minima – Constrained maxima and minima – Lagrange's multiplier met		unctions of two	o varı	ables	– Apj	plications
Unit – II	Multiple Integrals:						9
	egration in cartesian coordinates - Change of order of integration - Appl	lication: Area	between two	curve	s – T	riple i	ntegratio
	n coordinates – Volume as triple integrals.						1
Unit – III	Vector Calculus: derivative – Gradient of a scalar point function – Divergence of a vector		tion Ourlof			Calar	9
Irrotational	vectors – Vector Integration: Introduction – Green's, Stoke's and Gauss heorems and evaluation of integrals using them.						
Unit – IV	Analytic Functions:						9
equations (of a complex variable – Analytic functions – Necessary and sufficient (Statement only) – Properties of analytic function (Statement only) – Ha	armonic funct					
	s: Fluid flow – Conformal mapping: w = z + a, az, 1/z – Bilinear transform	nation.					
							•
Introductior – Cauchy's circular con							
Introductior – Cauchy's circular con	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo s residue theorem (without proof) – Applications: Evaluation of definite in						ssificatio
Introductior – Cauchy's circular con LIST OF EX 1. Fin	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo s residue theorem (without proof) – Applications: Evaluation of definite in ntour. XPERIMENTS / EXERCISES:						ssification
Introductior – Cauchy's circular con LIST OF EX 1. Fin 2. Co	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo s residue theorem (without proof) – Applications: Evaluation of definite in ntour. XPERIMENTS / EXERCISES: nding ordinary and partial derivatives						ssification
Introductior – Cauchy's circular con LIST OF EX 1. Fin 2. Co 3. Ev	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo s residue theorem (without proof) – Applications: Evaluation of definite in ntour. XPERIMENTS / EXERCISES: Inding ordinary and partial derivatives computing extreme values of function of two variables						ssification
LIST OF EX 1. Fin 2. Co 3. Ev 4. Fin	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo s residue theorem (without proof) – Applications: Evaluation of definite in intour. XPERIMENTS / EXERCISES: Inding ordinary and partial derivatives computing extreme values of function of two variables valuating double and triple integrals						ssification
LIST OF EX 1. Fin 2. Co 3. Ev 4. Fin 5. Co	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo a residue theorem (without proof) – Applications: Evaluation of definite in atour. XPERIMENTS / EXERCISES: Inding ordinary and partial derivatives computing extreme values of function of two variables valuating double and triple integrals Inding the area between two curves						ssification
LIST OF EX 1. Fin 2. Co 3. Ev 4. Fin 5. Co 6. Ap	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo s residue theorem (without proof) – Applications: Evaluation of definite in ntour. XPERIMENTS / EXERCISES: Inding ordinary and partial derivatives computing extreme values of function of two variables valuating double and triple integrals Inding the area between two curves computing gradient, divergence and curl of point functions						ssification
- Cauchy's circular con 1. Fin 2. Co 3. Ev 4. Fin 5. Co 6. Ap 7. De	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo s residue theorem (without proof) – Applications: Evaluation of definite in ntour. XPERIMENTS / EXERCISES: Inding ordinary and partial derivatives computing extreme values of function of two variables valuating double and triple integrals Inding the area between two curves computing gradient, divergence and curl of point functions polying Milne-Thomson method for constructing analytic function	ntegrals invo	lving sine and				sification s over the
Introductior – Cauchy's circular con LIST OF EX 1. Fin 2. Co 3. Ev 4. Fin 5. Co 6. Ap 7. De 8. Fin	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo a residue theorem (without proof) – Applications: Evaluation of definite in itour. XPERIMENTS / EXERCISES: Inding ordinary and partial derivatives computing extreme values of function of two variables valuating double and triple integrals Inding the area between two curves computing gradient, divergence and curl of point functions coplying Milne-Thomson method for constructing analytic function etermination of Mobius transformation for the given set of points Inding poles and residues of an analytic function	ntegrals invo					sifications over the
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Introductior – Cauchy's circular con LIST OF EX 1. Fin 2. Co 3. Ev 4. Fin 5. Co 6. Ap 7. De 8. Fin TEXT BOO 1. Ra REFERENCE	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo a residue theorem (without proof) – Applications: Evaluation of definite in intour. XPERIMENTS / EXERCISES: Inding ordinary and partial derivatives computing extreme values of function of two variables valuating double and triple integrals Inding the area between two curves computing gradient, divergence and curl of point functions computing dilne-Thomson method for constructing analytic function etermination of Mobius transformation for the given set of points Inding poles and residues of an analytic function DK: amana B V, "Higher Engineering Mathematics", 1 st Edition, Tata McGraw CES/ MANUAL / SOFTWARE:	Lecture:4	Iving sine and	nd P	ractic	actions	, Total:6
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Introduction – Cauchy's circular con LIST OF EX 1. Fin 2. Co 3. Ev 4. Fin 5. Co 6. Ap 7. De 8. Fin TEXT BOO 1. Ra REFERENCE 1. Kr 2. Ka S.	n – Cauchy's theorem (without proof) – Cauchy's integral formula – Taylo a residue theorem (without proof) – Applications: Evaluation of definite in intour. XPERIMENTS / EXERCISES: Inding ordinary and partial derivatives computing extreme values of function of two variables valuating double and triple integrals Inding the area between two curves computing gradient, divergence and curl of point functions computing dilne-Thomson method for constructing analytic function etermination of Mobius transformation for the given set of points Inding poles and residues of an analytic function DK: amana B V, "Higher Engineering Mathematics", 1 st Edition, Tata McGraw CES/ MANUAL / SOFTWARE:	Lecture:4 -Hill Publishi y, New Delhi tics For First	Iving sine and I 5, Tutorials a ng Company L , India, 2016. Year B.E/B.Te	nd P imite	ractic	ctions al:15 w Dell nt Edi	, Total:6



4.	Grewal B.S, "Higher Engineering Mathematics" 44thEdition, Khanna Publishers, New Delhi, 2018.
5.	MATLAB – Laboratory Manual

		OUTCO	-	urse, the	e stude	ents will	be able	e to					()	BT Map	
CO1	1			derivativ					ivariat	ole functi	ons.		•	Applying	,
CO2	eva	aluate n	nultiple	integrals	and ap	ply them	n to com	pute th	e area	and vol	ume of	the regions		Applying	(K3)
CO3		bly the blems.	concep	ots of d	erivativ	es and	line inte	egrals	of vec	tor func	tions in	engineerir	ng	Applying	(K3)
CO4	cor	struct		function given cor				nations	and c	letermin	e the im	age of give	en	Applying	(K3)
CO5	app	bly the		ues of c				evaluat	e real	and co	mplex ir	ntegrals ov	er	Applying	(K3)
CO6	der	nonstra	ate MA								of funct	tions of tw		Applying anipulatio	
			1		•	Mappin	g of CC	s with	POsa	and PSC	Ds				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	3	2											
CO	2	3	3	2											
CO	3	3	3												
CO	4	3	3												
CO	5	3	3	3											
CO	6					3									
1 – Sli	ight, 2	2 – Moo	derate,	3 – Subs	tantial,	BT- Bloo	om's Ta	xonomy	/						
						ASSES	SMENT	PATT	ERN -	THEOR	Y				
	t / Bl ateg	oom's ory*	Re	member (K1) %	ing U	Indersta (K2)		Apply (K3)	-	Analyz (K4) 9	•	Evaluating (K5) %		eating K6) %	Total %
	CAT	1		10		30		60)	-		-		-	100
	CAT	2		10		30		60)	-		-		-	100
	CAT	3		10		30		60)	-		-		-	100
	ES	E		10		30		60)	-		-		-	100
* ±3%	may	be vari	ed (CA	T1&2-	60 ma	rks & ES	SE - 100) marks	5)						

*Alternate week



Programme & Branch	B.E & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	2	BS	3	0	0	3
Preamble	This course aims to emphasize the engineering stude electrochemical storage devices, polymeric, composite & its control methods.						
Unit – I	ELECTROCHEMISTRY						9
calculation of cell hydrogen electroo	Is – types – representation of galvanic cell – electrode pot EMF from single electrode potential – reference electrodes de, standard calomel electrode, glass electrode – EMF se ometric titrations – mixture of weak and strong acid vs strong	: construction	, working and	d app	olicati	ons o	f standard
Unit – II	ELECTROCHEMICAL STORAGE DEVICES						9
classification of fu carbonate fuel cel	of batteries – choice of batteries for electric vehicle app el cells – description, principle, components and applications I and direct methanol fuel cell.						ell, molter
Unit – III	CORROSION AND ITS CONTROL METHODS						9
corrosion (wt. los coatings – pretre galvanizing) meth	duction – chemical corrosion – Pilling-Bedworth rule – ele- ential aeration corrosion with examples – galvanic series – fact as method only). Control methods – sacrificial anodic pro- eatment of metal surface – metallic coating: electroplating ods – non-metallic coating: anodizing – organic coating: paint	ctors influenc otection meth , electroless	ing rate of con od – corrosio plating and	rrosio on ir hot	on – i nhibite dippi	measu ors – ng (tii	protective protective nning and atings.
corrosion (wt. los coatings – pretre galvanizing) meth Unit – IV Polymers: Introo (elastomers) – n applications of properties and ar applications of ke Unit – V Lubricants: Introo aniline point and RDX). Rocket p abrasives: i) natur	ential aeration corrosion with examples – galvanic series – factors method only). Control methods – sacrificial anodic processing of metal surface – metallic coating: electroplating ods – non-metallic coating: anodizing – organic coating: paint POLYMER AND COMPOSITE MATERIALS duction – terminology – structure and property relations atural rubber- processing of latex- vulcanization of rubber polyurethane-polymethyl methacrylate (PMMA) – conduct oplications of polylactic acid. Composites: Introduction-type vlar fibre- fibre reinforced plastics (FRP) – properties and use CHEMISTRY OF ENGINEERING MATERIALS duction – classification – properties : viscosity, viscosity index carbon residue. Explosives: Introduction – noropellants: Introduction – properties and classification. Abrae ral abrasives – diamond, corundum and quartz ii) synthetic a	ctors influenc bection meth , electroless s, constituent ship of polyre er – synthetic cting polyme cs- polymer c s. x, flash and fi nanufacture c sives: Introdu brasives – sil	ing rate of con od – corrosid plating and s and function ners (mecha c rubber- pre r-biodegrada omposites – re point, clou of important e uction-propert icon carbide,	nrosid not not nical para ble synth d an xplos ies o borc	on – i hibitio dippi cerar , the ation, polyn hesis d pou sives of abra	measu ors – ng (tii mic co prop prop mer- , prop ur poir (TNT asives rbide	rement o protective nning and atings. -rubbers erties and synthesis erties and synthesis erties and 9 nt, oiliness , GTN and s - types o - industria
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		JTCOM ion of t		se, the st	udents	s will be a	able to						(BT Mapp Highest L	
CO1	appl	y the pr	inciples	of electro	chemis	try for va	rious ap	plicatior	าร					Applying	(K3)
CO2	use	the con	cepts of	batteries,	fuel ce	ells and th	eir appl	ications	in vari	ous field	s.			Applying	(K3)
CO3	mak	e use o	f corrosi	on control	metho	ds to solv	/e corro	sion rela	ated is:	sues.				Applying	(K3)
CO4	cate	gorize a	and utiliz	e the poly	mer ar	nd compo	site mat	erials fo	or vario	us applio	cations			Applying	(K3)
CO5	utilize the concepts of lubricants, explosives and adhesives for various applications.														(K3)
						Mappin	g of Co	s with I	POs ai	nd PSOs	5				
Cos/F	POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1										
CO	2	3	2	1	1										
CO	3	3	2	1	1										
CO	4	3	2	1	1										
CO	5	3	2	1	1										
1 – Sli	ght, 2	– Mode	rate, 3 –	Substant	ial, BT	- Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	RN – '	THEORY	(
	st / Blo Catego		Re	memberi (K1) %	ng	Understa (K2)	•	Apply (K3)		Analyzi (K4) 9		Evaluating (K5) %		reating (K6) %	Total %
	CAT	1		25		35		40)			x		F	100
	CAT	2		25		35		40)						100
	CAT	3		25		35		40)						100
	ESE			25		35		40)						100



Programme & Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Physics for Mechatronics Engineering, Matrices and ordinary Differential Equations	2/3	PC	3	1	0	4
Preamble	This course provides knowledge in Fluid Statics, kin basics of Thermodynamics.	ematics and Dy	namics. It al	so he	elps t	o unde	erstand the
Unit – I	Fluid Properties and Fluid Statics:						9+3
Compressibility,	and Classification – Properties of fluids: Density, Specifi Bulk Modulus, Capillary and Surface Tension – Fluid sta uge pressures – Manometers: Types and Pressure measur	atics: Concept c	of fluid static	pres	sure	- Pas	cal's law
Unit – II	Fluid Kinematics and Fluid Dynamics:						9+3
Velocity potentia	: Types of fluid flow - Continuity equation in two and three al function and Stream function. Fluid dynamics: Euler's e enturi meter, Orifice meter and Pitot tube						
Unit – III	Viscous Flow, Flow through Pipes and Dimension	onal analysis:					9+3
Unit – IV	ver transmission through pipes. Dimensionalanalysis: Buo Basics of Thermodynamics and First Law of Therr	modynamics:					9+3
equilibrium - Ze	s - Microscopic and macroscopic point of view - System eroth law of Thermodynamics - internal energy, enthalp d CP. First law of Thermodynamics - Application toclose e problems.	by, specific hea	t capacities	CV a	and (CP, R	elationship
Unit – V	Second Law of Thermodynamics and Entropy:						9+3
Reversibility - Irr	thermodynamics - Kelvin Planck and Clausius Statement: reversibility, reversible cycle - Heat engine, heat pump and ropy, the inequality of Clausius - Entropy principle - Ge	d refrigerator. C	arnot cycle a on for entro	and (py –	Claus Sim	ius th ple pr	eorem, the oblems in
TEXT BOOK:			Lectur	re:45	, luto	orial:1	5, Total:6
	R.K., "Fluid Mechanics and Hydraulic Machines", 9th Edition	Laxmi Publicat	ions New De	lhi 2	015		
1 Bansal F				,, <u>,</u> , <u>,</u>	010.		
REFERENCES:	"Engineering Thermodynamics" 5th Edition Tata McGray	w Hill Publishing	Company N	ew D	elhi '	2013	
REFERENCES: 1. Nag P.K Cengel	., "Engineering Thermodynamics", 5th Edition, Tata McGrav Yunus A. and Boles Michael A., "Thermodynamics: An Eng	9					New York
REFERENCES:1.Nag P.K2.Cengel2010.		jineering Approa	ch", 5th Editio	on, M	lcGra		New York

		UTCON tion of t		se, the st	udents	will be	able to								BT Mappe lighest Le	
CO1	und	lerstand	Fluid P	roperties a	and Flui	d Statics								Und	derstanding	g (K2)
CO2	solv	ve the p	roblems	related to	kinema	atics and	dynami	cs of flu	id flow						Applying (ł	(3)
CO3	calo	culate th	ie energ	y losses ir	n flow th	rough pi	pes							A	Analysing (K4)
CO4	ana	lyze the	e basic c	oncepts, f	irst law	of therm	odynam	ics and	its app	olications	6				Applying (ł	(3)
CO5	inte	rpret co	ncepts o	of second	law of t	hermody	namics	and ent	ropy					A	Analysing (K4)
						Марріі	ng of CO	Os with	POs a	and PSC)s					
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO	10 PO1	1	PO12	PSO1	PSO2
CO	1	3	3	2	2									2	2	2
CO	2	3	3	2	2									2	2	2
CO	3	3	3	2	2									2 2 2		
CO	4	3	3	2	2									2	2	2
CO	5	3	3	2	2									2	2	2
1 – Slig	ght, 2	– Mode	rate, 3 -	- Substant	tial, BT-	Bloom's	Taxonc	omy			4					
						ASSES	SSMEN	Γ ΡΑΤΤ	ERN -	THEOR	Y					
	t / Blo atego	oom's ory*	Re	ememberi (K1) %	ng	Jndersta (K2)		Apply (K3)		Analyz (K4)		Evaluati (K5) %		Creati	ng (K6) %	Total %
	CAT	1		5		10		75	5	10		-			-	100
	CAT	2		5		10		75	5	10		-			-	100
	CAT	3		5		10		75	5	10						
	ESE	Ξ		5		10		75	5	10		-			-	100
* ±3%	may b	oe varie	d (CAT	1, 2,3 – 50) marks	& ESE -	- 100 ma	arks)	I							



	(Common to EC	EEE, EIE and MTS Branches)				
Programm Branch	BE - ECE, EEE, EIE and MTS Brar	hes Sem. Ca	tegory L	. т	Р	Credit
Prerequisi	ites Programming in C	2	PC 3	0	2	4
Preamble	This course is indented to introduce novice learner from cross disciplines	ne concept of elementary data structur in Engineering and Technology.	es and not	on of	algorit	hms to
Unit – I	List:					9
	ctures - Abstract Data Types (ADT) - List ADT t – Application : Polynomial Addition	and Array Implementation - Linked Li	st - Doubly	/ Link	ed Lis	t - Circula
Unit – II	Stack and Queues:					9
	 Array and Linked List implementation of S pression Evaluation - Queue ADT – Array and L 				tfix Co	onversion
Unit – III	Trees:					9
(Binary He	iminaries – Binary Trees –Binary Tree Trave ap)- Application: Expression Tree	als - The Search Tree ADT – Binar	y Search	Trees-	-Priori	ty Queue
Unit – IV	Graphs:					9
	Definitions – Elementary Graph Operations- Algorithm – Minimum Spanning Tree: Prim"s Alg					st Paths
Unit – V	· · ·	5			-	9
	Sorting and Hashing: reliminaries – Insertion Sort – Quicksort – Merc	sort – Heapsort – Hashing – General	Idea – Has	sh Fur	ction -	-
	Open addressing.	1 0				·
	XPERIMENTS / EXERCISES:					
	plementation of C programs using pointers					
	plementation of singly linked list and its operation					
	plamantation of doubly linked list and its opera					
	plementation of doubly linked list and its opera	DNS				
4. Im	plementation of Stack and its operations	DNS				
4. Im 5. Im	plementation of Stack and its operations					
4. Im 5. Im 6. Im	plementation of Stack and its operations plementation of Queue and its operations plementation of Stack and Queue using Singly	inked List				
4. Im 5. Im 6. Im	plementation of Stack and its operations	inked List				
4. Im 5. Im 6. Im 7. Co	plementation of Stack and its operations plementation of Queue and its operations plementation of Stack and Queue using Singly	inked List				
4. Im 5. Im 6. Im 7. Co 8. Ev	aplementation of Stack and its operations aplementation of Queue and its operations aplementation of Stack and Queue using Singly ponvert a given In-fix Expression into Post-fix Ex	inked List				
4. Im 5. Im 6. Im 7. Co 8. Ev 9. Im	aplementation of Stack and its operations aplementation of Queue and its operations aplementation of Stack and Queue using Singly ponvert a given In-fix Expression into Post-fix Ex valuate the Post-fix Expression using Stack AD	inked List ression using Stack ADT				
4. Im 5. Im 6. Im 7. Co 8. Ev 9. Im	aplementation of Stack and its operations aplementation of Queue and its operations aplementation of Stack and Queue using Singly ponvert a given In-fix Expression into Post-fix Ex valuate the Post-fix Expression using Stack AD aplementation of Binary Search Tree traversals	inked List ression using Stack ADT	ecture:45,	Pract	ical:3	0, Total:7
4. Im 5. Im 6. Im 7. Co 8. Ev 9. Im 10. Im	aplementation of Stack and its operations aplementation of Queue and its operations aplementation of Stack and Queue using Singly porvert a given In-fix Expression into Post-fix Ex valuate the Post-fix Expression using Stack AD aplementation of Binary Search Tree traversals aplementation of sorting algorithms: Insertion ar	inked List ression using Stack ADT	ecture:45,	Pract	ical:3	0, Total:7
4. Im 5. Im 6. Im 7. Co 8. Ev 9. Im 10. Im	aplementation of Stack and its operations aplementation of Queue and its operations aplementation of Stack and Queue using Singly porvert a given In-fix Expression into Post-fix Ex valuate the Post-fix Expression using Stack AD aplementation of Binary Search Tree traversals aplementation of sorting algorithms: Insertion ar	inked List ression using Stack ADT I Quick sort				·
4. Im 5. Im 6. Im 7. Co 8. Ev 9. Im 10. Im TEXT BOO 1. W	aplementation of Stack and its operations aplementation of Queue and its operations aplementation of Stack and Queue using Singly ponvert a given In-fix Expression into Post-fix Ex valuate the Post-fix Expression using Stack AD aplementation of Binary Search Tree traversals aplementation of sorting algorithms: Insertion ar	inked List ression using Stack ADT I Quick sort				·
4. Im 5. Im 6. Im 7. Co 8. Ev 9. Im 10. Im TEXT BOO 1. W REFEREN	aplementation of Stack and its operations aplementation of Queue and its operations aplementation of Stack and Queue using Singly ponvert a given In-fix Expression into Post-fix Ex- valuate the Post-fix Expression using Stack AD aplementation of Binary Search Tree traversals aplementation of sorting algorithms: Insertion ar DK: eiss M. A., "Data Structures and Algorithm Ana	inked List ression using Stack ADT I Quick sort Lu	ion Asia, N	ew De	elhi, 20)16.

		UTCON on of the		e, the stud	ents w	vill be able	to						(BT Mapp Highest L	
CO1	app	ly List A	DT for	solving the	given	problems								Applying	(K3)
CO2	mak	ke use o	of arrays	and linke	d lists	to create S	Stack an	d Queu	e ADT:	S.				Applying	(K3)
CO3	utiliz	ze Tree	ADT to	develop s	mple	application	1							Applying	(K3)
CO4	mak	ke use o		Applying (K3)											
CO5	illus	trate the	e use of	standard	sorting	g and Hash	ning Tec	hnique	8					Applying	(K3)
						Mappin	g of CC	s with	POs ai	nd PSOs	5				
COs/I	POs	PO1	PO2	PO3	PO	4 PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1										
CO	2	3	2	1	1										
CO	3	3	2	1	1										
CO	4	3	2	1	1										
CO	5	3	2	1	1										
1 – Sli	ght, 2	– Mode	erate, 3	- Substant	ial, B1	- Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	ERN - 1	HEORY	,				
	st / Blo Catego	oom's ory*	R	emember (K1) %	ing	Understa (K2)		Appl (K3)		Analyz (K4) 9		Evaluating (K5) %		reating (K6) %	Tota %
	CAT	1		10		40		50)						100
	CAT	2		5		35		60)						100
	CAT	3		5		35		60)						100
	ESE	Ξ		5		35		60)						100
* ±3%	may b	be varie	d (CAT	1,2,3 – 50	marks	8 & ESE –	100 ma	rks)			u.		u.		



	(Common to Civil, Mechanical, Auto	omobilo Ch	omical Branc	hoc)			
Programme		omobile, Ch	emical Branc	nes)			
Branch	& BE - Civil, Mechanical, Automobile & BTech – Chemical Engineering Branches	Sem.	Category	L	т	Р	Credit
Prerequisite	es Programming in C	2	ES	3	0	2	4
Preamble	This course is indented to introduce the conce novice learner from cross disciplines in Engineer			ctures	and no	tion of a	lgorithms to
Unit – I	List:						9
	Ires – Abstract Data Types (ADT) – List ADT and Array opying Singly Linked List - Doubly Linked List- Insertion		tion – Linked	List- S	ingly Lir	ked List	- Insertion -
Unit – II	Stack and Queues:						9
Expression E Unit – III	 Array and Linked List implementation of Stacks – A Evaluation – Queue ADT – Array and Linked List implem Trees: ninaries – Binary Trees –Binary Tree Traversals – The start star	nentation of C	Queues – App	lication	IS		9
FindMin – Fi	ndMax – Insertion – Deletion- Expression Tree	Gearch free		Dearci	in nees	- Operati	
Unit – IV	Graphs:						9
	efinitions – Graph Traversals: Breadth First Search – hs – Dijkstra's Algorithm – Minimum Spanning Tree – P					orithms:	Unweightee
Unit – V	Sorting and Hashing:						9
Sorting – Pre – Open Addr	eliminaries – Insertion Sort – Quicksort – Merge sort – F ressing	Hashing – Ge	eneral Idea – H	lash F	unction	 Separa 	ate Chaining
LIST OF EX	PERIMENTS / EXERCISES:						
1. Im	nplementation of C programs using pointers						
2. Im	nplementation of singly linked list and its operations						
_							
3. In	nplementation of doubly linked list and its operations						
	nplementation of doubly linked list and its operations						
4. Im							
4. Im 5. Im	nplementation of Stack and its operations	List					
4. Im 5. Im 6. Im	nplementation of Stack and its operations	List					
4. In 5. In 6. In 7. Ev	nplementation of Stack and its operations nplementation of Queue and its operations nplementation of Stack and Queue using Singly Linked	List					
4. Im 5. Im 6. Im 7. Ex 8. Im	nplementation of Stack and its operations nplementation of Queue and its operations nplementation of Stack and Queue using Singly Linked valuate the Post-fix Expression using Stack ADT	List					
4. Im 5. Im 6. Im 7. Ex 8. Im 9. Im	nplementation of Stack and its operations nplementation of Queue and its operations nplementation of Stack and Queue using Singly Linked valuate the Post-fix Expression using Stack ADT nplementation of Binary Search Tree traversals	List					
4. Im 5. Im 6. Im 7. Ex 8. Im 9. Im	nplementation of Stack and its operations nplementation of Queue and its operations nplementation of Stack and Queue using Singly Linked valuate the Post-fix Expression using Stack ADT nplementation of Binary Search Tree traversals nplementation of Insertion sort and Quick sort	List		Lectur	e:45, Pr	actical:	30, Total:7
4. Im 5. Im 6. Im 7. Ex 8. Im 9. Im 10. Im	nplementation of Stack and its operations nplementation of Queue and its operations nplementation of Stack and Queue using Singly Linked valuate the Post-fix Expression using Stack ADT nplementation of Binary Search Tree traversals nplementation of Insertion sort and Quick sort nplementation of hash function	List		Lectur	e:45, Pr	ractical:	30, Total:7
4. Im 5. Im 6. Im 7. Em 8. Im 9. Im 10. Im	nplementation of Stack and its operations nplementation of Queue and its operations nplementation of Stack and Queue using Singly Linked valuate the Post-fix Expression using Stack ADT nplementation of Binary Search Tree traversals nplementation of Insertion sort and Quick sort nplementation of hash function						·
4. Im 5. Im 6. Im 7. Ex 8. Im 9. Im 10. Im TEXT BOOM Im 1. W REFERENCE Im	Applementation of Stack and its operations Applementation of Queue and its operations Applementation of Stack and Queue using Singly Linked Applementation of Stack and Queue using Stack ADT Applementation of Binary Search Tree traversals Applementation of Insertion sort and Quick sort Applementation of hash function Ac: Ac: Apple Manual / Software:	C", 2 nd Editior	n, Pearson Ed	ucatior	n Asia, N	lew Delh	i, 2016.
4. Im 5. Im 6. Im 7. Ex 8. Im 9. Im 10. Im TEXT BOUND 1. W REFERENCE 1. Ho	Applementation of Stack and its operations Applementation of Queue and its operations Applementation of Stack and Queue using Singly Linked Applementation of Stack and Queue using Stack ADT Applementation of Binary Search Tree traversals Applementation of Insertion sort and Quick sort Applementation of hash function C: Veiss M. A., "Data Structures and Algorithm Analysis in C	C", 2 nd Editior a Structures i	n, Pearson Ed n C", 2 nd Editi	ucatior on, Un	n Asia, N iversitie	lew Delh s Press,	Hyderabad

		COMES: of the c	ourse, th	e stude	ents will b	e able t	0						BT Mapped ighest Leve	
CO1	apply	List ADT	for solvi	ng the g	given prob	ems						A	Applying (K3)
CO2	make	e use of a	rrays and	d linked	lists to cre	ate Stad	ck and C	Queue A	DTs.			A	Applying (K3)
CO3	utilize	e Tree AD	DT to dev	elop sin	nple applic	ation						A	Applying (K3)
CO4	make	e use of G	Applying (K3)											
CO5	illustr	ate the u	se of star		A	Applying (K3)							
					Марр	ing of C	os with	n POs ai	nd PSOs	5				
Cos/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1										
CO2	3	2	1	1										
CO3	3	2	1	1										
CO4	3	2	1	1										
CO5	3	2	1	1										
1 – Slig	ht, 2 – N	loderate,	3 – Subs	stantial,	BT- Bloon	ı's Taxo	nomy							
					ASSE	SSMEN	Τ ΡΑΤΤ	ERN –	THEOR	(
	Bloom's egory*	Re	memberi (K1) %	ing	Understa (K2)	nding	Арр	olying 3) %	Ana	alyzing (4) %	Evalua (K5)	•	Creating (K6) %	Total %
CAT1 10 60 30														100
C	AT2		5		35			60						100
C	AT3		5		35			60						100
E	SE		5		35			60						100
* ±3% r	nay be v	aried (CA	AT 1,2,3 -	- 50 ma	rks & ESE	– 100 r	narks)							



	22MTT22 – ELECTRON DEVICES AND	DIGITAL CIRCU	ITS		T	r	1
Programme & Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	2/3	ES	3	0	0	3
Preamble	This course provides an insight on basic laws and the to the basic concepts of semiconductor devices. It presequential digital circuits.						
Unit – I	Basic Network Laws and Theorem:						9
	Energy and Power- Resistance, Inductance and Capacita irchhoff's Voltage Law- Star –Delta Transformation-						
Unit – II	Semiconductor Devices:						9
Diodes – Zener D	iconductors and Insulators – Properties of Semiconductor iode Voltage Regulator– Junction Transistors: Principle of s an Amplifier and Switch.						
Unit – III Boolean Algebra	Digital Electronics:	es and laws - De	-Morgan's Th	aor	om _	Minir	9 nization o
Boolean Algebra Boolean expressi	Digital Electronics: – Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations.						mization o
Boolean Algebra Boolean expressi	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D 						mization c
Boolean Algebra Boolean expressi Logic Functions u Unit – IV	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. 	Don't care conditic	ons. Logic Ga	ites			mization c ntations c
Boolean Algebra Boolean expressi Logic Functions u Unit – IV	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. Combinational Circuits: 	Don't care conditic	ons. Logic Ga	ites			mization on tations of the second sec
Boolean Algebra Boolean expressi Logic Functions u Unit – IV Half Adder – Full J Unit – V RS, JK, JKMS, D	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. Combinational Circuits: Adder – Half Subtractor – Full Subtractor – Multiplexer – D 	Don't care conditic	ons. Logic Ga coder / Decod	der.	– Imp	oleme	mization on tations of 9
Boolean Algebra Boolean expressi Logic Functions u Unit – IV Half Adder – Full J Unit – V RS, JK, JKMS, D	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. Combinational Circuits: Adder – Half Subtractor – Full Subtractor – Multiplexer – D Sequential Circuits: and T Flip flops – Excitation tables –Realization of one flip 	Don't care conditic	ons. Logic Ga coder / Decod	der.	– Imp	oleme	mization contations contations contations contations contact and c
Boolean Algebra Boolean expressi Logic Functions u Unit – IV Half Adder – Full J Unit – V RS, JK, JKMS, D	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. Combinational Circuits: Adder – Half Subtractor – Full Subtractor – Multiplexer – D Sequential Circuits: and T Flip flops – Excitation tables –Realization of one flip 	Don't care conditic	ons. Logic Ga coder / Decod	der.	– Imp	oleme	mization c ntations c 9 9 onous an
Boolean Algebra Boolean expressi Logic Functions u Unit – IV Half Adder – Full J Unit – V RS, JK, JKMS, D asynchronous cou TEXT BOOK:	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. Combinational Circuits: Adder – Half Subtractor – Full Subtractor – Multiplexer – D Sequential Circuits: and T Flip flops – Excitation tables –Realization of one flip 	Don't care condition	ons. Logic Ga coder / Decod flip flops – De	der.	– Imp	ynchr	mization of ntations of 9 9 9 onous an Total:4
Boolean Algebra Boolean expressi Logic Functions u Unit – IV Half Adder – Full A Unit – V RS, JK, JKMS, D asynchronous cou TEXT BOOK: 1. Ravish R Delhi for	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. Combinational Circuits: Adder – Half Subtractor – Full Subtractor – Multiplexer – D Sequential Circuits: and T Flip flops – Excitation tables –Realization of one flip unters – shift register. .Singh, "Network Analysis and Synthesis", 2nd Edition 20 	Don't care condition Demultiplexer – En p flop using other 19, McGraw Hill I	ons. Logic Ga coder / Decod flip flops – De Education (In	der. esigr	– Imp n of S Priva	ynchr te Lir	mization c ntations c 9 9 onous an Total:4 nited, Nev
Boolean Algebra Boolean expressi Logic Functions u Unit – IV Half Adder – Full A Unit – V RS, JK, JKMS, D asynchronous cou TEXT BOOK: 1. Ravish R Delhi for	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. Combinational Circuits: Adder – Half Subtractor – Full Subtractor – Multiplexer – D Sequential Circuits: and T Flip flops – Excitation tables –Realization of one flip unters – shift register. Singh, "Network Analysis and Synthesis", 2nd Edition 20 Units I & II. 	Don't care condition Demultiplexer – En p flop using other 19, McGraw Hill I	ons. Logic Ga coder / Decod flip flops – De Education (In	der. esigr	– Imp n of S Priva	ynchr te Lir	mization c ntations c 9 9 onous an Total:4 nited, Nev
Boolean Algebra Boolean expressi Logic Functions u Unit – IV Half Adder – Full A Unit – V RS, JK, JKMS, D asynchronous cou TEXT BOOK: 1. Ravish R Delhi for 1 2. Anandkur REFERENCES:	 Number systems – Complements – Boolean postulate ons – Canonical forms – Minimization: Karnaugh map, D sing gates, NAND – NOR implementations. Combinational Circuits: Adder – Half Subtractor – Full Subtractor – Multiplexer – D Sequential Circuits: and T Flip flops – Excitation tables –Realization of one flip unters – shift register. Singh, "Network Analysis and Synthesis", 2nd Edition 20 Units I & II. 	Don't care condition Demultiplexer – En p flop using other 19, McGraw Hill f ntice Hall of India,	ons. Logic Ga coder / Decod flip flops – De Education (In	der. esigr	– Imp n of S Priva	ynchr te Lir	mization of ntations of 9 9 9 onous an Total:4



		UTCOM tion of t		se, the stu	dents	will be al	ole to						(BT Mapp Highest L	
CO1	арр	ly the ba	asic laws	and theore	ems for	electric o	circuits							Applying	(K3)
CO2	inte	rpret the	e basic cl	naracteristi	cs of se	emicondu	ctor dev	vices					Un	derstandi	ng (K2)
CO3	veri	fy the Bo			Applying	(K3)									
CO4	des	ign the c		Applying (K3)											
CO5	des	ign the s	sequentia	al circuits										Applying	(K3)
						Mapping	g of Co	s with F	os an	d PSOs					
Cos/F	Pos	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	3	1		2							3	3	1
CO	2	2	1	1		2							3	3	1
CO	3	3	2	1		2							3	3	1
CO	4	3	3	1		2							3	3	1
CO	5	3	3	1		2							3	3	1
1 – Sli	ght, 2	– Mode	rate, 3 –	Substantia	I, BT- I	Bloom's T	axonom	ıy							
						ASSESS	MENT	PATTE	RN – T	HEORY					
	st / B Categ	loom's jory*	R	ememberi (K1) %	ng	Understa (K2)		Apply (K3)	•	Analyz (K4) ^c		Evaluating (K5) %		reating K6) %	Tota %
	CA	T1		10		25		65	;						100
	CA	T2		05		30		65	5						100
	CA	Т3		05		30		65	;						100
	ES	E		05		40		55	5						100



	22TAM02 – தமிழரும் தொழில்	v -					
	(Common to All Engineering and Techno	ology Bra	nches)				
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	பங்கன	ள பற்றிப் எ	டுத்	துை	ரத்த	ல்
அலகு – I	நெசவு மற்றும் பானை தொழில்நுட்பம்						3
சங்க காலத்தி கீறல் குறியீடுக	ல் நெசவு தொழில் – பானைத் தொழில்நுட்பம் க கள்	கருப்பு கீ	ிவப்பு பான்	ரடங்	கள்	– Ц	ாண்டகளில்
ച്ചാര്ര – 11	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்						3
அமைப்பு பற் பெருங்கோயில் மாதிரிகட்டமை		் கோ – நா ன் ஆல	_ வில்களும் ாயக்கா் க லயம் மற்று	– ாலச் ம் த	ே ந	சாழர் கோட மனை	் காலத்த பில்கள் - ல நாயக்கா
ച്ചാനം സം ചാത്ര – III	உர்றாட்டு வருகள் டீர்த்த காலத்தால் என்ன உற்பத்தித் தொழில்நுட்பம்		9			<u> </u>	3
மணிகள் – எலு அலகு – IV அணை, ஏரி, (தொழிற்சாலைகள் – கல்மணிகள் – கண்ணாடி றம்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலட வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட் தளங்கள், மதகு – சோழர்கால குமிழித் தூம்பின் ககாக வடிவமைக்கப்பட்ட கிணறுகள் – வேள	ப்பதிகார பப் முக்கிய	த்தில் மணி பத்துவம் –	களி கால்	ன் எ ல்நன	വഞ െ	கள். 3 ராமரிப்பு -
-	– கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும்	் முத்த	jக்குளித்தல்	- (பி	நிக்	_ல் குறித்த
,	வு – அறிவுசார் சமூகம்.						
<u> </u>				<u> </u>			3
மென்பொருட்க	ìழின் வளர்ச்சி – கணினிதத்தமிழ் வளர்ச்சி – தமி ள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகட	. 0		•			•
, , , ,	ள் சொற்குவைத் திட்டம்.						ணையத்தில்
	கள் சொற்குவைத் திட்டம்.						றையத்தில் Total:1
TEXT BOOK:	கள் சொற்குவைத் திட்டம்.						
1. 1	கள் சொற்குவைத் திட்டம். ரலாறு – மக்களும் பண்பாடும் – கே கே பிள்ளை ல பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவன		• • • •	ſĿ L	nri	நூல்	Total:1
தமிழக வ 1. கல்வியில்	ரலாறு – மக்களும் பண்பாடும் – கே கே பிள்ளை	ம், சென்	• • • •	С. Г.	וחדו	நூல்	Total:1
தமிழக வ 1. தமிழக வ கல்வியில் 2.	ரலாறு – மக்களும் பண்பாடும் – கே கே பிள்ளை 5 பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவன	ம், சென்	• • • •	С. г	ηuri	நூல்	Total:1
1. தமிழக வ கல்வியில் 2. கணினித்த REFERENCES:	ரலாறு – மக்களும் பண்பாடும் – கே கே பிள்ளை 5 பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவன	ம், சென் 2016	ഞ്ഞ, 2002			நூல்	Total:1
தமிழக வ 1. கல்வியில் 2. கணினித்த REFERENCES: 1. கீழடி–வை	ரலாறு – மக்களும் பண்பாடும் – கே கே பிள்ளை 9 பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவன 9மிழ் முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2	ம், சென் 2016 ல்லியல்	ഞ്ഞ, 2002			நூல்	Total:1



	Social Life	of Tamil	s (Dr.K.K	(Pillay) A	joint Pu	blicatior	n of TNT	B & ES	C and F	RMRL –	(in print)				
4.	Social Life	of the Ta	amils – T	he Classi	cal Perio	od (Dr.S	.Sigara	velu) (Pu	ublished	d by: Inte	ernationa	al Institut	e of Tam	il Studies	s).
5.	Historical I Tamil Stud		of the Ta	mils (Dr.S	S.V.Suba	atamania	an, Dr.K	.D. Thir	unavuk	arasu) (Publishe	d by : Int	ternationa	al Institut	te of
6.	The Contri	bution of	the Tam	il to India	n Cultur	e (Dr.M.	Valarma	athi) (Pu	plished	l by Inte	rnational	Institute	of Tamil	Studies)).
7.	Keeladi – ' Tamilnadu									ished by	/: Depart	ment of	Archaeo	logy &	
8.	Studies in	the Histo	ory of Ind	ia with Sp	ecial Re	ference	to Tam	ilnadu (l	Dr.K.K.I	Pillay) (F	Published	d by: The	e Author)		
9.	Porunai Ci Corporatio			Published	l by: Dep	partmen	t of Arch	naeolog	y & Tan	nilnadu ⁻	Textbook	and Ed	ucational	Services	S
10.	Journey of	Civilizat	ion Indus	to Vaiga	i (R.Bala	akrishna	n) (Publ	lished by	y: RMR	L) – Ref	erence E	Book.			
	JRSE OUTC			_										BT Map	
படிப்	பபை முடித்த -								0					Highest I	Level)
CO1	- C	லாச்ச லநுட்பம்	/	மற்றும் விளக்க மு		មិប្រមត្តិ	൭ഁ൭഻൏൳	லடய	நெச	പ്പ വ	ற்றும்	பானை	សា Und	derstand	ing (K2)
CO2	தமிழர்கவ முடியும்.	ரின் வ	டிவமை	ப்பு மற்	றும்	கட்டிட	த் தெ	நாழில்ந	நட்ப	ஆற்ற	ல் பற்ற	ரி விளச்	5.55 Uno	derstand	ing (K2)
$\sim \sim \sim$	கமிமர்கவ	ரின் உற்	பத்தித்	தொழில்	்நுட்பப	பற்றி ச	சுருக்கம	ாகக் கூ	ற முடியு	ும்.			Uno	derstand	ing (K2)
003	2-3-00														
	2000	ரின் வே	ளாண்ன	ாம மற்	றும் நீர்	ப்பாசஎ	னத் தெ	தாழில்	நுட்பம்) பற்றி வ	பிளக்க மு	டியும்.	Und	derstand	ing (K2)
CO3 CO4 CO5	தமிழர்கள			மை மற் தமிழ்	, r		· · ·				0			derstand derstand	0 ()
CO4	தமிழர்கள				மற்றுப	் கணி	ினித்த	பிழ் ப	ற்றி வி)៣ភំភ (0				0 ()
CO4 CO5	தமிழர்கள				மற்றுப		ினித்த	பிழ் ப	ற்றி வி)៣ភំភ (0				ing (K2)
CO4 CO5	தமிழர்கவ தமிழர்கவ	ரின் அற்	ிவியல்	் தமிழ்	மற்றுப் Mapp	் கணி ing of (ினித்த COs wi	மிழ் பர ith POs	ற்றி வி s and F	் ிளக்க (PSOs	ற்டியும்).	Und	derstand	ing (K2)
CO4 CO5	தமிழர்கள தமிழர்கள SOS/POS	ரின் அற்	ிவியல்	் தமிழ்	மற்றுப் Mapp	் கணி ing of (ினித்த COs wi PO6	மிழ் பர ith POs	ற்றி வி s and F PO8	ிளக்க (PSOs PO9	ں پہلایاں PO10).	Uno PO12	derstand	ing (K2)
CO4 CO5	தமிழர்கள தமிழர்கள SOS/POS CO1	ரின் அற்	ிவியல்	் தமிழ்	மற்றுப் Mapp	் கணி ing of (iனித்தா COs wi PO6 3	மிழ் பர ith POs	ற்றி வி s and F PO8 3	ளக்க (PSOs PO9 2	ழடியும் PO10 2).	Uno PO12 3	derstand	ing (K2)
CO4 CO5	தமிழர்கள தமிழர்கள 50s/POs <u>CO1</u> CO2	ரின் அற்	ிவியல்	் தமிழ்	மற்றுப் Mapp	் கணி ing of (iனித்த COs wi PO6 3 3	மிழ் பர ith POs	ັງຼັງ ເມີ s and F PO8 3 3	ிளக்க (PSOs PO9 2 2	یں ہے تو اور اور اور اور اور اور اور اور اور او).	Und PO12 3 3	derstand	ing (K2)
CO4 CO5	தமிழர்கள தமிழர்கள COS/POS CO1 CO2 CO3	ரின் அற்	ிவியல்	் தமிழ்	மற்றுப் Mapp	் கணி ing of (iனித்த COs wi PO6 3 3 3	மிழ் பர ith POs	ງັກ)ີ ຄ and F PO8 3 3 3	PSOs PO9 2 2 2 2	роциций РО10 2 2 2).	PO12 3 3 3	derstand	0 ()
CO4 CO5	தமிழர்கள தமிழர்கள СО/РОS СО1 СО2 СО3 СО4	ரின் அற் PO1	്വിലல് PO2	் தமிழ் PO3	函றறுப Mapp PO4	ng of (PO5	COs wi PO6 3 3 3 3 3 3 3	மிழ் பர ith POs	ງັງເກີ	Р Р Р С С С Р С	роцицій РО10 2 2 2 2).	PO12 3 3 3 3 3	derstand	ing (K2)
CO4 CO5	эвдрітая эддрітая Эддрітая СО5/РО5 СО1 СО2 СО3 СО4 СО5	ரின் அற் PO1	്വിലல് PO2	் தமிழ் PO3	函ற的 Mapp PO4	o கணி ing of (PO5 n's Taxo	COs wi PO6 3 3 3 3 3 3 3 3 0 00my	ith POs	ງັກີ)	2 2 2 2 2 2 2	роцицій РО10 2 2 2 2).	PO12 3 3 3 3 3	derstand	ing (K2)
CO4 CO5 C	தமிழர்கள தமிழர்கள (CO1 (CO2 (CO3 (CO4 (CO5 (CO5)) (CO5)) (CO5))	ரின் அற் PO1	றிவியல் PO2 3 – Subs	PO3	Mapp PO4 T- Bloon	ing of (PO5 n's Taxo ESSME	COs wi PO6 3 3 3 3 3 3 3 3 Nnomy	ith POs PO7	ັງဤ	PSOs PO9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	роцицій РО10 2 2 2 2 2 2	PO11	PO12 3 3 3 3 3 3	PSO1	PSO2
CO4 CO5 C	эшулаа Э	ரின் அற் PO1	றிவியல் PO2 3 – Subs	PO3 PO3 itantial, B	Mapp PO4 T- Bloon	ing of (PO5 n's Taxo ESSME derstan (K2) %	COs wi PO6 3 3 3 3 3 3 3 Nnomy	ith POs	ັງဤ	2 2 2 2 2 2 2	рцици РО10 2 2 2 2 2 2 2 2 2).	PO12 3 3 3 3 3	derstand PSO1 ting	PSO2
CO4 CO5 C		ரின் அற் PO1 oderate,	றிவியல் PO2 3 – Subs	PO3 PO3 itantial, B ⁻ itantial, B ⁻ itantial, B ⁻	Mapp PO4 T- Bloon	o கணி ing of (PO5 n's Taxo ESSME derstan (K2) % 60	COs wi PO6 3 3 3 3 3 3 3 Nnomy	ith POs PO7	ັງဤ	PSOs PO9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	рцици РО10 2 2 2 2 2 2 2 2 2	PO11	Und PO12 3 3 3 3 3 Creat	derstand PSO1 ting	PSO:
CO4 CO5 C	эшулаа Э	ரின் அற் PO1	றிவியல் PO2 3 – Subs	PO3 PO3 stantial, B tantial, B tantial, B 40 40	Mapp PO4 T- Bloon	n's Taxo ESSME (K2) % 60 60	COs wi PO6 3 3 3 3 3 3 3 Nnomy	ith POs PO7	ັງဤ	PSOs PO9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	рцици РО10 2 2 2 2 2 2 2 2 2	PO11	Und PO12 3 3 3 3 3 Creat	derstand PSO1 ting	Total % 100
CO4 CO5 C		ரின் அற் PO1 oderate,	றிவியல் PO2 3 – Subs	PO3 PO3 itantial, B ⁻ itantial, B ⁻ itantial, B ⁻	Mapp PO4 T- Bloon	o கணி ing of (PO5 n's Taxo ESSME derstan (K2) % 60	COs wi PO6 3 3 3 3 3 3 3 Nnomy	ith POs PO7	ັງဤ	PSOs PO9 2 2 2 2 2 2 2 2 2 2 8 RY nalyzing K4) %	рцици РО10 2 2 2 2 2 2 2 2 2	PO11	Und PO12 3 3 3 3 3 Creat	derstand PSO1 ting	PSO 2



	22TAM02 - TAMILS AND TECHNO						
	(Common to All Engineering and Technolo	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		h related techno				
	WEAVING AND CERAMIC TECHNOLOGY			Jiogy			3
-	ry during Sangam Age – Ceramic technology – Black and Red War		(BRW) _ Graf	fiti on	Potte	rice	3
	DESIGN AND CONSTRUCTION TECHNOLOGY	erollenea	S (DIVV) – GIAI		rolle		3
Designing and stones of Sang Temples of Ch	Structural construction House & Designs in household materials jam age – Details of Stage Constructions in Silappathikaram – olas and other worship places – Temples of Nayaka Period – Tyj – Chetti Nadu Houses, Indo – Saracenic architecture at Madras du	Sculptures pe study (and Temples Madurai Meena	of M	amal	lapura	am – Great
UNIT – III	MANUFACTURING TECHNOLOGY						3
Minting of Coin	lding – Metallurgical studies – Iron industry – Iron smelting, steel s – Beads making – industries Stone beads – Glass beads – Terrac em stone types described in Silappathikaram.						
UNIT – IV	AGRICULTURE AND IRRIGATION TECHNOLOGY						3
	nds, Sluice, Significance of Kumizhi Thoompu of Chola Period, A Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche /.						
UNIT – V	SCIENTIFIC TAMIL & TAMIL COMPUTING						3
Development o Academy – Tar	f Scientific Tamil – Tamil computing – Digitalization of Tamil Bool nil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	ks – Deve	lopment of Tar	nil 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	5).
REFERENCES	:						
	வரலாறு - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளி ா கழகம்), உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை,		ழ்நாடு பாட	தால் ட	ற்ற	யம் க	ல்வியில்
2. கணின்	த்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016						
3. கீழடி ன	வகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்	ியல் துல	றை வெளியீ(ይ)			
4. பொருல	நை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீ(թ					
5. Historical Studies)	Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavuka	arasu) (Pul	olished by : Inte	ernatio	nal lı	nstitut	e of Tamil
6. The Cont	ribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished	by Interna	ational Institute	of Tar	nil St	udies).
	'Sangam City Civilzation on the banks of river Vaigai; (Jointly Publi k and Educational Services Corporation, Tamilnadu)	shed by: D	epartment of <i>i</i>	Archae	eolog	у & Т	amilnadu
8. Studies in	the History of India with Special Reference to Tamilnadu (dr.K.K.P	illay) (Pub	lished by : The	Autho	r)		
	Civilization (Jointly Published by: Department of Archaeology & Tam on, Tamilnadu)	ilnadu Tex	tbook and Edu	cation	al Se	ervice	S
B.E	- Mechatronics Engineering, Regulation, Curriculum and Syll	abus – R2	2022			92	



10. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.



	SE OUTC		ırse, the s	tudents v	will be ab	le to						()	BT Map lighest l	
CO1			nd ceramic				and tami	society.					derstandi	
CO2	Illustrate	about the	design an	d constru	ction tech	nology.						Un	derstandi	ing (K2)
CO3	summar	ze about t	he manufa	cturing te	chnology.							Un	derstandi	ing (K2)
CO4	explain t	he agricul	ture and irr	igation te	chnology.							Un	derstandi	ing (K2)
CO5	explain t	ne signific	ance of tar	nil in scie	ntific and	computir	ng.					Un	derstandi	ing (K2)
					Mappin	g of CO	s with P	Os and P	SOs					
COs/P	Os PO	1 PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	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 – Slig	ght, 2 – M	oderate, 3	- Substan	tial, BT- E	Bloom's Ta	axonomy	/	1	1	I				
T						-	PATTER		-				•	
	Bloom's egory*		nbering I)%		standing 2) %		plying (3) %		alyzing (4) %		uating 5) %	Creat (K6)		Total %
C	AT1	4	40	. (60		-				•			100
C	AT2	4	40	(60									100
C	AT3	4	40	(60									100
	SE					I		NA		I		1		

		(Common to All BE/BT	ech branches)					
Progr Branc	amme& :h	All BE/BTech branches	Sem.	Category	L	т	Ρ	Credit
Prere	quisites	Nil	1/2	ES	0	0	6	3
Pream		This course is designed to provide foundatio on developing a prototype model with the ba Processes, 3D Printing Technology, Robotics MENTS / EXERCISES:	sic knowledge of Co	omputer-aideo				
		PART A – Manufacturi	ing (30 Hours)					
1.	Selection	of product, free hand sketching and detailing						
2.	Construc	tion of model using Arc/TIG/MIG/Gas/Spot weldir	ng operations					
3.	Enhancir	ng the model with sheet metal						
4.	Creating	the parts of the model using lathe						
5.	Creating	the parts of the model using milling and drilling n	nachines					
		PART B – Product Design and I	Development (30 H	ours)				
1.	Free han	d sketching and detailing of the component						
2.	3D part r	nodelling of the component using CAD software						
3.	Enginee	ing Analysis of the component model						
4.	Generate	e the component using 3D printer						
5.	Value ac router	dition to the produced component using CNC	milling machine, C	NC laser cut	ting	mach	nine a	and CNC
		PART C – Robotics	(30 Hours)					
1.	Design o	f electronic circuit and its debugging						
2.	Interfacir	ng of sensors, actuators and wireless communica	ation modules with m	nicrocontroller				
3.	Assembl	y of Tracker Robot with accessories						
4.	Developi	nent of control strategies for motion control, path	planning and obsta	cle avoidance)			
5.	Demonst	ration and testing of Robot in static environment						
								Total:90
		IANUAL /SOFTWARE:						
1. 2.		ry Manual 2020 and SOLID WORKS 2018 Software						

		UTCO tion of		urse, th	e stude	ents wil	ll be ab	le to					(ዞ	BT Map lighest L	
CO1			he prot proces	21	model (using n	nechani	cal ope	erations	like w	elding, f	orming an		Applying Precision	· /·
CO2						he proto er and C		0	dern ma	achines	like 3D p	orinter, CN		Applying Precision	
CO3	des	sign and	d develo	op the a	utonom	ious rob	ot for re	eal-time	applica	tions				Applying Precision	
						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	PO12	PSO1	PSO2
CO	1	3	3	3		2		ĺ		3	2		2		ĺ
CO2	2	3	3	3		3		ĺ		3	2		2		Ì
COS	3	3	3	3		2				3	2		2		ĺ
1 – Slig	ght, 2	2 – Mod	erate, 3	- Subs	stantial,	BT- Blo	om's Ta	axonom	y		1		1	1	1

Brand	amme 8 ch		B.E. 8	Mecha	atronic	s Engir	eering				Sem.	Category	/ L	ТР	Credit
Prere	quisites		Nil								2/3	ES	0	0 2	1
Prean	nble				provides ital circ		on tra	ining to	analyz	e the c	haracteri	stics of ser	micondu	ictor dev	ices and
LIST	OF EXPI	RIM	IENTS	EXER	CISES:										
1.	Verific	atior	n of Ohr	n's law,	Kirchho	off's Lav	v								
2.	Verific	atior	of Seri	es and	Paralle	l Circuit	s								
3.	Chara	cteri	stics of	semico	nductor	diode a	nd zen	er diode)						
4.	Input	and c	output c	haracte	ristics c	of transis	stor und	ler CE c	onfigura	ation					
5.	Half w	ave	and Ful	l wave i	rectifier										
6.	Verific	atior	of Boo	lean the	eorems	using d	igital log	gic gate	s						
7.	Desig	n and	d impler	nentatio	on of bir	nary add	der and	subtrac	tor						
8.	Desig	n and	d impler	nentatio	on of mu	ultiplexe	r and d	e-multip	lexer						
9.	Desig	n and	d impler	nentatio	on of en	coder a	nd deco	oder							
10.	Desig	n of a	asynchr	onous d	counter										
11.	Desig	n of s	synchro	nous co	ounter										
12.	Desig	n of S	Shift Re	gister											
															Total:30
DEEE		2/ NA /		/SOFT											
1.	_		Manua		WARE.										
••	Labor	liony	Mariae												
	RSE OUT			urse, th	e stude	ents wil	ll be ab	le to					(BT Map Highest I	
CO1						d boolea							•	derstandi	ng (K2),
	-							vices ar	nd its an	nlicatio	n			Imitation Applying	(K3),
CO2	anaryz									phodulo				anipulation Applying	
CO2	1		combin	ational	circuits	and the	seque	ntial circ	cuits					Precision	
CO2 CO3	desigr	the									0-				
	desigr	the				Марр	ing of (Cos wit	h POs a	and PS	US				
	POs P	01	PO2	PO3	PO4	PO5	ing of (PO6	Cos wit PO7	h POs a PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO3	POs P			PO3 1 1	PO4		-	1	1	r	1	P011	PO12 3 3	PSO1 3	PSO2 2 2

				(Corr	mon to	Mecha	nical, N	lechatro	nics an	d Autor	nobile bra	anches)				
Progra Branc	amme ä h	&	B.E - branc		nical, M	echatro	onics a	nd Auto	omobile)	Sem.	Categor	y L	т	Ρ	Credi
Prerec	quisites	5	Nil								2	BS	0	0	2	1
Pream	ble		calorir analyt	netric, j ical cap	oH met ability t	eric, po o engin	tentiom eering	etric, s	bectrop	notome o aims	tric expe	c, conductor riments an the knowl	d there	by to	mp	rove th
LIST C	OF EXP															
1.	Detei	rmina	tion of s	strength	of an u	nknowr	n solutio	on using	pH me	er.						
2.	Analy	/sis a	nd com	parison	of the s	strength	of acid	s in the	given n	nixture u	using cor	nductivity m	neter.			
3.	Poter	ntiom	etric app	oroach	using a	Pt elect	trode fo	r the es	timatior	of iron	in the gi	ven sample	ə.			
4.	Spec	troph	otometr	ic meth	od for th	ne detei	minatic	on of Iro	n in stee	el.						
5.	Deter	rmina	tion of r	nolecula	ar weigł	nt of a p	olymer	/ liquid	by Ostw	ald vise	cometer.					
6.	Volur	netric	analys	is of nic	kel by c	omplex	ometric	metho	d.							
7.	Estim	nation	of sulp	hur pres	sent in f	uel usir	ng elect	ro-analy	tical teo	hnique	s.					
8.					water sa dness b				of drin	king / ir	ndustrial p	ourpose by	estima	ing the	e ca	lcium,
9.								wastew	ater sar	nple.						
10.	Dete	rmina	tion of (COD of	the give	en wast	ewater	sample								
11.	Elect	roplat	ing pro	cess (D	emonst	ration).										
12.			analysi onstrati		al - dete	ermine r	noisture	e, volatil	e matte	r and a	sh contei	nt of a give	n samp	e of		
																Total:3
REFE	RENCE	S/ M	ANUAL	/SOFT	WARE:											
1.					ndan P. s, Erode			d Manjı	ıla Rani	K., "Cł	nemistry l	aboratory	Manual	", 1 st E	ditio	on,
On co	SE OU	тсоі	MES:					le to						BT N Highe Applyi	st L	.evel)
CO1	estim	ate th	ne hardr	ness, D	O and C	COD pre	esent in	the give	en wate	r sampl	e.			Precis	ion	(S3)
CO2	analy	ze th	e amou	nt of Fe	, Ni, coi	nductivi	ty and p	oH of th	e given	solutior	٦.			Apply Precis	ion	(S3)
CO3			te the v ntent in		ter for th	ne detei	rminatio	on of mo	lecular	weight	of polym	er and		Applyi Precis		
					1	Маррі	ing of (Cos wit	h POs a	nd PS	Os			-		
COs/P		PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSC	01	PSO
CO		3	2	1	3			3								
CO2 CO3		3	2	1	3			3								
1.1.1.	≺	3	2	1	3	1		2	1		1	1		1		



(Offered by Department of Information Technology)gramme & nchAll B.E./B.Tech. BranchesSem.CategoryLTPrequisitesProblem Solving and Programming in C3ES302	
nch All B.E./B. Tech. Branches Sem. Category L I P	
requisites Problem Solving and Programming in C. 3 ES 3 0 2	Credit
	4
This course deals with core Introduction to Python. It gives a comprehensive introduction to problem solution using python constructs and libraries.	lving
Introduction:	9
blem solving strategies – program design tools – Types of errors – Testing and Debugging- Basics: Literals – varia tifiers – data types - input operation – comments – reserved words – indentation – Operators and Expressions – Decisio ements: Introduction – conditional statement – iterative statements – Nested Loops – break, continue and pass statement ops.	on Contro ents – els
 Lists, Tuples and Dictionary: Access, update, nested, cloning, operations, methods, comprehensions, looping - Tuple: Create, utility, access, update 	9
rations, assignments, returning multiple values, nested tuples, index and count method - Dictionary: Create, access, lify, delete, sort, looping, nested, built-in methods – list vs tuple vs dictionary.	
- III Strings and Regular Expressions:	9
ngs: Concatenation, append, multiply on strings – Immutable – formatting operator – Built-in string methods and function ration – functions – operators – comparing – iterating – string module – Regular Expressions – match, search, sub, fi ter functions – flag options.	
- IV Functions and Modules:	9
ctions: Introduction - definition – call – variable scope and lifetime – return statement – function arguments – lambda f umentation strings – programming practices recursive function- Modules: Modules – packages – standard library m tion redefinition.	
- V Object Orientation:	9
ss and Objects: Class and objects – class methods and self – constructor – class and object variables – destructor – p ate data member. NumPy : NumPy Arrays – Computation on NumPy Arrays. Matplotlib : Line plots – Scatter Plots	public and
OF EXPERIMENTS / EXERCISES:	
Programs using conditional and looping statements	
Implementation of list and tuple operations	
Implementation of dictionary operations	
Perform various string operations	
Use regular expressions for validating inputs	
Demonstration of different types of functions and parameter passing	
Develop programs using classes and objects	
Perform computation on Numpy arrays	
Draw different types of plots using Matplotlib	
Lecture:45, Practical:30,	, Total:7
T BOOK:	
Reema Thareja., "Introduction to Python using problem solving approach", 3 rd impression, Oxford University Press., N 2017.	√ew Delh



CO1 3 2 1 1 Image: constraint of the state	1.	-					-						Delhi, 201			
On completion of the course, the students will be able to (Highest Leve On completion of the course, the students will be able to (Highest Leve C01 use basic python constructs to build simple programs Applying (K3) C02 apply strings and regular expression for searching and retrieval Applying (K3) C04 solve the problems using functions and modules. Applying (K3) C04 P01 P02 P03 P06 P07 P08 P01 P12 PS01 P CO1 3 2 1 1 P05 P01 P012 PS01 P CO1 3 2 1 1 1 P 1 P 1 P 1 Applying (K3) CO1 3 2 1	2.				Python D	ata So	cience Ha	ndbook	Essenti	al Too	ls for Wo	orking wi	th Data", O	'Reilly pu	blishers,1 ^{si}	
On completion of the course, the students will be able to (Highest Level C01 use basic python constructs to build simple programs Applying (K3) C02 apply list, tuple and dictionary to handle variety of data. Applying (K3) C03 apply strings and regular expression for searching and retrieval Applying (K3) C04 solve the problems using functions and modules. Applying (K3) C05 apply object-oriented concepts and perform data science operations using python Applying (K3) C06 PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PSO1 P C02 3 2 1 1 Image: Science operations Image: Science operations <td></td>																
Apply list, tuple and dictionary to handle variety of data. Applying (K3) CO3 apply strings and regular expression for searching and retrieval Applying (K3) CO4 solve the problems using functions and modules. Applying (K3) CO5 apply object-oriented concepts and perform data science operations using python Applying (K3) COs/POs PO1 PO2 PO3 PO6 PO7 PO8 PO10 PO11 PO12 PSO1 P COs/POs PO1 PO1 PO11 PO12 PSO1 P COs/POs PO1 PO11 PO12 PSO1 P COS/POS PO1 PO11 PO12 PSO1 P COS/POS PO1 PO11 PO12 PSO1 P CO3 3 2 <td></td> <td></td> <td></td> <td></td> <td>se, the st</td> <td>udent</td> <td>s will be</td> <td>able to</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>					se, the st	udent	s will be	able to								
CO3 apply strings and regular expression for searching and retrieval Applying (K3) CO4 solve the problems using functions and modules. Applying (K3) CO5 apply object-oriented concepts and perform data science operations using python Applying (K3) Mapping of COs with POs and PSOs CO3/POS PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 P CO3/OS PO1 Applying (K3) CO3/POS PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 P CO1 3 2 1 1	CO1	use	basic p	ython co	nstructs t	o build	simple p	rograms							Applying	g (K3)
CO4 solve the problems using functions and modules. Applying (K3) CO5 apply object-oriented concepts and perform data science operations using python Applying (K3) Mapping of COs with POs and PSOs COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 P CO1 3 2 1 1 <	CO2	app	ly list, tu	ple and	dictionary	to hai	ndle varie	ty of dat	a.						Applying	g (K3)
COS apply object-oriented concepts and perform data science operations using python Applying (K3) COS/POS PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 P CO1 3 2 1 1 Image: Cost of the cost of	CO3	app	ly string	s and re	gular expi	ressior	n for searc	ching an	d retriev	val					Applyin	g (K3)
Mapping of COs with POs and PSOs PO1 PO12 PSO1 P COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PSO1 P CO1 3 2 1 1	CO4	solv	e the pr	oblems	using fund	ctions a	and modu	iles.							Applying	g (K3)
COs/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 P CO1 3 2 1 1 <	CO5	app	ly object	t-oriente	d concept	ts and	perform d	lata scie	nce ope	eration	s using p	ython			Applying	g (K3)
CO1 3 2 1 1 Image: constraint of the state							Марр	oing of (COs wit	th POs	and PS	Os				
CO2 3 2 1 1 Image: constraint of the state of the sta	COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO3 3 2 1 1 Image: constraint of the state	CO	1	3	2	1	1										
CO4 3 2 1 1 Image: Constraint of the state of the sta	CO	2	3	2	1	1										
CO5 3 2 1 1 Image: Constraint of the state			-		-	-										
Second L - Moderate, 2 – Moderate, 3 – Substantial, BT- Bloom's TaxonomyASSESSMENT PATTERN - THEORYTest / Bloom's Remembering (K1) %Understanding (K2) %Applying (K3) %Canalyzing (K4) %Evaluating (K5) %Creating (K6) %ToCAT1101575 </td <td>CO4</td> <td>4</td> <td>3</td> <td></td> <td>1</td> <td>1</td> <td></td>	CO4	4	3		1	1										
ASSESSMENT PATTERN - THEORYTest / Bloom's Category*Remembering (K1) %Understanding (K2) %Applying (K3) %Analyzing (K4) %Evaluating (K5) %Creating (K6) %ToCAT1101575 <td< td=""><td></td><td></td><td>_</td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>			_	_												
Test / Bloom's Category*Remembering (K1) %Understanding (K2) %Applying (K3) %Analyzing (K4) %Evaluating (K5) %Creating (K6) %ToCAT1101575 </td <td>1 – Slig</td> <td>ght, 2</td> <td>– Mode</td> <td>rate, 3 –</td> <td>Substant</td> <td>tial, BT</td> <td>- Bloom's</td> <td>Taxono</td> <td>omy</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	1 – Slig	ght, 2	– Mode	rate, 3 –	Substant	tial, BT	- Bloom's	Taxono	omy							
Category* (K1)% (K2)% (K3)% (K4)% (K5)% (K6)% TC CAT1 10 15 75							ASSI	ESSME		TERN	- THEO	RY				
CAT2 10 15 75 CAT3 10 15 75				Re		ng										Total %
CAT3 10 15 75		CAT	1		10		15		75	5						100
		CAT	2		10		15		75	5						100
		CAT	3													100
ESE 10 15 75		ESE			10		15		75	5						100



Progra		22MTT31- STRENGTH OF MATERIALS				
Branch	amme & h	B.E. & Mechatronics Engineering Sem. Category	L	т	Ρ	Credit
Prereq	quisites	Engineering Mechanics, Matrices and Ordinary3/4PCDifferential Equations3/4PC	3	1	0	4
Pream	1	To understand the concepts of types of stress, strain, strain energy, principal str biaxial state of stress in thin cylinders and spherical shells. Also, estimate and of bending moment diagram due to external loads and the bending stresses of the be and deflection of beams using different methods and buckling load of a column circular shaft and estimation of stress acting on the helical coil springs. Deformation of Solids and Strain Energy:	draw eams is an	the s . Eva d str	shear luatio uts.	force and n of Slope Forsion or 9+3
strain-	simple and co	Is: Stability- Strength- Stiffness- Tensile- Compressive and Shear stresses - Strain impound bars - Introduction to Standards and various theories of failure – Relation be rain Energy: Uniaxial loads- gradually applied load- suddenly applied load and impact	twee	en ela		
	is of State of stresses: stre	Analysis of State of Stress and Biaxial stresses: Stress: Biaxial state of stress – thin cylinders and shells – Deformation in Thin cylinders at a point on inclined planes – Principal planes and stresses – Mohr's circle for				
Unit –	111	Transverse Loading on Beams and Stresses in Beams:				9+3
simply		on Beams: Types - transverse loading in beams-shear force and bending momen d overhanging beams-Point of contraflexure. Stresses in Beams: Theory of simple ber				
Double	tion of Beams integration n	Deflection of Beams and Columns: Elastic curve of neutral axis of the beam under normal loads – evaluation of beat nethod and Macaulay's method. Columns: End condition –equivalent length of colu Rankine's formula for columns.				
	n on Circular	Torsion on Circular Shafts and Torsion on Springs: Shafts: Torsion– shear stress distribution – hollow and solid circular section - Tor				9+3
		stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hel eflection of springs under axial load.				
		stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load.	ical s	spring	gs und	der torsion
	stiffness and d	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load.	ical s	spring	gs und	
loads-s	stiffness and d BOOK:	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load.	ical s	spring	gs und	der torsion
loads-s TEXT E 1.	stiffness and d BOOK:	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load. Lecture	ical s	spring	gs und	der torsion
loads-s TEXT E 1.	BOOK: Rajput R.K RENCES: Rattan S.S	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load. Lecture , "Strength of Materials". 6th Edition, S.Chand & Co., New Delhi, 2018. , "Strength of Materials". 3rd Edition, Tata McGraw Hill Education Private Ltd., New D	ical : : 45 , ⁻ elhi,	Tutor	;ial:15	der torsion
Ioads-s TEXT E 1. REFER	BOOK: Rajput R.K RENCES: Rattan S.S	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load. Lecture , "Strength of Materials". 6th Edition, S.Chand & Co., New Delhi, 2018.	ical : : 45 , ⁻ elhi,	Tutor	;ial:15	der torsion
Ioads-s TEXT I 1. REFER 1. 2.	BOOK: Rajput R.K RENCES: Rattan S.S Timoshenk 2010.	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load. Lecture , "Strength of Materials". 6th Edition, S.Chand & Co., New Delhi, 2018. , "Strength of Materials". 3rd Edition, Tata McGraw Hill Education Private Ltd., New D	ical : : 45 , ⁻ elhi,	Tutor	;ial:15	der torsior
Ioads-s TEXT I 1. REFER 1. 2. 3. COURS	BOOK: Rajput R.K RENCES: Rattan S.S Timoshenk 2010. Amrita Virt	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load. Lecture , "Strength of Materials". 6th Edition, S.Chand & Co., New Delhi, 2018. , "Strength of Materials". 3rd Edition, Tata McGraw Hill Education Private Ltd., New D o S.P, "Elements of Strength of Materials". 10th Edition, Tata McGraw Hill Publishi ual Laboratory	ical : : 45 , ⁻ elhi,	Spring Tutor 2017 Compa B	ial:15	der torsion 5, Total:60 New Delhi,
TEXT E 1. REFER 1. 2. 3. COURS On cor	BOOK: Rajput R.K RENCES: Rattan S.S Timoshenk 2010. Amrita Virt SE OUTCOM mpletion of th	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load. Lecture , "Strength of Materials". 6th Edition, S.Chand & Co., New Delhi, 2018. , "Strength of Materials". 3rd Edition, Tata McGraw Hill Education Private Ltd., New D to S.P, "Elements of Strength of Materials". 10th Edition, Tata McGraw Hill Publishi ual Laboratory ES:	ical : : 45 , ⁻ elhi,	Spring Tutor 2017 Compa B (Hig	ial:15	der torsion 5, Total:60 New Delhi,
Ioads-s TEXT E 1. REFER 1. 2. 3. COURS On cor CO1	BOOK: Rajput R.K RENCES: Rattan S.S Timoshenk 2010. Amrita Virt SE OUTCOM mpletion of th analyze the	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load. Lecture , "Strength of Materials". 6th Edition, S.Chand & Co., New Delhi, 2018. , "Strength of Materials". 3rd Edition, Tata McGraw Hill Education Private Ltd., New D to S.P, "Elements of Strength of Materials". 10th Edition, Tata McGraw Hill Publishi ual Laboratory ES: he course, the students will be able to	ical : : 45 , ⁻ elhi,	2017 2017 Compa B (Hig Ar	rial:15	der torsion 5, Total:60 New Delhi, oped Level)
Ioads-s TEXT I 1. REFER 1. 2. 3. COURS	BOOK: Rajput R.K RENCES: Rattan S.S Timoshenk 2010. Amrita Virt SE OUTCOM mpletion of th analyze the analyze the	stepped shaft. Torsion on springs: Wahl's correction factor of springs stresses in hele eflection of springs under axial load. Lecture , "Strength of Materials". 6th Edition, S.Chand & Co., New Delhi, 2018. , "Strength of Materials". 3rd Edition, Tata McGraw Hill Education Private Ltd., New D to S.P, "Elements of Strength of Materials". 10th Edition, Tata McGraw Hill Publishi ual Laboratory ES: he course, the students will be able to e stress, strain and strain energy of simple bars	ical : : 45 , ⁻ elhi,	Spring Tutor 2017 Compa B (Hig Ap	T Maj ghest oplying	der torsion 5, Total:60 New Delhi, Deped Level) g(K3)



CO5 a	inalyze the	e torsion l	behavior	of shaft	is and co	il spring	S						Applying	(K3)
					Mappin	g of CO	s with	POs ar	nd PSOs	6				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	2	1	1								3	3	3
CO2	3	3	2	2	1							3	3	3
CO3	3	2	1	1								3	3	3
CO4	3	2	1	1								3	3	3
CO5	3	3	2	2	1							3	3	3
1 – Slight,	2 – Moder	ate, 3 – S	Substantia	al, BT- I	Bloom's	Taxonor	ny							
					ASSES	SMENT	PATTE	ERN - T	HEORY	,				
	Bloom's gory*	Rer	nemberi (K1) %	ng l	Jndersta (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating K6) %	Tota %
C	AT1		10		10		80)						100
C	AT2		10		10		80)						100
C	AT3		10		10		80)						100
_	SE		10		10		80)						100



Program	ime &	B.E. & Mechatronics Engineering Sem. Cat	ategory	L	т	Р	Credit
Branch Prerequi	sitos		PC	3	1	0	4
rielequi	31105	Ligineering Drawing, Ligineering mechanics 3/4	FU	5		U	-
Preamble	e	This course deals with the study of relative motion between the various parts act on them.	s of a mac	hin	e an	d forc	es which
Unit – I		Kinematics of Basic Mechanisms:					9+3
law-Kiner mechanis	matic Invers	finitions – Kinematics of Links, Pairs and Chains - Degree of Freedom Mobili sions of 4-bar and slider crank mechanism - Displacement, velocity and ical Method velocity and acceleration polygons –Relative velocity method, of slider crank mechanism - Klien's construction for slider crank mechanism.	l accelerat , instantan	tion	-an	alysis	in simpl
Unit – II		Force Analysis and Balancing of reciprocating engine:					9+3
		0'Alembert's principle-Inertia force analysis in reciprocating engines - Gas			-		
-		nk shaft torque – Turning Moment Diagrams of 2&4 stroke Engines - Static ar	-	ic b	alan	cing -	-Balancin
	-	Balancing of single cylinder Engine –Balancing of in line Multi-cylinder Engine	е				
Unit – III		Kinematics of Cams, Followers and Gear Trains:					9+3
retardatio follower,	on, SHM and roller - The	as and followers, displacement, velocity and acceleration curves for uniform velocity and cycloidal curves. Layout of cam profile - Types with reciprocating and osci eory of Gearing – gear nomenclature, law of gearing, Gear trains – types, cyclic gear trains.	cillating fol	low	ers li	ike kn	ife – Edg
Unit – IV		Free and Damped Vibrations:					9+3
		bratory systems-types-Single degree of freedom system -Longitudinal Vil uency by energy method, Dunkerly's method-Critical speed damped free vil nping-free vibration with viscous damping, Critically damped system, under da	ibration of	sir	ngle		
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CO1	2	1	1	1	2							2	2	3
CO2	2	3	3	2								2	2	3
CO3	2	3	3	3	3							2	3	3
CO4	2	3	3	2								2	3	3
CO5	2	3	3	1								2	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	omy							
					40050	OMENIT				<u></u>				
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Test / Ble Catege		Rer	nemberi (K1) %	ng l	Jndersta (K2)	•	Apply (K3)	•	Analyzi (K4) %	•	Evaluating (K5) %		reating K6) %	Total %
CAT	1		10		10		80)						100
CAT	2		10		10		80)						100
CAT	3		10		10		80)						100
ESE	Ξ		5		10		85	5						100
* ±3% may b	be varie	d (CAT 1	,2,3 – 50	marks	& ESE –	100 ma	rks)							



Program Branch		B.E. & N	lechatroni	cs Engineering			Sem.	Category	y L	. Т	Р	Credit
Prerequ	uisites	Multivar	iable Calc	ulus and Complex	Analysis		3	PC	3	0	0	3
Preamb	ble			ces the fundamental system in the design					es an	und	erstand	ling of the
Unit – I		Fundam	entals of s	signals and system	IS:							9
Region	of Conver	gence (RC	DC) of vari	assification of contir ious classes of sys s system – Mechatro	tems. Classific	ation of o	control S	Systems: O	pen l			
Unit – I	I	System	Modeling:	1								9
	mechanical			uation, Transfer func vith/without Gears).								
Unit – I	11	Time Re	sponse Ai	nalysis:								9
Type ar order u Criterior	Inderdampe	System - I d System	First order a for step in	system - Second ord nput - Time domain	der system: Cla specifications	ssificatior – Error a	n and nat analysis -	ure of resp - Concepts	onse of st	- Re abili	sponse sy: Rou	of secon th Hurwit
Unit – ľ	V	Frequen	icy Respoi	nse Analysis:								9
Frequer	ncy domain	specificati	ons – Bode	e plot - Polar plot - N	lyquist stability	criterion.						
Unit – V	V	Compor										•
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TEXT B	300K:	ator - Type	s of compendations of compendations of compendations of compensations of the second second second second second	-								t Locus. Total:4
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CO2	3	2	1	1	2					2	3	3
CO3	3	2	1	1	2					2	3	3
CO4	3	2	1	1	2					2	3	3
CO5	3	2	1	1	2					2	3	3
1 – Slight, 2	2 – Mod	erate, 3 –	Substantia	al, BT	- Bloom's Tax	konom	у				L.	
					ASSESSM	IENT F	PATTERN -	THEORY				
Test / B Categ		Re	ememberi (K1) %	ng	Understand (K2) %	ing	Applying (K3) %	Analyzing (K4) %	Evaluati (K5) %	-	Creating (K6) %	Total %
CA	T1		10		10		80					100
CA	T2		10		10		80					100
CA	T2		10		10		80					100
ES	SE		05		05		90					100



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Branc			Wechation		gineering	9			PC	_			
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Pream	ıble						struction, worl electrical ma						I
Unit –		DC Ma											9
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Unit –		-	phase Indu				<u> </u>						9
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motor:	Classificati	ons- Const	ruction and	l Principl	•	•	n - Torque an cations - Univ		-	/pes	-Appli		
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motor: Unit – Servo	Classificati V mechanisn	ons- Const Specia n – DC Se	ruction and I Machines rvo motor -	l Principl s - AC Se	e of operative	ration– Appli pr – Applicat	cations - Univ	ersal moto	or				9
motor: Unit – Servo	Classificati V mechanisn	ons- Const Specia n – DC Se	ruction and I Machines rvo motor -	l Principl s - AC Se	e of operative	ration– Appli pr – Applicat	cations - Univ	ersal moto	or				9 Brushles
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CO1	3	3	3	3						2	3	3
CO2	3	3	3	3						2	3	3
CO3	3	3	3	3						2	3	3
CO4	3	3	3	3						2	3	3
CO5	3	3	2	2			2	2		2	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substanti	al, BT-	· Bloom's Taxon	omy						
					ASSESSMEN	PATTERN	- THEOR	Y				
Test / Bl	oom'e								F or a local distance			
Catego		Rei	nemberir (K1) %	ng L	Understanding (K2) %	Applying (K3) %	Analyzi (K4) 9		Evaluating (K5) %		reating (K6) %	Total %
Catego CAT	ory*	Rei					-				-	
¥	ory* 1	Rei	(K1) %		(K2) %	(K3) %	-				-	%
CAT	ory * 1 2	Rei	(K1) % 10		(К2) % 50	(K3) % 40	-				-	% 100
CAT CAT	ory * 1 2 3		(K1) % 10 10		(K2) % 50 50	(K3) % 40 40	-				-	% 100 100

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6. F 7. E 8. F 9. C 10. E 11. C	Regulation Displacem Response Closed loo Design of d	of three ent anal of first c p contro	e phase lysis of i order system	alterna mechar stem ar	tor by E nical train	MF me	ethod nal and		-	m					
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8. F 9. C 10. E 11. C	Response Closed loo Design of o	of first c p contro	order sys	stem ar	nd electi				-	m					
9. C 10. E 11. C	Closed loo Design of d	p contro	ol of pos			romech	anical s	system u							
10. [11. [Design of a	-		sition co	ntrol sv			,	using ge	ears					
11. (-	compen	ootoro f			stem a	nd elect	trohydra	ulic ser	vo syste	m				
	Calibration		salors to	or first c	order sy	stem									
12. A		of force	e senso	r and po	otention	neter fo	r angle	measur	ement						
	Actuator po	osition r	esponse	e for dif	ferent lo	oads an	nd surfa	ce angle	e contro)					
															Total:30
REFERE	ENCES/ M	ANUAL	/SOFT	WARE:											
1. N	Mehta V.K	. & Rohi	it Mehta	ı, "Princ	iples of	Electri	cal Mac	hines", 2	2 nd Edi	tion, S.C	hand & Co	. Ltd., I	New	Delhi,	2019.
	Salivahana Education					takrish	nan G.	R. , "C	ontrol \$	Systems	Engineerir	ng", 1s	st Ed	lition,	Pearson
	Laboratory			,											
COURSE	E OUTCOI	MES:											BT	Мар	ped
	pletion of													hest I	
CO1 a	analyze the	e perfori	mance	characte	eristics	of DC r	nachine	es, AC m	nachine	s and tra	Insformers		Pre	cision	(S3)
CO2 0	design, de	velop ar	nd analy	ze the	control	system	s conce	epts for r	eal time	e applica	tions		Pre	ating cision	(S3)
CO3 d	design, de	velop ar	nd imple	ement c	ompens	ator ar	nd contr	oller for	closed	loop sys	tem			ating cision	
					Mappi	ina of (Cos wit	h POs a	and PS	Os					
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	P	SO1	PSO2
CO1	3	3	1	2					3	3		2		3	3
CO2 CO3	3	3 3	3 3	3 3	3 3				3	3 3		2	<u> </u>	3 3	3

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Progr Branc	amme & :h	B.E. 8	Mech	atronic	s Engineer	ing			Sem.	Category	L	т	Р	Credit
Prere	quisites	Engin	eering	Drawing	g				3/4	PC	0	0	2	1
Pream	nble	This c tool.	ourse a	ids to de	esign the m	echanical a	and elec	trical co	omponer	its drawing	using	com	outer-a	aided
LIST (OF EXPERI	NENTS /	EXER	CISES:										
1.					· dimension and toleran		nal view	s, abbr	eviations	and conve	entions	s, we	lding s	symbols
2.	Free hand conventio				elements - eads.	keys, pin jo	oints, fas	steners	, hexago	nal and squ	uare h	ead I	oolts a	and nuts
3.	Part and a	assembly	/ drawir	ng of spi	got and cot	ter joint for	Robotic	arm us	sing AUT	OCAD.				
4.	Part and a	assembly	/ drawir	ng of bea	arings / valv	es using A	UTOCA	D.						
5.	Part and a	assembly	/ drawir	ng of cor	necting roo	d using AU	TOCAD.							
6.	Part and a	assembly	/ drawir	ng of Rol	botic Manip	ulator usin	g AUTO	CAD.						
7.	Circuit des	sign of s	olid-sta	te emerg	gency light	and beepe	r circuit u	using A	UTOCAL	D Electrical				
8.	Design of	DC pow	er supp	ly unit u	sing AUTO	CAD Elect	rical.							
9.	Line diagr	am of wi	ring of a	a drawin	g hall using	AUTOCA	D Electr	ical.						
10.	Connectio	n diagra	m of 3-	point sta	arter and D	DL starter ι	using AU	ITOCA	D Electri	cal.				
1. 2.	AUTOCAI	y Manua	I											
Ζ.	AUTOUA	JOOnwa												
	RSE OUTCO		urse, th	e stude	nts will be	able to							[·] Map hest L	ped ₋evel)
Un co	interpret t	he drawi	,										olying oulatio	
CO1		le alam	ngs of v	/arious r	nachine pa		ning IS c	onventi	ons		ſ	Manip		on (S2)
	-	e technic	al draw	ings of r	nachine pa nechatronio	rts conform	-			limensions		App Manip		(K3), on (S2)
CO1	design the through a	e technic opropriat	al draw	ings of r S	-	rts conform	compone	ents witl	h exact c	limensions	1	App Manip App	oulatio	(K3), on (S2)
CO1 CO2	design the through a	e technic opropriat	al draw	ings of r S	nechatronic	rts conform cs related c cuits for rea	compone	ents with	h exact c on	limensions	1	App Manip App	oulatio	(K3), on (S2) (K3),
CO1 CO2	design the through a develop e	e technic opropriat	al draw	ings of r	nechatronic	rts conform cs related c cuits for rea of Cos with	compone	ents with	h exact c on	limensions PO11	1	App Manip App Manip	oulatio	(K3), on (S2) (K3),
CO1 CO2 CO3	design the through a develop e POs PO1	e technic opropriat lectrical	al draw te views and ele	ings of r	nechatronic drawing circ Mapping (rts conform cs related c cuits for rea of Cos with	compone al time ap h POs a	ents with oplication nd PS(h exact c on Os		1	App Manip App Manip	oulatic lying oulatic	(K3), on (S2) (K3), on (S2)
CO1 CO2 CO3 COs/F	design the through a develop e POs PO1 1 2	e technic opropriat lectrical PO2	al draw e views and ele PO3	ings of r ctronic c PO4	hechatronic drawing circ Mapping (PO5 PC	rts conform cs related c cuits for rea of Cos with	compone al time ap h POs a	ents with oplication nd PS0 PO9	h exact c on Os PO10		PO12	App Manip App Manip	oulatic olying oulatic SO1	(K3), on (S2) (K3), on (S2) PSO 2
CO1 CO2 CO3 COs/F CO	design the through a develop e POs PO1 1 2 2 2	e technic opropriat lectrical PO2 2	al draw e views and ele PO3 2	ings of r ctronic c PO4 2	mechatronic drawing circ Mapping (PO5 PC 2	rts conform cs related c cuits for rea of Cos with	compone al time ap h POs a	ents with oplication nd PS0 PO9 1	h exact c on Ds PO10 2		PO12 2	App Manip App Manip	oulatic olying oulatic SO1 3	(K3), on (S2) (K3), on (S2) PSO 2 3



			(Com	mon to All I	Engineering	and Techno	ology B	ranches)				
Progra	amme & Bra	anch	All B.E.	/B.Tech Br	ranches	S	em.	Catego	ry L	т	Р	Credi
Pr	erequisites	5	Nil				III	HS	0	0	2	1
						1			1 1			
Preaml	ble				gned to impa er professior				speak, re	ad ar	nd wri	te in
LIST O	F EXPERIN	MENTS	6 / EXER	CISES:								
1.	Self In	troduct	tion & Mo	ck Interviev	V							
2.				with Resum								
3.	Preser	ntation:	A Techn	ical topic /	Project repor	t & a Case	study					
4.	Situation	onal Di	ialogues	/ Telephoni	c Conversati	ons						
5.	Group	Discus	ssion									
6.	Readir	ng Alou	bu									
7.	Listeni	ing Cor	mprehens	sion								
8.	Writing	g Comp	pany Prof	iles								
9.	Prepar	ring re	views of	a book/proc	luct/movie							
10.	Pronur	nciatior	n Test									
	4											
REFER	RENCES/ M	IANUA	L /SOFT	WARE:								Fotal:3
REFER 1. 2.	Lab N	Manual		WARE: ge Lab Softv	ware							lotal:3
1. 2. COUR	Lab M Orell SE OUTCO	Manual Digital	Languag	je Lab Softv	ware will be able	to				3T Ma ghes	apped	1
1. 2. COUR	Lab M Orell SE OUTCO mpletion of	Manual Digital MES: f the co	Languag	je Lab Softv e students		to			(Hi Unde In	ghes erstan nitatio	appeo t Lev nding(on (S1	ł el) K2),
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	(Common to All Engineering and Technology	Branches	3)				
Programme & Branch	All B.E/B.Tech Branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	3	MC	2	0	0	0
•							
Preamble	This course provides an approach to understand the various pollution control & monitoring methods for sustainable life awareness for engineering students on biological sciences.						
Unit – I	Environmental Studies and Natural Resources						5
Introduction to Er resources-case s	nvironmental Science – uses, over-exploitation and conservation tudies	of forest,	water, minera	al, fo	od, e	nergy	and land
Unit – II	Ecosystem and Biodiversity						5
Food web only). E	cept and components of an ecosystem -structural and functional f Biodiversity: Introduction – Classification – Bio geographical classif of biodiversity - case studies.						
Unit – III	Environmental Pollution						5
	ollution: Definition – causes, effects and control measures of: (a) ayer depletion (b)Water pollution (c) Soil pollution - Role of an indiv						
Unit – IV	Environmental Monitoring						5
Functions of Carl nucleus- Heredity	Introduction to Biological Science bohydrates, lipids, proteins and nucleic acids - Cells and its org- and DNA - organization of DNA in cells - Genes and chromosom ycle and molecules that control cell cycle.						
nucleus- Heredity & meiosis - Cell c	pohydrates, lipids, proteins and nucleic acids - Cells and its org						ondria an on- mitosi
Functions of Carl nucleus- Heredity & meiosis - Cell c TEXT BOOK:	boohydrates, lipids, proteins and nucleic acids - Cells and its org and DNA - organization of DNA in cells - Genes and chromosom ycle and molecules that control cell cycle.	nes- Cell	division -Type	es of	cell o	divisio	ondria an on- mitosi
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					Mappin	ng of CC	Ds with	POs a	nd PSO	S				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1					3							
CO2	2	1					3							
CO3	3	2	1				3							
CO4	3	2	1				3							
CO5	3	1												
1 – Slight, 2		iate, 5 –	Substan	.iai, DT-			лпу							
					ASSES	SMENT	PATTE	ERN – ⁻	THEOR	Y				
Test / Bl Categ		Rei	memberi (K1) %	ng U	ASSES Indersta (K2)	inding	PATTE Apply (K3)	ying	THEOR Analyz (K4) 9	ing	Evaluating (K5) %		reating K6) %	Total %
	ory*	Rei		ng U	ndersta	anding %	Apply	ying)%	Analyz	ing				Total % 100
Categ	ory * 1	Rei	(K1) %	ng U	ndersta (K2)	anding %	Apply (K3)	ying) %)	Analyz	ing				%
Categ CAT	ory* 1 2	Rei	(K1) % 25	ng U	ndersta (K2) 35	anding %	Apply (K3) 40	ying) %)	Analyz	ing				% 100

Programme	(Common to AUTO, CIVIL, MECH, MTS	S and FT I	Branches)				
& Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	4	BS	3	1	0	4
Preamble	To impart knowledge in interpolation, numerical di skills to apply numerical algorithms to identify root and solve linear system of equations, ordinary and	ts of algeb	aic and trans	cenc	lenta		
Unit – I	Solution to Algebraic and Transcendental Equ		•				9+3
	d – Method of false position – Newton-Raphson me : Gauss elimination method and Gauss - Jordan n methods.						
Unit – II	Interpolation:						9+3
interpolation for	vith equal intervals: Newton's forward and backw rmulae: Gauss forward and backward interpolation prolation formula – Newton's divided difference form	formulae -					
Unit – III	Numerical Differentiation and Integration:						9+3
	using Newton's forward, backward and divided e – Simpsons 1/3 rd rule – Simpsons 3/8 th rule – Dou						
Unit – IV	Numerical Solution of First order Ordinary Diff						9+3
	thods: Taylor series method – Euler method – Mod step methods: Milne's predictor corrector method –				orde	r Ru	nge-Kutta
Unit – V	Solutions of Boundary Value Problems in PDE	:					9+3
TEXT BOOK:1.Veerar							
I. Veela	aion T. Pomochandron T. "Numerical Methode" 1st	Edition M		lucat	ion (Chon	noi 2010
	ajan T, Ramachandran T., "Numerical Methods", 1 st	Edition, M	cGraw Hill Ec	lucat	ion, (Chen	nai, 2019
	a Rao. K., "Numerical Methods for Scientists and I						
1. Sanka Ltd, Ne 2. Stever	a Rao. K., "Numerical Methods for Scientists and E w Delhi, 2007. C. Chapra, Raymond P. Canale., "Numerical M	Engineers"	, 3 rd Edition,	Pren	tice	Hall	of India F
1. Sanka Ltd, Ne 2. Stever Educa	a Rao. K., "Numerical Methods for Scientists and E w Delhi, 2007.	Engineers" lethods fo	, 3 rd Edition, r Engineers",	Pren	tice Editi	Hall (of India F McGraw-
1.Sanka Ltd, Na2.Stever Educa3.Sastry4.Ramar	a Rao. K., "Numerical Methods for Scientists and E w Delhi, 2007. C. Chapra, Raymond P. Canale., "Numerical M ion, 2014.	Engineers" lethods fo 5 th Edition	, 3 rd Edition, r Engineers", , PHI Learnin	Pren , 7 th g Pvt	tice Editi t. Ltd	Hall (ion, 1	of India F McGraw- 5.
1. Sanka Ltd, Ne 2. Stever Educa 3. Sastry 4. Ramar New D	 a Rao. K., "Numerical Methods for Scientists and E v Delhi, 2007. C. Chapra, Raymond P. Canale., "Numerical M ion, 2014. S.S, "Introductory Methods of Numerical Analysis", a B V, "Higher Engineering Mathematics", 1st Editionelhi, 2006. 	Engineers" lethods fo 5 th Edition	, 3 rd Edition, r Engineers", , PHI Learnin	Pren , 7 th g Pvt	tice Editi t. Ltd ing C	Hall (ion, 1 , 201 Comp	of India I McGraw- 5.
1. Sanka Ltd, Na 2. Stever Educa 3. Sastry 4. Ramar New D COURSE OUT On completio	 Rao. K., "Numerical Methods for Scientists and E w Delhi, 2007. C. Chapra, Raymond P. Canale., "Numerical M ion, 2014. S.S, "Introductory Methods of Numerical Analysis", a B V, "Higher Engineering Mathematics", 1st Editionelhi, 2006. 	Engineers" lethods fo 5 th Edition n, Tata Mc	, 3 rd Edition, r Engineers", , PHI Learnin Graw-Hill Pu	Pren , 7 th g Pvt	tice Editi t. Ltd ing C B1 (Hig	Hall (ion, 1 , 201 comp r Ma hest	of India F McGraw- 5. any Limit pped
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1.Sanka Ltd, Na2.Stever Educa3.Sastry4.Ramar New DCOURSE OUT On completioCO1apply NCO2perform	 a Rao. K., "Numerical Methods for Scientists and Bew Delhi, 2007. C. Chapra, Raymond P. Canale., "Numerical Mion, 2014. S.S, "Introductory Methods of Numerical Analysis", as B V, "Higher Engineering Mathematics", 1st Editionelhi, 2006. COMES: n of the course, the students will be able to rarious numerical techniques to solve algebraic and the students is a solve algebraic and the students is	Engineers" lethods fo 5 th Edition n, Tata Mo transcende	, 3 rd Edition, r Engineers", , PHI Learnin Graw-Hill Pu ental equation	Pren , 7 th g Pvt	tice Editi t. Ltd ng C B1 (Hig	Hall (ion, 1 , 201 comp F Ma j hest Apply	of India I McGraw- 5. any Limit pped Level) ying (K3)
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					Mappin	g of CO	s with	POs a	nd PSC	s				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1											
CO2	3	2	2											
CO3	3	3	2											
CO4	3	2	1											
CO5	3	3	3											
1 – Slight, 2	2 – Mod	lerate, 3	- Substar	ntial, B	- Bloom	i's Taxo	nomy							
		TT			ASSES	SMENT	PATTI	ERN -	THEOR	Y				
Test / Bl Categ		Re	memberi (K1) %	ng L	Indersta (K2)	•	Apply (K3)		Analyz (K4) 9	-	Evaluating (K5) %		reating K6) %	Total %
CAT	Г1		10		10		80)	-		-		-	100
CAT	Г2		10		10		80)	-		-		-	100
CAT	Г3		10		10		80)	-		-		-	100
ES	E		10		10		80)	-		-		-	100
* ±3% may	be varie	ed (CAT	1,2,3 - 5	0 marks	s & ESE	– 100 n	narks)			·				



Programme & Branch	B.E. & Mechatronics Engineering Sem. Category	L	т	Р	Credit
	lil 4 PC	3	0	2	4
Frerequisites		3	U	2	4
Preamble	his course provides an insight on modeling and analyzing of different components us	ng C/	AD p	ackag	es and CA
	pols	U			
	Sketching and Drafting:				9
	ines, rectangles, circles, arcs, ellipses, centerlines; Sketch tools – offset, convert, trim;	Sket	h re	lation	-
	, axis, mate; references; Drawing views; Annotations	Onen			
Unit – II 🛛 🗧	D Modelling and evaluations:				9
	ires – extrudes, revolves, sweeps, lofts; Fillets and chamfers; Linear, circular, and fill p nd end; Mass properties; Materials	atterns	s; Dii	mensi	ons; Featur
Unit – III	D Assembly and simulations:				9
	nts; Standard mates – coincident, parallel, perpendicular, tangent, concentric, distance,	angle:	Ref	erence	
planes, axis, mate	· · · · ·	J ,			5 7
Unit – IV	Basic Structural and Thermal analysis:				9
	Finite Element Method; General Steps of the Finite Element Method; Solid Modeling	; Mes	shina	– Fr	
	; Stiffness matrix ; Boundary Conditions; Solvers; Post Processing – Stress, Strain, Defo				
Unit – V	Ion-linear, modal and harmonic analysis:				9
	IENTS / EXERCISES: ching Exercise				
3. Modeling	f machine building components				
4. Part and A	of machine building components of robotic accessories				
5. Part and A	•				
6. Assembly	of robotic accessories				
-	of robotic accessories ssembly of shafts, keys and couplings				
Linear Str	of robotic accessories ssembly of shafts, keys and couplings ssembly of spigot and cotter joint for Robotic arm and Simulation of four bar and slider crank mechanisms and simulation of a 4 axis Robotic arm				
	of robotic accessories ssembly of shafts, keys and couplings ssembly of spigot and cotter joint for Robotic arm and Simulation of four bar and slider crank mechanisms and simulation of a 4 axis Robotic arm ictural Analysis of 2D and 3D shafts				
9. Thermal a	of robotic accessories ssembly of shafts, keys and couplings ssembly of spigot and cotter joint for Robotic arm and Simulation of four bar and slider crank mechanisms and simulation of a 4 axis Robotic arm ictural Analysis of 2D and 3D shafts nalysis of a typical heat exchanger				
9. Thermal a	of robotic accessories ssembly of shafts, keys and couplings ssembly of spigot and cotter joint for Robotic arm and Simulation of four bar and slider crank mechanisms and simulation of a 4 axis Robotic arm inctural Analysis of 2D and 3D shafts nalysis of a typical heat exchanger analysis of a mechanism under different loading conditions				
9. Thermal a	of robotic accessories ssembly of shafts, keys and couplings ssembly of spigot and cotter joint for Robotic arm and Simulation of four bar and slider crank mechanisms and simulation of a 4 axis Robotic arm inctural Analysis of 2D and 3D shafts nalysis of a typical heat exchanger analysis of a mechanism under different loading conditions	re:45,	Pra	ctical	:30, Total:7
9. Thermal a	of robotic accessories ssembly of shafts, keys and couplings ssembly of spigot and cotter joint for Robotic arm and Simulation of four bar and slider crank mechanisms and simulation of a 4 axis Robotic arm inctural Analysis of 2D and 3D shafts nalysis of a typical heat exchanger analysis of a mechanism under different loading conditions	re:45,	Pra	ctical	:30, Total:7
9. Thermal a 10. Structural TEXT BOOK:	of robotic accessories ssembly of shafts, keys and couplings ssembly of spigot and cotter joint for Robotic arm and Simulation of four bar and slider crank mechanisms and simulation of a 4 axis Robotic arm inctural Analysis of 2D and 3D shafts nalysis of a typical heat exchanger analysis of a mechanism under different loading conditions	re:45,	Pra	ctical	:30, Total:7
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9. Thermal a 10. Structural TEXT BOOK: 1. Ibrahim Zo REFERENCES/ N 1 David C.	of robotic accessories ssembly of shafts, keys and couplings ssembly of spigot and cotter joint for Robotic arm and Simulation of four bar and slider crank mechanisms and simulation of a 4 axis Robotic arm ictural Analysis of 2D and 3D shafts nalysis of a typical heat exchanger analysis of a mechanism under different loading conditions Lectu id, "Mastering CAD/CAM.", 2 nd Edition, McGraw Hill Education, New Delhi, 2006.				
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	SE OUT		: course, th	e studer	nts will I	be able	to							BT Mappe ghest Le	
CO1	applv i	ndustrv	standards i	n the pre	paration	of tech	nical m	nechanic	al draw	vinas.			-	oplying (ł	
001					F									ipulation	. ,
CO2	create	and eva	luate the th	ree-dime	ensional	solid m	odels						-	oplying (ł Nipulation	
CO3	assem	ble and	simulate th	e three-d	limensio	nal soli	d mode	els						oplying (ł nipulation	,
CO4	solve s	tructural	and therm	al analys	sis probl	ems usi	ng FEA	A techniq	ues				-	oplying (ł ecision (,
CO5	solve t	ne moda	I and harm	ionic prol	olems us	sing ana	alysis to	ools						alysing (ecision (
					N	lapping	of Co	s with P	os and	I PSOs					
Cos	s/Pos	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
С	01	3	3	1	2	2				2	3	2	3	3	3
C	02	2	1	1	2	2				2	3	2	3	2	2
C	03	3	2	1	2	2				2	2	2	3	3	3
C	04	3	3	1	2	2				2	1	2	3	3	3
C	05	3	3	1	2	2				2	3	2	3	3	3
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	st / Bloor Category		Rememi (K1)			standir (2) %		pplying (K3) %		lyzing (4) %	Evaluat (K5) %		Creating (K6) %	Тс	otal %
	CAT1		10			20		40		30					100
	CAT2		10			20		40		30					100
	CAT3		NA	\											
	ESE		NA	1											
* ±3%	may be	varied (C	CAT 1,2 – 5	50 marks)										



Brancl	amme & h	B.EMechatronics Engineering	Sem.	Category	L	т	Ρ	Credit
Prereg	uisites	Nil	4/3	PC	3	0	0	3
				_		-		_
Pream	ble	This course provides an overview of a wide variety of ma metal forming, metal removal, metal joining and metal finis machine element parts						
Unit –		Foundry Technology:						9
materia	als, types an	ing and Casting - Molding sand: types, properties - Preparation d allowances - Core making: types of core, core materials, n , Investment Casting and Shell mold Casting - Defects in castir	naking of a					
Unit –	II	Metal Forming Processes:						9
and pip		, Rolling mills, Rolling operations - Extrusion: Forward and Bac d Hydrostatic Extrusion - Drawing: Hot and Cold drawing - Dee ns						
Unit –		Metal Removal Processes:						9
Twist c	rill nomencla	arts and operations - single point cutting tool nomenclature - D ture - Reaming and tapping - Milling Machine: Types, operatio perations. (Numerical problems in Lathe, Drilling and Milling operations)	ns - types					
Unit –		Metal Joining Processes:						9
Electro Resista	on Beam We ance Welding	Iding Process - Fusion Welding Processes: Arc Welding - Gas ding - Laser Beam Welding - Solid State Welding: Cold We - Explosion Welding - Gas welding: Oxy – Acetylene welding	elding - U	trasonic Weld	ding -	- Fri	ction	Welding
Brazino	a and solderi							
		ng: Concepts and applications. Metal Finishing Processes:						9
Unit – Grindir	V ng Machine: I	ng: Concepts and applications. Metal Finishing Processes: Methods of grinding - Types of grinding machines - Grinding wh				ng –	Honi	-
Unit – Grindir	V ng Machine: I	ng: Concepts and applications. Metal Finishing Processes:				ng –	Honi	
Unit – Grindir	V ng Machine: I	ng: Concepts and applications. Metal Finishing Processes: Methods of grinding - Types of grinding machines - Grinding wh				ng —	Honi	ng - Sup
Unit – Grindir finishin	V ng Machine: I	ng: Concepts and applications. Metal Finishing Processes: Methods of grinding - Types of grinding machines - Grinding wh				ng –	Honi	ng - Supe
Unit – Grindir finishin TEXT I	V ng Machine: I g - Broaching BOOK:	ng: Concepts and applications. Metal Finishing Processes: Methods of grinding - Types of grinding machines - Grinding wh	ine types a	ind operations		ng –	Honi	ng - Supe
Unit – Grindir finishin TEXT I 1.	V ng Machine: I g - Broaching BOOK: Kaushish	ng: Concepts and applications. Metal Finishing Processes: Methods of grinding - Types of grinding machines - Grinding why Machine: pull type and push type broachers - broaching mach	ine types a	ind operations		ng –	Honi	ng - Supe
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CO2	3	3	3	2							2	2	2
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Programme &		•	•		_	-	•
Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	Т	Ρ	Credit
Prerequisites	Physics for Mechatronics Engineering, Electron Devices and Digital Circuits	4	PC	3	0	0	3
Preamble	This course provides an understanding of measurement methor sensors and signal conditioning circuits.	ods, cons	struction and	work	ing pi	incipl	e of
Unit – I	Introduction to Measurement Systems:						9
Measurement syst	ts of measurement system – Methods of measurement – Classific em errors - Error analysis – Static and dynamic characteristics of ucers – Smart Sensors.						
Unit – II	Non-Electrical Transducers:						9
Bourdon gauge, B	surement: Filled system thermometer, Bimetallic thermometer. ellows and Diaphragm. Vacuum measurement: McLeod gauge, T t: Rotameter – Orifice. Level measurement: Float gauges.						
	Electrical Transducers: cers: Potentiometer, RTD, Thermistor – Thermocouple – Stra adiation measurement using pyrometers. Inductive transducer: LVD						9 – Force
performance chara	Basics of Operational Amplifiers: al amplifier stages – Pin diagram & internal circuit diagrams of acteristics. Op – AMP Applications: Inverting and Non-inverting a tor, Differentiator, Instrumentation amplifier						
Unit – V	Signal Converters and Conditioning:						9
Chierana and the second	dimention types) weight an arrange Clancel Conditioning DC bridge	Class	types), A/D				
bridge. AC bridges	kimation types) using op-amps. Signal Conditioning: DC bridge : Introduction –Sources and Detectors – Maxwell's inductance bridge : Introduction –Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's inductance bridge : Introduction – Sources and Detectors – Maxwell's		sification of r				heatston
bridge. AC bridges	: Introduction –Sources and Detectors – Maxwell's inductance bridg	ge – Wie	sification of r en's bridge	esist	ances	s – W	heatston
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bridge. AC bridges TEXT BOOK: 1. Sawhney Compan 2. D Choud REFERENCES: 1. John G. 2. Ramon F COURSE OUTCO On completion of CO1 infer the	: Introduction –Sources and Detectors – Maxwell's inductance bridg /. A.K, "A Course in Electrical and Electronics Measurements and In y Private Limited, New Delhi, 2015. (Unit-I,II &III) hury Roy., "Linear Integrated Circuits ", 5th Edition, New Academic Webster, "Measurement, Instrumentation, and Sensors Handbook" Pallas.Amey and John G.Webster, "Sensors and Signal Conditionin MES: the course, the students will be able to	ge – Wie nstrume : Science , 2nd Ed g", 2nd I	ntation", 18th e, New Delhi, ition, CRC P Edition, John	Editi 2018 Wile	on, D 3. (Ur y & S (Hig Jnde	hanpa hit-IV& d Sta ons, 2 F Map hest	Total:4 Total:4 at Rai & V) tes, 2018 2012. pped Level)
bridge. AC bridges TEXT BOOK: 1. Sawhney Compan 2. D Choud REFERENCES: 1. John G. 2. Ramon F COURSE OUTCO On completion of CO1 infer the CO2 select su	: Introduction –Sources and Detectors – Maxwell's inductance bridg A. A.K, "A Course in Electrical and Electronics Measurements and In y Private Limited, New Delhi, 2015. (Unit-I,II &III) hury Roy., "Linear Integrated Circuits ", 5th Edition, New Academic Webster, "Measurement, Instrumentation, and Sensors Handbook" Pallas.Amey and John G.Webster, "Sensors and Signal Conditionin MES: the course, the students will be able to basic concepts of measurement system	ge – Wie nstrume : Science , 2nd Ed g", 2nd I g", 2nd I	ntation", 18th e, New Delhi, ition, CRC P Edition, John	Editi 2018 Wile	on, D 3. (Ur y & S (Hig Jnde	hanpa hanpa it-IV& d Sta ons, 2 F Map hest	Total:4 Total:4 at Rai & V) tes, 2018 2012. Dped Level) ling (K2)
bridge. AC bridges TEXT BOOK: 1. Sawhney Compan 2. D Choud REFERENCES: 1. John G. 2. Ramon F COURSE OUTCO On completion of CO1 infer the CO2 select su CO3 identify s	: Introduction –Sources and Detectors – Maxwell's inductance bridg A. A.K, "A Course in Electrical and Electronics Measurements and In y Private Limited, New Delhi, 2015. (Unit-I,II &III) hury Roy., "Linear Integrated Circuits ", 5th Edition, New Academic Webster, "Measurement, Instrumentation, and Sensors Handbook" Pallas.Amey and John G.Webster, "Sensors and Signal Conditionin MES: the course, the students will be able to basic concepts of measurement system itable non-electrical, electrical transducers and sensors for various	ge – Wie nstrume : Science , 2nd Ed g", 2nd I g", 2nd I ents	ntation", 18th e, New Delhi, ition, CRC P Edition, John	Editi 2018 Wile	on, D 3. (Ur Unite y & S (Hig Unde	hanpa hanpa it-IV& d Sta ons, 2 F Map hest rstanc	Total:4 Total:4 at Rai & V) tes, 2018 2012. Dped Level) ling (K2)
bridge. AC bridges TEXT BOOK: 1. Sawhney Compan 2. D Choud REFERENCES: 1. John G. 2. Ramon F COURSE OUTCO On completion of CO1 infer the CO2 select su CO3 identify s CO4 Infer the	: Introduction –Sources and Detectors – Maxwell's inductance bridg A. A.K, "A Course in Electrical and Electronics Measurements and In y Private Limited, New Delhi, 2015. (Unit-I,II &III) hury Roy., "Linear Integrated Circuits ", 5th Edition, New Academic Webster, "Measurement, Instrumentation, and Sensors Handbook" Pallas.Amey and John G.Webster, "Sensors and Signal Conditionin MES: the course, the students will be able to basic concepts of measurement system itable non-electrical, electrical transducers and sensors for various uitable electrical transducers and sensors for various	ge – Wie nstrume : Science , 2nd Ed g", 2nd I g", 2nd I ents	ntation", 18th e, New Delhi, ition, CRC P Edition, John	Editi 2018 Wile	on, D 3. (Ur Unite y & S (Hig Jnde Jnde	hanpa it-IV& d Sta ons, 2 F Map hest rstanc rstanc	Total:4 Total:4 at Rai & V) tes, 2018 2012. Dped Level) ling (K2) ling (K2)
bridge. AC bridges TEXT BOOK: 1. Sawhney Compan 2. D Choud REFERENCES: 1. John G. 2. Ramon F COURSE OUTCO On completion of CO1 infer the CO2 select su CO3 identify s CO4 Infer the	: Introduction –Sources and Detectors – Maxwell's inductance bridg A.A.K, "A Course in Electrical and Electronics Measurements and In y Private Limited, New Delhi, 2015. (Unit-I,II &III) hury Roy., "Linear Integrated Circuits ", 5th Edition, New Academic Webster, "Measurement, Instrumentation, and Sensors Handbook" Pallas.Amey and John G.Webster, "Sensors and Signal Conditionin MES: the course, the students will be able to basic concepts of measurement system itable non-electrical, electrical transducers and sensors for various uitable electrical transducers and sensors for electrical measurement basic concepts of operational amplifier and its various applications	ge – Wie nstrume : Science , 2nd Ed g", 2nd I g", 2nd I ents	ntation", 18th e, New Delhi, ition, CRC P Edition, John	Editi 2018 Wile	on, D 3. (Ur Unite y & S (Hig Jnde Jnde	hanpa it-IV& d Sta ons, 2 F Map hest rstanc rstanc	Total:4 Total:4 at Rai & V) tes, 2018 2012. Dped Level) ling (K2) ling (K2) ling (K2)



COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		3								1	2	2
CO2	2	3		3								1	3	3
CO3	2	3		3								1	3	3
CO4	2	3		3								1	3	3
CO5	2	3		3								1	3	3
1 – Slight, 2 -	- Modera	ate, 3 – S	Substantia		Bloom's		•			,				
Test / Blo Catego		Rer	nemberi (K1) %		ASSES Indersta (K2)	nding	Apply (K3)	/ing	Analyzi (K4) %	ing E	Evaluating (K5) %		eating (6) %	Total %
CAT	1		15		85				. ,		~ /			100
CAT	2		15		70		15	5						100
CAT	3		15		70		15	5						
ESE	-		10		70		20)						100
* ±3% may be		(CAT 1.	-	0 marks	-							1		



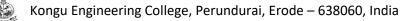
		(Offered by Department of Mechatronics	s Engineerina)					
Progr Branc	amme&	B.E. Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
	n quisites	Nil	4	PC	3	0	2	4
	-							
Pream		This course provides the fundamental knowledge on Gra and interfacing techniques of Virtual Instrumentation (VI)		Design progi	ramm	ning,	data a	-
Jnit -		Basics of Virtual Instrumentation:						9
		Graphical System Design based virtual instrument - Data Flo						
		nd modular programming - Graphical programming palettes	: Control, Fun	ctions and to	ol pa	lettes	s – Da	ata Types
Jnit -	ric, String, a II	VI Programming Techniques:						9
		Shift Registers, Case, Event, Timed, Flat-sequence - Ex tion - File I/O: Read/ Write - Variables: Local/Global - Sub-Vi		e - Formula r	nodes	s - A	rrays/	Clusters
Jnit -	III	Data Acquisition Hardware Interface:						9
			minology las	talling harder	oro c		rivora	-
Config	guring and ac	rdware and software - Concepts of data acquisition and tern dressing the hardware - Communicating between the Real-					ivers	
Jnit -	IV	Data Logging, Control, and Monitoring						9
		ting the Analog Input/Output: Simulating the Hardware a gnal - Triggering - Timing and Synchronization Methods - Pro				nt - (Genei	rating ar
Jnit -	V	Real time Applications:						9
		Signal processing tools - Measuring Temperature, Strain, F	Force, Pressur	e, Sound, Vil	oratio	on, ar	nd Ac	celeratio
•		, and Duty Cycle. Vision and Motion, Vision Acquisition and V						
∟xper 1.	riments:	isition using LabVIEW for temperature measurement with th	ermocounle					
2.		isition using LabVIEW for temperature measurement with R		r				
<u>-</u> . 3.		of a CRO using LabVIEW and measurement of frequency an			ourc	2		
,. 1.		action generator using LabVIEW and display the amplitude a					necte	yd)
. 5.		ate amplitude modulation considering modulating and carrier				y coi	meete	u).
5. 6.		EDs to DAQ output and implement the counter operation.						
7.	-	isition using LabVIEW for load / strain measurement using s	uitable transd	ucers.				
8.		ate binary to grey code converter (& vice versa) using DAQ of						
9.		isition using LabVIEW for distance/humidity measurement u		ransducers.				
		udio input with Microphones and output using DAQ card.						
	cading c					actio	cal:30	
				Lecture:4	5, Pi			, Total:7
10.	BOOK:			Lecture:4	5, Pi	uoiii		, Total:7
10.	Jeffery Tr	avis & Jim Kring, "LabVIEW for Everyone: Graphical progr	ramming made				dition	
10. TEXT	Jeffery Tr Education Gary W. J	, India, 2009. (Unit-I, II & III) Ionson and Richard Jennings "Labview Graphical Programm	0	e easy and F	un",	3 rd E		, Pearso
10. TEXT 1. 2.	Jeffery Tr Education	, India, 2009. (Unit-I, II & III) Ionson and Richard Jennings "Labview Graphical Programm	0	e easy and F	un",	3 rd E		, Pearso
10. FEXT 1. 2. REFE	Jeffery Tr Education Gary W. J (Unit – IV RENCES:	, India, 2009. (Unit-I, II & III) lonson and Richard Jennings "Labview Graphical Programn & V)	ning", Fourth I	e easy and F Edition, McGr	un", aw F	3 rd E İill, N	lew Y	, Pearso
10. TEXT 1. 2.	Jeffery Tr Education Gary W. J (Unit – IV RENCES: Gupta, Jo Rick Bitte	, India, 2009. (Unit-I, II & III) lonson and Richard Jennings "Labview Graphical Programm & V) seph & John, "Virtual Instrumentation using LabVIEW", 2 nd E r, Taqi Mohiuddin & Matt Nawrocki, "LabVIEW Advanced	ning", Fourth I	e easy and F Edition, McGr cGraw Hill, Ir	un", aw F	3 rd E Iill, N 2010	lew Y	, Pearsc ork, 201
10. TEXT 1. 2. REFE 1.	Jeffery Tr Education Gary W. J (Unit – IV RENCES: Gupta, Jo Rick Bitte	, India, 2009. (Unit-I, II & III) lonson and Richard Jennings "Labview Graphical Programn & V) seph & John, "Virtual Instrumentation using LabVIEW", 2 nd E	ning", Fourth I	e easy and F Edition, McGr cGraw Hill, Ir	un", aw F	3 rd E Iill, N 2010	lew Y	i, Pearso ork, 2017
10. TEXT 1. 2. REFE 1. 2.	Jeffery Tr Education Gary W. J (Unit – IV RENCES: Gupta, Jo Rick Bitte	, India, 2009. (Unit-I, II & III) lonson and Richard Jennings "Labview Graphical Programm & V) seph & John, "Virtual Instrumentation using LabVIEW", 2 nd E r, Taqi Mohiuddin & Matt Nawrocki, "LabVIEW Advanced roup, New York, 2007.	ning", Fourth I	e easy and F Edition, McGr cGraw Hill, Ir	un", aw F	3 rd E 1ill, N 2010 ^{rnd} E	lew Y dition, T Map	n, Pearso ork, 2017 Taylor
10. TEXT 1. 2. REFE 1. 2. COUR	Jeffery Tr. Education Gary W. J (Unit – IV RENCES: Gupta, Jo Rick Bitte Francis G	, India, 2009. (Unit-I, II & III) lonson and Richard Jennings "Labview Graphical Programm & V) seph & John, "Virtual Instrumentation using LabVIEW", 2 nd E r, Taqi Mohiuddin & Matt Nawrocki, "LabVIEW Advanced roup, New York, 2007.	ning", Fourth I	e easy and F Edition, McGr cGraw Hill, Ir	un", aw H ndia, s", 2	3 rd E 1ill, N 2010 ^{rnd} E B (Hig	lew Y dition, T Ma p	ork, 2017 Taylor



CO2	inte	rpret the	e differer	nt softwar	e tools	in Virtual	Instrum	entatior	า				N	Applying lanipulatio	. ,
CO3	inte	rface da	ata acqui	sition har	dware	with softw	vare							Applying lanipulatio	(K3)
CO4	dev	elop pro	ogrammiı	ng concep	ots witl	h data log	ging and	d contro						Applying lanipulatio	(K3)
CO5	design graphical programming solutions to real world problems Mapping of COs with POs and PSOs													Applying Precision	
						Mappir	ng of CC)s with	POs a	nd PSO	s				
COs/F	POs	PO1	PO2	PO3	PO4	4 PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3	3	3	3	2							2	3	3
CO	2	3	3	3	3	2							2	3	3
CO	3	3	3	3	3	2							2	3	3
CO	4	3	3	3	3	2							2	3	3
CO	5	3	3	3	3	2							2	3	3
1 – Sli	ght, 2	- Mode	erate, 3 -	Substant	tial, B1	Γ- Bloom's	Taxono	omy							
						ASSES	SMENT	PATT	ERN - 1	THEOR'	′				
	st / Ble Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)	•	Apply (K3)		Analyz (K4) 9	-	Evaluating (K5) %		reating K6) %	Total %
	CAT	1		15		35		50)						100
	CAT	2		10		35		55	5						100
	CAT	3		10		35		55	5						100
	ESE	1		5		40		55	5						100
* ±3%	may b	be varie	d (CAT 1	,2,3 – 50	marks	s & ESE –	100 ma	rks)			·				



Progr Branc	amme ch	8	B.E. 8	Mech	atronic	s Engi	neering	9			Sem.	Category	/ L	т	Ρ	Credi
Prere	quisite	es	Nil								4	PC	0	0	2	1
Pream	nble							o under and the			lyze the	concept b	ehind	work	ing of	variou
LIST	OF EX	PERIM	IENTS	EXER	CISES:											
1.	Mea	asurem	ent of te	empera	ture usi	ng Ther	mistor									
2.	Mea	asurem	ent of te	empera	ture usi	ng Ther	mocou	ple & R	TD							
3.	Mea	asurem	ent of d	lisplace	ment us	sing PO	T, LVD	T & Cap	acitive	transdu	cer					
4.	Mea	asurem	ent of T	orque,	Strain a	ind Ford	ce using	g strain	gauge							
5.	Flow	v meas	suremer	nt using	Orifice	meter a	and Rota	ameter								
6.	Diap	ohragm	n based	Pressu	re mea	sureme	nt									
7.	Сар	acitive	based	Level N	leasure	ment										
8.	Mea	asurem	ent of n	nagnetio	c field s	trength	using h	all effec	t senso	r						
9.	Rem	note m	onitorin	g using	loT and	d Instrur	nentatio	on ampl	ifier							
10.	Mea	asurem	ent and	l monito	ring of	unknow	n Resis	stance fo	or a give	en case	study us	ing Wheats	stone E	Bridge	e& lo1	-
11.	Mea	asurem	ent and	l monito	ring of	unknow	n Induc	tance fo	or a give	en case	study us	ing Maxwe	ll Bridg	e& lo	ъT	
12.	Mea	asurem	ent and	l monito	ring of	unknow	n Capa	citance	for a give	ven cas	e study ι	ising Scher	ing Bri	dge8	ιοT	
																Total:3
RFFF	RENC	ES/ M	ANUAL	/SOFT	WARF											
1.	_		Course													
	RSE OI		MES: the cou	urse, th	e stude	ents wi	ll be ab	le to							Map hest L	ped _evel)
CO1									nsors ar	nd signa	al conditio	oning units.			lying ation	
<u> </u>	+ili-	zo thou	mooour	omonto	vetemo	to obor	ootoriz	e the giv	ion như		optity				lying	· ·
CO2	uunz		measur		systems	to chai	acterize	e the giv	en priy:	sicai qu	anniy		1	-	oulatic lying	on (S2)
CO3	expe	erimen	t with m	easure	ment br	idges a	nd to in	terface	sensors	s with lo	T module	Э			cision	
			I	I	I	Марр	ing of C	Cos wit	h POs a	and PS	Os					I
COs/F		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	P	SO1	PSO2
CO		3	2	1	3	2				2	2		2		3	3
CO							1	1	1					1		



Brand	ramme & ch	B.E. &	Mech	atronic	s Engiı	neering	1			Sem.	Category	L	т	Ρ	Credi
Prere	equisites	Nil								4/3	PC	0	0	2	1
Prear	mble						ing to v rent ma			turing pr	ocesses an	d to pi	odu	ce the	
LIST	OF EXPERI	MENTS /	EXER	CISES:											
1.	Lathe ope	erations:	Step tu	ning, Ta	aper tur	ning ar	nd Knurl	ing							
2.	Lathe ope	eration: T	hread (Cutting											
3.	Lathe ope	eration: E	ccentrio	c turning	9										
4.	Milling ma	achine op	eration	s: Spur	gear m	illing / C	Contour	/ Key w	ay millii	ng					
5.	Shaper / I	Planner r	nachine	e operat	ions: Ke	ey way	/ Dove t	ail shap	e Cutti	ng					
6.	Drilling m	achine or	peratior	s: Drilli	ng, Rea	ming a	nd Tapp	bing							
7.	Grinding r	machine	operatio	ons: Su	rface gr	inding a	and cylii	ndrical	grinding						
8.	Preparatio	on of mou	uld for s	and ca	sting us	ing sing	gle piece	e / split	patterns	6					
9.	Practice a	a butt / laj	p joint u	ising the	e given	metal s	trips by	Arc / G	as weld	ing					
10.	Practice a	a butt / la	p joint u	ising the	e given	metal s	trips by	TIG / M	IIG weld	ding					
										-					Total:30
DEEE			/SOLT												
	ERENCES/ N			WARE:											
1.	Laborator	y Manua	I		0000000	s" 2nd	Edition	PHILO	arning	Dyt I td	New Delhi	2013			
	Laborator	y Manua	I		ocesse	s", 2nd	Edition,	PHI Le	arning	Pvt. Ltd.,	New Delhi,	2013.			
1. 2. COU	Laborator Kaushish	y Manua J.P., "Ma DMES:	l anufacti	uring Pr		·		PHI Le	arning	[⊃] vt. Ltd.,	New Delhi,		BT	「Map hest I	
1. 2. COU	Laborator Kaushish RSE OUTCC ompletion o develop t	y Manua J.P., "Ma DMES: f the cou he variou	l anufacti irse, th is mecl	uring Pr e stude	ents wil	l be ab	le to				New Delhi, e point and		BT (Hig App	hest I	.evel) (K3),
1. 2. COUF On co CO1	Laborator Kaushish RSE OUTCC ompletion o develop t multi poin develop t	y Manua J.P., "Ma DMES: f the cou he variou t cutting the variou	I anufacti I rse, th Is mec tools Is mec	uring Pr <u>e stude</u> nanical nanical	ents wil compor	I be ab nents u	le to sing ce	ntre lat	ne throu	ugh singl		I	BT (Hig App Pre App	hest I olying cision olying	Level) (K3), (S3) (K3),
1. 2. COUP On co CO1 CO2	Laborator Kaushish RSE OUTCC ompletion o develop t multi poin develop t grinding a	y Manua J.P., "Ma DMES: f the cou he variou t cutting he variou nd drillin	I Irse, th us mect tools us mect g mach	uring Pr e stude nanical nanical ines	ents wil compor compor	I be ab nents u nents u	le to sing ce sing spo	ntre lat	ne throu achines	ugh singl like milli	e point and ng, shaper,	 ,	B1 (Hig Pre App Pre	hest I olying cision olying cision	(K3), (S3) (K3), (K3), (S3)
1. 2. COUI On co	Laborator Kaushish RSE OUTCC ompletion o develop t multi poin develop t grinding a	y Manua J.P., "Ma DMES: f the cou he variou t cutting he variou nd drillin green sar	I Irse, th us mect tools us mect g mach	uring Pr e stude nanical nanical ines	ents wil compor compor	I be ab nents u nents u	le to sing ce sing spo	ntre lat	ne throu achines	ugh singl like milli	e point and	 ,	BT (Hig App Pre App Pre App	hest I olying cision olying	(K3), (S3) (K3), (S3) (K3), (K3),
1. 2. COUI On co CO1 CO2 CO3	Laborator Kaushish RSE OUTCC ompletion o develop t multi poin develop t grinding a develop g welding so	y Manua J.P., "Ma DMES: f the cou he variou t cutting t he variou and drillin preen sar etup	I anufactu urse, th us mect tools us mect g mach nd moul	e stude nanical nanical ines ds usin	ents wil compor compor g stand Mappi	I be ab nents u nents u ard pati	le to sing ce sing spo terns ar Cos with	ntre lat ecial ma id creat n POs a	ne throu achines e the jo	ugh singl like milli ints using Ds	e point and ng, shaper, g TIG / MIG	,	BT (Hig App Pre App Pre App Pre	hest I blying cision blying cision blying cision	_evel) (K3), (S3) (K3), (S3) (K3), (S3)
1. 2. COUI On co CO1 CO2 CO3	Laborator Kaushish RSE OUTCC ompletion o develop t multi poin develop t grinding a develop g welding so	y Manua J.P., "Ma DMES: f the cou he variou t cutting t he variou ind drillin green sar etup PO2	I anufactu Irse, th Is mectools Is metools Is metools Is metools Is mectools Is metools Is	e stude nanical nanical ds usin PO4	ents wil compor compor g stand	I be ab nents u nents u ard pat	le to sing ce sing spo terns ar	ntre lat ecial ma nd creat	ne throu achines e the jo and PS(PO9	ugh singl like milli ints using Ds PO10	e point and ng, shaper, g TIG / MIG	PO12	BT (Hig App Pre App Pre App Pre	hest I blying cision blying cision blying cision SO1	evel) (K3), (S3) (K3), (S3) (K3), (S3) PSO2
1. 2. COUP On co CO1 CO2	Laborator Kaushish RSE OUTCC ompletion o develop ti multi poin develop ti grinding a develop g welding so POs PO1 01 3	y Manua J.P., "Ma DMES: f the cou he variou t cutting t he variou and drillin preen sar etup	I anufactu urse, th us mect tools us mect g mach nd moul	e stude nanical nanical ines ds usin	ents wil compor compor g stand Mappi	I be ab nents u nents u ard pati	le to sing ce sing spo terns ar Cos with	ntre lat ecial ma id creat n POs a	ne throu achines e the jo	ugh singl like milli ints using Ds	e point and ng, shaper, g TIG / MIG	,	BT (Hig App Pre App Pre App Pre	hest I blying cision blying cision blying cision	(K3), (S3) (K3), (S3) (K3), (K3),

	(Common to All BE/ BTech Engineering and Tec	hnoloav h	ranches)				
Programme & Branch	All BE/ BTech Engineering and Technology branches	Sem.	Category	L	т	Р	Credi
Prerequisites	Nil	4	EC	0	0	80	2
Preamble	This subject is to enhance the employability skills and to dev	velop care	er competen	су			
Unit – I	Soft Skills – I :						20
etiquette- Body La Unit – II	Quantitative Aptitude and Logical Reasoning – I:	·					30
Unit – II Problem solving		and ind			Datia	-proport	
variation-Partners							
	hip-Time speed and distance-Data interpretation-data re al connectives-Binary logic Linear arrangements- Circular and c	presentat	ion. Logical				
Deductions-Logic	hip-Time speed and distance-Data interpretation-data re al connectives-Binary logic Linear arrangements- Circular and c Written Communication & Verbal Aptitude	presentat complex a	ion. Logical rrangement	rea	Isonin	g: Fan	nily tree
Deductions-Logic Unit – III Writing Skills: Wr Professional e-m (Transcoding) W Phrases Paired V Spotting Errors S	hip-Time speed and distance-Data interpretation-data re al connectives-Binary logic Linear arrangements- Circular and c	complex a complex a cover le cal Report s Homon orms usir Transforn	tter -Respond writing Inter yms One wo g appropriate hation : Active	rea ding preta ord s e art e-Pas	to Jol tion c ubstiti icles a ssive	o Adver of Techr ution Id and pre & Direct	nily tree 30 tisemen nical Da ioms ar position
Deductions-Logic Unit – III Writing Skills: Wr Professional e-m (Transcoding) W Phrases Paired V Spotting Errors S	hip-Time speed and distance-Data interpretation-data re al connectives-Binary logic Linear arrangements- Circular and c Written Communication & Verbal Aptitude iting strategies and formats Importance of Résumés Writing a ail Writing Responding to e-mails and business letters Technic riting One-page Essays. Verbal Aptitude Synonyms Antonym vords Analogies Spelling test Cloze test using suitable verb f entence Correction and Formation Grammar Based questions (complex a complex a cover le cal Report s Homon orms usir Transforn	tter -Respond writing Inter yms One wo g appropriate hation : Active	rea ding preta ord s e art e-Pas	to Jol tion c ubstiti icles a ssive	o Adver of Techr ution Id and pre & Direct	nily tree 30 tisemen nical Dat ioms ar position
Deductions-Logic Unit – III Writing Skills: Wr Professional e-m (Transcoding) W Phrases Paired V Spotting Errors S	hip-Time speed and distance-Data interpretation-data re al connectives-Binary logic Linear arrangements- Circular and c Written Communication & Verbal Aptitude iting strategies and formats Importance of Résumés Writing a ail Writing Responding to e-mails and business letters Technic riting One-page Essays. Verbal Aptitude Synonyms Antonym vords Analogies Spelling test Cloze test using suitable verb f entence Correction and Formation Grammar Based questions (complex a complex a cover le cal Report s Homon orms usir Transforn	tter -Respond writing Inter yms One wo g appropriate hation : Active	rea ding preta ord s e art e-Pas	to Jol tion c ubstiti icles a ssive	o Adver of Techr ution Id and pre & Direct	anily tree 30 tisemen hical Dations ar positions -Indirect
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Deductions-Logic Unit – III Writing Skills: Wr Professional e-m (Transcoding) W Phrases Paired v Spotting Errors S Rearranging Jum TEXT BOOK: 1. Edgar Th Services	hip-Time speed and distance-Data interpretation-data re al connectives-Binary logic Linear arrangements- Circular and c Written Communication & Verbal Aptitude iting strategies and formats Importance of Résumés Writing a ail Writing Responding to e-mails and business letters Technic riting One-page Essays. Verbal Aptitude Synonyms Antonym vords Analogies Spelling test Cloze test using suitable verb f entence Correction and Formation Grammar Based questions (bled Sentences & Jumbled paragraphs, Identifying Facts, Inferen- orpe and Showick Thorpe, "Objective English for Competitive E	epresentat complex a Cover le cal Report is Homon orms usir (Transform ences and	tter -Respond writing Inter yms One wo g appropriate hation : Active Judgements	rea ding preta ord s e art e-Pas state	to Jol tion c ubstiti icles a ssive ement	g: Fan o Adver of Techr ution Id and pre & Direct s	nily tree 30 tisemen nical Da ioms ar position -Indirect Total:4
Deductions-Logic Unit – III Writing Skills: Wr Professional e-m (Transcoding) W Phrases Paired v Spotting Errors S Rearranging Jum TEXT BOOK: 1. Edgar Th Services REFERENCES:	hip-Time speed and distance-Data interpretation-data re al connectives-Binary logic Linear arrangements- Circular and c Written Communication & Verbal Aptitude iting strategies and formats Importance of Résumés Writing a ail Writing Responding to e-mails and business letters Technic riting One-page Essays. Verbal Aptitude Synonyms Antonym vords Analogies Spelling test Cloze test using suitable verb f entence Correction and Formation Grammar Based questions (bled Sentences & Jumbled paragraphs, Identifying Facts, Inferen- orpe and Showick Thorpe, "Objective English for Competitive E	Presentat complex a a Cover le cal Report is Homon orms usir (Transform ences and Examinatio	ion. Logical rrangement tter -Respond writing Inter yms One wo g appropriate hation : Active Judgements	rea ding preta ord s e art e-Pas state	to Jol tion c ubstiti icles a ssive ement	g: Fan o Adver of Techr ution Id and pre & Direct s	nily tree 30 tisemen hical Da ioms ar position -Indirec Total:4



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CO1			e soft sk nd as a t		arners t	o suppor	t them v	work ef	ficiently	in an c	organizat	ion as an		Applying (K3 Precision (S3	
CO2	solv	/e real t	ime prob	olems usi	ng num	erical ab	ility and	logical	reason	ing				Applying (K3 Precision (S3	
CO3				on skills grammati			ous		Applying (K3 Precision (S3						
						Марр	ing of C	Os wit	h POs	and PS	Os				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO	1	3	2				3	3		3		3	2		
CO	2	3	2				3	3		3		3	2		
CO	3		2				3	3		3	3	3	2		
1 – Sli	ght, 2	– Mode	erate, 3 -	- Substa	ntial, B1	- Bloom	's Taxor	nomy	1						
						ASSE	SSMEN	IT PAT	TERN -		RY				
	at / Bl	oom's ory*	Re	member (K1) %	ing l	ASSE Jndersta (K2)	anding	IT PAT Apply (K3)	ying	THEOF Analyzi (K4) 9	ing E	valuating (K5) %	Creati	ng (K6) %	Total %
		ory*	Re		Ŭ	Jndersta	anding	Apply	ying	Analyz	ing E		Creati	ng (K6) %	
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Programme & Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites		5	PC	2	0	2	3
Preamble	This course provides knowledge and skill to generate, fluids	, control and tran	smission of po	ower	usin	g pres	surized
Unit - I	Fundamentals of Fluid Power System and Hydraul	lic pumps:					6
application – Fluid Selection - Sizing	wer system – Advantages and applications of Fluid pov d power symbols – Hydraulic pumps: Gear, Vane and F of pumps (Numerical problems in Pumps).	-					ristics and
Unit - II	Control Components of Hydraulic System:						6
Pressure control valves and its type	valves: Three way valve, Four way valve, Check valve valves: Pressure relief, Pressure Reducing, Counter bala es – Proportional Valves – Servo valves: Mechanical type	ance, Sequencing	g and Unloadi	ng V			ow control
Unit - III	Pneumatic System and Actuators:						6
	ton, screw and vane compressor – Fluid conditioning ele oolers, Air dryers – Air control valves – Fluid power actua		•				
	nders – Sizing of actuators (Numerical problems in Actuat		Rolary actual	015 -	- type	es – C	Jushiohing
mechanism in cyli Unit - IV	nders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design:	tors).	-				6
mechanism in cyli Unit - IV Basic pneumatic Cascade Circuit d	nders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design: circuits – Pneumatic vacuum systems –Electrical compo lesign method (two / three cylinder circuits) – Accumulato plications in Fluid power circuit.	tors). onents and electr	rical controls	for F	luid p	power	6 circuits -
mechanism in cyli Unit - IV Basic pneumatic Cascade Circuit d circuits – PLC app Unit - V	Inders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design: circuits – Pneumatic vacuum systems –Electrical compo lesign method (two / three cylinder circuits) – Accumulato plications in Fluid power circuit. Industrial Circuits and Maintenance:	tors). onents and electi or – Types and aj	rical controls	for F uits -	luid µ - Pre	oower ssure	circuits - intensifier
mechanism in cyli Unit - IV Basic pneumatic Cascade Circuit d circuits – PLC app Unit - V Industrial circuits: balance valve circ circuits – Fail safe systems.	Inders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design: circuits – Pneumatic vacuum systems –Electrical components lesign method (two / three cylinder circuits) – Accumulator plications in Fluid power circuit. Industrial Circuits and Maintenance: Speed control circuits – Regenerative cylinder circuits – F cuit – Hydraulic cylinder sequencing circuit – Automatic e circuits - Sealing devices: Types and materials – Installation	tors). onents and electron or – Types and ap Pump unloading cylinder recipro	rical controls oplication circ circuit – Doub cating circuit	for F uits - le pu – Cy	luid µ - Pre Imp c	bower ssure circuit	6 circuits – intensifier 6 – Counter chronizing
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mechanism in cyli Unit - IV Basic pneumatic Cascade Circuit d circuits – PLC app Unit - V Industrial circuits: balance valve circ circuits – Fail safe systems. List of Exercises 1. Design and	Inders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design: circuits – Pneumatic vacuum systems –Electrical components lesign method (two / three cylinder circuits) – Accumulator plications in Fluid power circuit. Industrial Circuits and Maintenance: Speed control circuits – Regenerative cylinder circuits – Fecuit – Hydraulic cylinder sequencing circuit – Automatic e circuits - Sealing devices: Types and materials – Installation a / Experiments: nd testing of speed control circuits and synchronizing circuit	tors). onents and electron or – Types and ap Pump unloading cylinder recipro ation, Maintenan	rical controls oplication circ circuit – Doub cating circuit ce and trouble	for F uits - le pu – Cy e sho	Iuid µ - Pre Imp c /linde poting	bower ssure circuit	circuits – intensifier Counter chronizing
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mechanism in cyli Unit - IV Basic pneumatic Cascade Circuit d circuits – PLC app Unit - V Industrial circuits: balance valve circ circuits – Fail safe systems. List of Exercises 1. Design an 3. Design an	Inders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design: circuits – Pneumatic vacuum systems –Electrical components lesign method (two / three cylinder circuits) – Accumulato plications in Fluid power circuit. Industrial Circuits and Maintenance: Speed control circuits – Regenerative cylinder circuits – F cuit – Hydraulic cylinder sequencing circuit – Automatic e circuits - Sealing devices: Types and materials – Installation a/ Experiments: nd testing of speed control circuits and synchronizing circuit nd testing of Electro-hydraulic circuits. (i) with pressure sector	tors). onents and electron or – Types and ap Pump unloading cylinder recipro ation, Maintenan nits quence valve (ii) n and without time	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic	for F uits - le pu – Cy e sho	Iuid µ - Pre Imp c /linde poting	bower ssure circuit	circuits – intensifier Counter chronizing
mechanism in cyli Unit - IV Basic pneumatic Cascade Circuit d circuits – PLC app Unit - V Industrial circuits: balance valve circ circuits – Fail safe systems. List of Exercises 1. Design an 2. Design an 3. Design an 4. Design an	Inders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design: circuits – Pneumatic vacuum systems –Electrical components lesign method (two / three cylinder circuits) – Accumulator plications in Fluid power circuit. Industrial Circuits and Maintenance: Speed control circuits – Regenerative cylinder circuits – Fecuit – Hydraulic cylinder sequencing circuit – Automatic e circuits - Sealing devices: Types and materials – Installate at testing of speed control circuits and synchronizing circuit nd testing of Electro-hydraulic circuits. (i) with pressure second testing of Sequential circuit with pneumatic control (with	tors). pnents and electron pr – Types and appendix Pump unloading of cylinder recipronation, Maintenan ation, Maintenan uits quence valve (ii) and without time switches	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic e delay)	for F uits - le pu – Cy e sho	Iuid µ - Pre Imp c /linde poting	bower ssure circuit	circuits - intensifie Counter chronizing
mechanism in cyli Unit - IV Basic pneumatic Cascade Circuit d circuits – PLC app Unit - V Industrial circuits: balance valve circ circuits – Fail safe systems. List of Exercises 1. Design an 2. Design an 3. Design an 5. Design an	Inders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design: circuits – Pneumatic vacuum systems –Electrical compo- lesign method (two / three cylinder circuits) – Accumulator plications in Fluid power circuit. Industrial Circuits and Maintenance: Speed control circuits – Regenerative cylinder circuits – F cuit – Hydraulic cylinder sequencing circuit – Automatic e circuits - Sealing devices: Types and materials – Installa / Experiments: Ind testing of speed control circuits and synchronizing circuit at testing of Electro-hydraulic circuits. (i) with pressure second testing of Sequential circuit with pneumatic control (with at testing of Electro Pneumatic sequential circuit with limit	tors). pnents and electron pr – Types and appendix of a structure Pump unloading and a structure cylinder recipronation, Maintenan ation, Maintenan at	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic e delay) ve	for F uits - le pu – Cy > sho	luid - Pre imp c vilinde ooting	bower ssure bircuit ar syn g of Fl	circuits – intensifier – Counter chronizing luid Power
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mechanism in cyli Unit - IV Basic pneumatic Cascade Circuit d circuits – PLC app Unit - V Industrial circuits: balance valve circ circuits – Fail safe systems. List of Exercises 1. Design an 2. Design an 3. Design an 4. Design an 5. Design an 7. Design an	Inders – Sizing of actuators (Numerical problems in Actuat Fluid Power Circuit Design: circuits – Pneumatic vacuum systems –Electrical components lesign method (two / three cylinder circuits) – Accumulator plications in Fluid power circuit. Industrial Circuits and Maintenance: Speed control circuits – Regenerative cylinder circuits – Fecuit – Hydraulic cylinder sequencing circuit – Automatic e circuits - Sealing devices: Types and materials – Installate at testing of speed control circuits and synchronizing circuit nd testing of Electro-hydraulic circuits. (i) with pressure second testing of Sequential circuit with pneumatic control (with nd testing of Electro Pneumatic sequential circuit with limit nd testing of Pneumatic circuits with logic controls – AND with nd testing of Pneumatic circuits with logic controls – AND with	tors). pnents and electro pr – Types and appendix of a structure of the second secon	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic e delay) ve aulic circuits u	for F uits - le pu – Cy > sho	luid - Pre imp c vilinde ooting	bower ssure bircuit ar syn g of Fl	circuits - intensifier - Counter chronizing luid Power
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TEXT	BOOK:
1.	Esposito Anthony, "Fluid Power with Applications", 7th Edition, Pearson Higher Education, New York, 2015.
REFE	RENCES:
1.	Jegadeesa T., "Hydraulics and Pneumatics", I.K International Publishing House Pvt. Ltd., New Delhi, 2015.



2.	Maju	ımdar S	S.R., "Oil	Hydraulic	Syste	ems – Prin	ciples a	nd Mair	ntenan	ce", 2nd	Edition,	Tata McGr	aw-Hill, N	lew Delhi,	2017.
3.	Maju	ımdar S	8.R., "Pn	eumatic S	ystem	s – Princij	ples and	I Mainte	enance	", 2nd Ec	dition, Ta	ta McGrav	v-Hill, Nev	w Delhi, 20	017.
		JTCOM on of t		se, the st	udent	s will be a	able to						(BT Mapı Highest L	
CO1		•	•	•		d their sy ndustrial a			in ind	ustry and	d also se	elect suitat		derstandi Imitation	• • •
CO2	seleo	ct pneu	matic co	mponents	and f	luid power	· actuato	ors for lo	ow-cos	t automa	tion			derstandi Imitation	• • •
CO3	desi	gn and	construc	t a fluid po	ower c	ircuits rea	I time a	oplicatio	ons					Applying lanipulatio	. ,
CO4			struct an tomation	d test flui	d pow	er circuits	with pne	eumatic	, electi	ical, PLC	C and log	gic control		Applying (lanipulatio	
CO5	deve	lop and	d simulat	e fluid pov	ver cir	cuits using	g simula	ition sof	ftware	for indus	trial appl	ications		Applying (lanipulatio	
						Mappin	g of CO	s with	POs a	nd PSOs	6				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	2	2	2			1	1				1	1	2	2
CO	2	2	2	3	1	2	1	1				2	2	3	3
CO	3	2	3	3	1	2	1	1				2	2	3	3
CO	4	2	3	3		3						2	2	3	3
CO	5	2	2	3		3						2	2	3	3
1 – Slię	ght, 2 -	– Mode	rate, 3 –	Substant	al, BT	- Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	RN –	THEORY	,				
	t / Blo atego		Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyzi (K4) %		Evaluating (K5) %		reating (K6) %	Tota %
	CAT	1		20		80									100
	CAT2	2		15		65		20)						100
	CAT	3		10		30		60)						100
				05	Т	60		35	T						100



		22MTC52 - POWER ELECTRONIC	CO AND DRIV	23					
Program Branch	me &	B.E. & Mechatronics Engineering		Sem.	Category	L	т	Р	Credit
Prerequi	sites	Electron Devices & Digital Circuits, Electrical Mach	hines	5	PC	3	0	2	4
Preamble)	This course provides the basics of Power semicone converters and drives.	ductor devices	s. It gi	ives the prin	ciple	de	sign (of powe
Unit – I		Power Electronics Devices:							9
power M	OSFET,	electronics – Principle of operation – Steady state and GBT – Firing circuit for thyristor – Steady state and sy troduction to Wide band gap semiconductors (SiC and G	witching chara	cteristi					
Unit – II		AC-DC and DC-AC Converter:							9
semi cor	nverter -	controlled converter with R and RL load - Freewheeling Three phase semi converter – Three phase fully con- DC converter. Introduction to inverter –Single phase inv	ontrolled conve	erter –	6 pulse and			-	-
Unit - III		DC - DC and AC - AC Converter:							9
		ntrol strategies – Principle of operation DC to DC Conv gle phase AC voltage controller – On - off control and ph							
Unit – IV		DC Drives:							9
		Drives – Two quadrant chopper drive – Four quadrant ch							
Unit – V Introduct – Stator control	voltage a	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station	motor – Stato	-				-	-
Unit – V Introduct – Stator control List of E	voltage a	AC Drives: action motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments:	motor – Stato	-				-	y contro
Unit – V Introduct – Stator control List of E	voltage a	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station	motor – Stato	-				-	y contro
Unit – V Introduct – Stator control List of E	voltage a xercises Steady sta	AC Drives: action motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments:	motor – Stato	-				-	y contro
Unit – V Introduct – Stator control List of E 1 S 2 S	voltage a xercises Steady sta Single pha	AC Drives: AC Drives: AC Drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments: te characteristics of Gate driver Circuit	motor – Stato	-				-	y contro
Unit – V Introduct – Stator control List of E 1 S 2 S 3 [voltage a xercises Steady sta Single pha Design of	AC Drives: AC Drive: AC Drives: AC Drive: AC Drive: A	motor – Stato	-				-	y contro
Unit – V Introduct – Stator control List of E 1 S 2 S 3 E 4 S	voltage a xercises Steady sta Single pha Design of Single pha	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments: Ite characteristics of Gate driver Circuit Ite characteristics of Gate driver Circuit Ite converter Buck Converter	motor – Stato	-				-	y contro
Unit – V Introduct – Stator control List of E 1 S 2 S 3 C 4 S 5 S	voltage a xercises Steady sta Single pha Design of Single pha Simulatior	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments: Ite characteristics of Gate driver Circuit Ite characteristics of Gate driver Circuit Ite converter Buck Converter Ite AC voltage controller	motor – Stato	-				-	y contro
Unit – V Introduct – Stator control List of E 1 S 2 S 3 C 4 S 5 S 6 S	voltage a xercises Steady sta Single pha Design of Single pha Simulatior Simulatior	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments: Ite characteristics of Gate driver Circuit Ite chara	motor – Stato	-				-	y control
Unit – V Introduct – Stator control List of E 2 S 3 C 3 C 4 S 5 S 6 S 7 S	voltage a xercises Steady sta Single pha Design of Single pha Simulatior Simulatior	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments: Ite characteristics of Gate driver Circuit Ite chara	motor – Stato	-				-	y contro
Unit – V Introduct - Stator control List of E: 1 S 2 S 3 C 4 S 5 S 6 S 7 S	voltage a xercises Steady sta Single pha Design of Single pha Simulatior Simulatior	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments: Ite characteristics of Gate driver Circuit Ite chara	motor – Stato	-					y contro ase VFI
Unit – V Introduct - Stator control List of E: 1 S 2 S 3 C 4 S 5 S 6 S 7 S 8 S	voltage a xercises Steady sta Single pha Design of Single pha Simulation Simulation Simulation	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments: Ite characteristics of Gate driver Circuit Ite chara	motor – Stato	-	ntrol- concep				y contro ase VFI
Unit – V Introduct - Stator control List of E: 1 S 2 S 3 C 4 S 5 S 6 S 7 S 8 S TEXT BC	voltage a xercises Steady sta Single pha Design of Single pha Simulation Simulation Simulation	AC Drives: Inction motor drives – Speed control of 3-phase induction and frequency control — Stator current control – Station / Experiments: Ite characteristics of Gate driver Circuit Ite chara	motor – Stato		Lecture:45,	Prac	thre	al:30,	y contro ase VFE



1.	Sing	gh M.D	. & Kanc	handhani	K.B., "F	ower Ele	ectronics	s", McGra	w Hill, N	lew Delł	ni, 2013.				
2.	Gob	oal K. D	ubey, "F	undamer	itals of E	lectrical	Drives",	2nd Edit	ion, Nar	osal Pub	lishing I	House, New	/ Delhi, 2	2012.	
COUR On co				rse, the s	students	s will be	able to						(BT Map Highest L	
CO1	exp	lain the	e operati	on and sv	vitching	characte	ristics of	f power s	olid state	e device	S			derstandi Imitation	
CO2	des	cribe th	ne workir	ng princip	le of AC	– DC an	d DC –	AC conve	erters					derstandi Imitation	
CO3	exp	ress th			derstandi Imitation										
CO4	sele	ect a su	uitable po	ower con	verter for	a given	DC driv	e						Applying anipulatic	(K3)
CO5	cho	ose an	appropr	iate powe	er conve	rter for a	given A	C drive						Applying anipulatic	
						Mappir	ng of CO	Os with F	Os and	I PSOs					
COs/P	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	2	1		2							2	2	2
CO2	2	3	2	1		2							2	2	2
COS	3	3	2	1		2							2	2	2
CO4	1	3	2	1		2							2	2	2
CO5	5	3	2	1		2							2	2	2
1 – Slig	ght, 2	– Mod	erate, 3 ·	 Substar 	ntial, BT-	Bloom's	Taxono	omy							
						ASSES	SMEN	Γ ΡΑΤΤΕ	RN - TH	IEORY					
	: / Blo atego		Re	memberi (K1) %	ng l	Jndersta (K2)		Apply (K3)		Analyz (K4) ^o		Evaluating (K5) %		eating <6) %	Total %
	CAT1	1		30		7	0								100
	CAT2	2		25		7	' 5								100
	CAT3	3		30		5	50	20)						100
	ESE			20		6	60	20)						100
* ±3%	may b	be varie	ed (CAT	1,2,3 – 50) marks	& ESE –	100 ma	rks)			<u>.</u>				

Cred	Ρ	. т	L	Category	Sem.		s Engineering	B.E. & Mechatronics	ogramme &	Progra Branci
3	0	6 0	3	PC	5		esses	Manufacturing Proce	erequisites	Prereq
ing centr	chinin	and ma	ing a	ing for turnir	orogramm	machines, part p	the concepts of CNC n ment techniques	This course provides and various measurem	eamble	Pream
9							letal Cutting and CNC			Unit –
nsations f Prives, Ax	npens lle Dri	n – Cor k, Spinc	stem arbox nent	n of CNC sys hanism, gear – Arrangem	nfiguration Drive Mec e bearing	ls: Structure, Cor s and Controls - I d pulleys, Spindle	on – Construction details ol CNC systems, Drives otors. Timing belts and	chanics of chip formation C machines: Classification – DNC – Adaptive contro Levitation and Linear mong ball screws – Backlash	achinability. CNC achine accuracy ives - Magnetic	Machir Machir drives
9				5		,		Tooling For CNC Mad	-	Unit –
ssemblies g and wo of operation	ol ass nping ost of	rs – To n, clarr es – Ce	older catior achin	res – Tool ho ciples of loc of CNC Mad	ning cent nent. Prir selectior	rning and Machiner-Tool managen actors influencing nines in industrie	ing requirements for Tur utomatic Pallet Changer nes and Retrofitting: Fac introducing CNC machi	oling system – Preset an ic head changers – Toolin ATC Mechanisms – Au conomics of CNC Machir – Practical aspects of i nance, Other maintenanc	stem – Automati ool Magazines – Iding devices. Ed CNC Machines	system Tool N holding of CN0
0						nung.				
9								Part Programming of	nit — III	Unit –
							T CNC Machines:			
ng (Turni	mming	prograi	part	g – Manual p	ogrammir	ion. CNC part pro		ninology - G and M Code	art Program Term d Milling).	
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CO4		r linear ghness	and a	ngular m	neasure	ements u	ising va	arious	instrum	ients ar	nd deter	mine the	surface	Underst (K2	0
CO5			e form sion syste	•	file me	easureme	nt using	g Coor	dinate	Measu	ring Mad	chine (CM	IM) with	Apply (K	-
						Маррі	ng of C	Os with	POs a	and PSC	Ds				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
СО	1	3	3	3	3								2	2	2
CO	2	3	3	3		3							3	2	2
CO	3	3	3	3	3	3							2	2	2
CO	4	3	3	3	3	3							2	2	2
CO	5	3	3	3	3	3							2	2	2
1 – Sli	ght, 2	– Mode	erate, 3 -	- Substar	ntial, B1	- Bloom'	s Taxon	omy							
						ASSE	SSMEN	Τ ΡΑΤΤ	ERN -	THEOR	Y				
	t / Blo atego	oom's ory*	Rer	nemberi (K1) %	ng	Understa (K2)	0	Apply (K3)		Analyz (K4) ^o		valuating	(K5) %	Creating (K6) %	Total %
	CAT	1		15		75		10)						100
	CAT	2		15		70		15	5						100
	CAT	3		15		70		15	5						100
	ESE	Ξ		15		70		15	5						100
* ±3%	may b	oe varie	d (CAT 1	,2,3 – 50) marks	8 & ESE -	- 100 ma	arks)							



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CO1	2	3	3		1						2	3	3
CO2	2	3	3		2						2	3	3
CO3	2	3	3		3						2	3	3
CO4	2	3	3		3						2	3	3
CO5	2	3	3		3						2	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substanti	al, BT-	Bloom's	Taxono	omy						
					ASSES	SMENT	PATTER	RN - "	THEORY				
Test / Blo Catego		Rer	nemberin (K1) %	ng U	ndersta (K2)		Applyii (K3) %		Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
CAT	1		18		72		10						100
CAT	2		18		62		20						100
CAT	3		10		10		80						100
			15		30		55						100



B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
-	5	PC	3	0	2	4
This course provides knowledge and skill to generate, con fluids	rol and trans	smission of po	ower	usin	g pres	ssurized
Fundamentals of Fluid Power System and Hydraulic p	imps:					9
power system – Advantages and applications of Fluid power s luid power symbols – Hydraulic pumps: Gear, Vane and Pisto ng of pumps (Numerical problems in Pumps).						
Control Components of Hydraulic System:						9
bl valves: Three way valve, Four way valve, Check valve and bl valves: Pressure relief, Pressure Reducing, Counter balance, ypes – Proportional Valves – Servo valves: Mechanical type and	Sequencing	g and Unloadi	ng V	/alves		ow contro
Pneumatic System and Actuators:					•	
biston, screw and vane compressor – Fluid conditioning element coolers, Air dryers – Air control valves – Fluid power actuators:						
coolers, All givers – All control valves – Fluid Dower actualors.			0.00	+ 10	~ (Suchianin
		Rolary actual	ors -	– type	es – (Cushionin
ylinders – Sizing of actuators (Numerical problems in Actuators).		Rolary actual	ors -	– type	es – (1
ylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design:		-				
ylinders – Sizing of actuators (Numerical problems in Actuators).	s and electr	ical controls	for F	Tuid	powe	r circuits
ylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component	s and electr	ical controls	for F	Tuid	powe	r circuits
Fluid Power Circuit Design: Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T upplications in Fluid power circuit. Industrial Circuits and Maintenance:	s and electr ypes and ap	rical controls	for F uits -	luid – Pre	powe ssure	r circuits - intensifie
sylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T upplications in Fluid power circuit.	s and electr ypes and ap o unloading o uder reciproo	rical controls oplication circ circuit – Doub cating circuit	for F uits - le pu	Fluid – Pre ump c	powe ssure circuit	r circuits - intensifie
sylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T upplications in Fluid power circuit. Industrial Circuits and Maintenance: s: Speed control circuits – Regenerative cylinder circuits – Pump circuit – Hydraulic cylinder sequencing circuit – Automatic cylinder	s and electr ypes and ap o unloading o uder reciproo	rical controls oplication circ circuit – Doub cating circuit	for F uits - le pu	Fluid – Pre ump c	powe ssure circuit	r circuits - intensifie
rylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T applications in Fluid power circuit. Industrial Circuits and Maintenance: s: Speed control circuits – Regenerative cylinder circuits – Pump circuit – Hydraulic cylinder sequencing circuit – Automatic cylinate afe circuits - Sealing devices: Types and materials – Installation	s and electr ypes and ap o unloading o uder reciproo	rical controls oplication circ circuit – Doub cating circuit	for F uits - le pu	Fluid – Pre ump c	powe ssure circuit	r circuits - intensifie
sylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T upplications in Fluid power circuit. Industrial Circuits and Maintenance: ss: Speed control circuits – Regenerative cylinder circuits – Pump circuit – Hydraulic cylinder sequencing circuit – Automatic cylin afe circuits - Sealing devices: Types and materials – Installation es / Experiments:	s and electr ypes and ap o unloading o ider reciproo Maintenano	rical controls oplication circ circuit – Doub cating circuit ce and trouble	for F uits - lle pu – Cy e sho	Fluid - Pre ump c ylinde poting	powe ssure circuit	r circuits intensifie - Counte
sylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T upplications in Fluid power circuit. Industrial Circuits and Maintenance: is: Speed control circuits – Regenerative cylinder circuits – Pump circuit – Hydraulic cylinder sequencing circuit – Automatic cylinate circuits - Sealing devices: Types and materials – Installation es / Experiments: and testing of speed control circuits and synchronizing circuits	s and electr ypes and ap o unloading o ider reciproo Maintenano ce valve (ii)	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic	for F uits - lle pu – Cy e sho	Fluid - Pre ump c ylinde poting	powe ssure circuit	r circuits intensifie - Counte
sylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T applications in Fluid power circuit. Industrial Circuits and Maintenance: ss: Speed control circuits – Regenerative cylinder circuits – Pump circuit – Hydraulic cylinder sequencing circuit – Automatic cylin afe circuits - Sealing devices: Types and materials – Installation es / Experiments: and testing of speed control circuits and synchronizing circuits and testing of Electro-hydraulic circuits. (i) with pressure sequent	s and electrypes and ap o unloading o ider reciproo Maintenano ce valve (ii) without time	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic	for F uits - lle pu – Cy e sho	Fluid - Pre ump c ylinde poting	powe ssure circuit	r circuits intensifie - Counte
sylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T upplications in Fluid power circuit. Industrial Circuits and Maintenance: is: Speed control circuits – Regenerative cylinder circuits – Pump circuit – Hydraulic cylinder sequencing circuit – Automatic cylinate circuits - Sealing devices: Types and materials – Installation es / Experiments: and testing of speed control circuits and synchronizing circuits and testing of Sequential circuit with pneumatic control (with and	s and electry ypes and ap ounloading o der reciproo Maintenano ce valve (ii) without time	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic e delay)	for F uits - lle pu – Cy e sho	Fluid - Pre ump c ylinde poting	powe ssure circuit	r circuits intensifie - Counte
sylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T applications in Fluid power circuit. Industrial Circuits and Maintenance: ss: Speed control circuits – Regenerative cylinder circuits – Pump circuit – Hydraulic cylinder sequencing circuit – Automatic cylin afe circuits - Sealing devices: Types and materials – Installation es / Experiments: and testing of speed control circuits and synchronizing circuits and testing of Sequential circuit with pneumatic control (with and and testing of Sequential circuit with pneumatic control (with and and testing of Electro Pneumatic sequential circuit with limit swite	s and electrypes and ap o unloading o ider reciproo Maintenano ce valve (ii) without time ches and OR val	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic e delay)	for F uits - lle pu - Cy e sho	Fluid - Pre ump o ylinde potino	powe ssure circuit er syr g of F	r circuits - intensifie - Counte achronizing luid Powe
sylinders – Sizing of actuators (Numerical problems in Actuators). Fluid Power Circuit Design: ic circuits – Pneumatic vacuum systems –Electrical component t design method (two / three cylinder circuits) – Accumulator – T upplications in Fluid power circuit. Industrial Circuits and Maintenance: is: Speed control circuits – Regenerative cylinder circuits – Pump circuit – Hydraulic cylinder sequencing circuit – Automatic cylin afe circuits - Sealing devices: Types and materials – Installation es / Experiments: and testing of speed control circuits and synchronizing circuits and testing of Sequential circuit with pneumatic control (with and and testing of Sequential circuit with pneumatic control (with and and testing of Electro Pneumatic sequential circuit with limit swite and testing of Pneumatic circuits with logic controls – AND valve	s and electr ypes and ap o unloading o der reciproo Maintenano ce valve (ii) without time shes and OR val	rical controls oplication circ circuit – Doub cating circuit ce and trouble with hydraulic e delay) ve aulic circuits u	for F uits - lle pu - Cy e sho	Fluid - Pre ump o ylinde potino	powe ssure circuit er syr g of F	r circuits - intensifie - Counte achronizing luid Powe
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TEXT	BOOK:
1.	Esposito Anthony, "Fluid Power with Applications", 7th Edition, Pearson Higher Education, New York, 2015.
REFE	RENCES:
1.	Jegadeesa T., "Hydraulics and Pneumatics", I.K International Publishing House Pvt. Ltd., New Delhi, 2015.



2.	Мај	umdar S	S.R., "Oil	Hydraulic	Syste	ms – Prin	ciples a	nd Mair	tenano	ce", 2nd	Edition,	Tata McGra	aw-Hill, N	lew Delhi,	2017.
3.	Мај	umdar S	S.R., "Pn	eumatic S	ystems	s – Princi	ples and	I Mainte	nance	', 2nd Ec	dition, Ta	ata McGraw	/-Hill, Ne	v Delhi, 20	017.
		JTCOM ion of t		se, the st	udents	s will be a	able to						(BT Mapp Highest L	
CO1				compone ts for diffe					in indu	ustry and	d also s	elect suitab	ole Ur	derstandi Imitation	• • •
CO2	sele	ct pneu	matic co	mponents	and flu	uid power	· actuato	ors for lo	w-cost	automa	tion		Ur	derstandi Imitation	
CO3	desi	gn and	construc	t a fluid p	ower ci	rcuits rea	I time a	oplicatio	ons				M	Applying anipulatio	. ,
CO4		•	struct an tomation	d test flui	d powe	er circuits	with pne	eumatic	, electr	ical, PL(C and log	gic control f	Μ	Applying (anipulatio	n (S2)
CO5	deve	elop and	d simulat	e fluid pov	wer ciro	cuits using	g simula	ition sof	tware f	or indus	trial app	ications		Applying (anipulatio	
						Mappin	g of CO	s with	POs ar	nd PSOs	6				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	2	2	2			1	1				1	1	2	2
CO	2	2	2	3	1	2	1	1				2	2	3	3
CO	3	2	3	3	1	2	1	1				2	2	3	3
CO	4	2	3	3		3						2	2	3	3
CO	5	2	2	3		3						2	2	3	3
1 – Slig	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	my							
						ASSES	SMENT	PATTE	RN – 1	THEORY	,				
	st / Blo Catego	oom's ory*	Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyzi (K4) %		Evaluating (K5) %		reating (K6) %	Tota %
	CAT	1		20		80									100
	CAT	2		15		65		20)						100
	CAT	3		10		30		60)						100
	ESE	-		05		60		35							100



Diane	amme & ch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Prere	quisites	Physics for Mechatronics Engineering, Electron Devices and Digital Circuits	5	PC	3	0	2	4
Pream	nble	This course provides an understanding of measurement metho sensors and signal conditioning circuits.	ods, cons	struction and v	vork	ing pi	rincipl	e of
Unit –	- 1	Introduction to Measurement Systems:						9
Measu	urement syster	of measurement system – Methods of measurement – Classific n errors - Error analysis – Static and dynamic characteristics of cers – Smart Sensors.						
Unit -	- 11	Non-Electrical Transducers:						9
Bourd	lon gauge, Bell	irement: Filled system thermometer, Bimetallic thermometer. ows and Diaphragm. Vacuum measurement: McLeod gauge, T Rotameter – Orifice. Level measurement: Float gauges.						
Unit -	- 111	Electrical Transducers:						9
Resist measu	tive transduce urement – Rad	rs: Potentiometer, RTD, Thermistor – Thermocouple – Stra ation measurement using pyrometers. Inductive transducer: LVD	ain gaug T, RVD	ge – Torque T – Capacitive	me trar	asure Isduc	ement er.	– Force
Unit -	- IV	Basics of Operational Amplifiers:						9
perfor	mance charac	amplifier stages – Pin diagram & internal circuit diagrams of teristics. Op – AMP Applications: Inverting and Non-inverting a r, Differentiator, Instrumentation amplifier						
Unit -	- V	Signal Converters and Conditioning:						9
Exper	riments:	ntroduction –Sources and Detectors – Maxwell's inductance bridg	ge – Wie	en's bridge				
1.		nt of temperature using Thermistor						
2.		nt of temperature using Thermocouple & RTD						
3.								
4		t of displacement using POT, LVDT & Capacitive transducer						
	Flow measu	nt of Torque, Strain and Force using strain gauge						
5.		nt of Torque, Strain and Force using strain gauge rement using Orifice meter and Rotameter						
5. 6.	Diaphragm b	nt of Torque, Strain and Force using strain gauge rement using Orifice meter and Rotameter based Pressure measurement						
5. 6. 7.	Diaphragm b Capacitive b	nt of Torque, Strain and Force using strain gauge rement using Orifice meter and Rotameter based Pressure measurement ased Level Measurement						
5. 6. 7. 8.	Diaphragm b Capacitive b Measuremen	nt of Torque, Strain and Force using strain gauge rement using Orifice meter and Rotameter based Pressure measurement ased Level Measurement nt of magnetic field strength using hall effect sensor						
5. 6. 7. 8. 9.	Diaphragm t Capacitive b Measuremen Remote mor	nt of Torque, Strain and Force using strain gauge rement using Orifice meter and Rotameter based Pressure measurement ased Level Measurement nt of magnetic field strength using hall effect sensor hitoring using IoT and Instrumentation amplifier	using WI	heatstone Brid	lge&			
5. 6. 7. 8. 9.	Diaphragm t Capacitive b Measuremen Remote mor	nt of Torque, Strain and Force using strain gauge rement using Orifice meter and Rotameter based Pressure measurement ased Level Measurement nt of magnetic field strength using hall effect sensor	using W	heatstone Brid	-		cal:30	, Total:7
5. 6. 7. 8. 9. 10.	Diaphragm t Capacitive b Measuremen Remote mor	nt of Torque, Strain and Force using strain gauge rement using Orifice meter and Rotameter based Pressure measurement ased Level Measurement nt of magnetic field strength using hall effect sensor hitoring using IoT and Instrumentation amplifier	using W		-		cal:30	, Total:7
5. 6. 7. 8. 9. 10. TEXT	Diaphragm to Capacitive bo Measurement Remote more Measurement BOOK: Sawhney.	nt of Torque, Strain and Force using strain gauge rement using Orifice meter and Rotameter based Pressure measurement ased Level Measurement nt of magnetic field strength using hall effect sensor hitoring using IoT and Instrumentation amplifier	-	Lecture:4	5, P	ractio		
5. 6. 7. 8. 9. 10. TEXT 1.	Diaphragm & Capacitive b Measuremen Remote mor Measuremen BOOK: Sawhney. A Company I	A.K, "A Course in Electrical and Electronics Measurements and Ir	nstrume	Lecture:4	5, Pi	r actio on, D	hanpa	at Rai &
5. 6. 7. 8. 9. 10. TEXT 1. 2.	Diaphragm & Capacitive b Measuremen Remote mor Measuremen BOOK: Sawhney. A Company I	A.K, "A Course in Electrical and Electronics Measurements and Ir Private Limited, New Delhi, 2015. (Unit-I,II &III)	nstrume	Lecture:4	5, Pi	r actio on, D	hanpa	at Rai &
5. 6. 7. 8. 9. 10. TEXT 1. 2. REFE	Diaphragm to Capacitive bo Measurement Remote more Measurement BOOK: Sawhney. A Company for D Choudhu RENCES:	A.K, "A Course in Electrical and Electronics Measurements and Ir Private Limited, New Delhi, 2015. (Unit-I,II &III)	nstrume Science	Lecture:4 ntation", 18th e, New Delhi, 3	5, P i Editi 2018	on, D 8. (Ur	9hanpa hit-IV&	at Rai &
5. 6. 7. 8. 9. 10. TEXT 1. 2. REFE 1.	Diaphragm to Capacitive bo Measurement Remote more Measurement BOOK: Sawhney. Company for D Choudhu RENCES: John G. W	A.K, "A Course in Electrical and Electronics Measurements and Ir Private Limited, New Delhi, 2015. (Unit-I,II &III) ury Roy., "Linear Integrated Circuits ", 5th Edition, New Academic	Science	Lecture:4 ntation", 18th e, New Delhi, 2 lition, CRC Pre	5, P i Editi 2018	on, D . (Ur Unite	Phanpa hit-IV&	at Rai & V) tes, 2018
1. 2. REFE 1. 2.	Diaphragm to Capacitive bo Measurement Remote more Measurement BOOK: Sawhney. Company for D Choudhu RENCES: John G. W	A.K, "A Course in Electrical and Electronics Measurements and Ir Private Limited, New Delhi, 2015. (Unit-I,II &III) ury Roy., "Linear Integrated Circuits ", 5th Edition, New Academic ebster, "Measurement, Instrumentation, and Sensors Handbook", Ilas.Amey and John G.Webster, "Sensors and Signal Conditioning	Science	Lecture:4 ntation", 18th e, New Delhi, 2 lition, CRC Pre	5, P i Editi 2018	ractio on, D 3. (Ur Unite 7 & S	Phanpa hit-IV&	at Rai & V) tes, 2018



CO1	infer	the bas	sic conc	epts of me	easure	ement syst	tem						Ur	nderstand Imitation	0 ()
CO2	sele	ct suital	ble non-	electrical,	electr	rical transc	lucers a	ind sens	sors fo	or various	measu	rements	Ur	nderstand Imitatior	
CO3	iden	tify suita	able ele	ctrical trar	nsduce	ers and se	nsors fo	or electri	ical m	easurem	ents			nderstanc 1anipulati	0 ()
CO4	Infer	the ba	sic conc	epts of op	eratio	onal amplif	ier and i	its vario	us ap	olications	;			nderstanc 1anipulati	• • •
CO5	sele	ct a suit	table sig	nal condit	tioning	g system to	o enhan	ce the c	quality	of signal				Applying Precisior	
60×/P/	0-	DO1	DOD	DO3	DO	Mapping	-		1			DO14	DO42	DCO 4	DCOD
COs/P		PO1	PO2	PO3	PO4	+ P05	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2	3	2	3								1	2	2
CO2		2	3	2	3								1	3	3
CO3	5	2	3	2	3								1	3	3
CO4		2	3	2	3								1	3	3
CO5		2	3	2	3								1	3	3
1 – Sligh	nt, 2 –	Modera	ate, 3 – 3	Substantia	al, BT-	Bloom's	Taxonor	ny							
						ASSES	SMENT	PATTE	RN –	THEOR	(
	: / Bloo ategoi		Re	memberi (K1) %	ng	Understa (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		eating (6) %	Total %
	CAT1			15		85									100
	CAT2			15		70		15	5						100
	CAT3			15		70		15	5						
	ESE			10		70		20)						100
* ±3% m	ay be	varied	(CAT 1,	2&3-5	0 mar	ks & ESE	– 100 m	narks)	1		I		1		l

1. 2. 3. 4.		This p	facturir				-								
LIST OF 1. 2. 3. 4.	EXPERIN			ng Proc	esses					5	PC	0	0	2	1
1. 2. 3. 4.		vanou	ractical s meas				out gene	ration o	f CNC p	oart prog	ramming ar	nd to u	Inder	stand	about
2. 3. 4.	Study of G	IENTS	EXER(CISES:											
3. 4.		codes	and M o	codes fo	or mach	ining ce	entre an	d turnin	g centre	e					
4.	Programm	ing and	machin	ing of g	jiven co	mpone	nt using	CNC tu	urning c	entre.					
	Programm	ing and	machin	ing of g	jiven co	mpone	nt using	CNC tu	urning c	entre wit	h canned c	ycles			
5.	Programm	ing and	machin	ing of g	jiven co	mpone	nt using	CNC tu	urning c	entre by	using drillin	g and	borir	ng too	ls
	CNC code	genera	tion of g	given co	mpone	nt using	g MAST	ER CAN	И (Lathe	e) and int	terfacing it t	o CN	C turr	ning ce	entre
6.	Programm	ing and	machin	ing of J	lig plate	using	CNC ma	achining	centre						
7.	Programm	ing and	machin	ing of k	ey way	milling	operatio	on using	g CNC r	machinin	g centre				
8.	CNC code	genera	tion of g	given co	mpone	nt using	g MAST	ER CAN	M (Mill)	and inter	facing it to	CNC r	nach	ining o	centre
9.	Calibration	of Verr	nier / Mi	cromete	er; statio	c chara	cteristic	study- I	Measur	ement of	Componer	nts like	V blo	ock et	с
10.	Calibration	of Dial	Gauge	; static o	characte	eristic s	tudy; Us	se of dia	al gauge	e as mea	suring devi	ce and	l Con	nparat	tor
11.	Measurem	ent of n	nicro co	mponer	nts usin	g Profil	e projec	tor							
12.	Study of A	utocollir	nator, S	Surface	roughne	ess test	ter and o	coordina	ate mea	suring m	achine (CM	1M)			
															Total:30
	ENCES/ M														
			-								Agency, In	dia, 20	013.		
2.	Jain R.K, "	Engine	ering Me	etrology	", Khan	ina Pub	lishers,	New De	əlhi, 22 ^r	nd Edition	, 2022.				
3.	Laboratory	manua	l												
	E OUTCO		ursa th	o stude	onte wil	ll ha ah	le to							⁻ Map hest I	ped Level)
CO1	develop, s	imulate	a profi	le using				elop pa	rt progr	am and	execute the		Арр	lying	(K3),
	same usin	-			libratio	n and r	neasure	ements	process	ses and	perform the			oulation Olying	on (S2) (K3).
	characteris														on (S2)
СОЗ	carry out th	ne linea	r and ar	ngular n	neasure	ements	of vario	us mecł	nanical	compone	ents			olying oulatio	(K3), on (S2)
					Mann	ing of (Cos wit	h POe 4	and PS	0s					
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PO9	PO10	P011	P012	2 P	SO1	PSO2
CO1	3	3	3	3	3	2						3		3	3
CO2	3	3	3	3	2				3	3		3		3	3

B.E.– Mechatronics Engineering, Regulation, Curriculum and Syllabus – R2022

		221	/ITL52 -	MICRO	CONT	ROLLE	R PRO	GRAM	MING A	ND API	PLICATI	ONS LABC	RATO	RY		
Progra Branc		8	B.E. 8	& Mech	atronic	s Engi	neering	g			Sem.	Category	/ L	т	Р	Credit
Prerec	quisit	es	Electr	on Dev	vices ar	nd Digit	tal Circ	uits La	borator	y	5	PC	0	0	2	1
Pream	ble			ourse e ne appl			crocont	roller pr	ogramn	ning, sir	nulation	and interfac	cing of	hard	ware	for a
LIST C			IENTS /			/licropro	ocessor									
2.			functior			•										
Embeo	dded	C prog	gram de	evelopn	nent an	d hard	ware In	iterfacii	ng							
3.	Inte	rfacing	of swite	ch, LED	and se	ven seg	gment L	ED								
4.	Inte	rfacing	of LCD	with 89	ec51 Mi	crocont	roller									
5.	Inte	rfacing	DC mo	tor prog	grammir	ng with	89c51 I	Microco	ntroller							
6.	Inte	rfacing	Steppe	er motor	with 89	c51 Mi	crocont	roller								
7.	Inte	rfacing	Servo ı	motor w	ith 89c	51 Micro	ocontro	ller								
8.	Actu	uation o	of pneur	matic cy	linders	for the	given a	pplicatio	on							
9.	Inte	rfacing	of high	power	devices	with 89	9c51 Mi	crocont	roller							
10.	Inte	rfacing	sensor	s, Micro	control	ler with	loT mo	dule for	the give	en appli	cation					
																Total:30
REFE	RENC	ES/ M	ANUAL	/SOFT	WARE:											
1.		zidi Mu v Delhi		d Ali, "	The 80	51 Micr	ocontro	oller and	d Embe	dded S	ystems",	2nd Editio	n, Pre	ntice	e Hall	of India
2.	Lab	oratory	, manua	d.												
COUR															Мар	
On co CO1			the cou						essor ai	nd 8905	51 micror	controller			hest L olying	Level)
						-							Ν			on (S2)
CO2	dev	elop Er	nbedde	d C pro	grammi	ing usin	ig 89C5	51 micro	controll	er to the	e interfac	ing circuits			olying cision	
CO3	dev	elop re	al-time	Mechat	ronics a	pplicati	ons usi	ing 89C	51 micro	ocontrol	ler			Ana	lyzing cision	(K4),
						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	P	SO1	PSO2
CO1	1	3	2	1	1					2			1		3	
CO2	2	2	2	3	2	3				2			2		3	2
COS		3	2	3	2	3				2			2		3	2
1 – Slig	ght, 2	– Mod	erate, 3	– Subs	stantial,	BT- Blo	om's T	axonom	ıy							



	(Common to All BE/ BTech Engineering and Tech		anches)				
Programme & Branch	All BE/ BTech Engineering and Technology branches	Sem.	Category	L	т	Р	Credit
Prerequisites	Nil	5	EC	0	0	80	2
Preamble	This subject is to enhance the employability skills and to deve	elop caree	r competency	,			
Unit – I	Soft Skills – II :						20
	ew: Foundation in core subject- industry orientation / knowledg skills-Activities before Interview, upon entering interview roo Quantitative Aptitude and Logical Reasoning – II:						
and polynomial Probability-Statis reasoning: Condi reasoning- Quan	level II: Money related problems-Mixtures-Symbol base proble equations-Special, equations-Inequalities-Sequence and ser ics-Data sufficiency- Geometry-Trigonometry-Heights and dista- tionality and grouping-Sequencing and scheduling- Selections-I based reasoning-Flaw detection- Puzzles-Cryptarithms.	ies-Set th ances-Co-c	eory-Permuta ordinate geon	ations netry	s and -Mens	d comb suration	inations∙ . Logica in logica
Unit – III	Reading & Speaking Skills g comprehension– Effective Reading strategies – Descriptive,						30
comprehension / of an argument Reading notices Sharing of Real	ocating factual information within a text – global reading/s scanning for specific information – detailed comprehension / in – identifying the writer's attitude and opinions – Reading new and book reviews –Interpreting graphic data & Advertisements Time Experience; Conversational Practices –Role Play – S	tensive real s articles s. Speaking Short Talks	ading – under in business r g: Mock Inter s / TED Tall sentation – O	rstan naga view ks – rator	ding t izines s –Se Exten y and	he deve , newsp elf-Introc npore; Effectiv	elopment papers – duction – Giving a
Speaking; Pair D	/arious Topics – Technical / Non-Technical Topics – Project Re iscussion – Group Discussion – The process of Group Discussion ersations & Skills – Negotiating Skills.		egles to be at				sessed -
Speaking; Pair D	iscussion – Group Discussion – The process of Group Discussion						sessed – Total:45
Speaking; Pair D Telephonic Conv TEXT BOOK:	iscussion – Group Discussion – The process of Group Discussionersations & Skills – Negotiating Skills.	on – Strate					Total:45
Speaking; Pair D Telephonic Conv TEXT BOOK:	iscussion – Group Discussion – The process of Group Discussion	on – Strate		Pea	irson		Total:4
Speaking; Pair D Telephonic Conv TEXT BOOK:	iscussion – Group Discussion – The process of Group Discussion ersations & Skills – Negotiating Skills. orpe and Showick Thorpe, "Objective English for Competitive Ex	on – Strate		Pea	irson		Total:45
Speaking; Pair D Telephonic Conv TEXT BOOK: 1. Edgar Th Services REFERENCES:	iscussion – Group Discussion – The process of Group Discussion ersations & Skills – Negotiating Skills. orpe and Showick Thorpe, "Objective English for Competitive Ex	on – Strate	", 6th Edition,	Pea	irson		Total:4
Speaking; Pair D Telephonic Conv TEXT BOOK: 1. Edgar Th Services REFERENCES: 1. Aruna Ko	iscussion – Group Discussion – The process of Group Discussion ersations & Skills – Negotiating Skills. orpe and Showick Thorpe, "Objective English for Competitive Ex Pvt Ltd, 2017.	on – Strate xamination dia, New D	", 6th Edition, pelhi, 2015.				Total:4

		OUTCOI		rse, the s	student	s will be	able to							BT Mappe (Highest Le			
CO1	develop the soft skills of learners to support them work efficiently in an organization as an individualand as a team													Applying (K3), Precision (S3)			
CO2	sol	solve real time problems using numerical ability and logical reasoning												Applying (K3), Precision (S3)			
CO3	O3 apply reading and speaking skills effectively for various academic and professional purposes													Applying (K3), Precision (S3)			
						Марріі	ng of C	Os with	POs a	nd PSO	S						
COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO	1	3	2	0	0	0	3	3	0	3	0	3	2				
CO2	2	3	2	0	0	0	3	3	0	3	0	3	2				
COS	3		2	0	0	0	3	3	0	3	3	3	3				
1 – Slig	ght, 2	2 – Mod	erate, 3	– Substar	ntial, BT	- Bloom's	s Taxon	omy			1	1					
						ASSES	SSMEN	ΓΡΑΤΤ	ERN -	THEOR	Y						
Test / Bloom's Category*			Re	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %	Cre	Creating (K6) %			
CAT		1	20			40		40							100		
CAT		2			50		50							100			
CAT		ī3				50		50							100		
ESE				NA													



Drogramm	08									1			
Programm Branch	eŏ	B.E. &	Mechatro	nics Enginee	ering			Sem.	Category	/ L	т	Ρ	Credit
Prerequisi	tes	Microc	ontroller P	Programming	and Applicati	ons		6	PC	3	0	0	3
Preamble			urse provid Istrial auton		wledge about Pl	LC progr	amming	g, I/O inte	erfacing and	l devel	opme	nt of S	SCADA
Unit – I		Device	Layer Con	mponents:									9
					ensors - Float S								
	•				crete Output De	evices: D	iscrete:	Relays	 Contactor 	s – DO	DL St	arter -	Solenoi
	alog Outp			valve – VFD									
Unit – II				ogic Control									9
Discrete I/C) module	es – Anal	og I/O moc	dules- Specia	operation – Ty II I/O modules – shooting of PLC	- CPU p							
Unit – III		Progra	mming of I	PLC:									9
• •	-	-			logic diagram- S ons - Applicatio			s –Instru	ctions: Bina	ry leve	I- Tin	ner – (Counter -
Unit – IV		Advan	ced PLC pr	rogramming	and Communi	cation F	rotoco	ls:					9
Program co	ontrol ins	tructions	- Analog Pl	LC operation	- Calculation f	or Digita	al count-	- HMI int	erface - Da	ata cor	nmur	icatio	ns: SPI
2C – Data	highway	- Devicel	Net- Contro	INet-EtherNe	t/IP-Modbus-Fie	eldbus- F	Profibus	•					
Unit – V		SCADA	.										
													9
Introduction		- SCAE	DA: Definitio		ts of SCADA -								
Introductior		- SCAE	DA: Definitio		ts of SCADA – ven case study -								
Introductior		- SCAE	DA: Definitio										station ·
Introduction Application	s of SCA	- SCAE	DA: Definitio										station ·
ntroductior Application: TEXT BOO	s of SCA	– SCAE DA- Dev	DA: Definition	ADA for a giv		- Using A	Analog,	Discrete	I/O's with F	PLC an			station
TEXT BOO	s of SCA PK: truzella F	– SCAE DA- Dev	DA: Definition	ADA for a giv	ren case study -	- Using A	Analog,	Discrete	I/O's with F	PLC an			station
Introduction Application TEXT BOO 1. Pe REFERENCE	s of SCA DK: truzella F CES:	– SCAE DA- Dev	DA: Definition eloping SC	ADA for a giv	ren case study -	- Using A	Analog, McGraw	Discrete /-Hill, Ne	I/O's with F	PLC an	d SC	ADA.	station -
Introduction Application TEXT BOO 1. Per REFERENCE 1. Stu	s of SCA DK: truzella F CES: uart G Mo	- SCAE DA- Dev Frank D.,	DA: Definition eloping SC/ "Programm Designing S	ADA for a giv nable Logic C SCADA appli	ren case study -	- Using A Edition, I -A Pract	Analog, McGraw ical App	Discrete /-Hill, Ne proach",	I/O's with F w York, 20' Elsevier, Ne	PLC an	d SC	ADA.	station -
Introduction Application TEXT BOO 1. Per REFERENCE 1. Stu	s of SCA DK: truzella F CES: uart G Mo	- SCAE DA- Dev Frank D.,	DA: Definition eloping SC/ "Programm Designing S	ADA for a giv nable Logic C SCADA appli	en case study -	- Using A Edition, I -A Pract	Analog, McGraw ical App	Discrete /-Hill, Ne proach",	I/O's with F w York, 20' Elsevier, Ne	PLC an	d SC	ADA.	station
Introduction Applications TEXT BOO 1. Per REFERENCE 1. Stu 2. Stu	s of SCA PK: truzella F CES: Jart G Mo Jart Boye	- SCAE DA- Dev Frank D., Crady, "	DA: Definition eloping SC/ "Programm Designing S	ADA for a giv nable Logic C SCADA appli	en case study -	- Using A Edition, I -A Pract	Analog, McGraw ical App	Discrete /-Hill, Ne proach",	I/O's with F w York, 20' Elsevier, Ne	PLC an	d SC.	ADA.	station -
Introduction Application TEXT BOO 1. Pe REFERENC 1. Stu 2. Stu COURSE C	s of SCA IK: truzella F CES: Jart G Mo Jart Boye	- SCAE DA- Dev Frank D., cCrady, " er A, "SC/	DA: Definition eloping SC "Programm Designing S ADA Super	ADA for a giv nable Logic C SCADA appli	ren case study - controllers", 5th l cation software I and data acqu	- Using A Edition, I -A Pract	Analog, McGraw ical App	Discrete /-Hill, Ne proach",	I/O's with F w York, 20' Elsevier, Ne	PLC an	nds, 2	ADA. 2013.	station
Introduction Application TEXT BOO 1. Per REFERENCE 1. Stu 2. Stu COURSE CONCESS On completion	s of SCA bK: truzella F CES: Jart G Mo Jart Boye Jart Boye DUTCOM	- SCAE DA- Dev Frank D., Crady, " r A, "SC/	DA: Definition eloping SC "Programm Designing S ADA Supern se, the stud	ADA for a giv nable Logic C SCADA applie visory Contro dents will be	ren case study - controllers", 5th l cation software I and data acqu	- Using A Edition, I -A Pract isition", 4	Analog, McGraw ical App	Discrete /-Hill, Ne proach",	I/O's with F w York, 20' Elsevier, Ne	PLC an	nds, 2 B1 (Hig	ADA. 2013.	station Total:4
Introduction Application TEXT BOO 1. Pe REFERENC 1. Stu 2. Stu COURSE C On comple CO1	s of SCA DK: truzella F CES: Jart G Mo Jart Boye DUTCON Stion of t er discret	- SCAE DA- Dev Frank D., Crady, " r A, "SC/ IES: he cours the and an	DA: Definitic eloping SC "Programm Designing S ADA Super Se, the stud alog field d	ADA for a giv nable Logic C SCADA appli visory Contro dents will be levices to be	ren case study - controllers", 5th l cation software I and data acqu a able to interfaced with F	- Using A Edition, I -A Pract isition", 4	Analog, McGraw ical App 4th Editi	Discrete /-Hill, Ne proach", ion, ISA,	I/O's with F w York, 20' Elsevier, Ne	PLC an I9. Itherlan	nds, 2 Bī (Hig	ADA. 2013. Map hest I	station Total:4 ped _evel) ing (K2)
Introduction Application TEXT BOO 1. Per REFERENCE 1. Stu 2. Stu COURSE COn complete CO1 infer	s of SCA DK: truzella F CES: Jart G Mo Jart Boye DUTCON Stion of t er discret	- SCAE DA- Dev Frank D., Crady, " r A, "SC/ IES: he cours the and an	DA: Definitic eloping SC "Programm Designing S ADA Super Se, the stud alog field d	ADA for a giv nable Logic C SCADA appli visory Contro dents will be levices to be	controllers", 5th cation software and data acqu	- Using A Edition, I -A Pract isition", 4	Analog, McGraw ical App 4th Editi	Discrete /-Hill, Ne proach", ion, ISA,	I/O's with F w York, 20' Elsevier, Ne	PLC an I9. Itherlan	nds, 2 Bī (Hig	ADA. 2013. Map hest I	station Total:4 ped _evel)
Introduction Applications TEXT BOO 1. Per REFERENC 1. Stu 2. Stu COURSE COn comple CO1 infe CO2 inte	s of SCA PK: truzella F CES: uart G Mo uart Boye Uart Boye DUTCON etion of t er discret	- SCAE DA- Dev Frank D., Crady, " r A, "SC/ IES: he cours re and an chitecture	DA: Definition eloping SC, "Programm Designing S ADA Superv se, the stud alog field d a, I/O modul	ADA for a giv nable Logic C SCADA appli visory Contro dents will be levices to be les and comr	controllers", 5th l controllers", 5th l cation software I and data acqu able to interfaced with F	- Using A Edition, I -A Pract isition", 4 PLC	Analog, McGraw ical App 4th Editi	Discrete /-Hill, Ne proach", ion, ISA,	I/O's with F w York, 20 ⁻ Elsevier, Ne France, 20	PLC an I9. Itherlan	nds, 2 B ^T (Hig Jnder	ADA. 2013. Map hest I standi	station Total:4 Ped Level) ing (K2)
Introduction Applications TEXT BOO 1. Per REFERENC 1. Stu 2. Stu COURSE COn comple CO1 infe CO2 inte	s of SCA PK: truzella F CES: uart G Mo uart Boye Uart Boye DUTCON etion of t er discret	- SCAE DA- Dev Frank D., Crady, " r A, "SC/ IES: he cours re and an chitecture	DA: Definition eloping SC, "Programm Designing S ADA Superv se, the stud alog field d a, I/O modul	ADA for a giv nable Logic C SCADA appli visory Contro dents will be levices to be les and comr	ren case study - controllers", 5th l cation software I and data acqu a able to interfaced with F	- Using A Edition, I -A Pract isition", 4 PLC	Analog, McGraw ical App 4th Editi	Discrete /-Hill, Ne proach", ion, ISA,	I/O's with F w York, 20 ⁻ Elsevier, Ne France, 20	PLC an I9. Itherlan	nds, 2 B ⁿ (Hig Jnder	ADA. 2013. Map hest I	station Total:4 Ped Level) ing (K2)
Introduction Applications TEXT BOO 1. Per REFERENCE 1. Stu 2. Stu COURSE CO On complete CO1 infe CO2 inte CO3 dev	s of SCA PK: truzella F CES: Jart G Mo Jart Boye Jart Jart Boye Jart Jart Jart Jart Jart Jart Jart Jart	- SCAE DA- Dev Frank D., Crady, " r A, "SC/ IES: he cours re and an chitecture PLC pro	DA: Definition eloping SC/ "Programm Designing S ADA Super se, the stud alog field d e, I/O modul ogramming t	ADA for a giv nable Logic C SCADA appli visory Contro dents will be levices to be les and comr	en case study - controllers", 5th l cation software al and data acqu able to interfaced with F nunication proto logic diagram fo	- Using A Edition, I -A Pract isition", 4 PLC	Analog, McGraw ical App 4th Editi	Discrete /-Hill, Ne proach", ion, ISA,	I/O's with F w York, 20 ⁻ Elsevier, Ne France, 20	PLC an I9. Itherlan	d SC nds, 2 B^T (Hig Jnder Jnder Ap	ADA. 2013. Map hest I standi	station Total:4 ped evel) ing (K2) ing (K2) (K3)
Introduction Application: TEXT BOO 1. Pe REFERENC 1. Stu 2. Stu 2. Stu COURSE C On comple CO1 inte CO2 inte CO2 dev CO3 dev CO4 imp	s of SCA PK: truzella F CES: Jart G Mo Jart Boye DUTCON et discret erpret arc velop the plement I	- SCAE DA- Dev Frank D., Crady, " er A, "SC/ IES: he cours the cours	DA: Definition eloping SC/ "Programm Designing S ADA Super- se, the stud alog field d e, I/O modul ogramming field d	ADA for a given a give	en case study - controllers", 5th l cation software al and data acqu able to interfaced with F nunication proto logic diagram fo	- Using A Edition, I -A Pract isition", 4 PLC pcols use	Analog, McGraw ical App 4th Editi	Discrete /-Hill, Ne proach", ion, ISA, C	I/O's with F w York, 20 Elsevier, Ne France, 20	PLC an I9. Itherlan	d SC nds, 2 (Hig Jnder Ap Ana	ADA. 2013. T Map hest I standi standi	station Total:4: ped evel) ing (K2) ing (K2) (K3) g (K4)
Introduction Application: TEXT BOO 1. Per REFERENCE 1. Stu 2. Stu COURSE CO On complete CO1 infer CO2 inter CO3 dev CO4 imp	s of SCA PK: truzella F CES: Jart G Mo Jart Boye DUTCON et discret erpret arc velop the plement I	- SCAE DA- Dev Frank D., Crady, " er A, "SC/ IES: he cours the cours	DA: Definition eloping SC/ "Programm Designing S ADA Super- se, the stud alog field d e, I/O modul ogramming field d	ADA for a given a give	en case study - controllers", 5th l cation software al and data acqu able to interfaced with F nunication proto logic diagram fo ations	- Using A Edition, I -A Pract isition", 4 PLC pcols use	Analog, McGraw ical App 4th Editi	Discrete /-Hill, Ne proach", ion, ISA, C	I/O's with F w York, 20 Elsevier, Ne France, 20	PLC an I9. Itherlan	d SC nds, 2 (Hig Jnder Ap Ana	ADA. 2013. Map hest I standi standi olying	station Total:4: ped evel) ing (K2) ing (K2) (K3) g (K4)
Introduction Application: TEXT BOO 1. Pe REFERENC 1. Stu 2. Stu 2. Stu COURSE C On comple CO1 inte CO2 inte CO2 dev CO3 dev CO4 imp	s of SCA PK: truzella F CES: Jart G Mo Jart Boye DUTCON et discret erpret arc velop the plement I	- SCAE DA- Dev Frank D., Crady, " er A, "SC/ IES: he cours the cours	DA: Definition eloping SC/ "Programm Designing S ADA Super- se, the stud alog field d e, I/O modul ogramming field d	ADA for a given a give	en case study - controllers", 5th l cation software al and data acqu able to interfaced with F nunication proto logic diagram fo ations	- Using A Edition, I -A Pract isition", 4 PLC pcols use pr simple elop indu	Analog, McGraw ical App 4th Editi ed in PL4 industri	Discrete /-Hill, Ne proach", ion, ISA, c c ial case : pontrol fur	I/O's with F w York, 20 Elsevier, Ne France, 20	PLC an I9. Itherlan	d SC nds, 2 (Hig Jnder Ap Ana	ADA. 2013. Map hest I standi standi olying	station - Total:4 ped evel) ing (K2) ing (K2) (K3) g (K4)
Introduction Application: TEXT BOO 1. Per REFERENCE 1. Stu 2. Stu COURSE CO On complete CO1 infer CO2 inter CO3 dev CO4 imp	s of SCA PK: truzella F CES: Jart G Mo Jart Boye DUTCON et discret erpret arc velop the plement I	- SCAE DA- Dev Frank D., Crady, " er A, "SC/ IES: he cours the cours	DA: Definition eloping SC/ "Programm Designing S ADA Super- se, the study alog field data alog field data pgramming to HMI for ind ng concepts	ADA for a given a give	en case study - controllers", 5th l cation software I and data acqu a able to interfaced with F nunication proto logic diagram fo ations SCADA to deve	- Using A Edition, I -A Pract isition", 4 PLC pcols use pr simple elop indu	Analog, McGraw ical App 4th Editi ed in PL4 industri	Discrete /-Hill, Ne proach", ion, ISA, c c ial case : pontrol fur	I/O's with F w York, 20 Elsevier, Ne France, 20	PLC an I9. Itherlan	d SC nds, 2 (Hig Jnder Ap Ana Ana	ADA. 2013. Map hest I standi standi olying	station - Total:4 ped evel) ing (K2) ing (K2) (K3) g (K4)



CO2	3	3	3	3	3				2	2	2
CO3	3	3	2	3	3				2	3	3
CO4	3	3	2	3	3				2	3	3
CO5	3	3	2	3	3				2	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, B1	Γ- Bloom's Taxor	iomy	I	L			I
					ASSESSMEN	T PATTERN	THEORY				
Test / Bl Categ		Rer	nemberiı (K1) %	ng	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
CAT	1		5		95						100
CAT	2				10	90					100
CA	-3				50	50					100
•			5		35	60					100



Preamb Unit - I History Precisio Magnet Unit - II Descrip Transfc Unit - II Forward	uisites ole of robotics on of moven tic gripper - S I otions: Positi prmation mate	This co positior Funda - Compo nents - E Special ty Frame on, Orie rices – R	n, motion a mentals o inents of i ind Effecto pes of grip Transforn ntation an	tended ind dyn f Seria ndustria ors: Ty pers	to prov amics o I Manir al robo pes of	vide a d of serial pulator: t – Join end effe	etailed manipul	underst ator.	anding	6 of serial	PC manipulato	3	0	0	3
Unit - I History Precisio Magnet Unit - II Descrip Transfc Unit - II Forward equatio	of robotics on of moven tic gripper - S I otions: Positi ormation mate	positior Fundar - Compo- nents - E Special ty Frame on, Orie rices – R	n, motion a mentals o inents of i ind Effecto pes of grip Transforn ntation an	nd dyn f Seria ndustria prs: Ty pers	amics (I Manir al robo pes of	of serial oulator: t – Join end effe	manipul t notatio	ator.	anding	of serial	manipulato	r and			
History Precisio Magnet Unit - II Descrip Transfc Unit - II Forward equatio	of robotics on of moven tic gripper - S I otions: Positi prmation mate	- Components - E Special ty Frame on, Orie	nents of i nd Effecto pes of grip Transforn ntation an	ndustri ors: Ty pers	al robo pes of	t – Join end effe					•	n anu	math	ematio	cs behind
Precisio Magnet Unit - II Descrip Transfc Unit - II Forward equatio	on of moven tic gripper - S I bitions: Positi prmation mati	nents - E Special ty Frame on, Orie rices – R	nd Effecto pes of grip Transforn ntation an	ors: Ty pers	pes of	end effe									9
Unit - II Descrip Transfo Unit - II Forward equatio	Ditions: Positi prmation mate	Frame on, Orie rices – R	Transform	-		mming r		Mecha	nical Gr	ipper: G					
Transfc Unit - I Forward equatio	ormation mat	rices – R													9
Forware equatio		Robot	opresental				-					-	-		ogeneous
equatio			Kinematic	s:											9
Unit - ľ	d and inverse ons: Two and				•						erg represer and three I			ward	kinematic
•••••	V	Differe	ntial Motio	ons an	d Velo	cities:									9
	ction - Linea cation of sing		gular veloc	ities of	a rigid	body - '	Velocity	propag	ation –	Derivatio	on of Jacob	ian for	seria	l man	ipulator -
Unit - V	1	Traject	ory Plann	ing an	d Robo	ot Dynar	nics:								9
-	pace trajecto quation of mo	-		-	-	-	-		-	mics: Ac	celeration o	of a rig	id bo	dy - Ir	ertia of a
															Total:45
ТЕХТ Е	BOOK:														
1.	Saeed B. N (Units -I, II &		oduction T	o Robo	otics: A	nalysis, (Control,	Applica	ations", 1	2nd Edit	on, Wiley I	ndia P	∕t. Lto	l., No	da, 2011
2.	Craig John -IV & V)	J., "Intro	duction to	Roboti	cs: Meo	hanics a	and Cor	ntrol", 3r	d Editio	n, Pears	on Educatio	on, Nev	w Del	hi, 20	17. (Units
REFER	ENCES:														
1.	Groover M. 2017.	P., "Indu	istrial Rob	otics, 7	Fechno	logy, Pro	ogramm	ing and	I Applic	ations",	2nd Editior	, McG	raw-H	Hill, N	ew Delhi
2.	Saha S.K.,	"Introduc	tion to Rol	ootics",	2nd Eo	dition, M	cGraw-I	Hill High	er Educ	ation, N	ew Delhi, 20	014.			
	SE OUTCON		se, the stu	Idents	will be	able to								Г Мар hest	ped Level)
CO1	interpret the	e features	s of a seria	l manip	oulator	with end	effecto	r					-	plying	
CO2	compute po												Ар	plying	(K3)
CO3	develop the													plying	
CO4	analyse the					of serial	manipu	lator						plying	
CO5	formulate tr	ajectory	and robot o	dynami	CS								Ар	plying	(K3)
					Маррі	ng of CO	Os with	POs ar	d PSO	5					
	Os PO1	PO2	PO3	PO4	PO5	PO6				-					



CO2	3	3	2	2	1				2	3	2
CO3	3	3	2	2	1				2	3	2
CO4	3	3	2	2	1				2	3	2
CO5	3	3	2	2	1				2	3	2
1 – Slight, 2	- Mode	rate, 3 -	Substant	ial, BT	- Bloom's Taxo	nomy					
					ASSESSMEN	IT PATTERN	- THEORY				
Test / Blo Catego		Rei	nemberir (K1) %	ng	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
CAT	1		20		50	30					100
CAT	2		20		40	40					100
CAT	3		20		40	40					100
ESE	E		20		40	40					100
		d (CAT 1	23-50	marks	& ESE – 100 m	arks)					

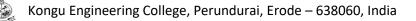
			ZZIVI	[L61-P	NUGRA											
Progr Branc	ramme a ch	&	B.E. 8	Mech	atronic	s Engi	neering	J			Sem.	Category	y L	т	Р	Credi
Prere	quisites	S	Micro Labor		ller Pro	gramm	ing and	d Appli	cations	5	6	PC	0	0	2	1
Pream	nble		This la	borato	ry cours of SCA	e provid DA for i	des pra ndustria	ctical re al auton	alizatio nation.	n of PL(C prograi	mming, I/O	interfa	acing	and	1
LIST (OF EXP	PERIN	IENTS /	EXER	CISES:											
1.	Introd	ductio	n to PL	C progr	amming) /simula	ation/co	mmunia	cation s	oftware						
2.	Logic	al tes	ting of I	/Os and	d its inte	erfacing	with PL	C								
3.	Level	l cont	rol using	g PLC v	vith AU⁻	FO/Man	ual mo	de								
4.	Linea	ar and	sequer	tial act	uation c	of Pneur	natic cy	/linder v	vith Tim	er and o	counter f	unctions				
5.	Deve	lopme	ent of H	MI for r	eal time	param	eter mo	nitoring	and co	ontrol wi	th Auto/N	lanual mod	le			
6.	Spee	d con	trol of n	notor us	sing soft	PLC										
7.	Temp	peratu	ire conti	ol using	g PLC a	nd HMI	along	with dat	a loggir	ng and t	rending					
8.	Press	sure N	/leasure	ment a	nd Flow	Contro	l using	PLC ar	d HMI v	with ala	rm and tr	rend				
9.	Introd	ductio	n to Ser	vo cont	trol usin	g PLC										
10.	Servo	o cont	rol appl	ication:	jogging	and pr	ofiling									
																Total:3
REFE	RENCE	S/ M	ANUAL	/SOFT	WARE:											
1.	Petru	ızella	Frank D)., "Proo	gramma	ble Log	ic Cont	rollers",	5th Ed	ition, M	cGraw-H	ill, New Yor	⁻ k, 201	9.		
2.	Labo	ratory	manua	I.												
	RSE OU														Т Мар	
	ompletion build		the cou simulate						na						ghest l plying	
CO1				0			•	gramm	iig					Pre	ecision	(S3)
CO2	devel	lop ha	ard wirin	g with I	PLC and	d field I/	Os								plying ecision	
CO3	devel	lop pla	ant leve	l autom	ation fo	r real pi	rocess	plant co	ntrol us	ing PLC	C and SC	ADA			alyzing ecision	
						Маррі	ing of (Cos wit	h POs a	and PS	Os					
COs/F	POs F	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	2 F	PSO1	PSO2
CO)1	2	3	1	2	3				2	1		2		3	3
CO		2	3	2	1	3				2	1		2		2	2
CO	3	3	3	1	2	3				2	1		2		3	3

Branc	ramme & ch	B.E. 8	Mecha	atronic	s Engir	neering				Sem.	Category	/ L	т	Ρ	Credit
	quisites	Micro Labor		ler Prog	grammi	ing and	Applicat	tions		6	PC	0	0	2	1
Pream		The la robot	boratory and mot	oile robo			application		tended	to provid	de a practio	al real	izatio	on of i	ndustria
1.	OF EXPER Study th effectors				1410 a	and Far	nuc ER 4	liA indu	ustrial	robots:	component	s, driv	e sy	stem	and end
2.	Creation	of Tool C	entre Po	oint (TC	P) and	Work C	bject usir	ng ABB	B IRB 1	410 indu	strial robo				
3.	Robot pr	ogrammii	ng exerc	ises: Po	pint-to-p	oint and	d Continu	ious pa	ath pro	grammin	g using AB	B Rob	ot St	udio	
4.	Pick and	place op	eration i	n teach	mode u	using AB	3B IRB 14	410 ind	dustrial	robot					
5.	Creation	of Tool C	entre Po	oint (TC	P) and	Work C	bject usir	ng Fani	uc ER	4iA indu	strial robot				
6.							-	-			g using Fa		R 4iA		
7.		-	-				anuc ER 4			-	0 0				
8.		nd Veloci				•									
9.		nning and	-												
9.	•	•				•		2000550	orios: I	l inear P	ail Kit, 3D p	orinter	Kit (` onve	wor Bol
10.		le sketch			gician			1000330	01165.1			Junei	rai, c		yor ber
11.	Vision ba	ased insp	ection ar	nd sortii	ng of co	mponei	nts using	Dobot	Magic	ian					
11. 12.					-						Robot: NA	D6			
					-						Robot: NAG	D ₆			Total:3
12.		e basic st	ructures	, functio	-						Robot: NAG	De			Total:3
12. REFE	Study the	e basic st	ructures	, functio	-						Robot: NA	D _e			Total:3
12. REFE 1.	Study th	e basic st	ructures /SOFT\	, functic	ons and	control					Robot: NA(De			Total:3
12. REFE 1. 2.	Study th RENCES/ Laborato ABB Rol	e basic st MANUAL ry Manua	ructures /SOFT\ II. and Ro	, functic WARE:	ons and	control					Robot: NAG	D ₆			Total:3
12.	Study the RENCES/ Laborato ABB Rol Fire Bird	e basic st MANUAL ry Manua pot Studic	ructures /SOFT\ I. and Ro vare and	wARE: bo Guic Hardw	ons and de Softv are ma	control vare. nual.					Robot: NAG	D ₆			Total:3
12. REFE 1. 2. 3. 4.	Study the RENCES/ Laborato ABB Rol Fire Bird Dobot –	e basic st MANUAL ry Manua oot Studic – V Softv	ructures /SOFT\ II. and Ro vare and and Har	wARE: bo Guic d Hardw	ons and de Softv are mai manual.	control vare. nual.	of sixth g				Robot: NA	D ₆		· · · · · · · · · · · · · · · · · · ·	Total:3
12. REFE 1. 2. 3. 4. 5.	Study the RENCES/ Laborato ABB Rol Fire Bird Dobot –	e basic st MANUAL ry Manua oot Studic – V Softw Software aphe – So	ructures /SOFT\ II. and Ro vare and and Har	wARE: bo Guic d Hardw	ons and de Softv are mai manual.	control vare. nual.	of sixth g				Robot: NA			. Мар	ped
12. REFE 1. 2. 3. 4. 5. COUF	Study the RENCES/ Laborato ABB Rol Fire Bird Dobot – Choregra RSE OUTC Completion	e basic st MANUAL ry Manua oot Studic – V Software aphe – So OMES: of the co	ructures /SOFT\ II. and Ro vare and and Har oftware a	wARE: bo Guid d Hardw dware r and NAC	de Softv are mai nanual. D Robot	control vare. nual. t manua	of sixth g	generati	tion Hu	imanoid			(Higl	[°] Map	ped _evel)
12. REFE 1. 2. 3. 4. 5. COUF On co	Study the RENCES/ Laborato ABB Rol Fire Bird Dobot – Choregra RSE OUTC ompletion of analyze	e basic st MANUAL ry Manua oot Studic – V Software aphe – So OMES: of the cout	ructures /SOFT\ il. and Ro vare and and Har oftware a ftware a urse, the trial robo	wARE: bo Guid d Hardw dware r and NAC	de Softv are mai nanual. D Robot	control vare. nual. t manua	of sixth g	generati	tion Hu	imanoid	Robot: NA	η η	(Higl App	• Map hest I	ped _evel) (K3),
12. REFE 1. 2. 3. 4. 5. COUF On co	Study the Study the Laborato ABB Rol Fire Bird Dobot – Choregra Choregra Choregra Choregra Choregra Choregra Choregra	e basic st MANUAL ry Manua oot Studic – V Software aphe – So OMES: of the con the indus line mod	ructures /SOFT\ il. and Ro vare and and Har oftware a urse, the trial robo	, function WARE: bo Guid d Hardw d Hardw rdware r and NAC e stude ots worl	de Softv are mainanual. D Robot nts will k cell p	vare. nual. t manua l be abl	of sixth g	generati	tion Hu	imanoid		η η	(Hig l Арр Лапір	Map hest l	ped _ evel) (K3), on (S2)
12. REFE 1. 2. 3. 4. 5. COUF On co CO1	Study the Study the Laborato ABB Rol Fire Bird Dobot – Choregra Choregra Choregra Choregra Choregra Choregra Choregra	e basic st MANUAL ry Manua oot Studic – V Software aphe – So OMES: of the con the indus line mod	ructures /SOFT\ il. and Ro vare and and Har oftware a urse, the trial robo	, function WARE: bo Guid d Hardw d Hardw rdware r and NAC e stude ots worl	de Softv are mainanual. D Robot nts will k cell p	vare. nual. t manua l be abl	of sixth g	generati	tion Hu	imanoid		ר ר ר ר	(Hig l App <i>N</i> anip App	[•] Map hest I lying bulatic	ped _ evel) (K3), on (S2)
12. REFE 1. 2. 3. 4. 5. COUF On co CO1 CO2	Study the Study the ERENCES/ Laborato ABB Rol Fire Bird Dobot – Choregra RSE OUTC Ompletion of analyze ON/OFF develop	e basic st MANUAL ry Manua oot Studic – V Software aphe – So OMES: of the co the indus line mod an embed	ructures /SOFT\ il. and Ro vare and and Har oftware a oftware a urse, the trial robo	wARE: bo Guid d Hardw d Hardw dware r and NAC e stude ots worl	de Software mainanual. D Robot	control vare. nual. t manua t manua t be abl roblems	of sixth g	generati velop rc	tion Hu	rogramm		n N	(Higl App Manip App Manip App	Map hest I lying bulatic lying bulatic lying	ped _evel) (K3), on (S2) (K3), on (S2) (K3),
12. REFE 1. 2. 3. 4. 5. COUF On co CO1 CO2	Study the Study the ERENCES/ Laborato ABB Rol Fire Bird Dobot – Choregra RSE OUTC Ompletion of analyze ON/OFF develop	e basic st MANUAL ry Manua oot Studic – V Software aphe – So OMES: of the co the indus line mod an embed	ructures /SOFT\ il. and Ro vare and and Har oftware a oftware a urse, the trial robo	wARE: bo Guid d Hardw d Hardw dware r and NAC e stude ots worl	de Softv are mainanual. D Robot nts will k cell p ing for a	control vare. nual. t manua t manua t be abl roblems autonom	of sixth g al. le to s and dev nous mob g machine	generati velop rc vile robo e visior	obot protot	rogramm		n N	(Higl App Manip App Manip App	Map hest I lying bulatic lying bulatic lying	ped _evel) (K3), on (S2) (K3), on (S2)
12. REFE 1. 2. 3. 4. 5. COUF On co CO1 CO2 CO3	Study the RENCES/ Laborato ABB Rol Fire Bird Dobot – Choregra RSE OUTC ompletion of analyze ON/OFF develop	e basic st MANUAL ry Manua oot Studic – V Software aphe – So OMES: of the con the indus line mod an embed	ructures /SOFT\ il. and Ro vare and and Har oftware a oftware a urse, the trial robo	wARE: bo Guid d Hardw d Hardw dware r and NAC e stude ots worl	de Softv are mainanual. D Robot nts will k cell p ing for a	control vare. nual. t manua t manua i be abl roblems autonom ms using ng of C	of sixth g al. al. s and dev nous mob g machine cos with F	velop rc vile robo e visior POs an	obot protot	rogramm	ing throug	n N	(Higl App Janir App Janir App Janir	Map hest I lying bulatic lying bulatic lying bulatic	ped _evel) (K3), on (S2) (K3), on (S2) (K3), on (S2)
12. REFE 1. 2. 3. 4. 5. COUF	Study the ERENCES/ Laborato ABB Rol Fire Bird Dobot – Choregra Chore	e basic st MANUAL ry Manua oot Studic – V Software aphe – So OMES: of the con the indus line mod an embed	ructures /SOFT\ il. and Ro vare and and Har oftware a oftware a trial robo e dded pro	, function WARE: bo Guio d Hardw dware r and NAC e stude ots work ogramm d sorting	de Software mainanual. D Robota nts will k cell p ing for a g syster Mappi	control vare. nual. t manua t manua t be abl roblems autonom	of sixth g al. al. s and dev nous mob g machine cos with F	velop rc vile robo e visior POs an	obot proton	rogramm		n	(Higl App Janir App Janir App Janir	Map hest I lying bulatic lying bulatic lying	ped _evel) (K3), on (S2) (K3), on (S2) (K3),
12. REFE 1. 2. 3. 4. 5. COUF On co CO1 CO2 CO3 COs/F	Study the RENCES/ Laborato ABB Rol Fire Bird Dobot – Choregra RSE OUTC ompletion of analyze ON/OFF develop develop POs PO1 3	e basic st MANUAL ry Manua bot Studic – V Software aphe – So DMES: DMES: bf the cont the indus line mod an embed the inspe PO2	ructures /SOFT\ il. and Ro vare and and Har oftware a driver a urse, the trial robo e dded pro ction and PO3	, function WARE: bo Guio d Hardw rdware r and NAC e stude ots worl ogramm d sorting PO4	de Softv are ma nanual. D Robot nts will k cell p ing for a g syster Mappi PO5	control vare. nual. t manua t manua i be abl roblems autonom ms using ng of C	of sixth g al. al. s and dev nous mob g machine cos with F	velop rc vile robo e visior POs an	obot pl ot n techr nd PSC PO9	rogramm hiques Ds PO10	ing throug) PO12	(Higl App Janir App Janir App Janir	Map hest I lying oulatic lying oulatic lying oulatic	ped _evel) (K3), on (S2) (K3), on (S2) (K3), on (S2) PSO2



					22	MTP61	- PRO	JECT V	/ORK I	(2022 E	Batch)					
Progra Branc		e &	B.E. 8	& Mech	atronic	s Engi	neering]			Sem.	Category	/ L	т	Ρ	Credit
Prerec	quisi	tes	NIL								6	EC	0	0	8	4
															Т	otal: 120
		OUTCO													Мар	
On co	-					ents wil										_evel)
CO1	ide	ntify an	d formu	late the	probler	n and c	oncepti	ualize th	e meth	odology	of the p	roject		App	ying	(K3)
CO2	des	sign the	compo	nents a	nd syste	ems usi	ng Mec	hatronio	; princip	les				Anal	zing	(K4)
CO3	fab	ricate a	Mecha	tronics	system	utilizing	experi	mental	skills					Crea	ating	(K6)
CO4	pla	n and e	xecute	the proj	ect as a	team								Evalu	ating	g (K5)
CO5	Co	mpile th	ne findin	igs and	concluc	le with o	oral/writ	ten rep	orts					App	ying	(K3)
						Маррі	ing of (Cos wit	h POs a	and PS	Os					
COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PS	601	PSO2
CO	1	3	3	3	2	2	2	2	2	3	3	3	2	:	3	3
CO2	2	3	3	3	3	3	2	2	2	3	3	3	2	;	3	3
COS	3	3	3	3	3	3	2	2	2	3	3	3	2	:	3	3
CO4	4	2	2	2	2	2	3	2	3	3	3	2	3	;	3	3
CO	5	3	3	3	3	2	3	2	3	3	3	2	3	;	3	3
1 – Sli	ght, 2	2 – Mod	erate, 3	– Subs	tantial.	BT- Blo	om's Ta	axonom	V	1	I	I I				<u>L</u>

					22	MTP62	- PRO	JECT V	ORK I	(2023 E	Batch)					
Progra Branc		e &	B.E. 8	& Mech	atronic	s Engii	neering	J			Sem.	Category	/ L	т	Ρ	Credit
Prerec	quisit	tes	NIL								6	EC	0	0	4	5
															То	otal: 120
••••		UTCO													Map	
				urse, th							6.0					_evel)
CO1	ide	ntify an	a formu	late the	probler	n and c	oncepti	ualize tr	ie meth	odology	of the p	roject		Арр	lying	(K3)
CO2	des	sign the	compo	nents a	nd syste	ems usii	ng Mec	hatronio	c princip	les				Ana	lyzing	(K4)
CO3	fab	ricate a	Mecha	tronics	system	utilizing	experi	mental	skills					Cre	ating	(K6)
CO4	pla	n and e	xecute	the proj	ect as a	team								Eval	uating	g (K5)
CO5	Co	mpile th	ne findin	gs and	concluc	le with c	oral/writ	ten rep	orts					Арр	lying	(K3)
						Маррі	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	P	SO1	PSO2
CO1	1	3	3	3	2	2	2	2	2	3	3	3	2		3	3
CO2	2	3	3	3	3	3	2	2	2	3	3	3	2		3	3
COS	3	3	3	3	3	3	2	2	2	3	3	3	2		3	3
CO4	4	2	2	2	2	2	3	2	3	3	3	2	3		3	3
CO5	5	3	3	3	3	2	3	2	3	3	3	2	3		3	3
1 – Slig	ght, 2	2 – Mod	erate, 3	– Subs	stantial,	BT- Blo	om's Ta	axonom	V	1	1	LI		1		1



	(Common to All Engineering and Tec	hnology Branche	s)				
Programme & Branch	All BE/BTech Branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	6	HS	2	0	0	2
Preamble	To make the student to know what they 'really w meaning of happiness and prosperity for a human b harmony at all the levels of human living, and live acc	peing. Also to fac	•				
Unit – I	Introduction:						6
Exploration – Co Aspirations – Co	Guidelines of Value Education – Content and Process of ontent and Process of Self exploration – Natural Accept ntinuous Happiness and Prosperity – Exploring Happines ns – Relationships – Physical Facilities – Right Understa Harmony in the Self and Body:	ance – Realizations and Prosperity	on and Under	stan	ding	– Bas	sic Humar
		(112) and Dasha N		- 16			-
the Self and Bod	d Body – Understanding Myself as Co–existence of Self y, Self ('I') as the Conscious Entity, the Body as the Mater Inderstanding Myself – Harmony with Body.						
Unit – III	Harmony in the Family and Society:						6
Harmony in the F	amily – Justice – Feelings (Values) in Human Relationsh	ips – Relationship	o from Family	to S	ociety	/ – Id	-
Harmony in the F	amily – Justice – Feelings (Values) in Human Relationsh Five dimensions of Human Endeavour.	ips – Relationship	o from Family	to S	ociety	/ – Ide	-
Harmony in the F of Human Goal – Unit – IV Order of Nature Conformance –	 Family – Justice – Feelings (Values) in Human Relationsh Five dimensions of Human Endeavour. Harmony in Nature and Existence: Interconnectedness – Understanding the Four order - Introduction to Space – Co–existence of units of Space 	- Innateness – N	atural Charac	teris	tic –	Basic	entification 6 Activity -
Harmony in the F of Human Goal – Unit – IV Order of Nature	 Family – Justice – Feelings (Values) in Human Relationsh Five dimensions of Human Endeavour. Harmony in Nature and Existence: Interconnectedness – Understanding the Four order - Introduction to Space – Co–existence of units of Space 	- Innateness – N ce – Limited and	atural Charac unlimited –	teris Activ	tic – re an	Basic	entification 6 Activity -
Harmony in the F of Human Goal – Unit – IV Order of Nature Conformance – Existence is Co– Unit – V Values in differer	 Five dimensions of Human Endeavour. Harmony in Nature and Existence: Interconnectedness – Understanding the Four order - Introduction to Space – Co–existence of units of Space existence. Implications of the above Holistic Understanding the dimensions of Human Living – Definitiveness of Ethica Comprehensive Human Goal – Humanistic Education – 	 Innateness – N Limited and of Harmony on I Human Conduct 	atural Charac unlimited – Professional t –Implications	teris Activ Ethi	tic – ′e an cs: √alue	Basic d No	entification 6 Activity - activity - 6 ed Living -
Harmony in the F of Human Goal – Unit – IV Order of Nature Conformance – Existence is Co– Unit – V Values in differer Identification of 0	 Five dimensions of Human Endeavour. Harmony in Nature and Existence: Interconnectedness – Understanding the Four order - Introduction to Space – Co–existence of units of Space existence. Implications of the above Holistic Understanding the dimensions of Human Living – Definitiveness of Ethica Comprehensive Human Goal – Humanistic Education – 	 Innateness – N Limited and of Harmony on I Human Conduct 	atural Charac unlimited – Professional t –Implications	teris Activ Ethi	tic – ′e an cs: √alue	Basic d No	entification 6 Activity - activity - 6 ed Living -
Harmony in the F of Human Goal – Unit – IV Order of Nature Conformance – Existence is Co– Unit – V Values in differer Identification of O Professional Ethi	 Five dimensions of Human Endeavour. Harmony in Nature and Existence: Interconnectedness – Understanding the Four order - Introduction to Space – Co–existence of units of Space existence. Implications of the above Holistic Understanding the dimensions of Human Living – Definitiveness of Ethica Comprehensive Human Goal – Humanistic Education – 	 Innateness – N Limited and of Harmony on I Human Conduct 	atural Charac unlimited – Professional t –Implications	teris Activ Ethi	tic – ′e an cs: √alue	Basic d No	6 Activity - -activity - 6 d Living -
Harmony in the F of Human Goal – Unit – IV Order of Nature Conformance – Existence is Co– Unit – V Values in differer Identification of O Professional Ethi TEXT BOOK:	 Five dimensions of Human Endeavour. Harmony in Nature and Existence: Interconnectedness – Understanding the Four order - Introduction to Space – Co–existence of units of Space existence. Implications of the above Holistic Understanding the dimensions of Human Living – Definitiveness of Ethica Comprehensive Human Goal – Humanistic Education – 	- Innateness – N ce – Limited and of Harmony on I Il Human Conduc Universal Huma	atural Charac unlimited – Professional t –Implications n Order – Co	terist Activ Ethios of Normale	tic – re an cs: √alue etence	Basic d No e base e and	Activity - -activity - 6 ed Living - I Issues ir Total:30
Harmony in the F of Human Goal – Unit – IV Order of Nature Conformance – Existence is Co– Unit – V Values in differer Identification of (Professional Ethi TEXT BOOK: 1. Gaur R.F Books P	 Five dimensions of Human Endeavour. Harmony in Nature and Existence: Interconnectedness – Understanding the Four order - Introduction to Space – Co–existence of units of Space existence. Implications of the above Holistic Understanding ant dimensions of Human Living – Definitiveness of Ethica Comprehensive Human Goal – Humanistic Education – cs. R., Sangal R., Bagaria G.P., "A Foundation Course in Human Course	- Innateness – N ce – Limited and of Harmony on I Il Human Conduc Universal Huma	atural Charac unlimited – Professional t –Implications n Order – Co	terist Activ Ethios of Normale	tic – re an cs: √alue etence	Basic d No e base e and	Activity - -activity - -activity - 6 d Living - I Issues in Total:30
Harmony in the F of Human Goal – Unit – IV Order of Nature Conformance – Existence is Co– Unit – V Values in differer Identification of C Professional Ethi TEXT BOOK: 1. Gaur R.F Books P	 Five dimensions of Human Endeavour. Harmony in Nature and Existence: Interconnectedness – Understanding the Four order - Introduction to Space – Co–existence of units of Space existence. Implications of the above Holistic Understanding ant dimensions of Human Living – Definitiveness of Ethica Comprehensive Human Goal – Humanistic Education – cs. R., Sangal R., Bagaria G.P., "A Foundation Course in Human Course	- Innateness – N ce – Limited and of Harmony on I Il Human Conduc Universal Huma	atural Charac unlimited – Professional t –Implications n Order – Co	terist Activ Ethios of Normale	tic – re an cs: √alue etence	Basic d No e base e and	Activity - -activity - 6 ed Living - I Issues ir Total:30



		UTCOM		se, the st	udent	s will be a	able to							BT Mapp Highest L	
CO1			meaning the soci	, ,,	iess a	nd prospe	rity and	do a co	rrect a	ppraisal	of the cu	urrent		Applying	(K3)
CO2		-		the Self a		e Body, un	derstan	d the m	eaning	of Harm	nony in t	he Self, the	•	Applying	(K3)
CO3						•					•	acceptable		Applying	(K3)
CO4	tran natu		nemselv	es to co-e	kist wi	th nature b	oy realisi	ing inter	conne	ctedness	s and for	ur order of		Applying	(K3)
CO5		nguish l er living		ethical ar	nd une	ethical prac	ctices, a	nd exter	nd ethi	cal and r	moral pr	actices for a	a	Applying	(K3)
						Mappin	g of CO	s with	POs a	nd PSOs	5				
COs/I	POs	P01	PO2	PO3	PO	4 PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	1	1										
CO	2	3	2	1	1										
CO	3	3	2	1	1										
CO	4	3	2	1	1										
CO	5	3	2	1	1										
1 – Sli	ght, 2	– Mode	rate, 3 -	- Substant	ial, BT	- Bloom's	Taxono	my							
						ASSES	SMENT	ΡΔΤΤΕ	RN - 1	THEORY	,				
	st / Blo Catego	oom's ory*	R	ememberi (K1) %	ng	Understa (K2)	anding	Apply (K3)	ying	Analyzi (K4) 9	ing	Evaluating (K5) %		Creating (K6) %	Tota %
	CAT	1		25		75									100
	CAT	2		25		75									100
	ESE	=		NA											100
* ±3%	may b	oe varie	d (CAT	1 & 2 – 50	marks	s & ESE –	100 ma	rks)							·



	(Common to All BE/BTe	ech branches)					
Programme & Branch	All BE/BTech branches	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Nil	7	HS	3	0	0	3
Preamble	The aim of the course is to create fundamental know economics, national income, marketing, operations					epts lil	ke
Unit – I	Micro Economics						9
	sics Concepts and Principles – Demand and Supply – rcular Flow of Economic Activities and Income.	Law of demand and	Supply – Dete	rmin	ants	– Mai	ket
Unit – II	Macro Economics, Business Ownership and Ma	nagement concepts					9
Business – Own Skills - Levels of	and its Measurement Techniques. Inflation - Causes of ership Types. Management concepts: Taylor and Fayor Management - Roles of Manager.						
Unit – III	Marketing Management						9
	e Concepts of Marketing - Four P's of Marketing - New cle - Pricing Strategies and Decisions.	Product Developmen	t – Intellectua	l Pro	perty	Righ	ts (IPR),
Unit – IV	Operations Management						9
Operations Man	agement - Resources - Types of Production System - S	Site Selection, Plant L	ayout, Steps	in Pr	oduc	tion F	Planning
Operations Man	agement - Resources - Types of Production System - S	Site Selection, Plant L	ayout, Steps	in Pr	oduc	tion F	Planning 9
Operations Man and Control - Inv Unit – V Accounting Princ	agement - Resources - Types of Production System - S ventory - EOQ Determination.	ion - Straight Line and	d Diminishing				9
Operations Man and Control - Inv Unit – V Accounting Princ	agement - Resources - Types of Production System - S ventory - EOQ Determination. Financial Management ciples – Financial Statements and its Uses – Depreciat	ion - Straight Line and	d Diminishing				9
Operations Man and Control - Inv Unit – V Accounting Princ	agement - Resources - Types of Production System - S ventory - EOQ Determination. Financial Management ciples – Financial Statements and its Uses – Depreciat	ion - Straight Line and	d Diminishing				9 od – Break
Operations Man and Control - Inv Unit – V Accounting Princ Even Analysis – TEXT BOOK:	agement - Resources - Types of Production System - S ventory - EOQ Determination. Financial Management ciples – Financial Statements and its Uses – Depreciat	ion - Straight Line an ounted Cash Flow Mo	d Diminishing ethods.	Bala	ince	Metho	9 od – Breal Total:4
Operations Man and Control - Inv Unit – V Accounting Princ Even Analysis – TEXT BOOK: 1. Compile Enginee	agement - Resources - Types of Production System - S ventory - EOQ Determination. Financial Management ciples – Financial Statements and its Uses – Depreciat Capital Budgeting - Significance –Traditional and Disc ed by Department of Management Studies, Kongu Englers", 1 st Edition, McGraw Hill Education, Noida, 2013.	ion - Straight Line an ounted Cash Flow Mo	d Diminishing ethods.	Bala	ince	Metho	9 od – Breal Total:4
Operations Man and Control - Inv Unit – V Accounting Princ Even Analysis – TEXT BOOK: 1. Compile Enginee REFERENCES:	agement - Resources - Types of Production System - S ventory - EOQ Determination. Financial Management ciples – Financial Statements and its Uses – Depreciat Capital Budgeting - Significance –Traditional and Disc ed by Department of Management Studies, Kongu Englers", 1 st Edition, McGraw Hill Education, Noida, 2013.	ion - Straight Line and ounted Cash Flow Me ineering College, "Ec	d Diminishing ethods. onomics and N	Bala Vlana	agem	Metho ent fo	9 od – Breal Total:4
Operations Man and Control - Inv Unit – V Accounting Princ Even Analysis – TEXT BOOK: 1. Compile Enginee REFERENCES: 1. Geetika	agement - Resources - Types of Production System - S /entory - EOQ Determination. Financial Management ciples – Financial Statements and its Uses – Depreciat Capital Budgeting - Significance –Traditional and Disc ed by Department of Management Studies, Kongu Englers", 1 st Edition, McGraw Hill Education, Noida, 2013.	ion - Straight Line and counted Cash Flow Me ineering College, "Eco Economics", 3 rd Edit	d Diminishing ethods. pnomics and M	Bala Vlana	agem	Metho ent fo	9 od – Breał Total:4



		UTCON on of th		e, the stuc	lents w	vill be able	to						(BT Map Highest	
CO1	iden	tify ma	rket equ	ilibrium ar	nd inter	pret natio	nal incoi	ne calc	ulations	s and inf	lation iss	sues		Applying	(K3)
CO2	cho	ose a s	uitable b	ousiness o	wnersl	hip for the	ir enterp	rise and	d illustra	ate mana	agerial fu	unctions		Applying	(K3)
CO3	infei	r marke	ting ma	nagement	decisi	ons							Ur	nderstand	ing (K2)
CO4	appl	ly appro	opriate c	peration r	nanage	ement cor	ncept in l	ousines	s situat	ions				Applying	(K3)
CO5	inter	rpret fin	ancial a	nd accour	nting st	atements	and eva	luate ne	ew prop	osals				Applying	(K3)
						Mappir	ng of CC)s with	POs ar	nd PSOs	5				
COs/P	Os	PO1	PO2	PO3	PO	4 PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	1	1	2			3		2	2	2	3	2		
CO	2		1	2			2	2	2	2	2	3	2		
CO	3	1	2	1			2		2	2	2	3	2		
CO	4	1	2	1			2		2	2	2	3	2		
CO	5	2	2				2		2	2	2	3	2		
1 – Slig	ght, 2	– Mode	erate, 3	– Substan	tial, B1	F- Bloom's	Taxono		ERN - T	HEORY	,				
	st / Blo Catego	oom's ory*	R	emember (K1) %	ing	Underst (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		eating (6) %	Total %
	CAT	1		20		40)	40)						100
	CAT	2		20		40)	40)						100
		-		20		40)	40)						100
	CAT	3		20											



				22MTT71 -	INDUSTRIAL IN	ITERNET	OF THINGS					
Progra Branc	amme & h	B.E. &	Mechatro	onics Engine	ering		Sem	Catego	y L	т	Р	Credit
Prerec	quisites	Senso	rs and Sig	nal Processi	ng		7	PC	3	0	0	3
Pream	ıble		-		wledge on Indu monitoring the e					itals t	o ent	nance the
Unit -	I	Introdu	uction:	-								ç
cloud- Applic	Business a a a a a a a a a a a a a a a a a a	spects of g computir	cloud-Virt ng. Sensor	tualization- K Cloud: Applic	astructure-base ey aspect of ations of Senso	cloud co	mputing-Mob			-	-	omputing
Unit -			chitecture			1.14						ç
archite		system co	omponents	: Sensors- Ga	onents - Variou ateways- Route							
Unit –	III	Senso	r and Inter	facing:								g
require	ements for I	IoT sensor	s- Role of a	actuators- Typ	ation - Roles of actuators			-				-
Unit –	IV	Protoc	ols and Cl	loud:								9
	uction to Inc VAN -NB-Io		a transmis	sion – Interbu	ıs – Bitbus - CC	C-link -Bat	tibus - Contro	ller area net	work -	Devic	eNet	– LoRa 8
Unit –	V	Indust	rial IoT- Ap	pplication Do	mains:							9
applica	ations), Wel				and quality cor and pharmaceut							
техт	BOOK: Anandaru	ding Techr	nology – Oi ee, Chand	il - Chemical a		ical indus	try - Applicat	ons of UAVs	in Indu	istries	S	Total:4
TEXT 1.	BOOK: Anandaru Edition, C	ding Techr	nology – Oi ee, Chand	il - Chemical a	and pharmaceut	ical indus	try - Applicat	ons of UAVs	in Indu	istries	S	Total:4
TEXT 1. REFE	BOOK: Anandaru Edition, C RENCES:	ding Techr p Mukherj RC Press,	ee, Chand 2020.	il - Chemical a	and pharmaceut	ical indus	try - Applicat	ons of UAVs	in Indu nings a	nd In	S	Total:45
TEXT 1. REFE 1.	BOOK: Anandaru Edition, C RENCES: Alasdair (ding Techr p Mukherj RC Press, Gilchrist, "In	ee, Chand 2020.	il - Chemical a lana Roy, Sud	and pharmaceut dip Misra," Intro al Internet of Th	ical indus	o Industrial I Edition, Apre	ons of UAVs nternet of Th ss, New Yor	in Indu nings a	nd In	s. dustry	Total:45
TEXT 1. REFE	BOOK: Anandaru Edition, C RENCES: Alasdair (Daniel Mi	ding Techr p Mukherj RC Press, Gilchrist, "II noli, "Build	ee, Chand 2020. ndustry 4.0 ling the Inte	il - Chemical a lana Roy, Sud r: The Industri ernet of Thing	and pharmaceut dip Misra," Intro al Internet of Th gs with IPv6 an	ical indus	o Industrial I Edition, Apre	ons of UAVs nternet of Th ss, New Yor	in Indu nings a	nd In	s. dustry	Total:45
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TEXT 1. REFE 1. 2. 3.	BOOK: Anandaru Edition, C RENCES: Alasdair (Daniel Mi Wiley& so Olivier He	ding Techr p Mukherj RC Press, Gilchrist, "lu noli, "Builc ons publica ersent, Dav blication, N	ee, Chand 2020. Industry 4.0 ling the Internations, Uniter vid Boswart	il - Chemical a lana Roy, Sud r: The Industri ernet of Thing ed Kingdom, 2 thic &, Omar	and pharmaceut dip Misra," Intro al Internet of Th gs with IPv6 an 2013.	ical indus oduction t ings", 1st d MIPv6:	try - Applicat o Industrial I Edition, Apro The Evolving	nternet of These and the second secon	in Indu nings a k, 2017 2M Co	nd In mmur	dustry nicatio	Total:45 v 4.0", 1s
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TEXT 1. REFE 1. 2. 3. COUR On co	BOOK: Anandaru Edition, C RENCES: Alasdair (Daniel Mi Wiley& so Olivier He Wiley put	ding Techr p Mukherj RC Press, Gilchrist, "Iu noli, "Builc ons publica ersent, Dav blication, N DMES: f the cour	ee, Chand 2020. Industry 4.0 ling the Inte tions, Unite vid Boswart ew Jersey, se, the stu	il - Chemical a lana Roy, Sud r: The Industri ernet of Thing ed Kingdom, 2 thic &, Omar 2012.	and pharmaceut dip Misra," Intro al Internet of Th gs with IPv6 an 2013. Elloumi, "The In	ical indus oduction t ings", 1st d MIPv6: ternet of	try - Applicat o Industrial I Edition, Apro The Evolving Things: Key	nternet of These and the second secon	in Indu nings a k, 2017 2M Cor and Pro	nd In mmur otocol B' (Hig	dustry nicatio s", 2n F Map hest	Total:4 v 4.0", 1s ons", John nd Edition
TEXT 1. REFE 1. 2. 3. COUR On co CO1	BOOK: Anandaru Edition, C RENCES: Alasdair (Daniel Mi Wiley& so Olivier He Wiley put SE OUTCC mpletion o comprehe infer the v	ding Techr p Mukherj RC Press, Gilchrist, "lu noli, "Builc ons publica ersent, Dav blication, N DMES: f the cour- end the fun various con	nology – Oi ee, Chand 2020. Industry 4.0 ling the Inte titions, Unite vid Boswart ew Jersey, se, the stu damentals nponents a	il - Chemical a lana Roy, Sud ernet of Thing ed Kingdom, 2 thic &, Omar 2012. idents will be of IIoT and its and architectu	and pharmaceut dip Misra," Intro al Internet of Th gs with IPv6 an 2013. Elloumi, "The In e able to s potentials in in re of IIoT	ical indus oduction t ings", 1st d MIPv6: ternet of	try - Applicat o Industrial I Edition, Apro The Evolving Things: Key nvironment	nternet of These and the second	in Indu nings a k, 2017 2M Col and Pro	nd In mmur otocol B' (Hig	dustry nicatio s", 2n F Map hest	Total:4 4.0", 1s ons", John d Edition pped Level)
TEXT 1. 1. 2. 3. COUR On coo CO1 CO2	BOOK: Anandaru Edition, C RENCES: Alasdair (Daniel Mi Wiley& so Olivier He Wiley put SE OUTCC mpletion o comprehe infer the v	ding Techr p Mukherj RC Press, Gilchrist, "Iu noli, "Builc ons publica ersent, Dav lication, N DMES: f the cour- end the fun various con different Ilo	nology – Oi ee, Chand 2020. Industry 4.0 ling the Inter- vid Boswart ew Jersey, se, the stur damentals nponents a T sensors	il - Chemical a lana Roy, Sud r: The Industri ernet of Thing ed Kingdom, 2 thic &, Omar 2012. Idents will be of IloT and its ind architectur system archit	and pharmaceut dip Misra," Intro al Internet of Th gs with IPv6 an 2013. Elloumi, "The In a able to s potentials in in re of IIoT ecture with inter	ical indus oduction t ings", 1st d MIPv6: ternet of dustrial e	try - Applicat o Industrial I Edition, Apro The Evolving Things: Key nvironment dards	nternet of These and the second	in Indu nings a k, 2017 2M Col and Pro	nd In mmur otocol (Hig Jndei	dustry nicatio s", 2n F Map hest	Total:4 v 4.0", 1s ons", John id Edition oped Level) ling (K2) ling (K2)
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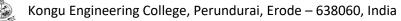
CO2	2	2	2	2	3				1	2	2
CO3	2	2	2	2	3				1	2	2
CO4	2	2	2	2	3				1	2	2
CO5	3	3	3	3	3				2	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT	r- Bloom's Taxono	omy	· ·			·	
					ASSESSMEN	PATTERN -	THEORY				
Test / Bl Categ		Rei	memberir (K1) %	ng	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
CAT	1		20		80						100
CAT	2		10		70	20					100
	-0		10		60	30					100
CAT	3		-								



					22MTF	971 PR(OJECT	WORK	II PHA	SE I (20	22 Batc	h)				
Progra Branc		e &	B.E. 8	& Mech	atronic	s Engi	neering)			Sem.	Category	/ L	т	Ρ	Credit
Prerec	quisi	tes	NIL								7	EC	0	0	10	5
															Тс	otal: 150
COUR	SE C	OUTCO	MES:												Мар	
On co	mple	tion of	the co	urse, th	e stude	ents wil	l be ab	le to						(Higl	hest L	_evel)
CO1	ide	ntify an	d formu	late the	probler	m and c	oncepti	ualize th	e meth	odology	of the p	roject		Арр	olying	(K3)
CO2	des	sign the	compo	nents a	nd syste	ems usi	ng Mec	hatronic	c princip	oles				Ana	lyzing	(K4)
CO3	fab	oricate a	Mecha	tronics	system	utilizing	experi	mental s	skills					Cre	ating	(K6)
CO4	pla	n and e	xecute	the proj	ect as a	a team								Eval	uating	g (K5)
CO5	cor	mpile th	e findin	gs and o	conclud	e with o	oral/writt	ten repo	orts					Арр	olying	(K3)
						Маррі	ing of (Cos wit	h POs a	and PS	Os					
COs/P	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	P	SO1	PSO2
CO	1	3	3	3	2	2	2	2	2	3	3	3	2		3	3
CO2	2	3	3	3	3	3	2	2	2	3	3	3	2		3	3
COS	3	3	3	3	3	3	2	2	2	3	3	3	2		3	3
CO4	4	2	2	2	2	2	3	2	3	3	3	2	3		3	3
CO	5	3	3	3	3	2	3	2	3	3	3	2	3		3	3
1 – Sli	ght, 2	2 – Mod	erate, 3	– Subs	tantial.	BT- Blo	om's Ta	axonom	y	1	1	I I				1

				22MTF	972 PR(OJECT	WORK	II PHA	SE I (20	23 Batc	h)			
Program Branch	ime &	B.E. 8	& Mech	atronic	s Engi	neering	J			Sem.	Category	L	ТР	Credit
Prerequi	sites	NIL								7	EC	0	0 8	6
													Т	otal: 150
	EOUTCO		urse, th	e stude	ents wil	ll be ab	le to					(BT Map Highest	
CO1 ⁱ	dentify an	id formu	late the	probler	m and c	oncepti	ualize th	e meth	odology	of the p	roject		Applying	(K3)
CO2	design the	e compo	nents a	nd syste	ems usi	ng Mec	hatronio	c princip	les				Analyzing	g (K4)
CO3 f	abricate a	a Mecha	tronics	system	utilizing	experi	mental	skills					Creating	(K6)
CO4 F	blan and e	execute	the proj	ect as a	a team							l	Evaluatin	g (K5)
CO5 0	compile th	e finding	gs and	conclud	e with o	oral/writt	en repo	orts					Applying	(K3)
					Маррі	ing of (Cos wit	h POs a	and PS	Os				
COs/PO	s PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	2	2	2	3	3	3	2	3	3
CO2	3	3	3	3	3	2	2	2	3	3	3	2	3	3
CO3	3	3	3	3	3	2	2	2	3	3	3	2	3	3
CO4	2	2	2	2	2	3	2	3	3	3	2	3	3	3
CO5	3	3	3	3	2	3	2	3	3	3	2	3	3	3
1 — Sliah	t, 2 – Moc	lerate. 3	– Subs	stantial.	BT- Blo	om's Ta	axonom	V	1	1	<u> </u>		1	1

						22MTP	81 PRC	JECT \	NORK	II PHAS	SE II					
Progra Branc		e &	B.E. 8	& Mech	atronic	s Engi	neering	J			Sem.	Category	/ L	т	Р	Credit
Prerec	quisi	tes	NIL								8	EC	0	0	8	4
											I				То	otal: 120
		OUTCOI etion of		urse, th	e stude	ents wil	l be ab	le to							⁻ Map hest I	ped ₋evel)
CO1	ana	alyze ar	ny comp	lex eng	ineering	g proble	m to pr	ovide a	opropria	ate rese	arch-bas	ed solution		Ana	lyzing	(K4)
CO2	des	sign the	compo	nents a	nd syste	ems usi	ng fund	amenta	l engine	eering p	rinciples			Ana	lyzing	(K4)
CO3	dev ski	•	abricate	e a mec	hatroni	cs syste	em utili	zing ex	perimer	ntal / ai	nalytical	/ simulatior	ו	Cre	eating	(K6)
CO4	pla	n and e	xecute	the proj	ect as a	team								Eval	uating	g (K5)
CO5	cor	mpile th	e finding	gs and o	conclud	e with o	ral / wri	tten rep	orts					Арр	olying	(K4)
						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	PO12	P	SO1	PSO2
CO	1	3	3	3	3	2	2	2	2	3	3	3	3		3	3
CO2	2	3	3	3	3	3	2	2	2	3	3	2	3		3	3
COS	3	3	3	3	3	3	3	2	2	3	3	3	3		3	3
CO4	4	2	2	2	2	2	3	2	3	3	3	2	3		3	3
CO	5	3	3	3	3	2	3	2	3	3	3	2	3		3	3
1 – Sli	ght, 2	2 – Mod	erate, 3	– Subs	stantial,	BT- Blo	om's Ta	axonom	y		1	ı — I		- 1		



Progr Branc	amme & ch	B.E. &	Mechatroni	ics Engineering			Sem.	Category	L	т	Р	Credit
Prere	quisites	Strengt	h of Materi	ials			5	PE	3	0	0	3
Pream	nble			es systematic know				of machine	eleme	nts a	nd	
Unit –	-1	Fundar	nental Prin	ciples of Design:								9
	, Varying, Tl			lesign, Optimum de Factor of safety – T								
Unit –	- 11	Design	of Shafts,	Keys and Couplin	gs:							9
•		nd Hollow sl	hafts – Base	ed on Strength, Rig pes – Key ways. De	dity and Defle			•••	eral R	igidit	/ -	
Unit –	- 111	Design	of Spur, H	elical, Bevel and V	orm Gears:							9
		elical, beve	and worm	gears – Multi spe	ed gear box c	lesign –Sp	our gear	- Forward	Traver	se. G	Gears	based c
Unit -	erence.	Docian	of Power a	crowe lournal B	arings and S	pringe:						9
				ocking & Overhauli			screw iac	k. Desian of	Journ	al Be	arina	_
				ng dimensions – De	-	-	-	-			-	-
Unit –				and Clutches:								9
				Single plate – Mult	Plate Clutche	es. Brakes	s - Functi	ons – Types	– linir	ngs -	Desig	n of bar
brakes	s – Internal e	expanding s	snoe brake.									
												Total
ТЕХТ	BOOK:											Total:4
		V.B., "Desi	gn of Machi	ne Elements", 4 th E	dition, Tata M	cGraw Hill	I, New Do	elhi, 2017.				Total:4
1.		V.B., "Desi	gn of Machi	ne Elements", 4 th E	dition, Tata M	cGraw Hill	l, New Do	əlhi, 2017.				Total:4
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1. REFE 1.	Bhandari RENCES: Richard G Edition, N	6. Budynas lew York, 20	and Keith N 017.	`	cal Engineerin	g Design",	, 1st Edit	-	/-Hill Ir	nterna	ationa	
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CO2	3	3	3		3					3	2	2
CO3	3	3	3	3	3					2	2	2
CO4	3	3	3	3	3					2	2	2
CO5	3	3	3	3	3					2	2	2
1 - Slight, 2	2 – Mode	rate, 3 -	Substan	tial, BT	- Bloom's	a Taxono	omy					
							•					
					ASSES	SMENT	PATTERN	- THEORY				
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	ory*	Rei		ng	Understa	anding %	Applying	Analyzing				
Categ	ory * [1	Rer	(K1) %	ng	Understa (K2)	anding %	Applying (K3) %	Analyzing				%
Categ CAT	огу* Г1 Г2	Rer	(K1) % 15	ng	Understa (K2) 35	anding %	Applying (K3) % 50	Analyzing				% 100



Program Branch	nme &	B.E. &	Mechatro	onics Engineering		Sem.	Category	L	т	Р	Credi
Brancn Prerequi	isites	Nil				5	PE	3	0	0	3
Preamble	e	convect		igned to provide basic co diation. It also includes th							
Unit – I		Condu									9
Introduct Dimensio	onal Stead	dy State ⊦		General Differential equa uction — plane and Co onduction							
Unit – II		Conveo									9
				namic and Thermal Bour nrough tubes	ndary Layer. Free	and Force	ed Convectior	n durii	ng ex	terna	l flow ove
Unit – III	1	Phase	Change He	eat Transfer and Heat E	xchangers:						9
				gimes of Pool boiling a er Coefficient – Fouling F						ensati	on - He
Unit – IV	1	Radiati	on:								9
Unit – V		Mass T	ransfer:								9
Basic Co	oncepts – I	Diffusion M		fer – Fick's Law of Diffus Analogy –Convective Ma			r Diffusion – (Conve	ective	e Mas	
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Basic Co - Momer	oncepts – I ntum, Hea OOK:	Diffusion N t and Mass	lass Trans s Transfer /	Analogy –Convective Ma	ss Transfer Corre	lation		Conve	ective	e Mas	s Transf
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					ASSESSMENT	PATTERN -	THEORY				
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Pream	ıble				pplication of variou business world.	us techniques /	decision	making tools	to so	olve s	carce	resource
Unit -		Linear	Models:									9
			•		PP – Standard and - Big M method, Tv			- Solutions to	LPP	: Gra	phical	I Solutior
Unit -	II	Transp	ortation,	Assignme	nt problems and S	Sequencing pr	oblems:					
Assigr	nment proble ne, n jobs 2	ems- Math machine, r	ematical	formulation nachine, n jo	Feasible solutions – Hungarian Alg bs m machine and	orithm. Seque	ncing Pr	oblems: 1 jo				•
			-		n flow models-Proj	-	ent: Cons	truction of ne	work	s- ac	tivity a	and ever
Unit -	÷		ry Mode		alysis and crashing	g of networks.						
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CO4	3	3	3	2	2					2	2	1	2
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		22MTE04 - MACHINE DRAWING						
Progra Branc	amme &	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
	quisites	Engineering Drawing, Design of Mechanical Elements	5	PE	3	0	0	3
Pream	ble	This course helps the student to communicate the necessary t and assembly of machine components. These drawings follow Organizations. Students have to be familiar with industrial draf production drawings to make themselves fit in industries.	rules lai	d down by nat	iona	l and	Interr	national
Machir	of Graphical	Introduction: I Language - Importance of Machine Drawing - Tools (from Inst s - Principles of Machine Drawing - BIS specifications for ma esentation of Machine Elements, Abbreviations and Symbols.						
Limits, Indicat Shaft a of Sym Unit –	, Fits and T ting Fits on I and Hole Te hbols - Indica	hation – Relative position of views – Examples-Sectioning-Intro olerance-Definitions - Classifications of Fits - System of Fits - Drawings - Tolerance Grade - Computations of Tolerance - Positi rminology - Method of Placing Limit Dimensions - Need of Geom ation of Minimum Material Condition - Interpretation of Indication of Screwed Fastenings:	Computations of To netrical To of Geome	ations - Selec olerance - Fur olerance - Ge atrical Toleran	ction Idam ome ce –	of F nental trical Exan	its - I of De Char nples.	Method o eviations acteristics 9
Screw and Ko Joints Unit – Drawir Import Bearin Unit – Introdu	- Designation ey-Types of - Represent IV ng of Project ance of Bill ag, Piston, Co V uction - Typ	 menclature - Threads Form - Conventional representations- Typon of Bolted Joints - Types of Nut Locking Arrangements – Spet Joints - Gib and Cotter Joints, Pin Joints and Knuckle Joints, ation of Welds - Symbols and its conventions. Drawing of Projections and Drawing of Sectional Views: tions-Orthographic view to isometric view and Isometric view to of materials - Drawing of Sectional Views-Keys, Bolts and Nuconnecting Rod, Cross heads. Assembly Drawing of Mechanical Components: Des of Assembly - Assembly procedures –Assembly of: Latherack, Stuffing Box, Plummer Block, Swivel Bearing and Safety Value 	cial Types o Types o orthograp uts, Coup Tail sto	es of Bolts an f key-Welded phic view of si pling: Flanged	d Nu Joir mple , Bu	nts-Ty e mac sh Ty	Wash pes o chine ype –	ers-Joints of Welded 9 elements · Footstep 9
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					Mappin	ng of CC)s with	POs a	nd PSO	S				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	2	1	1								2	2	3
CO2	3	2	1	1								2	2	3
CO3	3	2	1	1								2	2	3
CO4	3	2	1	1								2	2	3
CO5	3	2	1	1								2	2	3
1 – Slight, 2	– Mode	erate, 3 –	Substant	ial, BT	- Bloom's	Taxono	omy							
					ASSES	SMENT	ΡΑΤΤΙ	ERN - 1	THEOR	Y				
Test / Bl Catege		Rei	nemberi (K1) %	ng	Understa (K2)	•	Apply (K3)		Analyzi (K4) %	•	Evaluating (K5) %		reating K6) %	Total %
CAT	1		5		5		90)						100
CAT	2		5		5		90)						100
CAT	3				10		90)						100
ESI	Ε		5		5		90)						100
* ±3% may	be varie	ed (CAT	1,2,3 – 50) mark	s & ESE	– 100 n	narks)			1		1		



CO4

CO5

COs/POs

CO1

PO1

3

PO2

2

		22MTE05 - INTRODUCTION TO INDUSTRIAL INTERNET OF THINGS	S				
-	amme &	B.E. & Mechatronics Engineering Sem. Category	orv	L	т	Р	Credit
Branc	-				-	-	
Prereq	uisites	NIL 5 PE	-	3	0	0	3
Pream	ble	This course provides the knowledge on Industrial Internet of Things (IIoT) existing automation system for monitoring the entire planning and product lifecy		nent	als t	o en	hance the
Unit - I		Introduction:					9
cloud-E	Business as	lication-based IoT Protocols-Infrastructure-based protocols- Transport protocols bects of cloud-Virtualization- Key aspect of cloud computing-Mobile cloud computing. Sensor Cloud: Applications of Sensor Cloud- Big Data.			-	-	• •
Unit - I	I	IIoT Architectures:					9
		omponents - Various architectures of IOT and IIOT, Industrial internet - Refere ors- Gateways- Routers- Modem- Cloud brokers- Servers and its integration. W					•
Unit - I		Sensor and Interfacing:					9
require		nsors – Transducers: Classification - Roles of sensors in IIoT- Design of T sensors- Role of actuators- Types of actuators. Protocols: HART -MODBUS-					•
Unit - I	V	Protocols and Cloud:					9
		strial data transmission – Fieldbus – Profibus – Interbus – Bitbus - CC-link -Bati prks - ISA 100.11a -Wireless HART -LoRa & LoRaWAN -NB-IoT- IEEE 802.11AH		Cont	rolle	r area	a network,
Unit - V	V	Industrial IoT- Application Domains:					9
		plants - Inventory management and quality control - Plant safety and security y management – Oil - Chemical and pharmaceutical industry - Applications of UA		-			VR safety
							Total:45
TEXT	BOOK:						
1.	-	Mukherjee, Chandana Roy, Sudip Misra," Introduction to Industrial Internet of C Press, 2020.	Things	s an	d Ind	dustry	/ 4.0", 1st
REFE	RENCES:						
1.	Alasdair Gi	christ, "Industry 4.0: The Industrial Internet of Things", 1st Edition, Apress, New Y	/ork, 20	017.			
2.		oli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of s publications, United Kingdom, 2013.	M2M (Corr	mur	nicatio	ons", John
3.	Olivier Hers	sent, David Boswarthic &, Omar Elloumi, "The Internet of Things: Key Application cation, New Jersey, 2012.	ns and	Prot	ocol	s", 2r	nd Edition,
	SE OUTCON					Г Мар	
		the course, the students will be able to					Level)
CO1	-	d the fundamentals of IIoT and its potentials in industrial environment					ling (K2)
CO2 CO3		rious components and architecture of IIoT ferent IIoT sensors system architecture with interface standards		U			ling (K2) g (K3)
003							

B.E.- Mechatronics Engineering, Regulation, Curriculum and Syllabus - R2022

PO6

PO5

2

Mapping of COs with POs and PSOs

PO7

PO8

PO9

PO10

PO11

identify appropriate protocols and Cloud platforms for different IIoT challenges

build design thinking concepts for industrial IoT applications

PO3

2

PO4

2

PSO₂

2

Applying (K3)

Applying (K3)

PSO1

2

PO12

1



CO2	2	2	2	2	3				1	2	2
CO3	2	2	2	2	3				1	2	2
CO4	2	2	2	2	3				1	2	2
CO5	3	3	3	3	3				2	3	3
1 – Slight, 2	- Mode	rate, 3 –	Substant	ial, B1	Γ- Bloom's Taxon	omy	· · ·				
					ASSESSMEN	T PATTERN ·	THEORY				
Test / Bl	oom'e	Det	mombori		11. I		1				
Categ		Rei	nemberiı (K1) %	ng	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
	ory*	Rei		ng							
Categ	ory * [1	Kei	(K1) %	ng	(K2) %						%
Categ CAT	ory* [1]		(K1) % 20		(K2) % 80	(K3) %					% 100



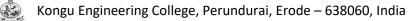
Prerequisites Systems and Control Engineering 5 PE 3 0 0 Preamble To understand and analyze the performance of linear and nonlinear system in state space domain without controllers. Int - I State Space Analysis in Continuous domain Review of state variable representation and state variable models in continuous systems. Conversion from transfer various state space model - Conversion of state space model to transfer function - Non-uniqueness of state model - E and eigen vectors - State transition matrix and its properties. Solutions of state equations - Free and forced responses. Unit - II State Feedback Controllers and Observers Controllability and observability - Relation between transfer function and state model - Effect of sampling time on contro observability - State feedback controllers. State estimators: Full and reduced order observer. Steady state error in state feedback controllers - Dead beat Control. Unit - III Phase Plane Analysis Behavior of nonlinear systems - Construction of phase portraits using isoclines- Limit cycle analysis. Unit - III Unit - IV Describing function Analysis Typical nonlinearities. Describing Function of nonlinearities - Review of Nyquist criterion for linear system - Nyuust state for nonlinear system - Limit cycle oscillations - Accuracy of Describing Function. Unit - V Lyapunov Stability Analysis Stability in the sense of Lyapunov - Second method of Lyapunov - Lyapunov stability analysis of linear time inv	9 er function Eigen value 9 rollability ar te model - 1 9 : Linear ar 9 ability criter 9 systems ar lysis for no
without controllers. Unit - I State Space Analysis in Continuous domain Review of state variable representation and state variable models in continuous systems. Conversion from transfer various state space model - Conversion of state space model to transfer function - Non-uniqueness of state model - E and eigen vectors - State transition matrix and its properties. Solutions of state equations - Free and forced responses. Unit - II State Feedback Controllers and Observers Controllability - State feedback controllers. State estimators: Full and reduced order observer. Steady state error in state feedback controllers. State estimators: Full and reduced order observer. Steady state error in state feedback controllers. Deadbeat Observers - Dead beat Control. Unit - III Phase Plane Analysis Behavior of nonlinear systems, jump resonance, sub-harmonic oscillation- Singular points Phase plane analysis: nonlinear systems - Construction of phase portraits using isoclines- Limit cycle analysis. Unit - IV Describing function Analysis Typical nonlinear system - Limit cycle oscillations - Accuracy of Describing Function method. Unit - V Lyapunov Stability Analysis State Transition of nonlinear time invariant to non-linear system - Krasovski's theorem - Variable gradient method of generating Lyapunov functions. Lyapunov anal autonomous systems. Unit - V Lyapunov Stability Analysis Stability in the sense of Lyapunov - Second method of Lyapunov - Lyapunov stability analysis of linear time invariant to non-line	9 er function Eigen value 9 rollability ar te model - 1 9 : Linear ar 9 ability criter 9 systems ar lysis for no
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 Gopal M, "Digital Control and State Variable Methods", 4th Edition, Tata McGraw-Hill, New Delhi, 2017. (Units- Slotine and Li, "Applied Nonlinear Control", 2nd Edition, Prentice Hall Publishers, USA, 1991. (Units – IV & V) REFERENCES:	
2. Slotine and Li, "Applied Nonlinear Control", 2 nd Edition, Prentice Hall Publishers, USA, 1991. (Units – IV & V) REFERENCES:	1 11 0 111
REFERENCES:	· I, II & III)
1. Richard C. Dorf & Robert H. Bishop. "Modern Control Systems". 12th Edition. Pearson Publication. New Jercy.	
····· · ···· · · ··· · · · · · · · · ·	2013.
2. Khalil, Hasan K., "Nonlinear Systems", 2 nd Edition, Prentice Hall, New Jercy, 2019.	
	lapped est Level)
CO1 analyze the time domain characteristics of continuous systems in state space domain Applyi	ving (K3)
CO2 design state feedback controllers and observers Applyi	ving (K3)
CO3 apply the concepts in the design of state feedback controllers and observers Applyi	ving (K3)
CO4 analyze the behavior of nonlinear systems using describing function method Applyi	ving (K3)
CO5 analyze the stability of linear and nonlinear systems using Lyapunov stability method Applyi	ving (K3)
Mapping of COs with POs and PSOs	



CO1	3	2	1	1	2					2	3	3
CO2	3	2	1	1	2					2	3	3
CO3	3	2	1	1	2					2	3	3
CO4	3	2	1	1	2					2	3	3
CO5	3	2	1	1	2					2	3	3
1 - Slight, 2	2 – Mode	rate, 3 -	Substant	tial, BT	- Bloom's	Taxono	omy					
							•					
					ASSES	SMENT	PATTERN	- THEORY				
Test / Bl Categ		Rei	nemberi (K1) %	ng	ASSES Understa (K2)	nding	PATTERN Applying (K3) %	- THEORY Analyzing (K4) %	Evaluating (K5) %		creating (K6) %	Total %
	ory*	Rei		ng	Understa	nding	Applying	Analyzing				Total %
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Credit	ГР	L	Category	Sem.	ng	B.E. & Mechatronics Engineering	amme & :h	Progra Branci
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9						Engines and Exhaust systems:	1	Unit –
ooling an	ngine c	am - E	Timing diagra	and Valve	. Simple Carburetor - Port	: Cylinder block - Cylinder head - Sum shaft - Bearings - Valves - Mufflers. Sin - MPFI and CRDI - Exhaust systems - S	pins - Crank	Piston
9						Transmission Systems:	· II	Unit –
					CVT - Over Drives - Tran	Construction - Clutch operation - Electro Floor Mounted Shift Mechanism - CV Joint - Universal Joints - Differential and	natic - Simple	Autom
9					n:	Steering, Brakes and Suspension:	· 111	Unit –
: Types o	ystems:	sion	Axle. Suspen	of Front	lectronic Steering - Types	 Wheel Alignment Parameters. Steer g mechanism - Power Steering - Electric Shock absorbers. Braking Systems: Ty 	mann steering nsion springs	Ackern
9							11/	Unit –
3					hting System:	Chassis Frame, Battery and Lighting	· IV	
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CO2	2	2	2		1							1	2	1
CO3	2				1							1	2	1
CO4	2	3	3	2	2			1				3	3	2
CO5	2		3	3	3	3	3	1				3	2	1
1 – Slight, 2	2 – Mode	erate, 3 –	Substant	ial, BT-			•	ERN - 1	THEORY	/				
Test / Bl Categ		Rei	nemberi (K1) %	ng U	ndersta (K2)	anding	Apply (K3)	/ing	Analyzi (K4) %	ng E	Evaluating (K5) %		reating K6) %	Total %
CAT	Г1		30		70									100
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Unit -					mentation:									9
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Unit -		1			are Interfac		Jai - Sui	J-VI.						9
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		ASSESSMEN	T PATTERN	- THEORY			
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	15	35	50				100
CAT2	10	35	55				100
CAT3	10	35	55				100
ESE	5	40	55				100

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



22MTE09 – POWER CONVERTERS AND ELECTRIC DRIVES

Branch	ne &	B.E. & M	lechatroni	ics Enginee	ring			Sem.	Category	/ L	т	Р	Credit
Prerequisit	ites	Electron	Devices a	& Digital Ci	rcuits, Electric	al Machine	S	5	PC	3	0	0	3
-					. 5								
Preamble				ectric Drives.	cs of Power s	emiconduct	or devic	ces. It g	ives the pr	inciple	desi	ign o	Powe
Unit – I		Power E	lectronics	s Devices:									9
Concept of	f power	electronics	s – Princip	ole of opera	tion – Steady s	ate and sw	vitching	characte	ristics of po	ower di	odes	, pov	er BJT
			-	-	 Steady state iconductors (Si 		-			-Two t	ransi	stor n	nodel c
Jnit – II				C Converte		,							9
Principle of	f phase	controlled	converter v	with R and F	RL load - Freewl	neeling diod	e- Singl	le phase	full wave co	onverte	r – S	ingle	phase
semi conve	verter –	Three pha	ase semi (converter -	Three phase erter –Single pl	ully control	led con	verter -	6 pulse a				
Unit - III				AC Conver	-								9
DC Choppe	er – Co	ntrol strate	egies – Prir	nciple of op	eration DC to D	C Converte	rs – Typ	oes – buo	ck and boos	st conv	erter	oper	ations -
Application	ns – Sing	gle phase A	AC voltage	e controller –	On - off control	and phase	control	– Sequer	nce control	of AC \	/oltag	ge coi	ntroller.
Unit – IV		DC Drive	es:										9
	- Introd	uction to D	DC drives -	- Basic per	ormance equat	ons of DC	motor –	Single p	hase DC d	lrives -	- Thr	ee ph	ase DC
					rive – Four qua			• •					
Unit – V		AC Drive	es:										9
	n – Indu	AC Drive			ol of 3-phase in		or – Sta	tor voltag	ge control –	Stator	frequ	Jency	-
Introduction		AC Drive	or drives – S	Speed contr	ol of 3-phase in	duction mot		-				-	contro
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CO4	3	2	1	2				2	2	2
CO5	3	2	1	2				2	2	2
1 – Slight, 2	2 – Mod	erate, 3	 Substantia 	, BT- Bloom's Tax	onomy					
				ASSESSMI	ENT PATTERN - 1	HEORY				
Test / Bl Categ		Re	membering (K1) %	Understandin (K2) %	ng Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		eating <6) %	Total %
CAT	-1		30	70						100
CAT	2		25	75						100
CAT	-3		30	50	20					100
	E		20	60	20					100



Programme 8 Branch	B.E. & Mechatronics Engineering Sem. Category	L	т	Р	Credit
Prerequisites	Strength of Materials 6 PE	3	0	0	3
continuum –	This course gives an introduction to the finite element method which uses different solving a system of governing equations over the domain of a continuous physical discretized into simple geometric shapes called as finite element. Introduction to FEA: o finite element analysis – Discretization – Matrix algebra – Gauss elimination method Classical Techniques in FEM. Weighted residual method – Ritz method. Potential en ne and two dimensions.	systen	n, whi	ch is g equ	lations fc
Unit – II	One Dimensional Elasticity Problems:				9
Transfer probl Unit – III Introduction to	Formulation of Element Matrices and Equations - Analysis of Truss and Beam problements. Image: Two Dimensional Elasticity Problems: 2-D Finite element modeling – Plane stress – Plane Strain – Displacement Equations – E promulation using Natural Coordinates. Applications to Temperature Effects and Torsion procession.	emen	t Mat		9
11.14 BZ					
Unit – IV	Axisymmetric Elements:				9
Axisymmetric Stress calcula Unit – V Four node qua	formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces ions – Boundary conditions – Applications to cylinders under internal or external pressure Isoparametric Elements for Two Dimensional Continuum: Idrilateral elements – Shape functions – Element stiffness matrix and force vector – Nume tress calculations.	s – Ro	tating) disce	e effects - s. 9
Axisymmetric Stress calcula Unit – V Four node qua integration – S	 Formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces ions – Boundary conditions – Applications to cylinders under internal or external pressure Isoparametric Elements for Two Dimensional Continuum: Idrilateral elements – Shape functions – Element stiffness matrix and force vector – Nume 	s – Ro	tating) disce	e effects - s. 9 - Stiffnes
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Axisymmetric Stress calcula Unit – V Four node qua integration – S TEXT BOOK: 1. Rao S REFERENCE: 1. Cook John V 2. Reddy 3. COURSE OUT On completio CO1 apply	Formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces ions – Boundary conditions – Applications to cylinders under internal or external pressure Isoparametric Elements for Two Dimensional Continuum: Idrilateral elements – Shape functions – Element stiffness matrix and force vector – Nume tress calculations. .S, "The Finite Element Method in Engineering", 5th Edition, Butterworth-Heinemann, Unit S: R.D., Malkus D.S., Plesha M.E. & Witt R.J., "Concepts and Applications of Finite Element Viley & Sons, New Jersey, 2007. / J.N., "An Introduction to the Finite Element Method", McGraw Hill, New Delhi, 2006. "COMES: n of the course, the students will be able to the finite element concepts used for designing engineering components one dimensional structural problems for different applications using element matrix	erical i	ates, : sis", 4 B' (Hig Ap	ation 2014. th Ed	e effects - s. 9 - Stiffnes Total:4 ition, ition,
Axisymmetric Stress calcula Unit – V Four node qua integration – S TEXT BOOK: 1. Rao S REFERENCE 1. Cook John V 2. Reddy 3. COURSE OUT On completio CO1 apply CO2 solve equat	Formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces ions – Boundary conditions – Applications to cylinders under internal or external pressure Isoparametric Elements for Two Dimensional Continuum: idrilateral elements – Shape functions – Element stiffness matrix and force vector – Nume tress calculations. .s, "The Finite Element Method in Engineering", 5th Edition, Butterworth-Heinemann, Unit S: R.D., Malkus D.S., Plesha M.E. & Witt R.J., "Concepts and Applications of Finite Element Wiley & Sons, New Jersey, 2007. / J.N., "An Introduction to the Finite Element Method", McGraw Hill, New Delhi, 2006. TCOMES: n of the course, the students will be able to the finite element concepts used for designing engineering components one dimensional structural problems for different applications using element matrix on ate the results for a 3D domain using simple two dimensional assumptions for different	erical i	ntegr ntegr ates, 2 sis", 4 B (Hig Ap Ana	ation 2014. th Ed	e effects - s. 9 - Stiffnes Total:4 ition, ition, j (K3)
Axisymmetric Stress calcula Unit – V Four node qua integration – S TEXT BOOK: 1. Rao S REFERENCE: 1. Cook John V 2. Reddy 3. COURSE OUT On completio CO1 apply CO2 solve equat CO3 estima	Formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces ions – Boundary conditions – Applications to cylinders under internal or external pressure Isoparametric Elements for Two Dimensional Continuum: idrilateral elements – Shape functions – Element stiffness matrix and force vector – Nume tress calculations. .s, "The Finite Element Method in Engineering", 5th Edition, Butterworth-Heinemann, Unit S: R.D., Malkus D.S., Plesha M.E. & Witt R.J., "Concepts and Applications of Finite Element Wiley & Sons, New Jersey, 2007. / J.N., "An Introduction to the Finite Element Method", McGraw Hill, New Delhi, 2006. TCOMES: n of the course, the students will be able to the finite element concepts used for designing engineering components one dimensional structural problems for different applications using element matrix on ate the results for a 3D domain using simple two dimensional assumptions for different	erical i	ntegr ntegr sis", 4 B (Hig Ap Ana Ana	ation 2014. 2014. T Map hest plying alyzing	9 - Stiffnes Total:4 ition, pped Level) g (K3) g (K4)



					Mappin	ng of CC)s with	POs ai	nd PSO	S				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1								3	3	3
CO2	3	2	1	1								3	3	3
CO3	3	3	3	3	2							3	3	3
CO4	3	3	2	2	1							3	3	3
CO5	3	2	1	1								3	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	omy							
					ASSES	SMENT	PATTE	ERN - 1	HEOR	Y				
Test / Bl Categ		Rer	nemberi (K1) %	ng U	Indersta (K2)		Apply (K3)	•	Analyzi (K4) %	•	Evaluating (K5) %	-	reating K6) %	Total %
CAT	1		25		35		40)						100
CAT	2				35		35	5	30					100
CAT	3				35		35	5	30					100
ESI	=		10		30		30)	30					100



Progra Branch	amme & h	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Prereq	quisites	Theory of Machines	6	PE	3	0	0	3
Pream	ble	This course equips the student to realize the precision equipm design strategies, machines and control.	ent design	and their relat	ed in	spec	tion n	nethods,
Unit –	I	Introduction to Precision Equipment Design:						9
Princip	les of accu	damentals of Economic Analysis - Role of a Design Engined racy, repeatability and resolution, Beyond Intelligent manufactur and methods, Basic requirements of Precision Machine tools.						
Unit –		Error Assessment and Inspection:						9
geome Methoo	etric and ki dologies of acy using a l	ors and error measurements, Propagation of errors, Motion erron nematic errors, Other types of errors in machines – therm error elimination, Future vision in machine error inspection, aser interferometer, contouring assessment using kinematic bar Design Strategies and Machine Key Components:	al, cutting CNC mac	force induce	ed, e	nviro	onme	ntal error
compoi	onents – g	or standard size machines, Steps in Design roadmap, Structuuide ways – selection, precision linear and rotating move nd order phenomena, Vibration isolation.						
Unit –	IV	Parallel Kinematic Machines (PKM):						9
issues,		erial and parallel systems, Precision design of a PKM – need nciples – Kinematic modeling- Case study of 3 PRS and PSS s on.						
Unit –	V	Precision Control:						9
ripple, t	friction, hys	motion control, system modeling and performance assessment steresis, incorporating nonlinear dynamics, Control design strate strol. Case Study – Design of piezoelectric actuator.						
								Total:4
TEXT E	BOOK:							
1.	Samir Me New York	kid, "Introduction to Precision Machine Design and Error Assess , 2013.	ment", CR	C-Press, Tayl	or an	d Fra	ancis	Group,
REFER	RENCES:							
1.	Alexander							
••		r H. Slocum, "Precision Machine Design", Prentice Hall Publishe	rs, New Je	ersey, 2009.				
2.	Zhuangde	r H. Slocum, "Precision Machine Design", Prentice Hall Publishe Jiang & Shuming Yang, "Precision Machines", Springer, Singap		-				
	-		oore, 2020		009.			
2. 3.	Kai Chenç	Jiang & Shuming Yang, "Precision Machines", Springer, Singar g," Machining Dynamics -Fundamentals, Applications and Practions	oore, 2020		009.			
2. 3. COUR	Kai Chenç SE OUTCO	Jiang & Shuming Yang, "Precision Machines", Springer, Singar g," Machining Dynamics -Fundamentals, Applications and Practions	oore, 2020		009.		T Maj	oped Level)
2. 3. COUR	Kai Cheng SE OUTCO mpletion of	Jiang & Shuming Yang, "Precision Machines", Springer, Singar g," Machining Dynamics -Fundamentals, Applications and Praction MES:	oore, 2020 ces", Sprin			(Hig	hest	
2. 3. COUR: On cor	Kai Cheng SE OUTCO mpletion of assess the	Jiang & Shuming Yang, "Precision Machines", Springer, Singar g," Machining Dynamics -Fundamentals, Applications and Praction MES: If the course, the students will be able to	oore, 2020 ces", Sprin			(Hig Inder	hest	Level)
2. 3. COUR: On cor CO1	Kai Cheng SE OUTCO mpletion of assess the inspect th	e Jiang & Shuming Yang, "Precision Machines", Springer, Singar g," Machining Dynamics -Fundamentals, Applications and Practic MES: f the course, the students will be able to e suitability of equipment designs concepts for specific application	oore, 2020 ces", Sprin	ger London 2		(Hig Indei Ap	jhest rstanc	Level) ding (K2)
2. 3. COURS On cor CO1 CO2	Kai Cheng SE OUTCO mpletion of assess the inspect th choose th	e Jiang & Shuming Yang, "Precision Machines", Springer, Singar g," Machining Dynamics -Fundamentals, Applications and Practic MES: f the course, the students will be able to e suitability of equipment designs concepts for specific application e errors in various machines like CNC machines	oore, 2020 ces", Sprin	ger London 2		(Hig Inder Ap Ap	jhest rstanc plying plying	Level) ding (K2) g (K3)



					Mappin	ng of CC)s with	POs a	nd PSO	S				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2							2	3	3
CO2	3	3	3	2	2							2	3	3
CO3	3	3	3	2	2							2	3	3
CO4	3	3	3	2	2							2	3	3
CO5	3	3	3	2	2							2	3	3
1 – Slight, 2						SMENT	•	ERN - 1	HEOR	Y				
Test / Bl Categ		Rer	nemberi (K1) %	ng L	Jndersta (K2)	•	Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating K6) %	Total %
CAT	F1		15		50		35	5						100
CAT	[2		15		50		35	5						100
CAT	ГЗ		15		50		35	5						100
	E		5		55		40	\						100



					JFACTUR					
Programn Branch	ne & B.E. &	Mechatronics Er	ngineering		Sem.	Category	L	т	Ρ	Credit
Prerequis	ites Manu	facturing Processo	es		6	PE	3	0	0	3
Preamble	group	ourse provides the ting technology, Cell ns and computer aid	ular manufacturin	g, Computer aideo						
Unit – I	Introc	luction:								9
of CIM sys	stem –Types of poblems. Basic Ele	g Planning, Manufa production – Manuf ments of an Autom ctories, Industrial re	acturing models a ated system – Le	and Metrics – Ma vels of Automatio	thematical n. Lean Pr	models of P	rodu	ction	Perfo	rmance -
Unit – II	Cellu	ar Manufacturing:								9
Flow Anal Cellular M	ysis – Cellular M anufacturing – Ra	rt Families – Parts lanufacturing – Col ank Order Clustering	mposite part cono g Method – Arrang	cept – Machine c ging Machines in a	ell design ı GT cell –	and layout - Hollier Metho	Qu	antita	tive a	nalysis ir blems.
Unit – III		ction Planning &				•				(
Productior Shop Floc	Planning and M or Control - Inver	Iter Aided Process I laster Production S Itory Control. Brief agement (SCM) – S	chedule – Materia on Manufacturing	al Requirement Pl	anning – (Capacity Plan	ning	- Co	ntrol	Systems
FMS – Si	mple Problems. anagement & Saf	- FMS Components Automated Guided ety. Automated Stor	Vehicle System	(AGVS) - AGVS	Application	•				•
	Com	uter Aided Quality		enormance –wetr	003.					
Computers Machine	s in QC, Automat Vision System,	ed Inspection Meth Optical Inspection AD/CAM.	Control: ods and Principle	es, Contact Inspec	tion Meth					Methods
Computers Machine Integration	s in QC, Automa Vision System, n of CAQC with C	ed Inspection Meth	Control: ods and Principle	es, Contact Inspec	tion Meth					Methods I Testing
Computers Machine Integration TEXT BOO	s in QC, Automat Vision System, n of CAQC with C DK:	ed Inspection Meth Optical Inspection AD/CAM.	/ Control: lods and Principle Method, Sensor	es, Contact Inspects, Co-ordinate N	tion Meth leasuring	Machine, C	omp	uter	Aideo	Methods Testing Total:4
Computers Machine Integration TEXT BOO 1. G In	s in QC, Automat Vision System, o of CAQC with C DK: roover M.P., "Aut dia, New Delhi, 2	ed Inspection Meth Optical Inspection AD/CAM.	/ Control: lods and Principle Method, Sensor	es, Contact Inspects, Co-ordinate N	tion Meth leasuring	Machine, C	omp	uter	Aideo	Methods Testing Total:4
Computers Machine Integration TEXT BOO 1. G In REFEREN	s in QC, Automat Vision System, of CAQC with C OK: roover M.P., "Aut dia, New Delhi, 2 ICES:	ed Inspection Meth Optical Inspection AD/CAM.	Control: ods and Principle Method, Sensor	es, Contact Inspectors, Co-ordinate M	tion Meth /leasuring Manufactu	Machine, C	omp	uter	Aideo	Methods Testing Total:4
Computers Machine Integration TEXT BOO 1. G In REFEREN 1. Ko	s in QC, Automat Vision System, of CAQC with C OK: roover M.P., "Aut dia, New Delhi, 2 ICES: pren, Yoram, "Co	ed Inspection Meth Optical Inspection AD/CAM. omation, Production 016.	Control: Iods and Principle Method, Sensor	es, Contact Inspects, Co-ordinate M nputer Integrated ems", McGraw Hil	tion Meth leasuring Manufactu I, New De	Machine, C ring", 4th Edit hi, 2014.	omp	uter	Aideo	Testing
Computers Machine Integration TEXT BOO 1. G In REFEREN 1. Ko 2. R	s in QC, Automat Vision System, of CAQC with C OK: roover M.P., "Aut dia, New Delhi, 2 ICES: pren, Yoram, "Co	ed Inspection Meth Optical Inspection AD/CAM. omation, Production 016.	Control: Iods and Principle Method, Sensor	es, Contact Inspects, Co-ordinate M nputer Integrated ems", McGraw Hil	tion Meth leasuring Manufactu I, New De	Machine, C ring", 4th Edit hi, 2014.	omp	Prent	Aidec	Methods Testing Total:4
Computers Machine Integration TEXT BOO 1. G In REFEREN 1. Ko 2. Rai COURSE	s in QC, Automat Vision System, of CAQC with C OK: roover M.P., "Aut dia, New Delhi, 2 ICES: oren, Yoram, "Co ao P.N., "CAD/C/	ed Inspection Meth Optical Inspection AD/CAM. omation, Production 016.	Applications", 3rd	es, Contact Inspects, Co-ordinate M nputer Integrated ems", McGraw Hil	tion Meth leasuring Manufactu I, New De	Machine, C ring", 4th Edit hi, 2014.	omp	Prent	Aidec ice-H	Methods Testing Total:4 all of
Computers Machine Integration TEXT BOO 1. G In REFEREN 1. Ko 2. R COURSE On compl	s in QC, Automat Vision System, of CAQC with C OK: roover M.P., "Aut dia, New Delhi, 2 ICES: oren, Yoram, "Co ao P.N., "CAD/C/ OUTCOMES: letion of the cou	ed Inspection Meth Optical Inspection AD/CAM. omation, Production 016. mputer control of Ma M: Principles and A	v Control: iods and Principle Method, Sensor an System and Con anufacturing System Applications", 3rd vill be able to	es, Contact Inspects, Co-ordinate M nputer Integrated ems", McGraw Hil Edition, McGraw H	tion Meth leasuring Manufactu I, New De	Machine, C ring", 4th Edit hi, 2014.	ion,	Prent	Aidec ice-H	Methods Testing Total:4 all of
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Computers Machine Integration TEXT BOO 1. G In REFEREN 1. Ko 2. R COURSE On compl CO1 ur CO2 id CO3 de	s in QC, Automat Vision System, of CAQC with C OK: roover M.P., "Aut dia, New Delhi, 2 ICES: oren, Yoram, "Co ao P.N., "CAD/C/ OUTCOMES: letion of the cou nderstand the CIM entify the parts by evelop a process	ed Inspection Meth Optical Inspection AD/CAM. omation, Production 016. mputer control of Ma AM: Principles and A rse, the students v A concepts in manuf v using different cod	v Control: ods and Principle Method, Sensor anufacturing System Applications", 3rd vill be able to facturing industrie ling methods equirement plan for	es, Contact Inspects, Co-ordinate M nputer Integrated ems", McGraw Hil Edition, McGraw H	tion Meth leasuring Manufactu I, New De	Machine, C ring", 4th Edit hi, 2014.	ion,	Prent Prent (Hig Under Ap	F Map hest stanc plying	Methods Testing Total:4: all of pped Level) ling (K2) g (K3)



					Mappin	ng of CC)s with	POs a	nd PSO	S				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	1							2	3	3
CO2	2	2	1	3	2							2	2	2
CO3	2	2	1	3	2							2	2	2
CO4	2	2	2	2	3							2	3	2
CO5	2	2	2	2	3							2	3	2
1 – Slight, 2	2 – Mode	erate, 3 –	Substant	tial, BT-		Taxono	•	- DN - 1		/				
Test / Bl	oom's	Rer	nemberi	ng U	Indersta		Apply		Analyz	-	Evaluating	C	reating	Tota
Categ	ory*		(K1) %		(K2)	%	(K3)		(K4) 🤋		(K5) %		K6) %	%
CAT	F 1		15		70		15	5						100
CAT	Γ2		15		70		15	5						100
CAT	ГЗ		15		70		15	5						100
ESI	F		5		75		20)						100



			2211112		ED PROGRAM	MING FOR	MECH	HATRO	NICS				
Prograr Branch		B.E. &	Mechatro	onics Engine	ering		\$	Sem.	Category	/ L	т	Р	Credit
Prerequ		Microc	ontroller I	Programming	g and Application	ons		6	PE	3	0	0	3
Preamb	ble		ourse prov ronics app		ge and skill on	advanced	Micro	controll	ers and Er	mbedd	ed pi	rogran	nming for
Unit - I		ATMEC	GA 8 Micro	ocontroller:									9
					mory organizatio						'O Po	orts –	Timers –
					terface – USART	T – Externa	al Hard	lware Ir	nterrupts – /	ADC.			
Unit - II				edded C Prog				0.000			£	tion .	9
					Timers: modes– – programming.		ning –	- Coun	ters – ADU	: con	rigura	ation i	egisters-
Unit - III				ocontroller	– programming.								9
					hitecture of ARI	M Cortex I	M3 : V	/arious	Units in th	e arch	itectu	ıre- D	-
	-		•		ers- Exceptions -								
Unit - IV			•		ets and Program			•		•			9
Assemb	oly basics- li	nstruction	list and d	escription- Us	eful instructions	- Memory I	mappir	ng- Bus	interfaces	and C	MSIS	S- Eml	bedded C
<u> </u>	ge Programn	•											
Unit - V					al time applicat								9
		•		orking- Comr	nunication Proto	ocols- Integ	gration	of Ser	isors- Actua	ators a	ind C	ontrol	ler in IoT
		n or Case	e Study.										
	- Applicatio												Total:45
TEXT B	300K:	V Valvan	o, "Embec	-	: Introduction to	ARM Cor	rtex™-	·M3 Mi	crocontrolle	r",Volu	me1,	Crea	
TEXT B 1.	300K: Jonathan V	V Valvan	o, "Embec	-	: Introduction to	ARM Cor	rtex™-	·M3 Mid	crocontrolle	r",Volu	me1,	Crea	
TEXT B	BOOK: Jonathan V Independer	V Valvan nt Publish	o, "Embec ing Platfor	-	s: Introduction to	o ARM Cor	rtex™-	M3 Mid	crocontrolle	r",Volu	me1,	Crea	
TEXT B 1. REFERI 1.	BOOK: Jonathan V Independer ENCES: Data sheet	V Valvan nt Publish – ATME0	o, "Embec ing Platfor GA 8	m, 2012.	: Introduction to				crocontrolle	r",Volu	me1,	Crea	
TEXT B 1. REFERI 1.	BOOK: Jonathan V Independer ENCES: Data sheet	V Valvan nt Publish – ATME0	o, "Embec ing Platfor GA 8	m, 2012.					crocontrolle	r",Volu	me1,	Crea	Total:45 te Space
TEXT B 1. REFERI 1. 2. COURS	BOOK: Jonathan V Independer ENCES: Data sheet Steve Furb	V Valvan nt Publish – ATMEC er., "ARM IES:	o, "Embec ing Platfor GA 8 I System-o	m, 2012.	ecture",2 nd Editio				crocontrolle	r",Volu	B.	ГМар	te Space
TEXT B 1. 1. 2. COURS On com	BOOK: Jonathan V Independer ENCES: Data sheet Steve Furb SE OUTCOM Inpletion of the second	V Valvan ht Publish – ATMEC er., "ARM //ES: the cours	o, "Embec ing Platfor GA 8 I System-o	m, 2012. on-Chip Archit	ecture",2 nd Edition	on, Pearso	on, 201:		crocontrolle		B ⁻ (Hig	۲ Map hest I	te Space
TEXT B 1. REFERI 1. 2. COURS On com	BOOK: Jonathan V Independer ENCES: Data sheet Steve Furb SE OUTCOM Inpletion of the second	V Valvan ht Publish – ATMEC er., "ARM //ES: the cours	o, "Embec ing Platfor GA 8 I System-o	m, 2012. on-Chip Archit	ecture",2 nd Editio	on, Pearso	on, 201:		crocontrolle		B ⁻ (Hig	۲ Map hest I	te Space
TEXT B 1. REFERI 1. 2. COURS On com	BOOK: Jonathan V Independer ENCES: Data sheet Steve Furb SE OUTCOM Interpret an	V Valvan nt Publish – ATME(er., "ARM //ES: the cours chitecture	o, "Embec ing Platfor GA 8 I System-o se, the stu	m, 2012. on-Chip Archit idents will be acing concep	ecture",2 nd Edition	on, Pearso microconti	on, 201:		crocontrolle		B ⁻ (Hig Jnder	۲ Map hest I	te Space ped _evel) ing (K2)
TEXT B 1. 2. COURS On com CO1 CO2	BOOK: Jonathan V Independer ENCES: Data sheet Steve Furb SE OUTCOM Interpret are develop err	V Valvan nt Publish – ATMEC er., "ARM //ES: the cours chitecture	o, "Embec ing Platfor GA 8 I System-o se, the stu and interf	m, 2012. on-Chip Archit idents will be facing concep ng using ATM	ecture",2 nd Edition e able to ts of ATMEGA 8	on, Pearso microconti trollers	on, 2013 roller	3.	crocontrolle		B ⁻ (Hig Jnder Ap	Γ Map hest I stand	te Space ped _evel) ing (K2)
TEXT B1.REFERI1.2.COURSOn comCO1CO2CO3	BOOK: Jonathan V Independer ENCES: Data sheet Steve Furb SE OUTCOM interpret ar develop err interpret ar	V Valvan nt Publish – ATMEC er., "ARM IES: the cours chitecture nbedded p	o, "Embec ing Platfor GA 8 I System-o se, the stu e and interf	m, 2012. on-Chip Archit idents will be facing concep ng using ATM	ecture",2 nd Edition e able to ts of ATMEGA 8 IEGA 8microcon	on, Pearso microconti trollers TEX M3 mic	roller crocon	3.			B [•] (Hig Jnder Ap	Γ Map hest I stand	te Space ped _evel) ing (K2) (K3)
TEXT B 1. REFERI 1. 2. COURS On com CO1 CO2 CO3 CO4	BOOK: Jonathan V Independer ENCES: Data sheet Steve Furb SE OUTCOM Interpret an develop em interpret an build embe	V Valvan nt Publish – ATMEC er., "ARM IES: the cours chitecture nbedded p chitecture dded prog	o, "Embec ing Platfor GA 8 I System-o se, the stu e and interf programmi e and interf gramming	m, 2012. on-Chip Archit idents will be facing concep ng using ATM facing concep using ARM C	ecture",2 nd Edition able to ts of ATMEGA 8 IEGA 8microcom ts of ARM CORT	on, Pearso microconti trollers FEX M3 mic ocontroller	roller crocon	3.			B (Hig Jnder Ap Jnder Ap	F Map hest I rstand plying	te Space ped _evel) ing (K2) (K3) ing (K2)
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CO4	3	3	2	3	3					2	3	3
CO5	3	3	2	3	3					3	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT	- Bloom's	Taxonc	omy					
					ASSES	SMENT	PATTERN	- THEORY				
Test / Bl Catego		Re	memberir (K1) %	ng	Understa (K2) °		Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
CAT	1		20		50		30					100
CAT	2		20		50		30					100
CAT	-3		25		45		30					100
ESI	E		20		50		30					100
* ±3% may l	be varied	I (CAT 1	,2,3 – 50	marks	& ESE –	100 ma	rks)					



Program Branch	nme &	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequ	iisites	Matrices and Ordinary Differential Equations, Multivariable Calculus and Complex Analysis, Problem Solving and Programming in C	6	PE	3	0	0	3
Preamble	le	This course gives an introduction about supervised, unsupervifind patterns or make predictions from empirical data.	ised and	reinforcement	lear	ning a	algorit	thms to
Unit - I		Mathematical Modelling of Machine Learning:						9
		 Designing a learning system - Perspectives and issues in r naximally specific hypotheses – Version spaces and candidate el 						– Task
Unit - II		Prediction & Artificial Neural Networks:						9
learning	algorithms	 Non-Linear regression -Decision tree learning: Decision tree rest Hypotheses search – Issues. Artificial Neural Networks: ayer network and Back propagation algorithm – Example. 						
Unit - III		Supervised Learning & Instance Based Learning:						9
classifier	r - Gibbs a	Bayes theorem – Concept learning – Maximum likelihood and l algorithm - Naïve bayes classifier – Example. Instance Base veighted regression - Radial basis functions - Case-based reaso	d Learnii					
Unit - IV	1	Unsupervised Learning:						9
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of evolut	tion and lea	doids – Genetic algorithms: Introduction – Example – Hypothesis arning – Parallelizing genetic algorithms.	s space s	earch – Gene	tic pi	rogra	mmin	g- Model
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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2							2	3	1
CO2	3	3	2	2	3							2	3	1
CO3	3	3	2	3	3							2	3	1
CO4	3	3	2	3	3							2	3	1
CO5	2	3	2	3	3							2	2	1
1 – Slight, 2	2 – Mode	erate, 3 –	Substant	iai, BT-			•	ERN - T	HEOR	(
1 – Slight, 2 Test / Bl Categ	oom's		nemberii (K1) %			SMENT	•	/ing	HEOR Analyzi (K4) %	ing l	Evaluating (K5) %		reating K6) %	Total %
Test / Bl	oom's ory*		nemberi		ASSES ndersta	SMENT	PATTE Apply	/ing %	Analyzi	ing l			•	Total %
Test / Bl Categ	oom's ory* Г1		nemberi (K1) %		ASSES ndersta (K2)	SMENT Inding %	PATTE Apply (K3)	ving %	Analyzi	ing l			•	%
Test / BI Categ	oom's ory* Г1 Г2		nemberi (K1) % 10		ASSES ndersta (K2) 60	SMENT Inding %	PATTE Apply (K3) 30	ving %	Analyzi	ing l			•	% 100



					ESS CONTROL AND INST						
Programn Branch	ne &	B.E. &	Mechatron	nics Enginee	ring	Sem.	Category	L	т	Р	Credit
Prerequis	ites		ontroller Pr Introl Engir		and Applications, System	^{IS} 6	PE	3	0	0	3
Preamble		control,	tuning of	controllers a	on process dynamics and and advanced control syst applications of various proc	ems. This	course also		-		• •
Unit - I		Introdu	ction to Pr	ocess Dynai	mics:						
 First ord 	er proces	s system	s - level, Te	emperature a	or automatic process contro nd pressure - Second order tion - Servo and regulatory	process sy					
Unit - II		Contro	I Character	ristics and T	uning:						
	modes - (Composit chols me	te control m thod.		ontrol system parameters ation criteria: Performance o Loops:						
		-			Cascade control - Ratio or ariable control.	control - Se	elective contr	ol Sy	stem	is - S	olit-Range
Unit - IV	-	Proces	s Instrume	entation:							
-					ol valves: Characteristics, ansmitters, Smart and intelli	-		ction	of c	control	valves
		1				gent hanen					
$1 \ln \pi = v$			s Control S	Systems							
Unit - V Boiler. Rea	actor. Mix		s Control S	-	Heat exchanger. Distillation	process.					
	actor, Mix			-	Heat exchanger, Distillation	process.					
Boiler, Rea				-	Heat exchanger, Distillation	process.					
Boiler, Rea	OK:	ing contro	ols, Evapora	ation, Dryer, H							Total:4
TEXT BOO	OK:	ing contro	ols, Evapora	ation, Dryer, H	Heat exchanger, Distillation		d Practice", ŕ	1st E	dition	i, Pea	Total:4
TEXT BOO	OK: eorge Ste elhi, 2015	ing contro	ols, Evapora	ation, Dryer, H			d Practice", 2	1st E	dition	ı, Pea	Total:4
Boiler, Rea TEXT BOO 1. Ge REFEREN	OK: eorge Ste elhi, 2015 ICES:	phanopo	ols, Evapora	ation, Dryer, H	S Control-An Introduction to	Theory and					Total:4
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1 – Slight, 2	– Mode	rate, 3 –	Substantia	I, BT-	Bloom's	Taxon	omy						
					ASSES	SMEN	T PATTER	RN - 1	THEORY				
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CAT	2		20		50		30						100
CAT	-3		20		50		30						100
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COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	3		1	2	2				2	1	2
CO2	1	1	3	1			1	1				1	3	3
CO3	3	1	2	1			1					2	3	3
CO4	3	1	3	3	2		1					2	3	3
CO5	2	2	1				1	1				3	1	2
1 – Slight, 2	2 – Mode	erate, 3 –	Substant	ial, BT-	Bloom's	Taxono	omy							
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CAT	Г1		30		40		30)						100
CAT	[2		25		50		25	5						100
CAT	T3		20		45		35	5						100
ES	F		15		65		20)						100



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COs/POs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1				2	2	3	2	2	1	1	2	3
CO2	1	1				3	2	3	3	3	1	1	2	3
CO3	3	2	2	2	2	2		1	2	2	1	1	2	3
CO4	2	2	2	2	2	2		1	2	2	1	1	2	3
CO5						3	3	2	3	2	1	1	2	3
1 – Slight, 2	– Mode	erate, 3 –	Substant	ial, BT-		SMEN1	,	ERN - T	HEOR	ŕ				
Test / Bl Categ		Rer	nemberii (K1) %	ng U	ndersta (K2)		Apply (K3)	•	Analyz (K4) 9		Evaluating (K5) %		reating K6) %	Total %
CAT	1		20		60		20)						100
CAT	2		20		30		30)	20					100
CAT	3		20		30		30)	20					100
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	uction to netic Arms								, Knee	e and f	oot pros	thesis. Act	ive pro	sthe	sis - (Control o
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1. REFE	Grahan RENCES Raymo Jacob S Leslie	: nd To Segil Crom	ong Kaiy , "Handb nwell, Fr	u, "Bio-m ook of Bio	echatror omechat	nics in N ronics",	/ledicine Acader	and Hea	althcare s, US, 2	e", CRC 2018.	C Press, I		easurer	nents	s", 2no	
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Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	30	40	30				100
CAT2	20	50	30				100
CAT3	20	30	50				100
ESE	20	40	40				100



	22MTE18 - PRECISION MA	NUFACTURING					
Programme & Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	Manufacturing Processes	7	PE	3	0	0	3
Preamble Unit – I Unconventional m	To impart knowledge in unconventional manufacture Introduction and Mechanical Energy Based Pro- achining processes – Need – Classification of mod	ocesses: ern machining proc	esses. Abrasi	ve Je	et Ma	achini	ng (AJM)
	ning (WJM)- Abrasive Water Jet Machining (AWJ ess parameters – MRR – SR.	M)- Ultrasonic Mac	hining (USM)	- V	/orkir	ng Pr	inciples
Unit – II	Electrical Energy Based Processes:						
Electric Discharge electrode / Tool - Equipment –Type	Machining (EDM)- Working Principle – Equipmer Power and control circuits - Tool Wear – Dielectric –Applications.	t used - Process F : – Flushing – Appl	Parameters - cations., Wire	Surfa cut	ace I EDN	⁻inish 1 – Pı	- MRR
Unit – III	Chemical and Electro-Chemical Energy Based	Processes:					
Process Paramete Unit – IV Laser Beam Mach Electron Beam M	ro-Chemical Machining: Principles of ECM – equipme rs. ECG and ECH – Working principle – Applications. Thermal Energy Based Processes: ining (LBM) - Process Parameters – Surface finish a achining (EBM)- Beam control techniques – Working	and MRR - Application	ons. Plasma A	Arc N	lachii	ning (PAM) an
Applications.							
Unit – V	High Precision Finishing Processes:						
	ishing (AFM)- Introduction -Working Principles – E (MAF)- Working Principles – Equipment – Process						-
	inciples – Equipment – Process parameters – Applica		cation. Mayin			ogical	1 11131111
(Total:4
TEXT BOOK:							
1. Gary F. B	enedict, "Non-traditional Manufacturing Processes", S	pecial Indian Editior	, CRC Press,	Flori	da, 2	019.	
REFERENCES:							
1. McGeoug	n J.A, "Advanced Methods of Machining", Springer, S	witzerland, 2014.					
2. Jain Vijay	K, "Advanced Machining Processes", Allied Publishe	rs Pvt. Ltd, New Dell	ni, 2009.				
3. Pandey P	C & Shan H.S, "Modern Machining Processes", Tata	McGraw-Hill, New D	elhi, 2017.				
COURSE OUTCO	MFS				B	Т Мар	ned
	the course, the students will be able to						Level)
	echanical energy based unconventional machining pr	ocesses for various	applications	ι	Jnde	rstanc	ding (K2)
CO2 apply the	electrical energy based processes for unconventional	machining			Ар	plying	g (K3)
CO3 utilize che	mical and electro-chemical energy based processes f	or machining		ι	Jnde	rstanc	ding (K2)
CO4 interpret t	nermal energy based processes for unconventional m	achining		ι	Jnde	rstanc	ding (K2)
CO5 select the	appropriate high precision finishing process for variou	is applications			Ар	plying	g (K3)
	Mapping of COs with PC	and BEOs					



COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1						1	2	3	2
CO2	3	2	2	2	1						1	2	3	2
CO3	3	2	2	2	1						1	2	3	2
CO4	3	2	2	2	1						1	2	3	2
CO5	3	2	2	2	1						1	2	3	2
1 – Slight, 2	2 – Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	omy							
					ASSES	SMENT		ERN - T	HEOR	(
Test / Bl Categ		Rer	nemberii (K1) %	ng U	ASSES ndersta (K2)		PATTE Apply (K3)	/ing	HEOR Analyz (K4) %	ing l	Evaluating (K5) %		reating K6) %	Total
	ory*	Rer		ng U	ndersta	nding	Apply	/ing %	Analyz	ing l				Total % 100
Categ	ory * Г1	Rer	(K1) %	ng U	ndersta (K2)	nding %	Apply (K3)	/ing %	Analyz	ing l				%
Categ CAT	ory* [1] [2]	Rer	(K1) % 13	ng U	ndersta (K2) 56	nding %	Apply (K3) 31	/ing %	Analyz	ing l				% 100



				22MTE19 -	DIGITAL TWIN	AND INDU	JSTRY 5.0					
Progra Branc	amme &	B.E. &	Mechatro	nics Enginee	ering		Sem.	Category	y L	Т	Р	Credit
	quisites	Progra	mmable A	utomation C	ontrollers		7	PE	3	0	0	3
Pream	ıble		-		amental concep d maintenance r	-		evelop sma	art inc	lustry	with	pro-active
Unit –	I	Introdu	uction									9
•				•	ey requirements rin role in industi		•••	•				
Unit -	II	Digital	Twin in a l	Discrete Indu	ustry							9
		-			ndustry – contro ollection on anal	-	-			-	-	Twin of a
Unit -		Digital	Twin in a l	Process Indu	ustry							9
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Unit -		Indust	-									9
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CAT	1		15		85							100
CAT	2		15		85							100
CAT	3		15		65		20					100
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CO5	3	2	1	1	1					2	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT	- Bloom's	Taxono	omy					
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Test / Bl Catego		Rei	memberir (K1) %	ng	Understa (K2)	-	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		eating K6) %	Total %
CAT	1		10		10		80					100
CAT	2		10		10		80					100
CAT	-3		10		10		80					100
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Unit –	II	Literat	ure Review	,									9
Literatu	ure Review:	Literature	Collection -	Methods - A	nalysis - Citatio	n Study	- Gap A	Analysis -	Problem F	ormula	tion	Techn	iques.
Unit –		Resear	ch Method	ology									9
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	BOOK:	Nicholas	"Pesearch I	Mathods: The	basics" 2nd ad	lition Pr		2017				/	
1.			"Research I	Methods: The	basics". 2 nd ed	lition, Rc	outledge	e, 2017.,				,	
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1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxonc	omy					I	L	
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Test / Bl Catego		Rer	nemberir (K1) %	ng U	ndersta (K2)	-	Apply (K3)	•	Analyzi (K4) %	-	Evaluating (K5) %		reating (K6) %	Total %
CAT	1		· · ·		40		50)	10				· · · ·	100
CAT	2				30		50)	10		10			100
CAT	3				20		30)	30		10		10	100
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* ±3% may b	oe varie	d (CAT 1	,2,3 – 50	marks &	ESE –	100 ma	rks)							

Progran Branch		B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Prerequ		Nil	7	PE	3	0	0	3
Preambl	le	This course deals with alternative sources of electric	c and hybrid vehicle	es and their su	ıbsys	tems		
configura	ations of I	Need for Alternative System: and electric vehicles – main components and workin hybrid and electric vehicles. Comparative study of die	sel, petrol, hybrid	and electric V				
Limitatio	•	id and electric Vehicles. Case study on specification of Energy Sources:	electric and hybrid	venicles.				9
Battery	Modeling-	rs- – Different types of batteries – Lead Acid- Nicke Equivalent circuits, Battery charging- Quick Charging ns of fuel cell. Ultra capacitors. Battery Management Sy	g devices. Fuel Co					
Unit – II		Electric Propulsion unit:						9
Configur	ration and	lectric components used in hybrid and electric vel control of Induction Motor drives, configuration and o tch Reluctance Motor drives, drive system efficiency.						
	g the elec	Sizing the drive system: tric machine and the internal combustion engine (ICE),	Sizing the propuls	ion motor, sizi	ng th	e po	wer e	9 lectronic
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					Mappir	ng of CC	Os with	POs a	nd PSO	S				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3		2	2	2				2	2	2
CO2	1	1	3	1			1	1				1	3	3
CO3	3	2	2	1			1					2	3	3
CO4	3	1	3	3	2		1					2	3	3
CO5	2	2	1				1	1				3	2	2
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	omy							
					ASSES	SMENT		ERN - ⁻	THEOR'	Y				
Test / Bl Catego		Rei	nemberi (K1) %	ng l	Jndersta (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating K6) %	Total %
CAT	1		20		50		30)						100
CAT	2		25		50		25	5						100
CAT	3		20		50		30)						100
ESI	Ξ		15		65		20)						100
* ±3% may l	oe varied	d (CAT 1	,2,3 – 50	marks	& ESE –	100 ma	irks)					·		·



Progra Branc	amme & h	&	B.E. &	Mechatro	onics Engine	eering			Sem.	Category	L	т	Ρ	Credit
Prerec	quisites	5	Nil						7	PE	3	0	0	3
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Unit –						ol in Machine								9
repres contro Unit – Adapti	entatior ISuperv II	n of m visory c trol-type	nechanic omputer Adapti es – AC	al pneuma control. ve Control C, ACO, F	atic and electric and PLC: Real time part	s- process mo ctrical systems ameter estima Applications in	s. Proces	is comp	uter Pe	ripherals -	Data	logge	er-Dire	ect digita
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		condar				and Sound M onitoring. Fund			ation, Sc	ound, Acous	tic Em	issior	. Mac	
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Unit –	-					h Other Techr								9
	& temp	perature												
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		onitoring				ng, Lubricant n in condition m				toring of Lu		а нус		-
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TEXT 1. REFE	BOOK: Mishr Delhi, RENCE	nitoring a R.C. , 2012.	g, Image & Patha	k K., "Mair	g techniques	in condition m	onitoring. Nanageme	ent", 2nd	Edition	, Prentice H	all of Iı	ndia F	Pvt. Ltd	Total:4
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CO2	3	2	1		1						2	1	2
CO3	3	2	3	2	1						2	1	2
CO4	3	2	3	2	1						2	1	2
CO5	3	2	3	2	1						2	1	2
1 – Slight, 2	- Mode	rate, 3 –	Substant	ial, BT	- Bloom's T	axonor	my			Ŀ			
					ASSESS	MENT	PATTERN	THEORY					
Test / Bl Catego		Rer	nemberir (K1) %	ng	Understan (K2) %		Applying (K3) %	Analyzing (K4) %		luating (5) %		reating K6) %	Total %
CAT	1		25		55		20						100
CAT	2		25		55		20						100
CAT	-3		25		55		20						100
ESI	E		10		70		20						100
* ±3% may l								1	1		1		



	22MTE23 - ADDITIVE MANU	FACTURING					
Programme & Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Prerequisites	NIL	7	PE	3	0	0	3
		I					
Preamble	This course provides scientific as well as technologic manufacturing processes. Variety of applications als customization.	-					-
Unit – I	Introduction to Additive Manufacturing:						
compression in pr – RP process cha systems - Classifi	nental fabrication processes, CAD for RPT, product or roduct development - Conceptual design - Detail design ain - 3D modelling -3D solid modeling software and th cation of RP systems - Benefits of RPT.	, Prototype fundar	nentals - Fund	dame	entals	of RI	P system ory of RI
Unit - II	Liquid based RP systems:						
Advantages. Soli Creation System	hy Apparatus (SLA): Principle, Photo polymers, Po d Ground Curing (SGC): Principle, Process paramete (SCS): Principle, Process parameters, Process details, I	ers, Process detai	ls, Machine o				ons. Solid
Unit - III	Solid based RP systems:						9
details, Advantag Advantages and details, Applicatio		(LOM): Principle,	Process para	mete	ers, F	Proces	ss details
Unit - IV	Powder based RP systems:						
-	Rapid Tooling and Applications of RP: ling, Indirect Rapid Tooling: Soft tooling and Hard too lical field – Conversion of CT/MRI scan data - Customized	• • • •				-	
TEXT BOOK:							Total:4
F	K.,Leong K& Lim C.S., "Rapid prototyping: Principles an	nd Applications", 3r	d Edition, Wo	rld so	cienti	fic, Ne	ewjersy,
REFERENCES:							
1. Pham D.	T. & Dimov S.S., "Rapid Manufacturing", Springer -Verla	g, London, 2011.					
2. Amitabha	Ghosh, "Rapid Manufacturing a Brief Introduction", Affil	liated East West P	ress, New Del	hi, 20	011.		
COURSE OUTCO On completion o	DMES: If the course, the students will be able to					T Map Jhest	oped Level)
	BD model for RP process in different file format				Ар	plying	g (K3)
CO2 select the	e suitable liquid based rapid prototyping system for a spe	ecific application			Ap	plying	g (K3)
CO3 identify th	ne suitable solid based rapid prototyping system for a sp	ecific application			Ap	plying	g (K3)
CO4 choose th	ne suitable powder based rapid prototyping system for a	specific application	ו		Ap	plying	g (K3)
CO5 apply the	concepts of rapid prototyping in product design and dev	velopment			Ap	plying	g (K3)
	echatronics Engineering Regulation Curriculum a			1		200	`



					Mappin	ng of CC)s with	POs a	nd PSO	S				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	2	2						2	2	2	2
CO2	2	3	1	2	2						2	2	2	2
CO3	2	3	1	2	2						2	2	2	2
CO4	2	3	1	2	2						2	2	2	2
CO5	2	3	1	2	2						2	2	2	2
1 – Slight, 2	2 – Mode	erate, 3 –	Substant	tial, BT-		SMEN1	•	ERN - 1	HEOR	Y				
Test / Bl Categ		Rer	nemberi (K1) %	ng L	Jndersta (K2)	-	Apply (K3)	-	Analyz (K4) 9	-	Evaluating (K5) %	-	reating K6) %	Total %
CAT	Г1		15		55		30)						100
CAT	Г2		15		55		30)						100
CAT	ГЗ		15		55		30)						100
	E		6		60		34							100



CO2

Progra Branch	amme & h	B.E. &	Mechatror	nics Enginee	ring			Sem.	Category	/ L	т	Ρ	Credit
	uisites	Nil						7	PE	3	0	0	3
Preamb	ble		-		c concepts of odern industrial		etworks	and diff	erent indus	strial a	utom	ation	protocols
Unit –		Introdu	ction to Ne	letworks in Ind	dustrial Auton	nation:							9
				chical commur ecent network	nication model	 Netwo 	ork requ	irement	s - Data Co	ommuni	catio	n bas	ics – OS
Unit - I	I	Data No	etwork Fur	ndamentals:									9
convert Bridges	ters – Data s – Routers	link contro – Gateway	l protocol – /s.	 Media acces 	andard – EIA ss protocol: Cor								
Unit - I				BUS Protocol:									9
					communication structure –Trar								
Unit - ľ	IV	Fieldbu	is and Prof	fibus:									9
Intercha	angeability.				requirements on tocol stack. Pro-								
		ubleshootir	ng – Founda	lation fieldbus	versus Profibus	S.							
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B.E.– Mechatronics Engineering, Regulation, Curriculum and Syllabus – R2022



CO3	3	3	2	3	1					1	3	3
003	3	5	2	3	1					1	3	3
CO4	3	3	2	3	1					1	3	3
CO5	3	3	2	3	1					2	3	3
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, B	T- Bloom's	Taxono	omy	i				
					ASSES	SMENT	PATTERN	THEORY				
Test / Blo Catego		Rei	memberii (K1) %	ng	Understa (K2)		Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
CAT	1		20		80							100
CAT	2		20		80							100
CAT	3		15		55		30					100
ESE			10		70		20					100
ESE * ±3% may b		d (CAT 1		mark	-	100 ma						100



Progr Branc	amme & ch	B.E. &	Mechatr	onics Engi	ineering			Sem.	Category	y L	т	Ρ	Credit
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Unit –	- 1	Introdu	uction to	Robot Pro	gramming:								9
Envel		rities – P			natics – Tool (– Reachabili								
Unit –	- 11	Introdu	uction to	RAPID Pro	gramming:								9
		trolling th	ne Program	m Flow – F	RAPID Syntax ured Design -		ot Func	tionality -	- Move Ins	tructior	ט – U	ser In	teraction
Unit –	- 111	RAPID	Data Typ	es:									9
Progra	am Structure	- Module	s – Routir	nes - Progra	am Data – Da - Communicat	ita Types – Da tion protocols	ata Decl	arations	-Expressio	ns – Ins	struct	ions –	Decisio
Unit –			Instructi										9
Interru	upts - Error	recovery	– Undo	- System	& time – M	lathematical i	nstructio	on- Exte	rnal compu	uter co	mmu	nicatio	on – Fil
					ration & Servio	ce – String Fu	Inctions	- Multitas	king – Bac	kward I	Execu	ution	
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					– Cost analys								Total:4
ТЕХТ	BOOK:												Total:4
		nical Refe			ID – An overvi		e Manua	al.					Total:4
1.	ABB, Tech		erence Ma	anual: RAP	ID – An overvi	iew Reference							Total:4
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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				100
CAT2	10	40	50				100
CAT3	10	60	30				100
ESE	10	40	50				100

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



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Programn Branch	ne &	B.E. &	Mechatr	onics En	igineerir	ng			Sem.	Categor	y L	т	Р	Credit
Prerequis	ites	Proble Machir		g and Pro	ogramm	ing in C, The	eory of		7	PE	3	0	0	3
Preamble					•	nd introduce ters through			•				· ·	
Unit – I Overview a governmer		ground: h				nned Aerial ons of UAVs,				Contempora	ary app	licatio	ons like	9 e military
systems.	On-boar	rations - d flight	characte	eristics – – Paylo	applica ads: se	tem (UAS) c tions. Propul ensing/surveil	sion: in lance,	ternal o weapor						
Unit – III	control, t		tle: Basic		•	- Ground con	troi stati	ons						9
Aerodynar	, flight co	weight, th ntrols, au	rust, and itopilots.	drag. Flig Emergen	ght perfo	rmance: clim fication and h								d control
Unit – IV		Unit Ti	tle: Dron	e Equipr	nent Mai	ntenance:								9
						of ground equ	uipment	- batteri	es - Sche	eduled serv	/icing -	Repa	air of e	quipmen
- Fault find Unit – V	ing and r					ulations:								9
Homeland		ry: FCC,	FAA. Re	gulations:	: FCC c	ompliance, U legal issues,				Aircraft R	egulatio	ons (FARs	- Safet
	aul Fahlst	rom, Tho	mas Glea	ison, "Intr	oduction	to UAV Syst	ems", 5	th Editic	on, John	Wiley & So	ns, Nev	w Jer	sey, 2	022.
				V. McLain	n, "Small	Unmanned A	Aircraft:	Theory	and Prac	tice", 1st E	dition,	Princ	eton L	Iniversity
				plications	of Unma	anned Aerial	Vehicles	s", 1st E	dition, C	RC press,	Florida,	202	Э.	
COURSE On compl	etion of	the cours										(Hig		_evel)
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	•					unmanned ae	erial syst	em					plying plying	
			on and co uipment n		-						1			(K3) ing (K2)
						ns in UAV op	eration							ing (K2)
				N	lanning	of COs with	POs ar		6					
							POS ar	PO9	s PO10	P011	DO4 2	-	<u> </u>	
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6 PO7	FUO				PO12	P	501	PSO2
COs/POs	PO1	PO2	PO3	PO4 3	PO5	PO6 PO7	FUo				2	P	SO1 3	PSO2
	-					PO6 PO7	FUo					P		
CO1	2	3	2	3	1	PO6 PO7					2		3	3
CO1 CO2	2	3 3	2 2	3 3	1	PO6 PO7					2 2		3 3	3
CO1 CO2 CO3	2 2 2	3 3 3	2 2 2	3 3 3	1 1 1	P06 P07					2 2 2		3 3 3	3 3 3



ASSESSMENT PATTERN - THEORY							
Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	15	65	20				100
CAT2	15	65	20				100
CAT3	30	70	-				100
ESE	5	65	30				100



Program Branch	nme &	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequi	isites	NIL	7	PE	3	0	0	3
Preamble	e	This course enables the student to understand the successful management of maintenance action				apteo	d in in	dustry fo
Unit – I		Principles and Maintenance System Planning						9
Importanc	ce and b	air and Maintenance – Maintenance as business – enefits of sound Maintenance systems: Maintena herent and overall availability – Mean time between Condition Based Maintenance:	ince systems - reactiv	ve, preventive	or p	oroac	tive s	ystems -
Introducti	ion to Co	ndition based monitoring of equipment and system	ems; Condition Monito	oring Techniq	ues	-Vibr	ation	analysis-
comparise thermome	son with eters – w	n techniques -Thermograph - lubrication methods and without CM; On-load testing and off-load ear-debris analysis.	-					
Unit – III		Maintenance Techniques:						9
– seven i	modern t	aintenance (TPM) –Relationship between Overall E pols –applications - Ladder of Maintenance improv effective management of Computerized Maintenar	vement-Computerized	online health				
Unit – IV	1	Failure Analysis and Reliability Engineering a	and Safety in Mainten	ance:				9
Defect/fai	ilure defir	ition; Failure - rate -mode -reporting - date collect		- tools -fault t	ree a	analy	sis - e	event tre
analysis-l	Root cau	ition; Failure - rate -mode -reporting - date collec se analysis - FMEA - FMECA - System Relia	ction; Failure analysis ability- series, parallel	and mixed of	config	gurati	on –	reliabilit
analysis-l increasing	Root cau	ition; Failure - rate -mode -reporting - date collect	ction; Failure analysis ability- series, parallel	and mixed of	config	gurati	on –	reliabilit
analysis-l increasing studies.	Root cau	ition; Failure - rate –mode -reporting – date collec se analysis – FMEA – FMECA - System Relia ues. Safety – Definition – methods of enhancing	ction; Failure analysis ability- series, parallel g safety – modern ind	and mixed of	config	gurati	on –	reliabilit ls – case
analysis-l increasing studies. Unit – V	Root cau ng technic	ition; Failure - rate –mode -reporting – date collect se analysis – FMEA – FMECA - System Relia ues. Safety – Definition – methods of enhancing Repair Methods of Mechanical and Electrical	ction; Failure analysis ability- series, parallel g safety – modern ind Equipment:	and mixed out and mixed of ustrial scenar	onfig ios-	gurati safet	on – y too	reliabilit <u>;</u> ls – case 9
analysis-l increasing studies. Unit – V Plain bea	Root cau ig technic arings – F	ition; Failure - rate –mode -reporting – date collec se analysis – FMEA – FMECA - System Relia ues. Safety – Definition – methods of enhancing	ction; Failure analysis ability- series, parallel g safety – modern ind Equipment: nains for power transm	and mixed oustrial scenar	ios-	gurati safet and g	on – y too gantry	reliabilit ls – cas 9 cranes -
analysis-I increasing studies. Unit – V Plain bea chain hois	Root cau ig technic arings – F ists – belt	ition; Failure - rate -mode -reporting - date collect se analysis - FMEA - FMECA - System Relia ues. Safety - Definition - methods of enhancing Repair Methods of Mechanical and Electrical olling element bearings - Flexible coupling and ch	ction; Failure analysis ability- series, parallel g safety – modern ind Equipment: nains for power transm	and mixed oustrial scenar	ios-	gurati safet and g	on – y too gantry	reliabilit ls – case 9 cranes - ries.
analysis-I increasing studies. Unit – V Plain bea chain hois TEXT BC	Root cau ig technic arings – F ists – belt DOK:	ition; Failure - rate -mode -reporting - date collect se analysis - FMEA - FMECA - System Relia ues. Safety - Definition - methods of enhancing Repair Methods of Mechanical and Electrical olling element bearings - Flexible coupling and ch	ction; Failure analysis ability- series, parallel g safety – modern ind Equipment: nains for power transmi pontrol components – Ma	and mixed oustrial scenar	config ios- ead Indu	gurati safet and g	on – y too gantry	reliabilit ls – cas 9 cranes - ries.
analysis-I increasing studies. Unit – V Plain bea chain hois TEXT BC 1. S	Root cau ig technic arings – F ists – belt DOK: Srivastava	ition; Failure - rate –mode -reporting – date collect se analysis – FMEA – FMECA - System Relia ues. Safety – Definition – methods of enhancing Repair Methods of Mechanical and Electrical olling element bearings – Flexible coupling and ch drives. Electrical motors – Maintenance of motor co	ction; Failure analysis ability- series, parallel g safety – modern ind Equipment: nains for power transmi pontrol components – Ma	and mixed oustrial scenar	config ios- ead Indu	gurati safet and g	on – y too gantry	reliabilit ls – cas 9 cranes - ries.
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					Mappir	ng of CC)s with	POs a	nd PSO	s				
COs/POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3			2						2	1	2
CO2	3	2	2			1						2	1	2
CO3	3	2	2			1					2	2	1	2
CO4	3	2	2			2						2	1	2
CO5	3	2	2			2					1	2	1	2
1 – Slight, 2	- Mode	rate, 3 –	Substant	ial, BT-	Bloom's	Taxono	omy							
					ASSES	SMENT	PATTI	ERN - 1	THEOR	Y				
Test / Bl Catego		Rer	nemberii (K1) %	ng l	Jndersta (K2)		Apply (K3)	•	Analyz (K4) 9		Evaluating (K5) %		reating K6) %	Total %
CAT	1		20		70		10)						100
CAT	2		20		70		10)						100
CAT	3		15		70		15	5						100
ESE	Ξ		15		70		15	5						100
* ±3% may b	oe varie	d (CAT 1	,2 &3 – 5	0 marks	s & ESE	– 100 m	arks)							



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Davies E.K, "Machine Vision: Theory, Algorithms, Practicalities", 3rd Edition, Elsevier, India, 2005.
Milan Sonka, "Image Processing Analysis and Machine Vision", 2007 Edition, Vikas Publishing House, India, 2007.
URSE OUTCOMES: BT Mapped
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CAT	2		15		50	35					100
CAT	3		15		50	35					100
	E		5		60	35					100



Programme & Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Problem Solving and Programming in C, Theory of Machines	8	PE	3	0	0	3
Preamble	This course enables to grasp the knowledge on different kir and path planning algorithms.	nds of mobile	e robots and t	heir (desig	n, arc	chitecture
Unit – I	Introduction to Mobile Robots:						9
	e robots: Automated Guided vehicles (AGVs)- Service robots - exploration robots - Humanoid robots – Nuclear robots – Un nobile robots.						
	Mobile Robot Engineering: osystems – Fundamentals of wheeled and legged mobile robot straints – Hilare mobile robots – Car-like mobile robots – Mobile						
	Locomotion: egged mobile robots - Leg configurations and stability - Examp d locomotion: Design space-Case studies.	les of legge	ed robot locon	notio	n - V	/heel	9 ed mobil
Unit – IV	Perception and Localization:						9
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	bile robots – Representing uncertainty - Feature extraction - Mo ng - Map representation - Probabilistic map-based localization.	odile rodot i	ocalization - (Jnaii	enge	of Io	calization
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CO2	3	3	3	3	2							2	3	3
CO3	3	3	3	3	2							2	3	3
CO4	3	3	3	3	2							2	3	3
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Programme Branch	& B.I	E. & Mechatro	nics Engineer	ring			Sem.	Category	/ L	т	Р	Credit
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CO4	3	3	3	3	2	2						3	2	2
CO5	3	3	3	3	2	2	2	2	3	2	2	3	2	2
1 – Slight, 2	– Mode	rate, 3 –	Substant	ial, BT	- Bloom's	Taxono	omy		L.					
					ASSES	SMEN		ERN -	THEORY	(
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CAT	2		10		30		30)	30					100
CAT	-3		10		30		30)	30					100
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Progra Branch	amme & h	B.E. &	Mechatro	nics Enginee	ering			Sem.	Categor	y L	т	Ρ	Credit
	uisites	Nil						8	PE	3	0	0	3
Preaml	ble	operati		ign of various	ental knowledg battery techno								
Unit –		Introdu	uction:										9
connec	cted in seri	es, Cells	connected	d in parallel,	& Batteries, No Electrochemic Modes of Char	cal and I							
Unit –	II	Major	Battery Ch	emistries De	velopment an	d Testing	j :						9
temper		ervice life.	Secondary		ervice time- Vo ischarge curve								
Unit –		Recen	t Technolo	gies:									9
solid s	state batteri	es-Polym	er solid el	ectrolytes for	ion batteries- F r lithium ion o damental, Con	conductior	n– [†] hir	n Film	solid state				
Unit –	IV	Desigr	of Battery	y Managemei	nt System (BN	IS):							9
Design system		of battery	BMS, Effec	ct of distance,	load, and forc	e on batte	ery life	and BM	S, Energy	balanci	ng wi	ith mu	ılti-batter
Unit –	V	Batteri	es for Aut	omotives – F	uture prospec	ts:							9
Doors	es of vehicle	e electrific	ation _ Rat	terv size vs. a	application -US	ABC and	DOF to	araets fo	or vehicula	r enera	y sto	rage s	wstems .
Analysi	is and simu	ulation of	batteries -	Equivalent of	circuit and life	modeling	g – Env	vironmer	ntal concer	ns in I	batter	y pro	duction
Analysi	is and simu	ulation of	batteries -	Equivalent of	circuit and life	modeling	g – Env	vironmer	ntal concer	ns in I	batter	y pro	duction
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2 2 2 3 ate, 3 – Substantia	2 1 3 2 al, BT- Bloom ASSE	SSMENT P		THEORY		1 1 2	2	2	2
2 3 ate, 3 – Substantia	3 2 al, BT- Bloom ASSE	SSMENT P		THEORY		2			
ate, 3 – Substantia	al, BT- Bloom ASSE	SSMENT P		THEORY		2	2	3	3
	ASSE	SSMENT P		THEORY		I			
Pomomhorin		1	ATTERN -	THEORY					
Bomomhorin	a Ila dana								
Rememberin (K1) %	-	-	Applying (K3) %	Analyzing (K4) %	Evalu (K5			reating (K6) %	Total %
20	8)							100
20	8)							100
20	6)	20						100
20	5	5	25						100
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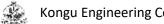
Programme & Branch	B.E. & Mechatronics Engineering	Sem.	Category	L	т	Ρ	Credit
Prerequisites	Manufacturing Processes, Engineering Economics and Management, Numerical Methods for Engineers	8	PE	3	0	0	3
Preamble	To impart knowledge about product/process design & demand material handling systems and implement aggregate plannin systems in industries.		-				-
Unit - I	Concept of PM and Demand Forecasting:						ę
Process planning	oduction Management – Production systems – Concept – Types and design- Economic Analysis- Designing for customer- Designers - Moving Average – Exponential Smoothing – Trend Project	gning for	manufacture	and	asse	mbly	. Demano
Unit - II	Facility Design:						ç
Plant layout: clas	actors affecting plant location – Center of Gravity Method – Facto sification – layout design procedures- Assembly Line Balancing. principles- classification of material handling equipment.	-				-	
Unit - III	Aggregate Planning and ERP:						9
	ing strategies-Methods-Master Production Schedule. Material re- Requirement Planning- MRP II. Enterprise Resource Planning (ER ware's	•					•
							-
	Supply Chain Management (SCM):						-
chain coordination management.	 A - Supply chain performance- Drivers and metrics- Planning de n - Bullwhip effect – Transportation networks- Inbound & outbook 				-		ry- Supply /arehouse
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	t / Blo atego	oom's ory*	Rei	memberi (K1) %	ng l	Jndersta (K2)		Apply (K3)		Analyzi (K4) %	•	Evaluating (K5) %		reating K6) %	Tota %
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CO1	3	2	2	1								2	3	3
CO2	3	2	2	1								1	1	1
CO3	3	2	3	1								1	1	1
CO4	3	2	3	1								1	1	1
CO5	3	3	3	3	3							3	3	3
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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	15	55	30				100						
CAT2	15	55	30				100						
CAT3	15	55	30				100						
ESE	5	65	30				100						



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	of Avionics, and space s								n and	crew tas	sks, Need	for Av	ionics	in civ	il-militar
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Unit – I			Deck and				5010.								9
	and display HUD, HMD,		ogies: Tac	ctile con	trol pan	el (TCP)), Direct v	/oice in	iput (D	VI) –-Civ	/il cockpit	and mi	litary	cockpi	t: MFDS
Unit – I	IV	Naviga	tion Syst	tems:											9
	/OR, DME,	NDB, ILS			n, RNA	V archit	ecture, II	NS, GF	PS and	d GNSS	characteri	stics, A	Airbor	ne su	rveillance
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Unit – \ Fly-by-v	v wire: Basic p		Wire & A and A320			study. Ai	uto pilot –	Basic	princip	les. Lon	nitudinal ar	d later	al au	to pilot	9
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1.	Albert Helfr	ick D "Pi	incinles c	of Avion	ice" 3rd	Edition	Avionics	Comm	unicat	ions Inc					
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2.	Cary R .Sp	itzer, "The	e Avionics	s Handb	000k", 1s	st Edition	n, Springe	er scien	ce+Bu	isiness m	nedia LLC	USA,	2000	•	
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CO2	integrate av	vionice ev	etom usir	a diaita	l data hi	10.00							Ap	plying	(K3)
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000	apply vario	us cockni											•	nivina	(1(0))
CO3			t display f	technolo	ogies for	avionics	S						Ap	pijing	(K3)
CO3	design and	•			ogies for	avionics	5							plying	
	design and design fly-b	build nav	vigation sy	/stems		avionics	5						Ap		(K3)
CO4	-	build nav	vigation sy	/stems	ems								Ap	plying	(K3)
CO4	design fly-b	build nav	vigation sy	/stems	ems		Ds with P		I PSO: PO9	s PO10	P011	P012	Ap Ap	plying	(K3)
CO4 CO5	design fly-b	build nav	vigation sy	vstems lot syste	ems Mappin	ng of CC	Ds with P				P011	P012	Ap Ap	plying	(K3) (K3)
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CO5	3	3	2	3	2		2					1	3	3
1 – Slight, 2	– Mode	rate, 3 -	Substant	ial, BT∙	- Bloom's	Taxono	omy							
	ASSESSMENT PATTERN - THEORY													
Test / Blo Catego		Re	memberir (K1) %	ng l	Understa (K2)	-	Applyi (K3) 9	-	Analyzing (K4) %	J	Evaluating (K5) %		Creating (K6) %	Total %
CAT	1		20		50		30							100
CAT	2		10		45		45							100
CAT	3		10		40		50							100
ESE			5		55		40							100
* ±3% may b	e varie	d (CAT 1	,2,3 – 50	marks	& ESE –	100 ma	rks)							

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CO4	3				2					3	
004	3	2	1	1	3					3	
CO5	3	2	1	1	3					3	
1 – Slight, 2	– Mode	rate, 3 –	Substan	tial, B	T- Bloom's	Taxono	omy	I		H	1
					ASSES	SMENT	PATTERN	- THEORY			
Test / Bl Catego		Re	memberi (K1) %	ng	Understa (K2)	-	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creat (K6)	-
CAT	1		15		85						100
CAT	2		15		85						100
CAT	3		15		55		30				100
ESI	Ē		5		60		35				100
CAT	3		15		55						



Brand	amme&	All B.E./B.Tech. Branches Except Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
	quisites	Nil	5	OE	3	0	2	4
	4				•			-
Prean	nble	This course provides the fundamental knowledge on Gra		Design progra	amn	ning,	data a	acquisitio
Unit -	1	and interfacing techniques of Virtual Instrumentation (VI) Basics of Virtual Instrumentation:	•					9
Archit	ecture of a G	raphical System Design based virtual instrument - Data Flo						platform
	gramming an eric, String, ar	d modular programming - Graphical programming palettes	: Control, Fun	ctions and too	l pa	lettes	s – Da	ata Types
Unit -		VI Programming Techniques:						9
		Shift Registers, Case, Event, Timed, Flat sequence - Ex		e - Formula n	ode	s - A	rrays/	Clusters
Wave Unit -		tion - File I/O: Read/ Write - Variables: Local/Global - Sub-V Data Acquisition Hardware Interface:						9
		dware and software - Concepts of data acquisition and ter	minology - Ins	talling hardwa	re a	nd d	rivers	-
		dressing the hardware - Communicating between the Real-						
Unit -		Data Logging, Control, and Monitoring						9
		ting the Analog Input/Output: Simulating the Hardware a nal - Triggering - Timing and Synchronization Methods - Pro				nt - (Genei	rating and
Unit -		Real time Applications:		a				9
		Signal processing tools - Measuring Temperature, Strain, F and Duty Cycle. Vision and Motion, Vision Acquisition and Y			ratio	n, ar	nd Ac	celeration
	iments:							
1.		isition using LabVIEW for temperature measurement with th						
2.	Data acqu	isition using LabVIEW for temperature measurement with R	TD/ Thermisto	r.				
3.	Creation o	f a CRO using LabVIEW and measurement of frequency an	d amplitude fr	om external so	ourco	Э.		
4.	Create fun	ction generator using LabVIEW and display the amplitude a	nd frequency	on CRO (exte	nall	y con	necte	ed)
5.	Demonstra	ate amplitude modulation considering modulating and carried	r wave from ex	ternal source				
6.	Interface L	EDs to DAQ output and implement the counter operation.						
7.	Data acqu	isition using LabVIEW for load / strain measurement using s	uitable transd	ucers.				
8.	Demonstra	ate binary to grey code converter (& vice versa) using DAQ of	card.					
9.	Data acqu	isition using LabVIEW for distance/humidity measurement u	sing suitable t	ransducers.				
10.	Reading a	udio input with Microphones and output using DAQ card.						
	Ŀ			Lecture:4	5, Pı	actio	al:30	, Total:7
TEXT	BOOK:							
1.		avis & Jim Kring, "LabVIEW for Everyone: Graphical progr , India, 2009.	amming made	e easy and Fu	ın",	3 rd E	dition	i, Pearsoi
REFE	RENCES:							
	Gupta, Jos	seph & John, "Virtual Instrumentation using LabVIEW", 2 nd E	dition, Tata M	cGraw Hill, Ind	dia,	2010		
1.								Taylor 8
1. 2.		r, Taqi Mohiuddin & Matt Nawrocki, "LabVIEW Advanced oup, New York, 2007.		9			,	Taylor



CO1	dem	nonstrat	e the bas	sic conce	ots of Vi	rtual Ins	trument	ation					Ur	nderstandi Imitation	5 ()
CO2	inte	rpret the	e differen	t software	e tools ir	n Virtual	Instrum	entatior	ו				N	Applying Ianipulatic	
CO3	inte	rface da	ita acquis	sition har	dware w	ith softv	vare						N	Applying Ianipulatio	
CO4	dev	elop pro	grammir	ig concep	ots with o	data log	ging and	d contro	I					Applying Precision	
CO5	desi	ign grap	hical pro	grammin	g solutic	ons to re	al world	probler	ns					Applying Precision	
						Mappin	ng of CC)s with	POs ar	nd PSO	S				
COs/F	POs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

003/103		102	100	104	100	100	101	1.00	105	1010	1011	1012	1001	1002
CO1	3	3	3	3	2							2		
CO2	3	3	3	3	2							2		
CO3	3	3	3	3	2							2		
CO4	3	3	3	3	2							2		
CO5	3	3	3	3	2							2		
					<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) %	Tota %
CAT1	15	35	50				100
CAT2	10	35	55				100
CAT3	10	35	55				100
ESE	5	40	55				100



					(04				-	- FA		_	-	-		-		a)							
Program	mo &	Δ1	I B.E./E	Toch					-					roni	CS E	ngir	neerin	g)							
Branch	nie o		i B.E./E		. DI d	anch	les i	EXC	Jept		Cha	lioi	lics				Sem	•	Cate	egory	L	Т	Ρ	(Credit
Prerequis	sites	Ni	I														5		C	θE	3	0	2		4
Preamble	·		is cour es.	se pro	vides	s the	e fur	ndar	men	ntal I	knov	wlea	dge	abo	ut a	uton	nation	in	the fi	eld of	prod	uctio	n and	las	sembly
Unit – I		0	/erview	:																					9
automatio	on overvie on – Sens , Process	nsors	for te	mpera																					
Unit – II		Pr	ogram	nable	Auto	oma	ation	n Co	ontro	olle	rs:														9
Programn diagram, I	nable cont PLC selec			-		-	-					-	-		-		-					-		-	
Unit – III			ommun																						9
Man-macl networkin																									on and
Unit – IV Definition			CADA:																						9
Unit – V Basic con Humanoic			obots fo configu							place	e rol	bot,	We	Iding	g ro	bot,	Robo	ts i	n Sor	ting, l	Mobil	e rob	ots, C	Cobo	9 ots and
LIST OF I	EXPERIM	MENT	S/EXI	ERCIS	ES:																				
1. Ir	ntroductior	on to	orogran	nming	/simu	ulatio	on/c	comr	mun	nicati	ion s	soft	ware	e for	PLC	C pro	ogram	mii	ng						
2. L	ogical test	sting	of I/O's	and its	s inte	erfaci	cing v	with	ו PL	.C fo	raç	give	en ca	ise s	stud	у									
3. L	evel contr	trol us	sing PL	С																					
4. Ir	nterfacing	g Pne	umatic	cylinde	ers w	/ith P	PLC																		
5. Ir	ntroductior	on to	HMI pro	gramr	ning	usin	ng so	oftwa	/are																
6. Ir	nterfacing	g PLC	and H	MI																					
7. D	ata loggin	ing ar	nd trend	ing us	ing P	PLC	& HI	IMI f	for a	a give	en c	case	e stu	dy											
8. S	studies on	n ABE	8 robot	unctio	ons ar	nd p	orogr	ramr	ming	g															
																			Leo	ture:	45, P	ractio	cal:30	0, To	otal:75
ТЕХТ ВО	OK:																								
1. B	Bolton W.,	, "Me	chatron	ics", 6	th Ed	dition	n, Pe	ears	son E	Educ	catio	on, I	New	Del	lhi, 2	2019									
REFERE	NCES/ MA		AL/SC	FTW	ARE:																				
1. P	Petruzella F	Fran	k D., "F	rograr	nmal	ble L	Logic	ic Co	ontro	oller	s", 5	5th	Editi	on, I	McG	Graw	-Hill, M	Ne	v Yor	k, 201	9.				
2. S	Stuart Boye	yer A.	, "SCA	DA Su	pervi	isory	/ Coi	ontro	ol an	nd Da	ata A	Acq	uisit	ion"	, 4th	di Edi	tion, I	SA	, USA	, 2010	5.				
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Ree.

		UTCOM		se, the s	udents	s will be	able to						(BT Map Highest I	
CO1	ider	ntify the	different	types of	sensors	s, actuato	ors and I	PLC use	ed in au	utomatio	n systen	ו	Ur	nderstandi Imitation	0 ()
CO2	infe	r the kn	owledge	about co	mmunic	cation and	d contro	l syster	n in rea	al time in	iterfacing)	Ur	nderstandi Imitation	• • •
CO3	ada	pt the c	oncepts	of SCAD	A for fac	ctory auto	omation						N	Applying Ianipulatic	• •
CO4	inte	rpret the	e basic c	onfigurati	on and	applicatio	on of rol	oot in fa	ictory a	utomatio	on			Applying Precision	
CO5	dev	elop pla	nt level a	automatic	n for re	al proces	s plant	using P	LC/SC	ADA/ ro	botics			Applying Precision	. ,
						Mappin	g of CC)s with	POs a	nd PSO	S				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	2	2											
CO	2	3	3	3											
CO	3	3	3	3		2									
CO	4	3	3	3		3									
CO	5	3	3	3	3	3				2	2		2		
1 – Sli	ght, 2	– Mode	erate, 3 –	Substan	tial, BT-	Bloom's	Taxono	omy							
						ASSES	SMENT	PATT	ERN - ⁻	THEOR	Y				
	st / Blo Catego	oom's ory*	Rei	nemberi (K1) %	ng l	Jndersta (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %		reating K6) %	Total %
	CAT	1		5		95									100
	CAT	2		5		50		45	5						100
	CAT	3		5		55		40)						100
	ESE	=		10		50		40)						100



Progr	2000 8			•	by Departmen		nics Eng	ineering)					
Brand	amme & ch	Engine		Branche	es Except Med	chatronics		Sem.	Categor	y L	Т	Р	Credit
Prere	quisites	Nil	<u> </u>					6	OE	3	1	0	4
Pream	abla	This se		a nina tha								dava	
Unit -			ition and D		e students to the students to	nink innovatio	n concep	ots and id	eas for bus	iness n	noaei	aeve	opments 9+
Innova	ation and Crea	ativity– T	ypes of inn	novation	– challenges i								of design
	n Thinking an Analogies – E				n Thinking Sta ng	ges: Empathi	ze – Defi	ine – Idea	ate – Proto	уре – 1	est.	Desig	n thinkin
Unit -		User S	tudy and C	Context	ual Enquiry:								9+
resea	rch – focus gr	oups – d	epth interv	/iews – a	/ data – classi analysis of qua hy –establish r	litative data -	- survey	methods	- observation	ions- P	roces	ss of i	dentifyin
Unit -		•	ct Design:		,					0			9+
protot	yping – tools				oncept evalua								
intera Unit -		Busine	ess Model	Canvas	(BMC):								9+
		BMC - dif			ng blocks- BM	C: Patterns -	Design	 Strateg 	gy – Proces	s–Busi	ness	mode	el failures
	ons and reme												
Unit -			d Commer		ion: ots - Different	Types of I		/ Diabte	Tradoma	ka Da	tonto	Goo	9+
						Types of f							
			nd Industria	al Desigr	n– Patent Lice	nsing - Techr	iology Co	ommercia					-
TEXT 1.	BOOK: Rishikesha				n- Patent Lice				Lectur	re:45, T	utori		-
TEXT 1.	BOOK: Rishikesha RENCES:	T.Krishn	an, "8 Step	os To Inn		g From Jugaa	Id To Exc	cellence",	Lectur	re:45, T	utori		-
TEXT 1. REFE	BOOK: Rishikesha RENCES: Peter Druck	T.Krishn ker, "Inno	an, "8 Step ovation and	os To Inn	novation: Going	g From Jugaa	d To Exc	cellence", .ondon, 2	Lectur Collins Inc	e:45, T ia, 201:	iutori 3.	ial:15	, Total:6
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CO4				3	2	2	2	3	3	3	3	3		
CO5				3	2	2		3	2	3	3	3		
1 – Slight, 2	– Mode	rate, 3 –	Substanti	al, BT	- Bloom's	Taxono	omy							
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Preamble		This co	ourse prov	vides the b	oasic knowle	edge abou	ut indust	rial mar	ipulator,	its control,	design	and	applic	ations
Unit – I				Robotics										9+3
					tion of robot			and op	en loop	control sys	tems. I	Kiner	natics	systems
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					epresentatio n- Euler-Lag				ation- DH	parameter	s- Jaco	bian	-Singu	Ilarity an
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Sensor - (and Prox	imity, Po	sition, Ve	locity, Force	e, Tactile.	. Introdu	uction to	c Camer	as- Camer	a calib	ratio	n- Ge	ometry o
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										Lectur	e:45, T	utor	ial:15,	Total:6
ТЕХТ ВОС	DK:													
1. Sa	aha S.K.,	"Introduc	tion to Ro	obotics", 2	2nd Edition, I	McGraw-H	Hill High	er Educ	ation, Ne	ew Delhi, 20	014.			
		"Introduc	tion to Ro	obotics", 2	2nd Edition, I	McGraw-I	Hill High	er Educ	ation, Ne	ew Delhi, 20	014.			
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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	15	65	20				100
CAT2	15	65	20				100
CAT3	10	60	30				100
ESE	10	55	35				100



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Unit - IV Additive Manufacturing Equipment: 9+ Process Equipment-Design and process parameters; Governing Bonding Mechanism; Common faults and troubleshoot Process Design 9+ Unit - V Post Processing & Product Quality: 9+ Post Processing- Requirement and Techniques. Product Quality- Inspection and testing - Defects and their causes. 9+ TEXT BOOK: Lecture:45, Tutorial:15, Total 1. Chee Kai Chua and Kah Fai Leong, "3D Printing and Additive Manufacturing - Principles and Applications", World Scientific, Singapore, 2017. 1. REFERENCES: 1. Sabrie Soloman, "3D Printing and Design", Khanna Publishing House, New Delhi, 2021. 6 Gibson I., Rosen D. W. & Stucker B., "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, USA, 2010. 3. Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Hanser Publisher, Germany, 2012. BT Mapped (Highest Level) COURSE OUTCOMES: BT Mapped (Highest Level) Understanding (K3) Colo understand the need of additive manufacturing in real world applications Applying (K3) Co2 choose appropriate technique for AM application Applying (K3) Co3 select a specific material for the given application Applying (K3) Co4	Init - IV Additive Manufacturing Equipment: 9+3 trocess Equipment-Design and process parameters; Governing Bonding Mechanism; Common faults and troubleshooti rocess Design 9+3 Init - V Post Processing & Product Quality: 9+3 Sost Processing- Requirement and Techniques. Product Quality- Inspection and testing - Defects and their causes. Lecture:45, Tutorial:15, Total EXT BOOK: Chee Kai Chua and Kah Fai Leong, "3D Printing and Additive Manufacturing - Principles and Applications", World Scientific, Singapore, 2017. EEFERENCES: . Sabrie Soloman, "3D Printing and Design", Khanna Publishing House, New Delhi, 2021. Gibson I, Rosen D. W. & Stucker B., "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Hanser Publisher, Germany, 2012. OURSE OUTCOMES: BT Mapped (Highest Level) Understanding Additive manufacturing in real world applications Understanding (K3) Ould identify the process parameters of different AM process Applying (K3) Applying (K3) Otog ensure the quality of the AM product Applying K3 Applying (K3) Out 2 1 POS POS POS POS POS POI PO1 PO1 PO1 PS0 PS0			n-Metals			us forms	s of raw	/ materia	al-Liqui	d, Solid	, Wire,	Powder;	Powder Pr	eparat	on a	nd the	
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1. Sabrie Soloman, "3D Printing and Design", Khanna Publishing House, New Delhi, 2021. 2. Gibson I., Rosen D. W. & Stucker B., "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, USA, 2010. 3. Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Hanser Publisher, Germany, 2012. BT Mapped (Highest Level) COURSE OUTCOMES: BT Mapped (Highest Level) On completion of the course, the students will be able to Understanding (K3) CO2 choose appropriate technique for AM applications Applying (K3) CO3 select a specific material for the given application Applying (K3) CO4 identify the process parameters of different AM process Applying (K3) CO5 ensure the quality of the AM product Applying (C3) Mapping of COs with POs and PSOs Cos/POs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS1	Sabrie Soloman, "3D Printing and Design", Khanna Publishing House, New Delhi, 2021. Gibson I., Rosen D. W. & Stucker B., "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, USA, 2010. Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Hanser Publisher, Germany, 2012. COURSE OUTCOMES: In completion of the course, the students will be able to understand the need of additive manufacturing in real world applications C01 understand the need of additive manufacturing in real world applications C02 choose appropriate technique for AM applications C03 select a specific material for the given application C04 identify the process parameters of different AM process C05 ensure the quality of the AM product C06 VI C07 2 C08 P01 P01 P02 P03 P04 P05 P06 P07 P08 P09 P01 P01 P01 P01 P01 P01 P01 P01 P01 P01 P03 P06 P01 P01 P01 P01 P01 <th>1. DEEEE</th> <th>Sci</th> <th>entific, S</th> <th></th> <th></th> <th>eong, "(</th> <th>3D Print</th> <th>ting and</th> <th>Additiv</th> <th>e Manu</th> <th>facturin</th> <th>g - Princi</th> <th>ples and Ap</th> <th>plicati</th> <th>ons",</th> <th>World</th> <th> </th>	1. DEEEE	Sci	entific, S			eong, "(3D Print	ting and	Additiv	e Manu	facturin	g - Princi	ples and Ap	plicati	ons",	World	
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	CO1 2 1 3	COc/P	200		PO2	PO3			<u> </u>		1	1	1	PO11	PO11		SO1	Peor
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CO2	2	1			2				3		
CO3	2	1			2				3		
CO4	2	3	1	2	2			2	2		
CO5	2	3	1	2	2			2	2		
1 – Slight, 2	- Mode	rate, 3 –	Substantia	al, BT	- Bloom's Taxon	omy		i i			
					ASSESSMEN	T PATTERN -	THEORY				
Test / BI Categ		Rer	nemberin (K1) %	g	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
0.17	1		33		67						100
CAT	1										
CAT			10		52	38					100
_	2		10 10		52 52	38 38					100 100

	22GE005 - ENTREPRENEURSHIP DEVEL	-					
Programme &	(Common to All Engineering and Technology All BE/BTech Branches	Sem.	Category	L	т	Р	Credit
Branch Prerequisites	Engineering Economics & Management	7	OE	3	0	0	3
rioroquieneo		-			U	•	
Preamble	The purpose of this course to create entrepreneurial awarenes	ss among	g engineering	stud	ents.		
Unit – I	Entrepreneurship Concepts:						9
- Entrepreneurs	 & Entrepreneur- Role in Economic Development - Factors affecti hip vs Intrapreneurship- Entrepreneurial Motivation factors – 7 f Entrepreneurs - Entrepreneurship Development in India 	-			-		
Unit – II	Entrepreneurial Ventures and opportunity assessment:						9
New venture cr	eation – Bootstrapping, Minipreneurship, Start-ups, Acquiring	g, Francl	hising & So	cial	ventu	ıring	- Ventur
Opportunity, Eva	ges - Models of market opportunity- Opportunity assessment: Criti luation process, Global opportunities for entrepreneurs.	cal Facto	ors In Opportu	inity	Asse	ssme	nt, Idea v
Unit – III	Business Plan:						9
Business Plan -	ess Model- Business Model Canvas- Objectives of a Business Pla Technical, Marketing, Financial Feasibility assessment - Competin sentation of the Business Plan: The 'Pitch'- case studies						
Unit – IV	Financing and accounting:						9
financing: Initial investors, Micro-	reneurial capital – Sources of Financial capital: debt financing- Public offering (IPO), Private placement - Venture capitalists - A financing, Peer-to-Peer Lending, Crowd funding - Natural cap n-Direct and indirect taxes, Insolvency and Bankruptcy- Case Stud	Angel invo bital. Pre	estors-New for	orms	of fir	nancii	ng: Impac
Unit – V	Small Business Management:						9
Scale Enterprise Contracting	s - Growth Strategies in small industry – Expansion, Diversit	fication,	Joint Venture	, Me	rger,	FDI	and Sub
TEXT BOOK:							
	F. Kuratko,"Entrepreneurship: Theory, Process, Practice", 11th Editi	on, Ceng	age Learning	, Bos	ston, 2	2020.	
REFERENCES:							
^{1.} Hill, Noid). Hisrich, Michael P. Peters & Dean A. Shepherd, Sabyasachi Sinl Ia, 2020.		· · ·				
	math Poornima .M, "Entrepreneurship Development and Small Bus n, Noida, 2018.	siness Er	nterprises", 3 ^r	^d Edi	ion, l	Pears	on
3. Gordon	E & Natarajan K, "Entrepreneurship Development", 6 th Edition, Him	alaya Pu	blishing Hous	e, M	umba	ai, 201	17.
COURSE OUTC	OMES: of the course, the students will be able to					T Maj ghest	oped Level)
CO1 understa	nd the importance of entrepreneurship and demonstrate the traits	of an ent	repreneur	Ap	plyin	g (K3)
CO2 identify s	uitable entrepreneurial ventures and business opportunity			Ap	plyin	ig (K3)
CO3 assess t	he components of business plan			Ar	nalyzi	ng (K	4)
CO4 appraise	the sources of finance and interpret accounting statements			Ap	plyin	ig (K3)
CO5 interpret	the causes of sickness of small scale enterprises and its remedies	6		Uı	nders	tandir	ng (K2)
	Mapping of COs with POs and PSC)s					
	echatronics Engineering Regulation Curriculum and Syllah					2/0	

COs/POs	P01	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		
1 – Slight, 2	2 – Mode	rate, 3 –	Substant	ial, BT-			•	ERN - T	HEOR	(
Test / Bl Categ		Rer	nemberii (K1) %	ng U	ndersta (K2)		Apply (K3)	•	Analyzi (K4) %	0	Evaluating (K5) %		reating K6) %	Total %
CAT	Γ1		20		40		40)						100
CAT	[2		20		30		30)	20					100
0/11							4.0							100
CAT	ГЗ		30		30		40)						100



				(Offered b	by Departme	nt of Mecha	tronics	Engineerin	1)				
-	amme &	All B.E			s Except Me			Sem		rv L	т	Р	Credit
Branc	ch	Engine	ering					Sem	Caleyo	у∟	•	Г	Crean
Prere	quisites	Nil						7	OE	3	0	0	3
Pream	nble				ntify and in							, i	-
Unit -	- 1				computers to Unmanned				tificial intelli	gence te	echno	logies	3. 9
Overv	iew and bac nment and c	kground: h							Contempor	ary app	licatio	ons lik	-
Unit -	- 11	Unit Tit	tle: Unma	nned Aer	rial System	(UAS) com	onent	ts:					9
syster	rms - config ns. On-boa aand/control,	rd flight	control -	- Payloa	ids: sensin	g/surveillanc	e, we	eaponized					
Unit -	- 111	Unit Tit	tle: Basic	Concept	s of Flight:								9
flight a	lynamics: lift, axes, flight c , parts, termi	ontrols, au	itopilots. E	Emergency									
Unit –	- IV	Unit Tit	tle: Drone	e Equipme	ent Mainten	ance:							9
	enance of dro t finding and					ound equipm	ient- ba	atteries - So	heduled ser	vicing -	Repa	air of e	quipmen
Unit –	- V	Unit Tit	tle: Regul	atories a	nd Pogulati	one:							9
	land regulated derations. Op		FAA. Reg	gulations:	FCC compl	iance, UAS			al Aircraft F	Regulati	ons (FARs) - Safety
consic	derations. Op	erational	FAA. Reg considerat	gulations: ions like li	FCC compliability / lega	iance, UAS I issues, eth	ical imp	plications.) - Safet Total:4
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COUF COUF COUF CO1 CO2 CO3	BOOK: Paul Fahls RENCES: Randal W Press, Ne Jha, "Theo RSE OUTCO SE OUTCO Manual Sector SE OUTCO Manual Sector SE OUTCO Manual Sector SE OUTCO Sector SE OUTCO Sector SE OUTCO Sector SE OUTCO Sector SE OUTCO Sector SE OUTCO Sector SE OUTCO Sector S	erational of strom, Tho . Beard & ⁻ wjersy, 20 ory, Design MES: the cours ledge on ti ne features ght operati	FAA. Rec considerat mas Gleas Timothy W 12. h, and App se, the stu he develop and char on and co	gulations: ions like li son, "Intro /. McLain, plications of udents wi pment and acteristics introl using	FCC compliability / lega	iance, UAS I issues, eth IAV Systems nanned Aircr d Aerial Veh f UAV in pro	aft: The icles", 5	Edition, Joh eory and Pr 1st Edition, nal activities	n Wiley & Se actice", 1st I	Edition, Florida	w Yor Princo 2020 (Hig Jnder Ap	k, 202 eton L). F Map hest I stand plying plying) - Safet Total:4: 22 Jniversity ped Level) ing (K2) (K3) (K3)
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CO5	2	3	2	3	1							2		
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														
ASSESSMENT PATTERN - THEORY														
Test / Bloom's Category*		Rei	Remembering (K1) %		Understanding (K2) %		Applyin (K3) %			E	Evaluating (K5) %		Creating (K6) %	Total %
CAT1			15		65		20							100
CAT	2		15		65		20							100
CAT3			30		70		-							100
ESE			5		65		30							100
* ±3% may b	oe varie	d (CAT 1	,2,3 – 50	marks	& ESE –	100 ma	rks)							



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			(0	Offered by D	epartment o	of Mechatron	ics Engi	ineering)					
Progra Brancł	amme & h	All B.E Engine		Branches Ex	cept Mecha	atronics		Sem.	Category	/ L	т	Ρ	Credit
Prereq	luisites	-	s for Mech tronics En		gineering,	Chemistry f	or	8	OE	3	0	0	3
Preaml	ble	fabrica		acturing and		asic concepts of Micro Syst							
Unit –	l			icrosensors	and Actua	ators							9
Microm Unit –	notors – Mic II	ovalves –	- Microgripp System Fal	bers. brication	-	s - Micro se							9
						terials - Photening process.	olithogra	aphy - Io	n implantat	ion - D	iffusio	on - C	xidation
Unit –				nufacturing									9
	em level - I					LIGA. Micro Wire bondir							
Unit –		Introdu	uction and	Overview: N	lanoscale l	Materials							9
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System	ns - Piezoac	tuators: S		models and									Total:4
TEXT	BOOK: Tai-Ran H Delhi, 200	su, "MEM 2. (Units-I	s And Micro, II & III)	osystems: De	Characteris	stics. Manufacture",			Graw-Hill Ed	ducatio	n Pvt		New
TEXT E 1.	BOOK: Tai-Ran H Delhi, 200 Lyshevski,	su, "MEM 2. (Units-I S.E, "Nai	S And Micro , II & III) no- and Mic	osystems: De	Characteris	stics.			Graw-Hill Ed	ducatio	n Pvt		New
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CO5	3	2	2	2					2	
1 – Slight, 2	– Mode	rate, 3 –	Substanti	al, B	T- Bloom's Taxonc	omy				
					ASSESSMENT	PATTERN	THEORY			
Test / Bl Categ		Rei	memberir (K1) %	g	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT	1		15		50	35				100
CAT	2		15		50	35				100
CAT	-3		15		50	35				100
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	ramme &	B.E. Mechatronics Engineering	Sem.	Category	L	т	Р	Credit
Bran	ch equisites	Numerical Methods for Engineers	5/6/7		3	0	. 2	4
Prere	quisites	Numerical Methods for Engineers	5/0/7	HN	3	U	Z	4
Prear	nble	To know the underlying structure behind data m for real world applications.	nodelling and machine I	earning conce	epts a	and a	oply t	he same
Unit -	-1	Data Modelling						9
		alytics and Types of Analytics – Big Data Analysis Bivariate Data and Multivariate Data – Multivariate	e Statistics – Essential					
Unit ·		Similarity Learning and Regression Analysis						9
Neare Corre	est Centroid lation and Ca	hilarity or Instance based Learning – Nearest Nei Classifier – Locally Weighted Regression (LWF susation – Introduction to Linear Regression – Vali sion – Logistic Regression.	R) – Introduction to R	egression –	Intro	oductio	on to	Linearity
Unit -	- 111	Bayesian Learning						9
Algor	luction to Pro ithm for Conti ⁻ Network – M	bability based Learning – Fundamentals of Bayes nuous Attributes – Types of Naive Bayes Classifie arkov Chain.	Theorem – Classificaters – Introduction to Property of the	ion Using Ba babilistic Gra	yes l phica	Model al Mod	– Na dels –	aive Bayes - Bayesiar
Unit -	- IV	Support Vector Machines						9
Optim	nization Proble	oport Vector Machine – Optimal Hyperplane – F em – Soft Margin Support Vector Machines – Intro Support Vector Regression.						
Unit -	- V	Reinforcement Learning						9
Comp	onents of Re	orcement Learning – Scope of Reinforcement L einforcement Learning – Markov Decision Proce	ss – Multi arm Bandit	Problem and	d Re			
Comp Type:	oonents of Re s – Model bas		ss – Multi arm Bandit	Problem and	d Re			
Comp Type: LIST	oonents of Res – Model bas	einforcement Learning – Markov Decision Proce ed Learning (Passive Learning) – Model Free Met	ss – Multi arm Bandit hods – Q Learning – S	Problem and ARSA Learnir	d Re			
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		UTCOM	-	se, the st	udents	will be	able to						(BT Mapp Highest L	
CO1	Inte	erpret the	e concep	ots behind	l data m	nodelling	and vis	ualizatio	on				Ur	nderstandir Imitation (• • •
000	linte								h dia ar i i		h . n . n h l .		Ur	nderstandir	,
CO2	Inte	erpret si	milarity ie	earning te	cnnique	es and re	egressio	n for so	lving u	ncertain	ty proble	ems		lanipulatior	
CO3	Inte	erpret pr	obability	-based lea	arning a	and apply	y for rea	I time a	pplicat	ions				nderstandir Ianipulatior	• • •
CO4	Арр	oly supp	ort vecto	or machine	es for s	olving op	otimizati	on-base	ed prob	lems				Applying (Precision (
CO5	Dev	elop pr	ogrammi	ng for reg	ressior	algorith	ms for c	decision	-makin	ig functio	ons			Applying (Precision (,
CO6	Dev	/elop da	ita mode	lling the g	jiven sa	imple da	taset us	ing mad	chine le	earning p	orogram	ming platforr	m	Applying (Precision (-
CO7	Dev	/elop sa	mple dat	taset usin	g Pand	as							M	Applying (lanipulatior	
CO8	Dev	velop pr	ogrammi	ng for sup	pervise	d machir	ne learni	ng algo	rithm fo	or the giv	/en sam	ple dataset		Applying (Precision (
						Mappir	ng of CC	Os with	POs a	nd PSO	S				
COs/F	POs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO	1	3	3	3	3	3							2	2	2
CO	2	3	3	3	3	3							2	2	2
CO	3	3	3	3	3	3							2	2	2
CO	4	3	3	3	3	3							2	2	2
CO	5	3	3	3	3	3							2	2	2
CO	6	3	3	3	3	3							2	2	2
CO	7	3	3	3	3	3							2	2	2
CO	8	3	3	3	3	3							2	2	2
1 – Slię	ght, 2	– Mode	rate, 3 –	Substant	ial, BT-	Bloom's	s Taxono	omy							
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	st / Blo atego	oom's ory*	Rer	nemberiı (K1) %	ng U	Jndersta (K2)		Apply (K3)		Analyz (K4) 9		Evaluating (K5) %	Crea	ating (K6) %	Tota %
	CAT	1		20		50		30)						100
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Branc			echatronics	-	-			Sem.	Category		Т	Р	Credit
Prerec	quisites	Numer	ical Method	ds for Eng	ineers			5/6/7	HN	3	0	0	3
Pream	nble		urse provide ous real-tim		tion to deep learr	ning with	focus o	n both th	eory and pr	actice	e to de	evelop	models
Unit –	·I	Machir	ne Learning	g Fundame	entals:								9
					h Machine Learn	ing – Ov	erfitting	– Confr	onting Over	fitting	— Ту	pes o	f Machin
Learni Unit –	ing: Classifica	1	0										9
Nodes	and Layers astic Gradier	of a Neu		 Supervi 	sed Learning of a sGD and Bate								Ita Rule
Unit –		Trainin	g of Multi-l	Laver Neu	ral Network:								9
		Algorithm	– XOR Pr		I Momentum - C	cost Fund	ction ar	nd Learn	ing Rule -	Cross	s Enti	ropy F	unction
Compa Unit –	arison of Cos		ns. Network a	nd Classif	ication:								9
					Improvement of	the Dee	p Neur	al Netwo	ork: Vanishi	ing G	radie	nt – C	•
					chitecture of Cor	vNet – C	onvolut	tion and	Pooling Lay	ers			-
Unit –			ations of D		and classification		and do	nth ima	no funion		aka	Dime	9
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CO4	3	3	3	3	2						2	3	3
CO5	3	3	3	3	3						2	3	3
1 – Slight, 2	– Mode	rate, 3 -	Substantia	al, BT-	Bloom's	Taxono	omy			I			
					ASSES	SMENT	PATTER	N - TH	EORY				
Test / Bl Categ		Rei	nemberin (K1) %	g l	Jndersta (K2) 9		Applyin (K3) %		nalyzing (K4) %	Evaluat (K5) %	•	Creating (K6) %	Total %
CAT	Г1		20		50		30						100
CAT	[2		20		50		30						100
CAT	ГЗ		20		50		30						100
ESI	E		20		50		30						100
* +3% may	he varie	d (CAT 1	23 - 50 r	narks	& ESE -	100 ma	rks)						1

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

Progra	amme &						
Branch		B.E. Mechatronics Engineering Sem.	Category	L	Т	Ρ	Credit
Prereq	uisites	Systems and Control Engineering 5/6/7	HN	3	1	0	4
Pream	ble	This course various methods in system identification and state	estimation	and	als		omotes a
		understanding different adaptive control schemes and its applications	oounnation	ana	uio	5 pr	Sinotoo u
Unit –	1	System Identification					9+3
system	identificational analysis.	mic systems, Models for Linear Time-invariant Systems, Time varying s on procedure. Non-parametric methods- Transient analysis, Frequency Parametric methods: Least Square- Prediction error method -Maximum	/ analysis, C	Corre	latic	on an	alysis an
Unit –		Recursive methods and Closed Loop Identification					9+3
methoc Direct a Unit – I	d- Input sigr and indirect	s: Recursive least squares method- The recursive prediction error methonal design for identification. Identification of systems operating in closed identification – Joint input / output identification State Estimation	l loop: Identi	fiabili	ity o	consid	derations 9+3
		ate Estimation: Kalman filter - Stability Analysis. Non-Linear State Estima te Estimation: Parameter Identification via Extended Kalman filter	ation: Extend	led K	aim	an fil	Iter – Buc
Unit –	IV	Adaptive Control Schemes					9+3
analysi adaptiv Adaptiv	is. Robust a /e control - /e control sc	ntrol (IMC) schemes: Known parameters -Adaptive Internal Model Control adaptive control: Problem formulation - Ordinary direct adaptive control v Robust adaptive control with least prior knowledge. Indirect adaptive per cheme and control law.	with dead zo	one -	- Ň	ew ro	bust direc
Optima concep	al adaptive t ots – Desigr	Applications of Adaptive Control tracking for nonlinear systems: Problem statement – Adaptive tracking of strict feedback system. Adaptive inverse for actuator compensation:	Plants with a				
concep Parame	al adaptive to ots – Design eterized inve	tracking for nonlinear systems: Problem statement - Adaptive tracking	Plants with a gns.	actua	tor	non-l	j – Invers inearities
Optima concep Parame	al adaptive for the design of	tracking for nonlinear systems: Problem statement – Adaptive tracking n of strict feedback system. Adaptive inverse for actuator compensation: erses – State feedback designs– Output feedback inverse control and desig	Plants with a gns.	actua 45, T	tor uto	rial:1	j – Invers inearities 5, Total:6
Optima concep Parame TEXT E	al adaptive for the design of	tracking for nonlinear systems: Problem statement – Adaptive tracking n of strict feedback system. Adaptive inverse for actuator compensation: erses – State feedback designs– Output feedback inverse control and desig oderstrom T and PetreStoica, "System Identification", Prentice Hall Internati	Plants with a gns.	actua 45, T	tor uto	rial:1	j – Invers inearities 5, Total:6
Optima concep Parame TEXT E 1.	al adaptive to ots – Design eterized inve BOOK: Torsten So (Unit- 1,2 &	tracking for nonlinear systems: Problem statement – Adaptive tracking n of strict feedback system. Adaptive inverse for actuator compensation: erses – State feedback designs– Output feedback inverse control and desig oderstrom T and PetreStoica, "System Identification", Prentice Hall Internati	Plants with a gns. Lecture:	4 5, T d Edit	tor uto	rial:1	j – Invers inearities 5, Total:6
Optima concep Parame TEXT E 1. 2.	al adaptive to ots – Design eterized inve BOOK: Torsten So (Unit- 1,2 & Gang Feng	tracking for nonlinear systems: Problem statement – Adaptive tracking n of strict feedback system. Adaptive inverse for actuator compensation: erses – State feedback designs– Output feedback inverse control and design oderstrom T and PetreStoica, "System Identification", Prentice Hall Internati &3)	Plants with a gns. Lecture:	4 5, T d Edit	tor uto	rial:1	5, Total:60
Optima concep Parame TEXT E 1. 2. REFER	al adaptive to ots – Design eterized inve BOOK: Torsten So (Unit- 1,2 & Gang Feng 5) RENCES:	tracking for nonlinear systems: Problem statement – Adaptive tracking n of strict feedback system. Adaptive inverse for actuator compensation: erses – State feedback designs– Output feedback inverse control and design oderstrom T and PetreStoica, "System Identification", Prentice Hall Internati &3)	Plants with a gns.	45, T d Edit	tion Hill	rial:1 , Lonc , 199	 I – Inversinearities 5, Total:60 don, 2001. 9 (Unit-4 8
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					Mappin	ng of CC	Os with	POs a	nd PSO	S				
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	3							2	3	3
CO2	3	2	1	1	3							2	3	3
CO3	3	2	1	1	3							2	3	3
CO4	3	2	1	1	3							2	3	3
CO5	3	2	1	1	3							2	3	3
1 – Slight, 2						SMENT		ERN - 1	THEOR	Y				
Test / Bl Categ		Rei	memberi (K1) %	ng U	Indersta (K2)	•	Apply (K3)	_	Analyz (K4) S	-	Evaluating (K5) %		reating K6) %	Total %
CAT	1		10		30		60)						100
CAT	2		10		30		60)						100
CAT	3		10		30		60)						100
ESI	Ξ		10		30		60)						100
* ±3% may	oe varie	d (CAT 1	,2,3 – 50	marks &	& ESE –	100 ma	rks)			·				

1.90

Progra Branci	amme &	k i	B.E. M	echatronic	cs Engin	eering				Sem.	Category	y L	т	Р	Credit
	quisites			on Devices Condition	-	gital Circuit	s, Senso	rs and		5/6/7	HN	3	1	0	4
Pream	ble					(MSDF) is -commerce		interdis	ciplinar	/ field w	ith a wide	range	of a	ipplica	tions fron
Unit –	1					JSION INTE		ON							9+3
Senso	rs and s		data, U	se of multi	iple sens	ors, Fusion ata - Limitat	applicatio	ons. The		nce hiera	archy: outpu	ut dat	a. Da	ita fus	
Unit –						A FUSION									9+3
						te transform association.				. Depen	dability and	Mark	ov cl	nains.	Taxonom
Unit –			ESTIM												9+3
		ng, pra	actical as	spects of h	Kalman f	filtering, ext	ended Ka	almal filt	ers. De	ecision le	vel identify	/ fusio	n. K	nowle	dge base
approa			ADVAN	ICED FILT	FERING										9+3
Data i	nformati		ter, exte	nded info	rmation	filter. Dece								nsor f	
		greem				using range		ursively.	. Distrib	uted dyn	amic senso	or fusi	on		1
Unit –						ATA STRU enting range		oortoint	in dat		Decian		time		9+3
						fusion system		centainty	y in data	a structu	es. Design	ing op	uma	sens	orsystem
	•			•		E					Lectur	e:45,	Tuto	rial:1	5, Total:6
TEXT	BOOK:														
		L. Hal	ll, Mathe	matical tec	chniques	in Multisens	sor data fu	usion, Ai	rtech H	ouse, Bo		(Unit	·1,2,:	3 &4)	
1.	David R.R. B	Brooks		6. Iyengar,		in Multisens sor Fusion:		-		-	ston, 1992.	•		,	
1. 2.	David R.R. B	3rooks /, 1998	and S.S	6. Iyengar,				-		-	ston, 1992.	•		,	
1. 2. REFEF	David R.R. B Jersey	3rooks ∕, 1998 S:	and S.S 8. (Unit-§	5. lyengar, 5)	Multisen		Fundame	ntals an	id Appli	cations v	ston, 1992.	•		,	
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B.E.– Mechatronics Engineering, Regulation, Curriculum and Syllabus – R2022



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CO4	2	3	3	3	2				2		2
CO5	1	3	3	3	2				2		3
1 – Slight, 2	- Mode	erate, 3 –	Substant	ial, B	T- Bloom's Taxo	nomy					
					ASSESSME	IT PATTERN	- THEORY				
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CAT	2		20		40	40					100
CAT	3		20		40	40					100
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TEXT B	300K:																
1.	Nikola	aus Co	orrell, "In	troductior	n to Auto	onomou	s Mobile	Robots'	", Mage	llan Sci	entific, 2	016.					
REFER		S:															
1.				ah Reza N (ingdom, 2		hsh & D	avide So	caramuz	zza, "Int	roductio	on to Aut	onomous N	lobile	e Rol	oots", 2	nd E	dition
2.	Juan-	Anton	io Ferná	-	drigal, J					Itaneou	s Localiz	ation and N	/lapp	ng fo	or Mobi	le Ro	obots
3.	Alonz	o Kelly	y, "Mobil	e Robotic	s: Math	ematics	, Models	and Me	ethods",	Cambr	idge Uni	versity Pres	ss, U	nited	Kingdo	om, 2	2013.
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CO2	apply	the di	fferent lo	calizatior	n techni	ques for	autonon	nous sys	stem						Applyin	g (K	3)
CO3	impler	ment S	SLAM Pa	aradigms	for auto	nomous	system							1	Applyin	g (K	3)
CO4	realize	e the p	oath plar	ning tech	niques	for auto	nomous	system						1	Applyin	g (K	3)
CO5	demo	nstrate	e the sim	nultaneou	s mapp	ing and	ocalizati	on conc	ept usi	ng autor	nomous	robot		,	Applyin	g (K	3)
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CO2	3	3	3	3	2					2	3	3
CO3	3	3	3	3	2					2	3	3
CO4	3	3	3	3	2					2	3	3
CO5	3	3	3	3	2					2	3	3
1 – Slight, 2	- Mode	rate, 3 –	Substant	ial, BT	- Bloom's T	axono	my					
					ASSESSI	MENT	PATTERN -	THEORY				
Test / Bl Categ		Rer	nemberir (K1) %	ng	Understand (K2) %	ling	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %		reating (K6) %	Total %
CAT	1		20		50		30					100
CAT	2		20		40		40					100
CAT	3		20		40		40					100
ESI	Ξ		20		40		40					100
* ±3% may	oe varied	d (CAT 1	,2,3 – 50	marks	& ESE – 10	0 ma	rks)					·