K.S.Rangasamy College of Technology (Autonomous Institution affiliated to Anna University, Chennai)



Curriculum & Syllabus

of

B.E. Mechatronics Engineering

(For the batch admitted in 2021–2022)

R 2018

Accredited by NAAC A++, Approved by AICTE, Affiliated to Anna University, Chennai.

KSR Kalvi Nagar, Tiruchengode – 637 215. Namakkal District, Tamil Nadu, India.

VISION

• To become a pioneer in producing competent Mechatronics Engineers, researchers and entrepreneurs through quality education

MISSION

- To produce competent and ethically bound Mechatronics professionals by imparting the technical knowledge and skills through quality teaching learning process
- To build an environment that is favourable for employability skills through collaborations with academia and industry
- To groom the students to focus on higher studies, research, entrepreneurship and be committed to the societal welfare and quality of life by creating an effective ecosystem

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- **PEO 1: Core competencies:** Our graduates apply engineering knowledge to solve problems in Mechatronics and relevant fields.
- **PEO 2: Employability:** Our graduates demonstrate technical and professional skills to ethically address the industrial and societal needs.
- **PEO 3: Higher Studies, Research and Entrepreneurship:** Our graduates pursue higher studies, research and entrepreneurship in diverse fields.

PROGRAM OUTCOMES (POs)

- 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 modelling 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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

- PSO1: Specify, design and develop automation systems for the given engineering applications.
- PSO2: Design and evaluate mechatronic systems using the state-of-the-art equipment and software tools.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) WITH PROGRAMME OUTCOMES (POs)

The B.E. Mechatronics Engineering Programme outcomes leading to the achievement of the objectives are summarized in the following Table.

Programme	Programme Outcomes												
Educational Objectives	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	
PEO 1	3	1	3	2	2	1	1	1	2	2	3	1	
PEO 2	3	3	3	2	2	1	1	1	2	2	3	1	
PEO 3	3	2	3	2	2	1	1	1	3	2	3	1	

Contributions: 1- low, 2- medium, 3- high

MAPPING: MECHATRONICS ENGINEEIRNG (UG)

Voor	Som	Course Name							PO					
rear	Sem.	Course Name	1	2	3	4	5	6	7	8	9	10	11	12
		Communication Skills I	1	1	1	1	1	2	1	2	3	3	2	3
		Calculus and Differential Equations	3	3	3	2	3							2
		Applied Chemistry	3	3	3	3	2	2	3	2	1	1	1	1
		Engineering Mechanics	3	2	2	3								2
	I	Basic Electrical Engineering	3	3	3	1	1	2	2	1				1
		Constitution of India								2	2	1		2
		Chemistry Laboratory	3	3	3	3	3	3	2	1	1		2	1
		Engineering Practices Laboratory	3	2	1			3	1		3		3	2
•		Communication Skills II	1	2	1	2	1	2	1	2	3	3	2	3
		Laplace Transform and Complex Variables	3	3	2	2	3							2
		Applied Physics	3	3	3	2	2	2	2	2	1	1	-	-
		Programming for Problem Solving	1	3		2	3			2				2
		Engineering Drawing	3	3	3	3	3	1		1		3	1	1
		Environmental Science	3	2	3	3	3	3	3	3	3	3	2	2
		Engineering Physics Laboratory	3	2	2	1	3	2	2	3	1	2	2	1
		Programming for Problem Solving Laboratory	1	3		2	3			2				2
		Partial Differential Equations and Statistics	3	3	3	2	2							2
		Analog Devices and Digital Circuits	3	1	2	3		2		3	3			3
		Strength of Materials	3	2	2	1	2	1	3		2	1	1	2
		Thermodynamics	3	2	2	2	2							
	III	Manufacturing Technology	2	3	2	2	3	2	2	3			2	1
		Universal Human Value	3	3	2	2	2	3	3	3	3	3	2	1
II		Manufacturing Technology Laboratory	3	2	1		2	3		1	3			3
		Analog Devices and Digital Circuits Laboratory	2	2	3	1	.2		3	2	2	.2		
		Career Competency Development I	1	1	1	1	1	2	1	2	3	3	2	3
		Industrial Drives and Control	2	3	3	2	3	2	2	1			1	1
	IV	Fluid Mechanics and Fluid Machines	3	1	2	3		1	3	2	3		2	
		Theory of Machines	3	3	3	2	2	2	2	3	1	1	2	2
		Hydraulic and Pneumatic Control	3	2	3	2	2	1	1		2	2	2	2

		Applied Materials Technology	2	2	2		2	1	1		3	2	1	1
		Start-ups and Entrepreneurship	3	2	3	3	3	1	1	1			3	2
		National Cadet Corps*(Air wing)	3	2	1	1	3	3	3	3	3	3	3	3
		National Cadet Corps*(Army Wing)	-	-	-	-	-	1	-	3	-	-	-	-
		Industrial Drives and Control Laboratory	3	3	2		1							3
		Applied Mechanics Laboratory	2	2	1	1								2
		Career Competency Development II	2	2	1	1	1	2	1	1	2	3	2	3
		Microprocessors and Microcontrollers	3	1	1	2	2		1	1				1
		System Design and Control	1	2		1	3	3	2	1		2		1
		Sensors and Instrumentation	3	2	2	3	2	2	1		2	3	2	2
	V	Machine Design	3	2	2	1	2	1	3		2	1	1	2
		Microprocessors and Microcontrollers Laboratory	3	1	1			1						
		Metrology and Dynamics Laboratory	3	2	2			3	1		3		3	2
Ш		Career Competency Development III	2	3	2	2	1	3			2	3	2	1
		Programmable Automation Controllers	3	1	1	2	2		1	1				1
		Computer Aided Design and Manufacturing	3	2	2	3	3	3			3	3	3	3
	М	Robotics Engineering	2	3	2	2	1	3			2	3	2	1
	VI	Robotics and Machine Vision laboratory	2	3	2	2	1	3			2	3	2	1
		Computer Aided Manufacturing Laboratory	2	3	2	2	1	3			2	3	2	1
		Career Competency Development IV	2	3	2	2	1	3			2	3	2	1
		Industrial Automation Protocols	3	2	2	2	2	2	2	1	2	1	1	3
		Embedded System	2	2		3		2	2			2		
		Autonomous Vehicle	3	2	1	2	2							2
	VII	Research Skill Development -I	3	3	2	2	2	2	1	2	1	3	2	1
	VII	Industrial Automation and Control Laboratory	2	2	1	1	3					3	3	2
IV		Embedded System Laboratory	3	2	1	2	1	1			1	3	2	2
		Project Work-Phase I	3	3	3	3	3	3	3	3	3	3	3	3
		Career Competency Development V	2	3	2	2	1	3			2	3	2	1
		Total Quality Management	3	2	3	2	1	3	2	1	2	2	3	2
	VIII	Research Skill Development -II	3	3	3	2	2	2	1	1	1	2	2	1
		Project Work -Phase II	3	3	3	2	2	2	1	1	1	2	2	1

3.3. 2- P.....

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
		THEORY						
1.	50 EN 001	Communication Skills I	HS	2	1	1	0	2
2.	50 MA 001	Calculus and Differential Equations	BS	4	3	1	0	4
3.	50 CH 001	Applied Chemistry	BS	3	3	0	0	3
4.	50 ME 003	Engineering Mechanics	ES	4	3	1	0	4
5.	50 EE 001	Basic Electrical Engineering	ES	3	3	0	0	3
6.	50 MY 001	Constitution of India	MY	2	2	0	0	0
		PRACTICALS						
7.	50 CH 0P1	Chemistry Laboratory	BS	4	0	0	4	2
8.	50 ME 0P1	Engineering Practices Laboratory	ES	4	0	0	4	2
			Total	26	15	3	8	20

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С
		THEORY						
1.	50 EN 002	Communication Skills II	HS	2	1	1	0	2
2.	50 MA 002	Laplace Transform and Complex Variables	BS	4	3	1	0	4
3.	50 PH 001	Applied Physics	BS	3	3	0	0	3
4.	50 CS 001	Programming for Problem Solving	ES	3	3	0	0	3
5.	50 ME 001	Engineering Drawing	ES	6	2	0	4	4
6.	50 MY 002	Environmental Science	MY	2	2	0	0	0
		PRACTICALS						
7.	50 PH 0P1	Engineering Physics Laboratory	BS	4	0	0	4	2
8.	50 CS 0P1	Programming for Problem Solving Laboratory	ES	4	0	0	4	2
			Total	28	14	02	12	20

SEMESTER III									
S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Р	С	
		THEORY							
1.	50 MA 003	Partial Differential Equations and Statistics	BS	4	3	1	0	4	
2.	50 MC302	Analog Devices and Digital Circuits	PC	3	3	0	0	3	
3.	50 ME 004	Strength of Materials	PC	4	3	1	0	4	
4.	50 ME 006	Thermodynamics	PC	4	3	1	0	4	
5.	50 MC303	Manufacturing Technology	PC	3	3	0	0	3	
6.	50 MY 004	Universal Human Value*	MY*	3	2	1	0	3*	
		PRACTICALS							
7.	50 MC 3P1	Manufacturing Technology Laboratory	PC	4	0	0	4	2	
8.	50 MC 3P2	Analog Devices and Digital Circuits Laboratory	PC	4	0	0	4	2	
9.	50 TP 0P1	Career Competency Development I	EEC	2	0	0	2	0	
			Total	31	17	4	10	22	

SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
		THEORY	•					
1.	50 MC 401	Industrial Drives and Control	PC	3	3	0	0	3
2.	50 ME 005	Fluid Mechanics and Fluid Machines	PC	4	3	1	0	4
3.	50 MC 402	Theory of Machines	PC	4	3	1	0	4
4.	51 MC 403	Hydraulic and Pneumatic control	PC	5	3	0	2	4
5.	50 MC 404	Applied Materials Technology	PC	3	3	0	0	3
6.	50 MY 014	Start-ups and Entrepreneurship	MY	2	2	0	0	0
7.	50 GE 00*	National Cadet Corps	GE*	4	2	0	2	3*
		PRACTICALS						
8.	50 MC 4P1	Industrial Drives and Control Laboratory	PC	4	0	0	4	2
9.	50 MC 4P2	Applied Mechanics Laboratory	PC	4	0	0	4	2
10.	50 TP 0P2	Career Competency Development II	EEC	2	0	0	2	0
			Total	31	17	02	12	22

SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С
		THEORY	<u> </u>					
1.	50 MC 501	Microprocessors and Microcontrollers	PC	3	3	0	0	3
2.	51 MC 502	System Design and Control	PC	4	3	1	0	4
3.	50 MC 503	Sensors and Instrumentation	PC	3	3	0	0	3
4.	50 MC 504	Machine Design	PC	4	3	1	0	4
5.	50 MC E1*	Elective -I	PE	3	3	0	0	3
6.	50 MC L1*	Open Elective-I	OE	3	3	0	0	3
		PRACTICALS						
7.	50 MC5P1	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
8.	50 MC 5P2	Metrology and Dynamics Laboratory	PC	4	0	0	4	2
9.	50 TP 0P3	Career Competency Development III	EEC	2	0	0	2	0
			Total	30	18	2	10	24

SEMESTER VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
		THEORY						
1.	50 MC 601	Programmable Automation Controllers	PC	4	3	1	0	4
2.	50 MC 602	Computer Aided Design and Manufacturing	PC	3	3	0	0	3
3.	51 MC 603	Robotics Engineering	PC	3	3	0	0	3
4.	50 MC E2*	Elective -II	PE	3	3	0	0	3
5.	50 MC E3*	Elective -III	PE	3	3	0	0	3
6.	50 MC L2*	Open Elective-II	OE	3	3	0	0	3
		PRACTICALS						
7.	50 MC 6P1	Robotics and Machine Vision Laboratory	PC	4	0	0	4	2
8.	50 MC 6P2	Computer Aided Manufacturing Laboratory	PC	4	0	0	4	2
9.	50 TP 0P4	Career Competency Development IV	EEC	2	0	0	2	0
			Total	29	18	1	10	23

3.3. 2- P.....

	SEMESTER VII										
S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С			
		THEORY									
1.	50 MC 701	Industrial Automation Protocols	PC	3	3	0	0	3			
2.	50 MC 702	Embedded System	PC	3	3	0	0	3			
3.	50 MC 703	Autonomous Vehicle	PC	3	3	0	0	3			
4.	50 MC E4*	Elective -IV	PE	3	3	0	0	3			
5.	50 MC E5*	Elective -V	PE	3	3	0	0	3			
6.	50 MC L3*	Open Elective-III	OE	3	3	0	0	3			
7.	50 AC 001	Research Skill Development -I	AC	1	1	0	0	0			
8.	50 GE 00*	National Cadet Corps	GE*	4	2	0	2	3*			
		PRACTICALS									
9.	50 MC 7P1	Industrial Automation and Control Laboratory	PC	4	0	0	4	2			
10.	50 MC 7P2	Embedded System Laboratory	PC	4	0	0	4	2			
11.	50 MC 7P3	Project Work-Phase I	EEC	4	0	0	4	2			
12.	50 TP 0P5	Career Competency Development V	EEC	2	0	0	2	0			
	•	•	Total	33	19	0	14	24			

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	SEMESTER VIII									
S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С		
		THEORY								
1.	50 HS 003	Total Quality Management	HS	3	3	0	0	3		
2.	50 AC 002	Research Skill Development -II	AC	1	1	0	0	0		
		PRACTICALS			•	•		•		
3.	50 MC 8P1	Project Work -Phase II	EEC	16	0	0	16	8		
4.	50 TP 0P6	Internship	EEC	0	0	0	0	3*		
			Total	20	4	0	16	11		

*Internship Extra 3 Credits is offered

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 166

Note: HS- Humanities and Social Sciences including Management Courses, BS- Basic Science Courses, ES-Engineering Science Courses, PC-Professional Core Courses, PE-Professional Elective Courses, OE- Open Elective Courses, EEC-Employability Enhancement Courses, AC-Audit Courses & MY- Mandatory Courses

Honours Degree – Robotics and Automation

S.No	Course Code	Course Name	L	Т	Р	Credits
1.	50 MC H01	Medical Robotics	03	0	0	03
2.	50 MC H02	AI for Robotics	03	0	0	03
3.	50 MC H03	Robot Kinematics and Dynamics	03	0	0	03
4.	50 MC H04	Applied and Industrial Robotics	03	0	0	03
5.	50 MC H05	Robotic Programming	03	0	0	03
6.	50 MC H06	Sensors and Machine Vision Systems	03	0	0	03
		Total	18	0	0	18

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3.3. 2- P.....

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HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 EN 001	Communication Skills I	HS	2	1	1	0	2
2.	50 EN 002	Communication Skills II	HS	2	1	1	0	2
3.	50 HS 003	Total Quality Management	HS	3	3	0	0	3

BASIC SCIENCE (BS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 MA 001	Calculus and Differential Equations	BS	4	3	1	0	4
2.	50 CH 001	Applied Chemistry	BS	3	3	0	0	3
3.	50 CH 0P1	Chemistry Laboratory	BS	4	0	0	4	2
4.	50 MA 002	Laplace Transform and Complex Variables	BS	4	3	1	0	4
5.	50 PH 001	Applied Physics	BS	3	3	0	0	3
6.	50 PH 0P1	Engineering Physics Laboratory	BS	4	0	0	4	2
7.	50 MA 003	Partial Differential Equations and Statistics	BS	4	3	1	0	4

ENGINEERING SCIENCES (ES)

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Р	С
1.	50 ME 003	Engineering Mechanics	ES	4	3	1	0	4
2.	50 EE 001	Basic Electrical Engineering	ES	3	3	0	0	3
3.	50 ME 0P1	Engineering Practices Laboratory	ES	4	0	0	4	2
4.	50 CS 001	Programming for Problem Solving	ES	3	3	0	0	3
5.	50 ME 001	Engineering Drawing	ES	6	2	0	4	4
6.	50 CS 0P1	Programming for Problem Solving Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С
1.	50 MC 302	Analog Devices and Digital Circuits	PC	3	3	0	0	3
2.	50 ME 004	Strength of Materials	PC	4	3	1	0	4
3.	50 MC 303	Manufacturing Technology	PC	3	3	0	0	3
4.	50 MC 3P1	Manufacturing Technology Laboratory	PC	4	0	0	4	2
5.	50 MC 3P2	Analog Devices and Digital Circuits Laboratory	PC	4	0	0	4	2
6.	50 ME 006	Thermodynamics	PC	4	3	1	0	4
7.	50 MC 401	Industrial drives and control	PC	3	3	0	0	3
8.	50 ME 005	Fluid Mechanics and Fluid Machines	PC	4	3	1	0	4
9.	50 MC 402	Theory of Machines	PC	4	3	1	0	4
10.	51 MC 403	Hydraulic and Pneumatic control	PC	5	3	0	2	4
11.	50 MC 404	Applied Materials Technology	PC	3	3	0	0	3
12.	50 MC 4P1	Industrial Drives and Control Laboratory	PC	4	0	0	4	2
13.	50 MC 4P2	Applied Mechanics Laboratory	PC	4	0	0	4	2
14.	50 MC 501	Microprocessors and Microcontrollers	PC	3	3	0	0	3
15.	51 MC 502	System Design and Control	PC	4	3	1	0	4
16.	50 MC 503	Sensors and Instrumentation	PC	3	3	0	0	3
17.	50 MC 504	Machine Design	PC	4	3	1	0	4
18.	50 MC5P1	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
19.	50 MC 5P2	Metrology and Dynamics Laboratory	PC	4	0	0	4	2
20.	50 MC 601	Programmable Automation Controllers	PC	4	3	1	0	4

21.	50 MC 602	Computer Aided Design and Manufacturing	PC	3	3	0	0	3
22.	51 MC 603	Robotics Engineering	PC	3	3	0	0	3
23.	50 MC 6P1	Robotics and Machine Vision Laboratory	PC	4	0	0	4	2
24.	50 MC 6P2	Computer Aided Manufacturing Laboratory	PC	4	0	0	4	2
25.	50 MC 701	Industrial Automation Protocols	PC	3	3	0	0	3
26.	50 MC 702	Embedded System	PC	3	3	0	0	3
27.	50 MC 703	Autonomous Vehicle	PC	3	3	0	0	3
28.	50 MC 7P1	Industrial Automation and Control Laboratory	PC	4	0	0	4	2
29.	50 MC 7P2	Embedded System Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

SEMESTER V, ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 MC E11	Wireless Sensor Networks	PE	3	З	0	0	3
2.	50 MC E12	Automobile Technology	PE	3	3	0	0	3
3.	50 MC E15	Modern Vehicle System	PE	3	3	0	0	3
4.	50 MC E14	Composite Materials	PE	3	3	0	0	3
5.	50 HS 004	Principles of Management	PE	3	3	0	0	3

SEMESTER VI, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 MC E27	Industry 4.0	PE	3	3	0	0	3
2.	50 MC E26	Non-conventional Machining Processes	PE	3	3	0	0	3
3.	50 MC E23	Design of Transmission Systems	PE	3	3	0	0	3
4.	50 MC E24	Industrial Design and Applied Ergonomics	PE	3	3	0	0	3
5.	51 MC E25	Virtual Reality and Augmented Reality	PE	3	3	0	0	3

SEMESTER VI, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 MC E31	Operations Research	PE	3	3	0	0	3
2.	50 MC E32	Design of Material Handling Equipments	PE	3	3	0	0	3
3.	51 PT T01	Creo for Design	PE	3	3	0	0	3
4.	50 MC E34	MEMS and NEMS	PE	3	3	0	0	3
5.	50 MC E35	Product Design and Costing	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 MC E45	Drone Technology	PE	3	3	0	0	3
2.	50 MC E47	Non Destructive Testing	PE	3	3	0	0	3
3.	50 MC E43	New and Renewable Energy Sources	PE	3	3	0	0	3
4.	50 MC E44	Machine Learning and Condition Monitoring	PE	3	3	0	0	3
5.	50 MC E46	Finite Element Method	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	51 PT T02	Creo for Production Engineering	PE	4	2	0	2	3
2.	51 MC E55	Rapid Prototyping	PE	4	2	0	2	3
3.	51 MC E56	PC Based Instrumentation	PE	4	2	0	2	3
4.	51 MC E57	Medical Mechatronics	PE	4	2	0	2	3
5.	51 MC E53	Fundamentals of Arduino	PE	4	2	0	2	3

OPEN ELECTIVES I / II / III / IV(OE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 MC L05	Robotics and Automation	OE	3	3	0	0	3
2.	50 MC L06	Applied Ergonomics	OE	3	3	0	0	3
3.	50 MC L01	Industrial Safety Engineering	OE	3	3	0	0	3
4	50 MC L08	Fire Safety	OE	3	3	0	0	3
5	50 MC L10	Robotics and Control	OE	3	3	0	0	3
6	50 MC L11	Digital Transformation in Manufacturing	OE	3	3	0	0	3

SEMESTER IV, GENERAL ELECTIVE (GE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Р	C
1.	50 GE 001	National Cadet Corps (Air Wing)	GE*	4	2	0	2	3
2.	50 GE 002	National Cadet Corps(Army Wing)	GE*	4	2	0	2	3

		SEMESTER VII & SEMESTER VIII, AUDIT	COURSES	(AC)				
S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 AC 001	Research Skill Development -I	AC	1	1	0	0	0
2.	50 AC 002	Research Skill Development -II	AC	1	1	0	0	0

MANDATORY COURSES(II/III/IVMY)

S.No	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 MY 001	Constitution of India	MY	2	2	0	0	-
2.	50 MY 002	Environmental Science	MY	2	2	0	0	-
3.	50 MY 004	Universal Human Value	MY	3	2	1	0	3*
4.	50 MY 014	Start-ups and Entrepreneurship	MY	2	2	0	0	-

		EMPLOYABILITY ENHANCEMENT C	OURSES (EE	EC)				
S.No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
1.	50 TP 0P1	Career Competency Development I	EEC	2	0	0	2	-
2.	50 TP 0P2	Career Competency Development II	EEC	2	0	0	2	-
3.	50 TP 0P3	Career Competency Development III	EEC	2	0	0	2	-
4.	50 TP 0P4	Career Competency Development IV	EEC	2	0	0	2	-
5.	50 TP 0P5	Career Competency Development V	EEC	2	0	0	2	-
6.	50 TP 0P6	Internship	EEC	2/4/8 (weeks)	0	0	0	1/2/3
7.	50 MC 7P3	Project Work-Phase I	EEC	4	0	0	4	2
8.	50 MC 8P1	Project Work -Phase II	EEC	16	0	0	16	8

BoS Chairman

SUMMARY

S No	Catagory			Cre	dits Pe	r Semes	ster			Total	Percentage
3.NO.	Calegory	I	II		IV	V	VI	VII	VIII	Credits	%
1.	HS	2	2	-	-	-	-	-	3	07	4.21
2.	BS	9	9	4	-	-	-	-	-	22	13.25
3.	ES	9	9	-	-	-	-	-	-	18	10.84
4.	PC	-	-	18	22	18	14	13	-	85	51.20
5.	PE	-	-	-	-	3	6	6	-	15	9.03
6.	OE	-	-	-	-	3	3	3	-	09	5.42
7.	EEC	-	-	-	-	-	-	2	8	10	6.02
8.	MY	MY I	MY II	3*	MY IV	-	-	-	-	03 *	-
9.	AC	-	-	-	-	-	-	AC I	AC II	-	-
10.	GE*	-	-	-	3*		-	-	-	03*	-
	Total	20	20	22	22	24	23	24	11	166	100

GE* is an optional, Extra credit is offered UHV* Extra credit is offered

3.3. 2- P.....

BoS Chairman

		K.S.Ra	ngasam	y College	e of Techno	ology – Aut	onomou	S	R2018					
	50 EN 001 – Communication Skills I Common to all Branches Hours/Week Total Credit Maximum Marks													
Common to all Branches Common to all Branches Semester Hours/Week Total Credit Maximum Marks L T P Hours C CA ES Total I 1 1 0 30 2 40 60 100														
Sem	nester	Hours/	Week		Total Hours	Credit	<u> </u>	Maximu	m Marks					
	1	L 1	1	P 0				E3 60	1 otai 100					
	•	 To help learn 	ers impro	ve their v	ocabulary a	and to enab	ble them t	to use wo	rds appropriately					
		in different ac	ademic a	nd profes	sional cont	exts								
		To help learne	ers devel	op strateg	ies that cou	uld be adopt	ted while	reading te	exts					
Obje	ctive(s)	 To help learn related situation 	ers acqu	ire the at	oility to spea	ak effective	ly in Eng	lish in rea	al life and career					
		 To equip study 	ents with	effective	speaking a	nd listening	skills in E	English						
		To facilitate I	earners	to enhan	ce their wi	riting skills	with coh	erence a	nd appropriate					
		format effectiv	/ely	(1 (
1 Utilize digital literacy tools to develop listening skills & make use of contextual clues to														
infer meanings of unfamiliar words														
2 Able to select, compile & synthesize information using communication strategies for an effective oral presentation														
Courseeffective oral presentation3Skim & Scan the textual content & infer meanings of unfamiliar words to develop reading														
Outcomes 3 Skim & Scan the textual content & infer meanings of unfamiliar words to develop reading & vocabulary skills 4 Generate ideas from sources to develop coherent content and support with relevant														
 & vocabulary skills 4 Generate ideas from sources to develop coherent content and support with relevant details in writing 														
details in writing 5 Recognize the basic phonetic patterns of language & execute it for competent loudreading														
Note:	Hours n	otified against each	unit in	the syllab	ous are only	v indicative	but are	not decis	ive. Faculty may					
decide	e the nur	mber of hours for e	ach unit	dependin	g upon the	concepts	and dept	h. Questi	ons need not be					
asked	based o	n the number of hou	irs notifie	d against	each unit ir	n the syllabu	JS.							
Listen	ing ing to Sh	ort Audios – Watchi	na Short	Videos - a	answering N	/ICQs and \	/ocabular	v Check-	Listening to Short					
Comp	rehensio	n Passages – Guide	d Listeni	ng – Liste	ning to son	gs and cogi	nizing the	lyrics.	[04]					
Speal	kina													
Brains	storming	- Group Discussion	(unstruc	tured) – S	Self Introdu	ction - Just	a Minute	(JaM) - S	Short Narratives –					
Cue C	Cards – P	icture Cards – Conv	ersationa	I Practice	es (Prelimina	ary).			[04]					
Readi	ing							_						
Silent	Reading	- Scanning and Sl	kimming	- Reading	g short and	Medium Pa		– Cogniti	on of Theme and					
– Mod	lulation a	nd Pronunciation Ch	neck.		ulaly List (3	50 worus) -			[04] [04]					
\A/#:1:-									L- J					
Functi	ig ional Voc	abulary and Word P	ower – D	ata Intern	retation - P	aragraph W	ritina – I	etter Writi	ng –Email Writing					
– Con	versation	al Fill Ups.		·····P			· · · · · · ·		[03]					
T						Total	Hours: 1	5 + 15 (Tu	torial) = 30 hours					
Iext	SOOKS	of Dizvi (Effoativo T	ochnical	Commun	ication' and	Edition M			n (India) Privata					
1.	Limited,	Chennai, 2018	ecnnical	Commun			Giaw Hi		on (India) Private					
2.	Normar Book', F	i Lewis, 'Word Powe Penguin Random Ho	er Made I ouse India	±asy - Th a, 2020	e Complete	e Handbook	tor Build	ling a Sup	erior Vocabulary					
Refer	ences:													
1.	Paul En Press, N	nmerson and Nick H N.York. 2005	lamilton	,'Five Mir	ute Activitie	es for Busin	iess Engl	ish', Cam	bridge University					
n	Arthur E	Brookes and Peter	Grundy ,	' Beginnii	ng to Write	: Writing Ac	ctivities for	or Elemer	tary and					
۷.	Interme	diate Learners', Car	nbridge l	Jniversity	Press, N.Y	ork, 2003								
3.	Michael Univers	McCarthy and Feli ity Press, N.York, 20	icity O D 012	ell, 'Eng	lish Vocab	ulary in Use	e: Upper	Intermed	iate', Cambridge					
4.	https://le	earningenglish.britis	hcouncil.	org/en/lis	tening									

Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	<u> </u>						P	0						Р	SO
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	1		1	1	1	1	2	3	3	2	3		1
	CO2	1	1		3	2	1		2	3	3	3	3		2
50 EN 001 &	CO3	1	2	1	2	1	1	2	1	2	3	2	3	1	1
Communication Skills I	CO4	1	2	1	1	2	2	1	2	1	3	3	3		3
	CO5	1	1		1	1	1	1	1	3	3	1	3		

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

		K.S.Ranga	samy Colle	ge of Techn	ology – Aut	onomous		R2018
		50 M <i>A</i>	001 - Calcu	lus and Diffe	erential Equa	ations		
	-		Com	mon to All E	ranches			
Somostor		Hours / Week	ζ.	Total	Credit	M	laximum Marl	٢S
Semester	L	Т	Р	hrs	С	CA	ES	Total
I	3	1	0	60	4	40	60	100
Objective(s)	 The goal of tradit The syll the eng Matrix a enginee This co importa among Develop 	al of this cour ional calculus labus is desig ineering prob Algebra is on ering. urse deals w nt role in the other disciplir oment of math	se is to achie ned to provid lems mathem e of the pow ith topics suc understandin nes. nematical skil	eve conceptua e the basic to natically and c rerful tools to ch as single ng of science Is to solve the	al understand ools of calculu bbtaining solu handle prac variable and , engineering e differential e	ding and to re is mainly for t itions. tical problem multivariable g, economics equations.	etain the bes the purpose c as arising in t calculus and and compute	t traditions f modeling he field of d plays an er science,
Course Outcomes	At the en 1 Apply Ca quadratio 2 Determir 3 Analyze 4 Solve the 5 Evaluate	d of the cour ayley - Hamilto c form into can be the circle of the Jacobian e linear and si definite and i	se, the stud on theorem to nonical form. f curvature, e methods and multaneous o ndefinite inte	ents will be a o find inverse volute and er the constrair differential eq grals using di	able to matrix and tr nvelope of the ned maxima a uations. fferent techni	ansformation e curves. and minima fu	techniques t	o reduce

The hours given against each topic are of indicative. The faculty have the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the numbers hours indicated.

Matrices

Characteristic equation–Eigen values and Eigen vectors of areal matrix–Properties of Eigen values and Eigen vectors–Cayley-Hamilton theorem (without proof) – Orthogonal transformation of a symmetric matrix to diagonal form–Reduction of quadratic form to canonical form by orthogonal transformation-Nature of quadratic form. [08] **Differential Calculus**

Curvature – radius of curvature (Cartesian and polar co-ordinates) – Centre of curvature – Circle of curvature – Involute and evolute–envelope. [09]

Functions of Several Variables

Partial differentiation – Homogeneous functions and Euler's theorem – Jacobians – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Constrained maxima and minima : Lagrange's Method of Un determined Multipliers. [09]

Differential Equations

Linear differential equations of second and higher order with constant co-efficient - R.H.S is $e^{\alpha x}$, $\sin \alpha x$, $\cos \alpha x$, $x^n n > 0$, $e^{\alpha x} \sin \beta x$, $e^{\alpha x} \cos \beta x$, $e^{\alpha x} x^n x^n \sin \alpha x$ and $x^n \cos \alpha x$ – Differential equations with variable co-efficients: Cauchy's and

 $x^n n > 0$, $e^{\alpha x} \sin\beta x$, $e^{\alpha x} \cos\beta x$, $e^{\alpha x} x^n \sin\alpha x$ and $x^n \cos\alpha x$ – Differential equations with variable co-efficients: Cauchy's and Legendre's form of linear equation–Method of variation of parameters – Simultaneous first – order linear equations with constant co-efficients. [09]

Integral Calculus

DefiniteandIndefiniteintegrals-Substitutionrule-TechniquesofIntegration-Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of Strational functions – Improper integrals. [10]

Total Hours: 45 + 15(Tutorial) = 60 hours

2.3. a

Text	book(s) :
1	Grewal B.S, "Higher Engineering Mathematics", 43 rd Edition, Khanna Publishers, Delhi, 2014.
I	Web site: https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html
2	Veerarajan.T., "Engineering Mathematics", for Semesters I and II, Tata McGraw Hill Publishing Co., New Delhi.,
2	2010.
Refe	rence(s) :
1	Kreyszig Erwin, "Advanced Engineering Mathematics", 10 th Edition, John Wiley and Sons (Asia)Limited,
1	New Delhi, 2016.
2	Integral Equations, calculus of variations and its applications - Dr. P. N. Agrawal, Dr. D. N. Pandey, NPTEL online
2	video courses.
3	Matrix Analysis with Applications - Dr. S. K. Gupta Dr. Sanjeev Kumar, Matrix Solvers -prof.Somnath Roy NPTEL
5	online video courses.
4	Dr.P.Kandasamy, Dr.K.Thilagavathy, Dr.K.Gunavathy, "Engineering Mathematics-II", S.Chand & Company Ltd,
-	New Delhi.
	Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	<u> </u>						Ρ	0						Р	SO
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	3	3	3							2	3	
50 MA001 & Calculus	CO2	3	3	2	2	2							2	3	
and Differential	CO3	3	3	3	2	2							2	3	
Equations	CO4	3	3	3	3	2							2	3	
	CO5	3	3	3	2	3							2	3	

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

		K.S.Ranga	asamy Colle	ge of Techn	ology – Aut	onomous		R2018					
			50 CH 001	Applied Ch	emistry								
			Commo	n to All Brar	nches								
Somostor		Hours / Wee	ek	Tota	Credit	N	laximum Ma	rks					
Jennestei	L	Т	P	lhrs	С	CA	ES	Total					
I	3	0	0	45	3	40	60	100					
Objective(s)	 To ratio oxidatio To anal its contr To help To endo To reca 	nalize the pen nstate, elect yze the therr olmethods the learners ow with an ov Il the basics	riodic proper ro negativity, nodynamic fu to analyze th verview of sp of stereoche	rties such as , atomic and unctions, cor he hardness ectroscopy p mistry and re	ionization p molecular of cept of cells of water and principles and action mech	otential, elec rbitals and corrosid tits removal d its applicat panism	tron affinity, on of metals ions	and					
 To recall the basics of stereochemistry and reaction mechanism At the end of the course, the student will be able to: Rationalize the periodic properties, variation of orbitals, interactions and orbitals with energylevel diagrams Analyze the thermodynamic functions, cell potentials and corrosion with its control measures Recognize the sources hardness of water and its removal Interpret the ranges of the electromagnetic spectrum used for exciting different molecular energylevels in various spectroscopic techniques Review of stereochemistry 													
Periodic proj Effective nucl polarizability - electroniccont Molecular orbi Chemical equ Thermodynam isotherm. Cel Conductomet Corrosion - ty corrosion - Co	perties ear charge - oxidation s figurations, io bitals of diat tals. Energy uilibria and nic functions l potentials ric titrations. pes of corre- prosion cont	- atomic and tates - pene onic, dipolar omic molect level diagran corrosion - energy - e - Nernst ec psion - chen trol methods	l ionic sizes tration of orl and Vander- ules - plots ms of diatom entropy - ent juation - app nical and ele (impressed	- ionization bitals- variati waals intera of the multio ics. Pi-molec chalpy- free e blications - f ectrochemica current and s	energies - e ons of s, p, ctions. Hard center orbital ular orbital c energy - Gib EMF series Il corrosion sacrificial an	lectron affini d and f orb Soft Acids a als. Equation of butadiene bs-Helmholt - application - mechanism ode methods	ity – electro ital energies and Bases (H is for atomic and benzene z equation - rs - Potenic m - Factors s) - Corrosio	negativity - of atoms - ISAB). c and e. [09] Van 't Hoff ometric and influencing n inhibitors. [09]					
Water chemi Sources - Wa	stry iter quality p	arameters -	impurities in	water and th	eir effects. I	Hardness - E	Estimation of	hardness -					

configurations. openings - med	Introduc chanism.	tion to re	actio	ns - s	substi	tution	- add	dition	- oxic	lation	- red	uctior	י - cy	clizatio	on and	ring [09]
<u></u>														Т	otal Ho	ours: 45
Text book(s) :																
1 Jain. P.C 2015.	c. and Mo	onica Jair	า, "Er	iginee	ering	Chem	istry"	, Dha	npatra	ai Puł	olishir	ng Co	. New	/ Delhi	i, 14 th e	dition,
2 Dr. S.Va edition,Ja	iramand anuary 2	Dr. Suba 013.	a Rar	nesh,	"Eng	ineeri	ing Cl	hemis	stry", \	Niley	India	Priva	te Lin	nited ,	2 nd	
Reference(s) :																
1 Puri B. R Company	., Sharm y,Delhi, 2	na L.R., a 2017.	nd Pa	athan	ia M.S	S., "Pi	rincipl	es of	Phys	ical C	hemi	stry",	Visha	l Publ	ishing	
2 Dara. S.S	S, "A Te>	kt Book C	of Eng	jineer	ing C	hemi	stry",	S Cha	and &	Co. I	_td., 2	2014.				
3 Bahl B.S	. and Aru	un Bahl, '	'Adva	nced	Orga	nic C	hemis	stry", S	S.Cha	and, N	lew D)elhi, :	2014.			
4 Sharma 2014.	B K. Inst	rumental	Meth	ods c	of Che	emica	l Anal	ysis,	Goel	Publis	shing	Hous	e Me	erut, 2	23 th edit	ion;
Pre-requis MAPPING	ite: Nil OF COU	URSE OI	лтсс	MES	, PRO	DGRA	MME		CON	IES A	ND P	ROG	RAM	ME S	PECIFI	С
COURSECC	DE &							F	0						P	SO
COURSE N	AME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1 3 3 2 2 2 2 2 1 1 2 2 2 CO2 3 3 3 2 2 2 3 1 1 1 2 2 2																
SO 1 S S Z <thz< th=""> Z Z<</thz<>																
50 CH 001 & Applied CO3 CO3 3 3 3 2 3 3 3 1 2 3 Chemistry CO3 CO																
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CO4 3 3 3 3 3 3 1 2 1 2 3 2 2 CO5 3 3 3 3 3 3 1 2 1 2 3 2 2																
Note: 3 – 3	Strong C	Contribut	tion;	2 – A	vera	ge Co	ntrib	ution	;1-	Some	e Con	tribu	tion			
		K.S.	Rang	asan	ıy Co	llege	of Te	echno	ology	– Au	tonoi	nous				R2018
				50 MI	E 003	– Enç	ginee	ring N	lecha	nics						
			()		Com	mon	to all	brand	hes							
Semester	1	Hours	/ We	ek			lota	1	Cre	edit		~~	Maxi		Vlarks	Tatal
1/11	L 3		1		0		60			ر 1				E0		100
	• To	learn a pi	roces	s for a	analys	is of s	static o	object	s, con	cepts	of for	rce, m	omen	t, and	mechar	nical
	equ	uilibrium ii	n two	and tl	hree c	dimens	sions.			•						
Objective(s)	• To	learn the	equili	brium	of rig	id boo	dies si	uch as	s fram	es, tru	usses,	, bean	ns.			
00,001110(3)	• To	identify th	ne pro	pertie	s of s	urface	es and	d solid	s by ι	ising o	differe	ent the	orem			
	• <u>T</u> o	impart ba	sic co	oncep	t of dy	namio	cs of p	particl	es.							
	• 10	understar	nd the	conc	ept of	r frictio	on and		nents (of rigi	d body	y dyna	amics.			
	At the e	end of the	e cou	rse, t	ne st	udent			le to		: .	-1-1:	المرام الم	to most o	-11	
	1. USe 2 Δρι	e scalar ar	la vec		ofsci	an tech	conc	onte ti	naiysii S solvi	ng loit a raal	world	Statica I probl	lome	termina		lures.
Course	2. Ap	loulate the		artia	of su	Inface	ond a	enline	using	u vario	ue th	orom	iems. ie			
Outcomes	4 An:	alvse and	solve	prob	lems	on kin	emati	cs an	d kine	tics		COICH	13.			
	5. Dra	aw a shea	r forc	e and	bend	lina m	omen	t diad	rams.	analy	sis of	riaid I	bodv (dvnam	ics and	
	cal	culation o	f fricti	onal f	orces	on co	ontact	surfa	ces.	- · · j		0				
Note: The hours	s given a	gainst ea	ch top	ic are	of in	dicativ	/e. Th	e facu	ilty ha	ve the	e freed	dom to	o deci	de the	hours r	equired
for each topic	based o	n importa	ance	and o	depth	of co	overa	ge ree	quired	l. The	e mar	ks all	otted	for qu	uestions	s in the
examinations sh	nall not de	epend on	the n	umbe	r of h	ours ir	ndicat	ed.								
07/10/0002												24	a. 5.	2	8	5

effect of hard water in various Industries-Softening of water- external treatment-zeolite process- ion-exchange process- internal treatment-carbonate, phosphate and calgon Conditioning-Desalination- reverse osmosis electrodialysis. Boiler troubles - methods of prevention. [09]

Analytical techniques and applications

Absorption laws - Ultra Violet spectroscopy (UV) - Principle - Instrumentation (Block diagram) - applications. Infra-Red spectroscopy (IR)- Instrumentation (Block diagram) - selection rule - types of fundamental vibrations applications. Nuclear Magnetic Resonance spectroscopy (NMR) - Principle - selection rule - Instrumentation (Block diagram) - chemical shift - factors influencing the chemical shift -applications. Atomic Absorption Spectroscopy (AAS)

- Principle - Instrumentation (Block diagram) -applications.

Concepts in Organic chemistry

Structural isomerism- types - Stereoisomerism - geometrical (Maleic and Fumaric acids) - optical isomerism (Lactic and Tartaric acids) - symmetry - chirality- enantiomers - diastereomers - optical activity - absolute

[09]

Basics and Statics of Particles

Introduction -Units and Dimensions-Laws of Mechanics–Principle of Transmissibility-Lame's theorem, Parallelogram and triangular Law of forces–Vectors–Vectorial representation of forces and moments.

Vector operations

Addition, subtraction, dot product, cross Product-Coplanar Forces–Resolution and Composition of forces–Equilibrium of a particle–Forces in Space-Equilibrium of a particle in Space-Equivalent systems of Forces-Single equivalent force. [12]

Equilibrium of Rigid Bodies

Free body diagram–Types of supports and their reactions–requirements of stable equilibrium–Static determinacy, Moments and Couples–Moment of a force about a point and about an axis–Vectorial representation of moments and couples–Varignon's Theorem-Equilibrium of Rigid bodies in two dimensions.

Trusses: Introduction, axial members, calculation of forces on truss members using method of Joints-Method of sections. [12]

Properties of Surfaces and Solids

Determination of Areas and Volumes-Centroid, Moment of Inertia of plane area (Rectangle, circle, triangle using Integration Method; T section, I section, Angle section, Hollow section using standard formula) - Parallel axis theorem and perpendicular axis theorem- Polar moment of inertia -Mass moment of inertia of thin rectangular section - Relation between area moment of inertia and mass moment of inertia. [12]

Dynamics of Particles

Displacement, Velocity, acceleration and their relationship–Relative motion -Projectile motion in horizontal plane– Newton's law–Work Energy Equation – Impulse and Momentum. [12]

Elements of Rigid Body Dynamics, Friction and Beams

Translation and Rotation of Rigid Bodies: Velocity and acceleration–General Plane motion: Crank and Connecting rod mechanism.

Friction

Frictional force–Laws of Coloumb friction–Simple contact friction–Ladder Friction-Rolling resistance–Ratio of tension in belt.

Transverse bending on beams

Types of beams: Supports and loads – Shear force and bending moment in beams – Cantilever, simply supported and overhanging beams. [12]

Total Hours: 45 + 15 (Tutorial) = 60 Text book(s) : Rajasekaran, S., Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House 1. Pvt. Ltd., 3rd Edition, 2017. 2. Beer, F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", Statics and Dynamics, McGraw-Hill International, 11th Edition, 2016. Reference(s) : Jayakumar, V. and Kumar, M, "Engineering Mechanics", PHI Learning Private Ltd, New Delhi, 2012 1. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2. 3. Bansal R.K," Engineering Mechanics" Laxmi Publications (P) Ltd, 2011. Irving H. Shames, Engineering Mechanics: Statics and Dynamics", Pearson Education Asia Pvt. Ltd, 4th Edition, 4. 2003. Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						Р	0							PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
	CO1	3	2	2	3								2	3	1	1
	CO2	3	2	2	3								2	3	1	1
50 ME 003 & Engineering Mechanics	CO3	3	2	2	3								2	3	1	2
Engineering Mechanics	CO4	3	2	2	3								2	3	1	2
	CO5	3	2	2	3								2	3	1	2

		K.S.Ranga	asamy Colle	ge of Techr	ology – Aut	onomous		R2018							
	50 EE 001 - Basic Electrical Engineering														
Common to all branches															
Somostor		Hours / Wee	ek	Total	Credit	Ma	aximum Mar	ks							
Semester	L	Т	P	hrs	С	CA	ES	Total							
I	3	0	0	45	3	40	60	100							

Objective(s	 To To ele To diff To hou To 	understan ctromagne know the erent type understan use wiring. implement safety m	id and ind the etic in sour s of p ind the it the easur	d deter work ductio ces o oower e vari princi es.	rmine ing pi n. f elec plant. ous c ples c	the el inciple tric po compc of ene	ectric e of e ower onents rgy co	al qua lectric gener of lo onserv	intity i cal ma ation ow vo vation	n DC achine and e Itage and	and A es by explain elect under	C circ applyi n the rical in stand	uits. ng Fa worki nstalla the n	araday ng pri ation need c	r's law inciple and b of eart	vs of es of basic thing
Course Outcomes	At the 1. Ana 2. Exp 3. Des 4. Rec 5. Des	end of the alyze the f blain the c blications. scribe the cognize th monstrate	e cou undar onstru opera e sigr the v	rse, tl menta uction ation o nifican arious	h e stu Is of e and f vario ce of types	idents lectric workir bus typ variou s of wi	s will c circung of pes of is com iring u	be ab its ex DC ar powe pone sed ir	le to cited b nd AC er plar nts of dom	by DC elect nt with low v estic a	and trical their oltage and to	AC su machi layou e elect know	pply. nes a ts :rical i v safet	nd ide nstalla	entify ations asures	their S.
Note:The h required for	ours given each topic	against ea based on	ach to impo	pic ar	e of ii and	ndicat depth	ive. T of co	he fao verag	culty h e req	ave t uired.	he fre The	edom marks	to de allot	ecide ted fo	the ho or	ours
DC and AC and voltage sinusoidal v power, Pow	Circuits - laws - Seri vaveforms, er factor. A	ations sha Electrical of al and par Peak and nalysis of	all not circuit allel c RMS f sing	t depe eleme circuits value lephas	nd on ents (l s - An es, Ph se AC	the n R, L a alysis asor circu	umbe nd C) of sin repres uits co	r of ho , Volta nple c sentat onsisti	ircuits ircuits ion, R ng of	ndicat nd cur with Real p R, L,	ed. rrent s DC e ower, C, R	ource xcitatio Reac L, RC	s - Kir on. Re tive p	rchhot eprese oower, C com	f's cu entatio Appa Ibinati	rrent on of arent ions. [12]
AC Machin Types, Loss Generation Characterist Synchronou	AC Machines - Faraday's laws of electromagnetic induction - Transformers: Construction, Working principle, Types, Losses in transformers, Regulation, Efficiency and applications. Generation of rotating magnetic fields - Three phase induction motor: Construction, working principle, Characteristics, Starting - Single phase induction motor: Construction, working principle and applications - Synchronous generators: Construction, Working principle and applications. Electrical Power Generation Systems - Sources of electrical energy: Renewable and nonrenewable - Principles and schematic diagram of Hydroelectric power plant. Thermal power plant. Nuclear power plant. Solar															
Synchronous generators: Construction, Working principle and applications.[08]Electrical Power Generation Systems - Sources of electrical energy: Renewable and nonrenewable - Principles and schematic diagram of Hydroelectric power plant, Thermal power plant, Nuclear power plant, Solar PV system and Wind energy conversion systems.[08]																
Electrical Power Generation Systems - Sources of electrical energy: Renewable and nonrenewable - Principles and schematic diagram of Hydroelectric power plant, Thermal power plant, Nuclear power plant, Solar PV system and Wind energy conversion systems. [05] Electrical Installations and House Wiring - Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB - Types of Batteries, Important Characteristics for Batteries - UPS. Single phase and three phase systems: Three phase balanced circuits, Phase sequence, voltage and current relations in star and delta connections - Basic house wiring tools and components - Domestic wiring: Service mains, meter board, distribution board, energy meter. Different types of wiring: staircase, fluorescent lamp and ceiling fan. Electrical Energy Conservation & Safety - Elementary calculations for energy consumption - BEE Standards - Electrical energy conservation - Methods. Electric shock, Precautions against shock, Objectives of earthing,																
	Total Hours: 45															
Text book(1 D. P. 2 D. C. Reference(p ook(s) : D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2017. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2017. ence(s) :															
1 L. S. I	Bobrow, "Fu	Indamenta	als of	Electr	ical E	ngine	ering"	Oxfo	rd Un	iversit	ty Pre	ss, 20	11.			
2 E. Hu	ghes, "Elec	trical and I	Electr	onics	Techr	nology	/", Pea	arson,	2016	lia 00	15					
3 V. D.	oro, "Electi	Electrical	eering			ntais",	Pren	ICE H	all Ind	iia, 20	015. 06					
Pre-req MAPPII	uisite: Nil NG OF COU	JRSE OU		MES, I	PROG	RAM	ME O	UTCC	OMES	AND	PRO	GRAN	име (SPEC	IFIC	
COURSE	CODE &	• -						P	0						P	SO
COURS	ENAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
		CO1	3	3			2					2	3		3	2
	1 & Paoia	CO2	3	3	1	1			2		2		2	1	3	2
		CO3	3	3	2	2			2	2	1			1	3	3

 CO5
 3
 3
 2
 1
 2
 2
 2

 Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

CO4

Electrical Engineering

K.S.Rangasamy College of Technology – Autonomous R2018 50 MY 001 - Constitution of India														
				50 MY 001	- Constitutio	on of India								
		L	ouro /Wook	Comm	On to all Bra	Crodit		Movimum Mo	rko					
Semest	er —			P	i otai bre	Clean			rs Total					
		2	0	0	30	-	100	-	100					
	•	To know	the premises	informing th	e twin theme	s of libertv ar	nd freedom fr	om a civil rig	nts					
		perspecti	ve.											
	•	To addre	ss the growth	of Indian op	oinion regard	ing modern li	ndian intellec	tuals' constitu	utional role					
Objectiv	99	and entitl	ement to civi	and econon	nic rights as v	well as the er	mergence of	nationhood in	theearly					
Objectiv		years of I	Indian nation	alism.	India offer th		amont of the	Dolohovily Do	volutionin					
	•	1917 and	l its impact or	the initial d	rafting of the	Indian Const	titution	DOISTIEVIK RE	volutionin					
	•	To gain k	nowledge on	bill passing										
	•	To acquir	e knowledge	on function	of election co	ommission								
	At	the end of	f the course	the student	s will be abl	e to:								
	1.	Discuss t	he growth of	the demand	for civil rights	in India for t	the bulk of fn	s before the a	rrival of					
		Gandhi in	Indian polition	cs.	-									
Course	2.	Discuss t	he intellectua	l origins of th	ne framework	of argument	t that informe	d the						
Outcomes Out														
	5.	under the	leadership	f Jawaharlal	Nehru and t	ne eventual f	ailure of the	proposal of di	rect					
		elections	through adul	t suffrage in	the Indian Co	onstitution.								
	4.	Discuss t	he passage c	of the Hindu	Code Bill of 1	956.								
	5. Explain the functions of Election Commission													
Note:Th	Note: The hours given against each topic are of indicative. The faculty have the freedom to decide the hours													
required	for eac	h topic bas	ed on import	ance and de	pth of cover	age required	. The marks	allotted force	uestions in					
the exam History	nination of Maki	s snall not (depend on the	e number of	nours indica	lea.								
History -	Draftin	g Committe	e, (Composit	ion & Workin	ia)				[05]					
Philoso	phy of t	he Indian (Constitution		0,									
Preamb	e - Sali	ent Feature	es I D: I () D D						[05]					
Eurodom	ontal Di	onstitutiona	al Rights & L	Dight to Ero	odom - Piah	t against Evr		uht to Eroodor	n of Poligion					
Cultural	and Edu	ucational Ri	iahts - Riaht t	o Constitutio	nal Remedie	s - Directive	Principles of	State Policy -	Fundamental					
Duties.			give ingrid					,	[05]					
Organs	of Gove	ernance				_		_	_					
Parliame	ent - Co	omposition	- Qualificatio	ons and Dis	qualifications	s - Powers a	and Function	ns Executive	- President -					
Governo	or - Cour	ICII OF IVIINIS	ters - Judiciar	y, Appointme	ent and Trans	ster of Judges	s, Qualificatio	ons - Powers a						
Local A	dminist	ration							[00]					
District's	Admin	histration h	ead: Role a	nd Importan	ice, - Munic	ipalities: Inti	roduction, M	layor and ro	le of Elected					
Represe	ntative,	CEO of Mu	unicipal Corp	oration - Pac	chayati raj: Ir	troduction, F	PRI: ZilaPach	ayat - Electe	edofficials and					
their role	es, CEO	ZilaPachay	at: Position a	and role- Blo	ck level: Orga	anizational H	lierarchy (Diff	erent departr	nents) -Village					
Election		ission	vppointed onit	ciais - impon	ance of gras		facy.		[05]					
Election	Commi	ssion: Role	and Functio	ning- Chief E	Election Com	missioner an	nd Election C	ommissioner	s- State					
Election	Commi	ssion: Role	and Functio	ning- Institut	te and Bodie	s for the we	Ifare of SC/S	ST/OBC and	women.[05]					
								То	tal Hours: 30					
	DK(S):	ctitution of	India 1050 (E	Poro Act) Co		ublication								
1. 1		i Ambedka	n B R "Fram	bare Act), GC		" 1StEdition	2015							
Referen	ce(s) :	., , , , , , , , , , , , , , , , , , ,	.,, i iun	ing or molar		, - London,								
1. E	Basu, D	D., "Introdu	ction to the C	onstitution o	f India", Lexi	s Nexis, 2018	5.							
2. N	1.P Jain	, "Indian Co	onstitution La	w", 7 th Editio	n, Lexis Nexi	s, 2014.								
3. 5	R Bhai	nsali, Textb	ook on The C	Constitution of	of India, Unive	ersal Publish	ers, 2015							
4. N	/I P Jain	, Outlines o	of Indian Lega	I and Consti	tutional Histo	ry, Lexisnexi	is, 2014							

3.3. 2- P.....

BoS Chairman

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE & COURSE NAME	00						Р	0						P	50
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
50 MY 001 & Constitution of India	CO1								2	2	1		2		
	CO2								2	2	1		2		
	CO3								2	2	1		2		
	CO4								2	2	1		2		
	CO5								2	2	1		2		

K.S.Rangasamy College of Technology – Autonomous R2018															
				50 CH 0P1- (Chemistry L	aboratory									
				Commo	n to all bran	iches									
Sen	nester		Hours / We	ek	Total	Credit	Ma	aximum Ma	rks						
	1		I	P	nrs 60		CA	ES	10tai						
	1		t the knowle	dae of theory	otical concer		00	40	100						
			velon the ex	nerimental sk	cills of the les	arners									
		 To tac 	velop trie ex silitate data i	nterpretation		amers.									
Obje	ctive(s)	• To en	able the lea	rners to get h	ands-on exp	erience on th	he principles	discussed i	n theory						
		sessio	ons.												
		• To ex	pose the lea	rners to vario	ous industrial	and environ	mental appli	cations.							
		At the end	l of the cour	se, the studer	nt will learn a	about									
		1. Estim	ate the amo	unt of hardne	ss, alkalinity	, chloride ior	n and dissolv	ed oxygen i	n						
		2 Eatim	sample	unt of borium	oblorido opo	h mixtura of a	oide by conc	luctomotry							
Co	ourse	2. ESum	ate the amo	unt of ferrous	ion by noter	tionetry	acius by conc	Juctometry							
Out	comes	4. Estim	ate the amo	unt of acid by	oH metry a	nd apply the	knowledge o	of pH							
		deterr	nination for	nealth drinks,	beverages,	soil, effluent	and other bi	ological sam	nples						
	5. Estimate the amount of ferrous ion by spectrophotometry 6. Determine the percentage of corrosion by weight loss method														
		6. Deteri	mine the pe	rcentage of co	orrosion by w	veight loss m	ethod								
1.	Estimatio	n of hardne	ss of water	by EDTA met	thod.										
2.	Estimatio	n of alkalini	ty of water s	sample.	Argontom	atria mathad									
3. 4		ation of dise		en in hoiler fe	ed water (W	inkler's meth	nd)								
	Estimatio	n of barium	chloride by	conductomet	ric precipitat	ion titration.	100).								
6.	Estimatio	n of mixture	e of acids by	conductome	tric titration.										
7.	Estimatio	n of ferrous	ion by pote	ntiometric titra	ation.										
8.	Estimatio	n of HCl, be	everages an	d other biolog	gical samples	s by pH mete	er.								
9.	Estimatio	n of iron co	ntent by spe	ectrophotome	try method.	weight leas a									
10.	Determin	ation of cor	rosion rate a	and inhibitor e	enciency by	weight loss n	nethod.	Tota	Hours: 60						
Text	book(s) :							1010							
4	Dr. S.Va	airamand D	r. Suba Ran	nesh, "Engine	ering Chemi	stry", Wiley	India Private	Limited , D	elhi, 2 nd						
1	edition,	January 20	013.		<u> </u>										
2	S.S. Da	ra, "A Text	Book on Exp	periments and	d Calculation	s Engineerin	ig", S.Chano	d & Co., Ltd.	, 2 nd						
Defe	edition,	2003													
Reter	Mondha	m Donn			Thomas N		- Toxt Book	of Ouantitati							
1	Chemic	al Analvsis"	ey. R.C, Ba . Pearson E	ducation. 6 th	edition. 2009	.j.r., vogels).	S TEXL DOUK	u Quantitati	ve						
2	O P Ver	mani , and	A K Narula,	"Applied Che	mistry : The	ory And Prac	tice, New Ag	ge Internatio	nal (P)						
3	Gary D.	Christian, "	Analytical C	hemistry", Jo	hn Wiley & S	Sons, 6 th editi	ion, 2007.	-	. ,						
4	Chatwal	Anand, "In	strumental I	Methods of Cl	hemical Anal	lysis", Himala	aya Publicati	ons, 5 th Edit	ion,2019.						

-<u>S____</u> 3.3. am

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						P	0						P	SO
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
50 CH 0P1 & Chemistry Laboratory	CO1	3	3	3	3	3	3	3	3	2		3	2	3	2
	CO2	3	3	3	3	3	3	2	3	1		2	1	2	1
	CO3	3	3	3	3	3	3	3	2	3		2	1	3	2
	CO4	3	3	3	3	3	3	2	1			2		2	3
	CO5	3	3	3	3	3	3	2	1			2	1	2	3

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution K. S. Rangasamy College of Technology – Autonomous

R2018

50 ME 0P1 – Engineering Practices Laboratory																	
					Com	mon	to all	brane	ches								
Somostor		Hours	s/We	ek			Tota	al	Cre	edit			Maxi	mum	Marks	S	
Semester	L		Т		Р		hrs		()		CA		ES		Tot	al
I	0		0		4		60		2	2		60		40		100)
	• Toa	cquire s	skills i	n bas	ic enç	ginee	ring p	ractic	es.								
	 To io 	lentify t	he ha	nd to	ols an	d ins	trume	nts.									
Objective(s)	 To p shop 	provide	hand	s on	expe	rienco	e in F	Fitting	, Car	pentr	y, Sh	eet n	netal,	Weld	ding a	ind la	the
	• Top	rovide p	oractic	al tra	ining	on ho	buse h	nold w	/iring a	and e	lectro	nic ci	rcuits				
	• To o	ffer rea	l time	activi	ity on	plum	bing c	onne	ctions	s in do	mest	ic app	olicati	ons.			
	At the e	nd of tl	he co	urse,	the s	stude	nt wi	ll be a	able t	0							
	1. Perf	orm fac	ing, p	lain t	urning	g, drill	ing.										
Course	2. Mak	e a mo	del of	fitting	g and	carpe	entry:	Squa	re, Do	ovetail	and	Cross	; lap j	oints.			
Outcomes	3. Fab	ricate th	ne mo	dels o	of she	et me	etal ar	nd we	lding j	joints.							
	4. Con	struct a	nd de	mons	strate	electi	rical a	nd ele	ectron	nic wir	ing ci	rcuit.					
Maakina ahan	5. Con	struct tr	ne wa	er pi	pe line	e in p	iumbi	ng sn	op.								
Safety aspects in machine shop, Study of Lathe and Radial drilling machine, Turning, Facing and Drilling.																	
Safety aspects in machine shop, Study of Lathe and Radial drilling machine, Turning, Facing and Drilling. Fitting and Carpentry																	
Fitting and Carpentry Safety aspects in Fitting and Carpentry, Study of tools and equipments, Preparation of models- Square, Dove																	
Safety aspects in Fitting and Carpentry, Study of tools and equipments, Preparation of models- Square, Dove tail joint. Cross Lap																	
tail joint, Cross Lap. Sheet Metal and Welding																	
Sheet Metal and Welding Safety aspects in Sheet metal and Welding, Study of tools and equipments, Sheet metal models - Scoope																	
Safety aspects in Sheet metal and Welding, Study of tools and equipments, Sheet metal models - Scoope,																	
Cone, Tray, Pro		weid jo	inis -L	.ap, t	ουιι, τ	-joint	s. Siu	uy oi	Gas	veidii	ig an	u ⊑qu	iipme	ms.			
Electrical wiri			5	·						J			o 10 to	\ \ /:			
Salety aspects		ical wir	ing, e	boo	OI EI		al IVIà	fluor	is and	t lomr		mpon	ents,	vvirir io oi	ig cir rouit	cuit ic	ir a
Blumbing	jie and sta	all case	SWILC	nes.	vviring	y circ		nuore	escen	t lamp	JS, Da	asic e	lectro		rcuit.		
Flumbing Study of plumb	ing toolo		hlv of	<u>с</u> т.	ninoo) and	nina	fitting		Hina	of thre	odo	in C I	Dino		• by
thread cutting of	ling loois, lige	assem		G.I.	pipes	FVC	, and	pipe	nung	5, Cui	ung d	JI UNE	aus	in G.i	.ripe:	5/ 7 V C	by
Smithy Plactic	nes. e mouldi	ha and	Glass	• • • • • • •	lina												
Safety aspects	in smithv	plastic	moul	dina :	and d	lass c	utting	1 Stu	dv of t	tools a	and e	auinm	ents				
Lab Manual :		plaotio	mea	anig	and g		, artini g	, 014				94.1911					
1. "Engine	ering Pra	ctices L	ab Ma	anual	", Dep	bartm	ent of	Mech	nanica	al Eng	jineer	ing, K	SRC	Τ.			
Pre-reauis	ite: Nil																
MAPPING	OF COU	RSE O	итсо	MES	, PRC) GR/			COM	IES A	ND P	ROG	RAM	ME S	PECI	FIC	
OUTCOM	ES																
COURSE CC	DE &	00						P	0							PSO	
COURSE N	AME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
		CO1	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2
50 ME 0P	1&	CO2	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2
Engineering Pi	actices	CO3	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2
Laborato	ry	CO4	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2
		CO5	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2

s..... 2.3. a.

	K.S.Rangas	amy College	e of Techno	logy – Auto	nomous		R2018					
	5	0 EN 002 – (Communica	tion Skills II								
		Commo	on to all Bra	nches								
	Hours / Wee	k	Total	Credit	M	aximum Mai	rks					
L	Т	Р	hrs	С	CA	ES	Total					
1	1	0	30	2	40	60	100					
 To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts. To help learners develop strategies that could be adopted while reading texts. To help learners acquire the ability to speak and write effectively in English in real life and career related situations. Improve listening, observational skills, and problem solving capabilities Develop message generating and delivery skills At the end of the course, the student will be able to 												
At the end 1. Identify the lists 2. Use co effectiv 3. Make in utilizing 4. Use a v conven 5. Demon	d of the cou speaker's presented on the content mmunication re oral interact offerences and digital literat variety of account tions of acact patrate profici	rse, the stud urpose and t t strategies, v ctions d predictions cy tools on t curate senter demic writing ency in com	dent will be one, compre vocabulary a s, develop re extual compr nce structure and use pee munication s	able to hend relation nd appropria ading speed rehension s with function er and teache kills in acade	nship betwee ate grammati , build acade onal vocabula er feedback f emic and prof	en ideas and cal structure emic vocabu ary, apply th fessional co	respondto es for lary by e writing. ntexts					
	L 1 • To hel differer • To hel career • Improv • Develo At the end 1. Identify the liste 2. Use co effectiv 3. Make in utilizing 4. Use a v conven 5. Demon	K.S.Rangas 5 Hours / Wee L T 1 1 To help learners in different academic To help learners de To help learners de To help learners au career related situa Improve listening, o Develop message (At the end of the cou 1. Identify speaker's puthe listening conten 2. Use communication effective oral interact 3. Make inferences an utilizing digital litera 4. Use a variety of according 5. Demonstrate profici	K.S.Rangasamy College 50 EN 002 – 0 Common Hours / Week L T P 1 1 0 • To help learners improve their different academic and professi • To help learners develop stratege • To help learners acquire the all career related situations. • Improve listening, observational • Develop message generating and At the end of the course, the stude 1. Identify speaker's purpose and the the listening content 2. Use communication strategies, we effective oral interactions 3. Make inferences and predictions utilizing digital literacy tools on to 4. Use a variety of accurate senter conventions of academic writing 5. Demonstrate proficiency in communication strategies and predictions 1. Use a variety of accurate senter conventions of academic writing 5. Demonstrate proficiency in communication strategies are a file 1. Identify speaker are a file 1. Identify speaker and predictions 3. Make inferences and predictions 4. Use a variety of accurate senter conventions of academic writing 5. Demonstrate proficiency in communications 1. Interactions are a file 1. Interactio	K.S.Rangasamy College of Techno 50 EN 002 – Communica Common to all Bra Hours / Week Total L T P hrs 1 1 0 30 • To help learners improve their vocabulary different academic and professional contexts • To help learners develop strategies that cou • To help learners develop strategies that cou • To help learners acquire the ability to spea career related situations. • Improve listening, observational skills, and p • Develop message generating and delivery s At the end of the course, the student will be 1. Identify speaker's purpose and tone, compre- the listening content 2. Use communication strategies, vocabulary a effective oral interactions 3. Make inferences and predictions, develop re utilizing digital literacy tools on textual compre- th. Use a variety of accurate sentence structure conventions of academic writing and use pee 5. Demonstrate proficiency in communication s	K.S.Rangasamy College of Technology – Autor 50 EN 002 – Communication Skills II Common to all Branches Hours / Week Total Credit L T P hrs C 1 1 0 30 2 • To help learners improve their vocabulary and enable different academic and professional contexts. • To help learners develop strategies that could be adopte • To help learners acquire the ability to speak and write career related situations. • Improve listening, observational skills, and problem solvin • Develop message generating and delivery skills At the end of the course, the student will be able to 1. Identify speaker's purpose and tone, comprehend relation the listening content 2. Use communication strategies, vocabulary and appropriateffective oral interactions 3. Make inferences and predictions, develop reading speed utilizing digital literacy tools on textual comprehension 4. Use a variety of accurate sentence structures with function conventions of academic writing and use peer and teached 5. Demonstrate proficiency in communication skills in acade 5. Demonstrate proficiency in communication skills in acade	K.S.Rangasamy College of Technology – Autonomous 50 EN 002 – Communication Skills II Common to all Branches Hours / Week Total Credit M L T P hrs C CA 1 1 0 30 2 40 • To help learners improve their vocabulary and enable them to used different academic and professional contexts. • To help learners develop strategies that could be adopted while readi • To help learners acquire the ability to speak and write effectively in career related situations. • Improve listening, observational skills, and problem solving capabilitie • Develop message generating and delivery skills At the end of the course, the student will be able to 1 1. Identify speaker's purpose and tone, comprehend relationship between the listening content 2. Use communication strategies, vocabulary and appropriate grammati effective oral interactions 3. Make inferences and predictions, develop reading speed, build acade utilizing digital literacy tools on textual comprehension 4. 4. Use a variety of accurate sentence structures with functional vocabulary conventions of academic writing and use peer and teacher feedback f 5. Demonstrate proficiency in communication skills in academic and proficiency in communication skills in academic and proficiency in communica	K.S.Rangasamy College of Technology – Autonomous 50 EN 002 – Communication Skills II Common to all Branches Hours / Week Total Credit Maximum Mar L T P hrs C CA ES 1 1 0 30 2 40 60 • To help learners improve their vocabulary and enable them to use words app different academic and professional contexts. • To help learners develop strategies that could be adopted while reading texts. • To help learners acquire the ability to speak and write effectively in English in career related situations. • • Improve listening, observational skills, and problem solving capabilities • Develop message generating and delivery skills At the end of the course, the student will be able to 1 1. Identify speaker's purpose and tone, comprehend relationship between ideas and the listening content 2. Use communication strategies, vocabulary and appropriate grammatical structure effective oral interactions 3. Make inferences and predictions, develop reading speed, build academic vocabu utilizing digital literacy tools on textual comprehension 4. Use a variety of accurate sentence structures with functional v					

Note: The hours given against each topic are of indicative. The faculty have the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Advanced English Listening Module

Extended Listening to Podcasts – Listen and Watch Video Clips - answering Inferential Multiple Choice Questions and Vocabulary Check- Listening to Lengthy Discourses – Structured Listening – Listening to Songs and Cognizing the Lyrics-Listening to popular speeches, news briefs and stories. [04]

Oral Communication

Debates – Group Discussion (Structured) and rotate roles – Elevator Speech – Prepared Talk – Extempore – Brief Technical presentations- Spin-a-Yarn – Short Film reviews – talk on silent videos – Dialogues and Role plays (Intermediate & Higher Level) – Interviews [04]

Critical Reading Process

Silent Reading – Scanning and Skimming - Reading comprehension with logical reasoning questions – Cognition of Theme and Inferential Meaning – advanced Academic and Functional Vocabulary List (1000 words) – word webs and semantic threads - Loud Reading – Modulation and Pronunciation Check – Mind maps – Note making – Deep Reading Skills.

Academic Writing Practices

Sentence Equivalence and Text completion tasks – Data Interpretation - Essay Writing – Letter Writing – Business Emails – Conversational Fill Ups-Rewordify (select a text and simplify/enhance the language)- Reports on events. [03]

Total Hours: 15 + 15 (Tutorial) = 30 hours

Text Books:

- 1. M.Ashraf Rizvi, 'Effective Technical Communication', 2nd Edition, McGraw Hill Education (India) Private Limited, Chennai, 2018
- 2. Norman Lewis, 'Word Power Made Easy The Complete Handbook for Building a Superior Vocabulary Book', Penguin Random House India, 2020

Reference(s) :

- 1. Paul Emmerson and Nick Hamilton, 'Five Minute Activities for Business English', Cambridge University Press, N.York, 2005
- Ruth Wainry B, 'Stories: Narrative Activities for The Language Classroom', Cambridge University Press, N.York, 2005
- 3. Stuart Edman, 'English Vocabulary in Use: Upper Intermediate', Cambridge University Press, N.Y, 2006
- 4. https://www.khanacademy.org/test-prep/sat/sat-reading-writing-practice

2.3. Q

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE & COURSE NAME	00						Ρ	0						P	SO
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	2		2	1	1	1	2	3	3	2	3		1
50 EN 002 – Communication Skills II	CO2	1	2	1	3	2	1		2	3	3	2	3		2
	CO3	1	2	1	2	1	1	2	2	2	3	2	3	1	2
	CO4	1	3	1	2	2	2	1	2	2	3	3	3	1	2
	CO5	1	1	1	1	1	1	1	1	3	3	2	3	1	3

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

R2018

		r.s.ran	gasanny Con	ege of rech	hology – Autono	mous		
		50 MA 0	02 - Laplace	Transform a	nd Complex Var	iables		
			Comn	non to All Bra	anches			
Somostor		Hours / Weel	(Total	Credit		Maximum Mar	:ks
Semester	L	Т	Р	hrs	С	CA	ES	Total
	3	1	0	60	4	40	60	100
	Multiple	e integration is	s used to solv	e problems i	nvolving volume a	and surface ar	ea.	
	Vector	calculus can	be widely use	ed for modelin	ng the various of p	hysics.		
	Introdu	ce the fundar	nental ideas	of the function	ns of complex var	iables and de	veloping a cle	ar
	underst	tanding of the	fundamenta	concepts of	complex analysis	such as anal	ytic function ar	nd
Objective(s)	comple	x integral.					-	
	 Identify 	and construc	t complex - c	lifferentiable f	unction.			
	Laplace	e Transforms	can be used	for efficiently	solving the proble	ems that occu	ir in various bra	anches of
	engine	ering disciplin	es.		0			
	At the end	of the cours	e, the stude	nts will be at	ole to			
	1. (i) Ev	aluate double	and triple in	tegrals.				
	(ii) U	nderstand the	concept of E	Beta and Gam	nma functions.			
Course	2. Apply	y the concept	of vector cal	culus to verify	/ Green's, Stoke's	and Gauss o	divergence the	orems.
Outcomes	3. Cons	struct analytic	function and	bilinear trans	formation.			
	4. Expa	and the function	ons as Taylor	's and Laurer	nt's series and eva	aluate the con	nplex integrals	-
	5. Appl	y Laplace trar	nsform techni	ques for solvi	ng differential eq	uations.		

The hours given against each topic are of indicative. The faculty have the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the numbers hours indicated.

Multiple Integrals

Double integration – Cartesian and polar coordinates – Change of order of integration – Area between two curves – Area as double integral – Triple integration in Cartesian coordinates. Beta and Gamma functions: Relationship between Beta and Gamma functions – Properties – Problems. [09]

Vector Calculus

Introduction - gradient of a scalar point function - directional derivative - angle of intersection of two surfaces – divergence and curl(excluding vector identities) - solenoidal and irrotational vectors - Green's theorem in the plane - Gauss divergence theorem -Stokes' theorem(without proof)- verification of the above theorems and evaluation of integrals using them. [09]

Analytic Functions

Analytic functions – Necessary conditions (Cauchy–Riemann equations)- Polar form of Cauchy–Riemann equations – Sufficient conditions (without proof) – Properties of analytic functions – Harmonic function –Harmonic conjugate – Construction of analytic functions– Conformal mapping: w = z + a, az, 1/z-Bilinear transformation. [09]

Complex Integration

Cauchy's Integral theorem (without proof) – Cauchy's integral formula – Taylor's and Laurent's series (without proof) Classification of singularities – Cauchy's residue theorem – Contour integration – Circular and semi-circular contours (excluding poles on real axis). [08]

Laplace Transforms

Conditions for existence – Transform of elementary functions – Basic properties – Shifting theorems- Derivatives and integrals of transforms—Transformofunits tepfunction–Dirac's delta function-Initial and final value theorem – Transform of periodic functions. Inverse Laplace transform – Convolution theorem (excluding proof) – Solution of second order or dinary differential equation with constant co-efficients – simultaneous equations of first order with constant co-efficients. [10]

	Total Hours: 45 + 15(Tutorial) = 60 hours
Text	book(s) : :
1.	Grewal B.S, "Higher Engineering Mathematics", 43 rd Edition, Khanna Publishers, Delhi, 2014. Website: https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html
2.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10 th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.
Refe	rence(s) :
1.	Bali.N.P and Dr.Manish Goyal,"A text book of Engineering Mathematics",8 th edition,Laxmi Publications (P) Ltd,2011
2.	Veerarajan.T., "Engineering Mathematics", for Semesters I and II, Tata McGraw Hill Publishing Co., New Delhi., 2010.
3.	Dr.P.Kandasamy Dr.K.Thilagavathy Dr.K.Gunavathy , "Engineering Mathematics -II", S.Chand & Company Ltd, New Delhi.
4.	SWAYAM online video courses.(www.swayamprabha.gov.in)

Pre-requisite: Nil

Γ

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	60						Р	0						P	SO
COURSE NAME	co	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	3	2	3							2	3	
50 MA 002 & Laplace Transform and Complex Variables	CO2	3	3	2	2	3							2	3	
	CO3	3	3	3	2	2							2	3	
	CO4	3	3	2	2	3							2	3	
	CO5	3	3	2	3	3							2	3	

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

K.S.Rangasamy College of Technology – Autonomous R2018										
	50PH001 Applied Physics									
		Hours/w	.E. Mecha	tronics Eng	Credit	Max	imum mar	ks		
Semester	L	T	P	Total hrs	C	CA	ES	Total		
II	3	0	0	45	3	40	60	100		
Objectives	 Analyze the crystal parameters to investigate crystal structures, crystal growthtechniques and to classify the type of the defect present in the crystal To enrich the understanding of various types of materials and their applications in engineering and technology. To enable the students to correlate the theoretical principles with application oriented studies in electrostatics. To impart knowledge on the concepts of magnetostatics, magnetic flux density, classifications of magnetic materials and its applications. 									
Course Outcomes	At the end of 1. Explain th 2. Solve the methods. 3. Gain the k 4. Expand th 5. Acquire a	of the course the basics of c engineering knowledge or the knowledge broad view c	e, the stud rystals and problems n electrosta on magne of smart magnet	ent will be a l different cry like plastic atics and dieleto static bou	able to ystal growth deformation lectric mater undary condi- panomateria	techniques. , slip and twin ials. tions and mag ls.	ning by ma netic mater	aterialtesting ials.		
Note: The ho required for e in the examin	ours given again each topic base nations shall not	nst each topic d on importai t depend on t	are of indi nce and de he number	cative. The pth of cover	faculty has the age required dicated.	he freedom to d. The marks a	decide the llotted for q	hours juestions		
Crystal Physics Introduction-Fundamental terms of crystallography–Bravais lattice–SC, FCC, BCC, HCP crystals-Miller indices- Relation between inter planer distance and inter atomic distance-Crystal defects–Crystal growth techniques- solution, melts (Bridgman and Czochralski) and vapour growth techniques. Properties of Matter and Materials Testing Properties of matter: Hooke's Law - Stress -Strain Diagram - Elastic Moduli - Relation between elastic constants - Poisson's Ratio - Expression for bending moment and depression - Cantilever - Expression for Young's modulus by Non uniform bending and its experimental determination. Materials testing: Mechanism of plastic deformation- slip and twinning – types of fracture – Vickers Hardness										

test - fatigue and creep te	est.														[09]
Electrostatics															
Maxwell's equation for e	electrosta	tics –	Edu	ie to	straig	ht coi	nducto	ors, c	ircula	r loop	, infin	ite sh	neet c	of curi	ent-
electric field intensity (D) - Elect	ric po	otentia	il - di	electr	ics -	dielec	ctric p	olariz	ation	-inter	nal fie	eld –	Claus	sius-
Mossotti equation - dielec	ctric stren	gth –	Dieleo	ctric Ic	oss- B	reak c	lown	mecha	anism	-appli	cation	s.			[09]
Magnetostatics	Magnetostatics														
Maxwell's equation for m	agnetosta	atics -	Bins	straigi	nt con	ducto	rs, cir	cular	loop,	Infinite	e shee	et of c	urrent	t - Lor	entz
force, magnetic field inte	ensity (H)	– BI	ot–Sa	varts	Law	– Am	ipere		uit La	aw —Iv	lagne	tic tiu	ix der	isity (B) —
magnetic materials – Cla	ASSIFICATIO	on – p	proper	ties-L	omai	n the	ory o	rterro	magn	etism	- Hysi	teresi	s- Ha	ra an	001
Soft magnetic materials		Struc	ture,	prepa	ratior	and a	applic	ations	з-арр	Icatio	ns.				[09]
Now Engineering Moto	i Nanote		logy	~~~	nrond	rotion	, nro	nortio	0 000	اممما	iontin	~~	Chon	- mor	mony
allove (SMA) sharester	indis. IVIE		yiass	1171 AU	hiehs		i, più iona	perue	o dillo	i appi	dicco	13 -	Shape		N
alloys (SiviA) - characteri	sucs, pro		n nro	u H all	oy ap	Millin		- auva	niage Bot				ayes 0	אס יווע אס יווע	1
Deposition method- Carb	ues- 10µ on Nano	J-UOW	п рю /Смт		Ddll nortio	iviiiiii)(y mei narati	nuu -		ioni-u	moth	od A	vapo	iun Pl	1001
Deposition method- Carb	Un Nano	Tube). F10	pertie	s, pre	parati	ULDY	electi	ic arc	meur	<u>ou, A</u>	Total	Hour	
Taxt book(s) : :													Totai	nour	5. 4 5
1 V Pajondran "Engine	oring Dh	veice'	' Tata	McG	row L	lill No		lhi (20	11)						
2 Brillal and N Subram	anian El	octrici	, Tala		naw i		dition	Δarc	$\frac{11}{2}$	on & E	Draka	h (20	06)		
	anian, Er	SCILICI	ty and	may	leusn	1,0™ ⊑	union	, Ayız	i, nai		Tanas	511 (20	(00)		
							" oth								<u> </u>
W.H.Hayt and A.Johr	n Buck, "I	<u>ngine</u>	eering	elect	roma	gnetic	s", 6 ^m	Editio	n lata	a McG	Fraw F	<u>lill, Ne</u>	ew De	<u>elhi. (2</u>	014)
2. David J Griffith, "Intro	duction t	o Elec	ctrody	namic	:S″,2 nd	Editio	on, Ne	ewdell	ni, Pre	entice	Hall o	t India	a Pvt.	Ltd.(1997)
^{3.} K.A.Gagadhar & Ran	nanathan	and	P.M.,ł	Khann	a, "El	ectror	nagne	etic fie	ld the	ory", t	5 th Edi	tion, F	Publisl	hers,N	lew
Delhi. 2013.															
4. Dattuprasad and Rar	nanlal Jo	shi, (2	2016)	"Engiı	neerin	ig Phy	/sics"	Tata I	McGra	aw hill	Educ	ation.			
Pre-requisite: Nil															
MAPPING OF COU	RSE OU	TCON	IES, F	PROG	RAM	ME O	UTCO	OMES	AND	PRO	GRA	ИМЕ	SPEC	IFIC	
OUTCOMES		-													
COURSE CODE &	~~~						P	0						P	SO
COURSE NAME	0.0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	2	2	2	2	2	2	2	2	-	-	2	2
			0	~	~	~	2	~	~	~	~		-	~	
50 PH 001 & Applied	CO2	3	3	3	2	2	-	2	2	2	1	1	-	2	1
Physics	CO3	3	2	3	2	2	1	2	1	-	2	-	-	2	2
,	CO4	3	3	3	1	3	2	2	2	1	1	-	-	1	-

3 Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

3

CO5

3

2

2

3

	K.S.Rangasamy College of Technology – Autonomous R2018											
	50 CS 001 - Programming for Problem Solving											
	-		Commo	n to all Brar	nches							
Semester		Hours / Wee	k	Total	Credit	M	aximum Mar	ks				
Gennester	L	L T P hrs C CA ES Total										
1/11	3	3 0 0 45 3 40 60 100										
Objective(s)	 To lear langua To exa To unc To app To enh 	To learn the evolution of computers and examines the most fundamental element of the C language To examine the execution of branching, looping statements, arrays and strings. To understand the concept of functions, pointers and the techniques of putting them to use To apply the knowledge of structures and unions to solve basic problems in C language To enhance the knowledge in file bandling functions for storage and retrieval of data										
Course Outcomes	At the end 1. Infer th data ty 2. Annota branch 3. Recog feature 4. Comp prepro 5. Interpret	d of the cour he evolution, ypes and exp ate the conce ning, looping ynize the con- es rehend basic pressor ret the file con-	se, the stud generation, ressions ept of consol statements, cepts of func concepts of ncepts using	dent will be representation arrays and so ctions, recurs f structures, re proper stand	able to: on of problem output featur strings sion, storage unions, user dard library f	n and recogr es and exam class specifi defined data unctions	nize the conc nine the exec es and point types and	epts of cution of ers with its				

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Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

Introduction to Computer and Programming

Introduction to Computers - Evolution of computers - Generations of computers and Programming Languages– Introduction to components of a computer system -Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart–Pseudocode with examples. From algorithms to programs– variables (with data types)– Type Qualifiers - Constants – Operators –expressions and precedence. [09] I/O, Branching, Loops and Arrays

Console I/O– Unformatted and Formatted Console I/O – Conditional Branching and Loops -Writing and evaluation of conditionals and consequent branching -Iteration and loops - Arrays (1-D, 2-D), Character arrays and Strings [09]

Functions and Pointers

Functions: Scope of a Function – Library Functions and User defined functions - Function Prototypes –Function Categorization - Function Arguments - Arguments to main function - The return Statement - Recursion

Passing Arrays to Functions– Storage class Specifiers.Introduction to Pointer Variables - The Pointer Operators
 Pointer Expressions - Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers– Dynamic memory allocation [09]

Structures, Unions, Enumerations, Typedef and Preprocessors

Structures - Arrays of Structures- Arrays and Structures within Structures - Passing Structures to Functions -Structure Pointers - Unions – Bit Fields - Enumerations - typedef – The preprocessor and comments. [09] **File**

File: Streams – Reading and Writing Characters - Reading and Writing Strings -, File System functions - Random Access Files

[09] Total Hours: 45

Text	book(s) : :
1	Herbert Schildt, "The Complete Reference C", Fourth Edition, Tata McGraw Hill Edition, 2010.
2	Byron Gottfried, "Programming with C", Third Edition, McGraw Hill Education, 2014.
Refe	rence(s) :
1	E.Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Edition, New Delhi, 2016.
2	Brian W. Kernighan and Dennis M. Ritchie, "C Programming Language", Prentice-Hall.
3	Reema Thareja, "Computer Fundamentals and Programming in C", Second Edition, Oxford Higher
4	K N King, "C Programming: A Modern Approach", Second Edition, W.W.Norton, New York, 2008.

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO												PSO	
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	3		2	2							1		
50 CS 001 & Programming for	CO2	1	3		3	3			2				2	3	3
	CO3	1	3		2	3			2				2	2	3
Problem Solving	CO4	1	3		3	3			2				2	3	3
	CO5	1	3		2	3			2				2	3	2

K.S.Rangasamy College of Technology – Autonomous												
	50 ME 001 - Engineering Drawing											
		Co	mmon to Ci	ivil, MECH,	MCT & TXT							
Somostor		Hours / Wee	k	Total	Credit	M	aximum Mar	ks				
Semester	L T P hrs C CA ES Total											
1/11	2 0 4 90 4 50 50 100											
	To ac	quire various	concepts lik	e dimension	ing, convent	ions and sta	ndards.					
	• To im	part the grap	hic skills for	converting pi	ictorial views	s of solids in	to orthograpl	hic views.				
Objective(s)	To lea	arn the conce	pt of project	ion of solids.								
	To understand the section of solids and development of surfaces.											
	To learn the concept of isometric projection.											

At the end of the course, the student will be able to

1. Use the drafting instruments and construct the conic sections

2. Convert the pictorial views of solids in to orthographic views

3. Draw the projections of regular solids and floor plans

- 4. Draw the true shape of sections and develop the lateral surfaces of right solids
- 5. Sketch the three dimensional view of solids for given orthographic views.

Note: The hours given against each topic are of indicative. The faculty have the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to Engineering Drawing and Plane Curves

Use of drawing instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning – Drawing sheet layouts - Title block – Line types – Scales: plain, diagonal and vernier scales. Construction of ellipse, parabola and hyperbola (Eccentricity method) - Construction of rectangular hyperbola - Construction of cycloids, epicycloids and hypocycloids. [7+12]

Orthographic Projection

Course

Outcomes

Introduction to orthographic projections – Planes of projection – Projection of points and lines inclined to both planes – Projection of planes (Inclined to one plane and parallel to other – Inclined to both planes) - Conversions of pictorial views to orthographic views. [6+12]

Projection of Solids and Floor plan

Projections of simple solids: prism, pyramid, cylinder and cone (Axis of solid inclined to both HP and VP) - Floor plans: windows, doors and fixtures such as water closet (WC), bath sink, shower etc. [5+12]

Sections of solids and Development of surfaces

Sections of solids :Prism, Cylinder, Pyramid, Cone – Auxiliary Views - Draw the sectional orthographic views of geometrical solids, objects from industry - Development of surfaces of Right solids – Prism, Pyramid, Cylinder and Cone. [6+12]

Isometric Projection

Principles of isometric projection – Isometric scale – Isometric projections of simple solids: Prism, pyramid, cylinder and cone - Isometric projections of frustum and truncated solids - Combination of two solid objects in simple vertical positions. [6+12]

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Total Hours: 90
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Text	t book(s) :
1.	Bhatt N.D., "Engineering Drawing", Charotar Publishing House Pvt. Ltd., 53rd Edition, Gujarat, 2014.
2.	Basant Agarwal and C.M.Agarwal., "Engineering Drawing", McGraw Hill Education, 2013.
Refe	erence(s) :
1.	Shah M.B., Rana B.C., and V.K.Jadon., "Engineering Drawing", Pearson Education, 2011.
2.	Natarajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2014.
3.	Venugopal K., "Engineering Graphics", New Age International (P) Limited, 2014.
1	Dhawan, R.K., "A Text Book of Engineering Drawing" 3rd Revised Edition, S.Chand Publishing, New
4.	Delhi,2012.
	Pre-requisite: NIL

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	РО											PSO		
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	3	3	3	1	1	1		3	2	2	3	2
	CO2	3	3	3	3	3	1		1		3	1	1	3	2
50 ME 001 & Engineering Drawing	CO3	3	3	3	3	3	1		1		3	1	1	3	2
	CO4	3	3	3	3	3	1		1		3	1	1	3	2
	CO5	3	3	3	3	3	1		1		3	1	1	3	2

K.S.Rangasamy College of Technology – Autonomous												
		50	MY 002 - E	nvironment	al Science							
			Commo	n to All Brar	nches							
Compoter	H	Hours / Week Total Credit Maximum Marks										
Semester	L	Т	Р	Hrs	С	CA	ES	Total				
II	2	0	0	30	-	100	-	100				
Objectives • To help the learners to analyze the importance of ecosystem and biodiversity. • • To familiarize the learners with the impacts of pollution and control.												

2.3. a.

		• To (enlighten	the le	earner	s abo	ut wa	ste ar	d disa	aster i	manag	gemei	nt.				
		 To To 	endow wi recognize	ith an e the s	overv social	riew o respo	f food nsibil	resou ity in e	irces, enviro	huma nmen	an hea tal iss	alth, p ues.	opulat	tion, a	warer	iess.	
		At the en	d of the	cours	se, the	e stud	lent v	vill be	able	to:							
		1. Reco	gnize the	e cono	cepts a	and is	sues	relate	d to e	nviror	ment	, ecos	ystem	n and	biodiv	ersity	
Cou	irse	2. Analy	yze the s	ource	, effec	ts, an	id con	trol m	easur	es of	pollut	ion.	-			-	
Outco	omes	3. Enlig	hten of s	olid w	aste a	and di	saste	r man	agem	ent.	-						
		4. Awar	eness at	oout fo	ood re	sourc	es, po	opulat	ion ar	id hea	lth iss	sues.					
		5. Anal	yze the s	ocial i	ssues	and	civic r	espon	sibiliti	es.							
Enviro	onmental	Studies,	Ecosyst	em a	nd Bi	odive	rsity										
Enviro	nmental s	studies - S	Scope an	d mul	tidisci	plinar	y natu	ire - N	eed f	or put	olic av	varene	ess - E	Ecosy	stem	- Struc	cture
and fur	nction. Bi	odiversity	- Values	of bio	odiver	sity -	Endar	ngere	d and	ende	mic sp	pecies	s - Hot	t spots	s - Ind	ia a m	nega
biodive	ersity natio	on - Threa	ats - Con	servat	tion -	n-situ	and	ex-situ	ı - Ca	se stu	dies.					[0)6]
Enviro	onmental	Pollution	1														
Pollutio	on - Air,	water, so	il, noise	and	nuclea	ar - so	ources	s, effe	ects a	nd co	ntrol	meas	ures ·	- Impa	acts o	f mini	ng -
Enviroi	nment pro	ptection a	ct- Case	studie	es.											[C)6]
Waste	and Disa	aster Mar	nagemen	lt											□ a set		
Vaste	- Solia w	aste - e-v	vaste - se	ource	s, ene mi D	icos al		ntrol n	neasu	Concerned	JSast	er ma	nager	nent -	Eartr	i quar נכ	
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Food F	Resource	es, Huma	n Popula	ation	And H	lealth	۱						_				
World	tood prob	olems - ov	/er grazir	ng and	d des	ertifica	ation ·	- effec	ts of	mode	rn agi	ricultu	re. Po	opulat	ion - F	opula	ation
explosi	ion and i	is impacts	s - HIV/A	IDS -	Can	cer- R	ole o	t II Ir	n envi	ronme	ent ar	ia nur	nan n	ealth	- Cas	e stuc	dies.
Social	[06]																
	tainahla tu	nu ine L	hla dava	lonma	nt - I	leo of	altorn	ato or	orav	eouro	00 - R	ain w	ator h	arvact	ina - V	Nator	chad
manad	iement -	Deforesta	tion - Gr	eenho		offect	- Gloł	nal wa	armina	30010 1 - Cli	mate	chand	ne - A	cid ra	in - 0	zone	laver
depleti	ion - Was	te land re		n Co	nsum	erism	and	vaste	nrodi	icts -	Role	of an	indivi	dual i	n O	20110	layer
conser	vation of	natural re	sources	- Cas	e stud	lies.	and	nuolo	prout	1010	1,010	or an	mann	adar i		[0)7]
														Tota	l Hou	rs: 30)
Text b	ook(s) :																
1	Anubha k	Kaushik a	Ind C P K	aush	ik, "Pe	erspec	ctives	in En	/ironn	nental	Stud	ies",	New <i>i</i>	Age Ir	nterna	tional	
	Publisher	s, New D	elhi, 6 th e	dition	, Jan	uary 2	2018.										
2.	Tyler Mill	er. G, "En	vironmer	ntal So	cience	e", Cei	ngage	e Publ	icatior	ns, De	elhi, 16	5 th edi	tion, 2	2018.			
Refere	ence(s):																
1	Gilbert M	.Masters	and Wer	ndell F	P. Ela	, "En∖	vironm	nental	Engir	neerin	g Anc	d Scie	nce",	PHIL	earni	ng Pri	vate
2	Limited, N	Vew Delhi	, 3 rd Editi	$\frac{1}{2}$	013. Studio	<u>~" ()</u>	ford					Jalhi		dition	2012		
Ζ.	Rajagopa	Davia an						Jniver	Sity P	Care		Deini,		aition,	2012.	nd 🗖 🚽 🖽	
3.	Deeksna 2012	Dave an	d Katewa	a. 5.3	5, EN	VITOTI	nenta	ii Siud	lies,	Ceng	age r	JUDIIC	ations	, Deir	11, , Z	Ealt	ion,
4	<u>2013.</u> Cunningh	am W P	and Sai	no B	W Fr	viron	ment	Scien	ce M	oraw	-Hill	ISA	9 th ed	ition (2007		
 Рі	re-requisi	te Nil		<u>у</u> о, D.	VV. LI	IVII OII	mont	Ocien	60, IVI	syraw	, .	007.	J Cu	10011, 2	2007.		
M		OF COU	RSE OU	гсом	IES. F	ROG	RAM	ME O	итсо	MES	AND	PRO	GRA	име з	SPEC	IFIC	
0	UTCOME	S			,												
COL	URSE CC	DE &							Р	0						PS	SO
CC	OURSE N	AME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
			CO1	י ר	1	°	1	1	°	· 2	2	2	2		2	י ר	2
			001	2	-	2	-		2	3	3	3	3		2	2	3
_		.	CO2	3	3	3	3	2	3	3	3	3	3	2	2	2	3
Enviro	DU IVIY UU	∠ & Scionco	CO3	3	3	3	3	2	3	3	3	3	3	2	2	2	3
Envire	Jimentai	Science	CO4	2	2	2	3	3	3	3	3	2	2	3	2	2	3
			CO5	3	3	3	3	3	3	3	3	3	3	3	2	2	3
N	ote: 3 – S	Strong Co	ontributi	on; 2	– Ave	rage	Cont	ributi	on; 1	– Sor	ne Co	ontrib	ution	1	1		
						-			<u> </u>	<u>.</u>							
			K.S.Ran	gasa	my Co	ollege	e of Te	echno	ology	– Aut	onon	nous				R	2018
50PH0P1 Engineering Physics Laboratory																	

	50PH0P1 Engineering Physics Laboratory										
	Common to - MECH, MCT, TXT, FT, BT, NST, CIVIL										
Semester	emester Hours/week Total Hrs Credit Maximum marks										
	L	Т	Р	60	С	CA	ES	Total			
II	0 0 4 2 60 40 100										

3.3. 2- P.....

		• To gain practical knowledge by applying the experimental methods to correlate with the									
		Physics theory.									
		Demonstrate an ability to make physical measurements and understand the limits of									
		precision in measurements									
Objec	tives	• To introduce different experiments to test basic understanding of physics concepts ap									
		in optics and electronics.									
		• To enable the students to correlate the theoretical principles with application oriented									
		studies.									
		Analyze the behavior and characteristics of various materials for its optimum utilization									
		At the end of the course, Students will able to									
		 Know the concept stress, strain and elastic limit of a given sample. (1-3) 									
Cou	rse	Grasp the knowledge of dependency of viscosity and surface of a liquid. (4-6)									
Outco	mes	3. Have a knowledge of diffraction property of light through grating and fiber opticcable(7-8)									
		4. Gain the dielectric constant of a given material. (9)									
		5. Acquire the knowledge of semiconductor photovoltaic solar cells.(10)									
LIST (OF EXP	ERIMENTS									
1. [Determi	nation of Young's modulus of a steel bar by uniform bending method.									
2. [Determi	nation of Young's modulus of a cantilever (Pin & Microscope method).									
3. [Determination of rigidity modulus of a wire by torsional pendulum.										
4. (Compari	son of co-efficient of viscosity of two different liquids by Poiseuille's method.									
5. (Co-effici	ent of viscosity of highly viscous liquids.									
6. (6. Comparison of surface tension of two different liquids by capillary rise method.										

- 7. Determination of NA, acceptance angle, and wave length of a given laser by using optical fiber.
- 8. Determination of wavelength of mercury spectral lines spectrometer grating.
- 9. Determination of dielectric constant.
- 10. V-I characteristics of solar cell.

Lab Manual

"Physics Lab Manual", Department of Physics, KSRCT

Pre-requisite: **NIL**

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	<u> </u>	РО												PSO	
COURSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	2	2	2	2	2	2	2	2	-	2	2	2
50 PH 0P1 &	CO2	3	3	3	2	2	-	2	2	2	1	1	2	2	1
Engineering Physics	CO3	3	2	3	2	2	1	2	1	-	2	2	-	2	2
Laboratory	CO4	3	3	3	1	3	2	2	2	1	1	-	1	1	-
	CO5	3	3	3	2	2	3	-	1	1	1	2	-	2	1

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

	K.S.Rangasamy College of Technology – Autonomous R201
	50 CS 0P1 - Programming for Problem Solving Laboratory
	Common to All Branches
Semester	Hours/Week Total hrs Credit Maximum Marks
	L T P C CA ES Total
П	0 0 4 60 2 60 40 100
Objective(s)	 To enable the students to apply the concepts of C to solve simple problems To use selection and iterative statements in C programs To apply the knowledge of library functions in C programming To implement the concepts of arrays, functions, structures and pointers in C To implement the file handling operations through C
Course Outcomes	 At the end of the course the students will be able to Apply how to read, display basic information and use selection and iterative statements Demonstrate C program to manage collection of related data Design and Implement different ways of passing arguments to functions, Recursion and implement pointers concepts Develop a C program to manage collection of different data using structures, Union, user-defined data types and preprocessor directives Demonstrate C program to store and retrieve data using file concepts

3 3.3. a ~~~

Total Hours= 60

BoS Chairman

LIST OF EXPERIMENTS

- 1 Implementation of Simple computational problems using various formulas.
- 2 Implementation of Problems involving Selection statements.
- 3 Implementation of Iterative problems e.g., sum of series.
- 4 Implementation of 1D Array manipulation.
- 5 Implementation of 2D Array manipulation.
- 6 Implementation of String operations.
- 7 Implementation of Simple functions and different ways of passing arguments to functions and Recursive Functions.
- 8 Implementation of Pointers
- 9 Implementation of structures and Union.
- 10 Implementation of Bit Fields, Typedef and Enumeration.
- 11 Implementation of Preprocessor directives.
- 12 Implementation of File operations.

Lab Manual

Lab Manual "Programming for Problem Solving Laboratory "Department of CSE,KSRCT.

Pre-requisite: NIL MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO												PSO	
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	3		2	2							1		
50 CS 0P1 &	CO2	1	3		3	3			2				2	3	
Problem Solving	CO3	1	3		2	3			2				2		1
Laboratory	CO4	1	3		3	3			2				2	2	
·	CO5	1	3		2	3			2				2		1

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

K.S.Rangasamy College of Technology – Autonomous R2018											
	Com	mon to Me	chanical En	gineering a	nd Mechatr	onics Engir	neering				
Comostor		Hours / We	ek	Total	Credit	J	Maximum M	larks			
Semester	L	Т	Р	hrs	С	CA	ES	Total			
III	3	1	0	60	4	40	60	100			
 To develop the mathematical skins for solving partial differential equations To understand Fourier series representation of periodic signals. To appreciate physical significance of fourier series techniques in solving one dimensionalwave and heat equations. To provide an understanding of the statistical methods and distribution concept by which reallife problems areanalyzed. To design and analyse the statistical experiments At the end of the course, Students will able to i] Formulate partial differential equations and solve the standard partial differential equations 											
Course Outcomes	At the e 1. i] Fc ii) ap di 2. i] Ot ii) Uf 3. i] kno non-: ii) ur sta 4. Calo regr 5. i] Tes ii) Ar	and of the co ormulate parti oplytheapprop fferential equi- train the Four- nderstand the zero velocity. nderstand the ate condition. culate and ap ession. st the statistic nalyze the de	al differential priatemethod ations with crier series ex e notions of h procedure to procedure to ply measure cal hypothesi sign of expen	ents will ab equations a tosolveLagra onstant coeff pansion for the alf-range Fo of find the so to find the so as of central s using t, F a riments using	le to nd solve the s inge'slineared icients. ne periodic fu urier series a lution of one- blution of one- tendency, m nd ² distribution one - way an	standard part quationsands and harmonic dimensional e-dimensional neasures of ons. nd two – way	tial differentia solve li analysis wave equati al heat equat dispersion, c	al equations near partial on with zero or tion with steady correlation and ns.			
The hours given against each topic are of indicative. The faculty have the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the numbers hours indicated.											
Partial Differe	ntial Equa	tions rential equati	ons by elimi	nation of art	pitrary consta	nts and arbi	trary function	ns – Non-linear			

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Non-linear partial differential equations of first order [Type I – IV] – Solution of partial differential equations of first order –

2.2.2.

Lag	range's linear equatior	ns – Linea	r part	ial diff	erentia	al equ	ations	with c	consta	nt coe	fficien	ts			[(09]
Fou	irier Series			• • • •	1				- 16	-			_			
Diri	chief's conditions - Fo	burier ser			and ev	ven tu	nction	s – H	alt rar	ige Fo	burier	series	5 – Ro	ot me	an sq	uare
Pait	le of a function – Parse	eval s idei	ntity —	Harmo	onic ai	naiysis	5.								Į	78]
Cla	sification of second or	is dor quae	i - lino	or nor	tial dif	foront		intion	- So	lution	of one	dimo	ncion	า พวง		ation
	olution of one-dimension	nal heat	equat	ion_P	rohlen	ne	iai equ	allona	5 – 30	lution		-unne	11510116	ai wav	e equa I	081
Bas	ic Statistics	sha neat	oquui		TODICI	10.									Ľ	00]
Mea	asures of central tend	encv: Me	an. N	1edian	and	Mode	- mea	sures	of dis	spersi	on: Ra	ande.	Quart	ile de	/iation	and
Sta	ndard deviation -meas	sures of sl	kewne	ess : B	lowlev	's co-6	efficier	nt of s	kewne	ess - F	earso	n's co	-efficie	ent of	skewn	ess -
mor	ments - kurtosis – corre	elation -	rank c	orrela	tion_r	egres	sion.								[1:	2]
Tes	ting of hypothesis ar	nd Desigr	n of ex	xperin	nents	•									-	-
Sm	all sample tests based	on t, F ar	nd 3 ² d	listribu	itions	– Con	tingen	cy tab	le [Te	st for	Indepe	enden	cy] – (Goodn	ess of	f fit –
One	e way classification – C	Completel	/ rand	omize	ed des	ign – I	RBD –	Two	way cl	assific	ation	-Latin	squai	re des	ign. [()8]
									То	tal Ho	ours: 4	15 + 1	5[Tuto	orial] =	= 60 h	ours
Тех	t book[s]:															-
1	Grewal B.S, "Highe	r Engine	ering	Math	emati	cs", 4	3 rd Ec	ition,	Khan	na Pi	ublishe	ers, D	Pelhi, 2	2014.	Neb :	site:
	https://pvpsitrealm.b	logspot.c	com/2	016/0	9/higł	ner-er	nginee	ring-n	nathe	matics	s-by-b	s.htm				
2	Gupta, S.C, and Ka	pur, J.N.,	"Fun	dame	ntals	of Ma	thema	atical S	Statist	ics", S	Sultan	Char	nd, Nir	nth ed	ition, l	New
- D - (Delhi, 1996.															
Rei	erence(s):										_ .				P 4	
1	Veerarajan T., "Prol	bability, S	statist	ics ar	nd Ra	ndom	proce	ess", a	ard Ed	dition,	Tata	Mc-G	raw H	III Pu	olicati	ons,
-	New Delhi, 2008.	<u> </u>														
2	Bali N.P and Manisl	n Goyal,	"A le	xt boo	ok of I	Engin	eering	i Matr	nemat	ics", S	th Ed	ition,	Laksh	imi Pu	Iblicat	ions
	Pvt Ltd, New Delhi,	2014.			_			_								
3	Mathematical method	ods and	its ap	oplica	tions	,Dr. F	P. N.	Agrav	val,Dr	. S. I	K. Gu	pta, I	NPTEI	_ onli	ne v	/ideo
	courses		. ,													
4	Basic statistics – np	tel nptel.	ac.in/	cours	es/10	51031	40/2									
	Pre-requisite: NIL															
MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC																
	OUTCOMES	1														
	OURSE CODE &	CO						P	0						P	SO
	COURSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
		CO1	3	3	3	3	3							2	3	
5	0 MA 003 & Partial	CO2	3	3	3	3	3							2	3	

50 MA 003 & Partial	CO2	3	3	3	3	3				2	3	
Differential Equations	CO3	3	3	3	3	2				2	3	
and Statistics	CO4	3	3	3	2	2				2	3	
	CO5	3	3	3	2	3				2	3	

K.S.Rangasamy College of Technology – Autonomous R2018											
		50 N	IC 302 - An	alog Devic	es and Digi	tal Circuits					
			B.E. M	echatronics	s Engineeri	ng					
Somostor		Hours / Wee	ek	Total	Credit		Maximum	Marks			
Semester	L	Т	Р	hrs	С	CA	ES	Total			
	3	0	0	45	3	40	60	100			
	To procure the fundamental knowledge in semiconductor diodes and applications										
	 To impart the fundamental knowledge in the areas of transistors and amplifiers. 										
Objectives	• Toe	quip learnei	s with Bool	ean algebra	and design	of combina	tional logic	circuits.			
Objectives	To acquaint learners with fundamentals and design of sequential circuits										
	 To educate learners with the basics of memory devices and implement combinational 										
	circu	its using the	e same.								
	At the er	nd of the co	ourse, the s	tudents wi	ll be able to):					
	1. Dem	onstrate the	characteris	tics of Sem	iconductor [Diodes					
Course	2. Desc	ribe the cha	racteristics	of transisto	r and amplif	iers					
Outcomes	3. Prac	tice the Boo	lean technio	ques and de	sign combir	national circ	uits.				
	4. Desi	gn Synchror	nous seque	ntial circuit u	using flipflop	S					
	5. Cons	struct combi	national log	ic functions	using Progr	ammable Lo	ogic Device:	S			
Semiconduo	ctor Diode	s and Appl	ications								
Intrinsic and Extrinsic semiconductors - drift and diffusion current -formation of PN junction – VI characteristics											
of diode – s	tatic and c	iynamic res	sistance. Ze	ener diode -	- photo dio	de – light e	emitting diod	de – laser diode	-		
optocoupler-	Clipper an	d Clamper -	 voltage reg 	julator and i	multipliers.			[09]			

Transistor and Operational Amplifiers

Construction & operation of BJT - Transistor characteristics - CE, CB and CC configuration - Construction & operation of JFET and MOSFET – FET characteristics - Ideal Op-Amp characteristics - Open loop, Closed loop configurations - Inverting & non-inverting amplifier – voltage follower - Summing amplifier- Comparators - Schmitt Trigger – Instrumentation Amplifier. [09]

Boolean Algebra and Combinational Circuits

Boolean postulates and laws - Minimization of Boolean expressions - Karnaugh map minimization - Quine-McCluskey method of minimization.

Combinational circuits: Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – BCD adder – Multiplexer – Demultiplexer – Encoder – Decoder – Parity checker – parity generators – Code converters – Magnitude Comparator. [10]

Sequential Circuits

Latches, Flip-flops – SR, JK, D, T and Master-Slave – Characteristic Equation – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops –Synchronous and Asynchronous Up/Down counters – Modulo–n counter, Registers – shift registers – Universal shift registers. [09]

Memory and Programmable Logic Devices

Classification of memories: ROM – PROM – EPROM – EEPROM – RAM – Write operation – Read operation – Static RAM Cell - Dynamic RAM cell –Programmable Logic Devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) – Implementation of combinational logic circuits using PROM, PLA and PAL. [08]

Total hours: 45

Text book(s) : :

1	Thomas L. Floyd, "Electronic Devices", Prentice Hall of India Pvt. Ltd., Pearson Education Pvt. Ltd., New
1	Delhi, 10 th Edition, 2017.

2	Satish K Karna, "Digital Electronics", Vikas Publishing House Pvt. Ltd, New Delhi, 2 nd Edition, 2017
Ref	erence(s) :

1	David A Bell	"Electronic Devices and	1 Circuits" C	Oxford University	Press	New Delhi	5 th Edition	2013
	Davia /Doi		, canounto , c		110000,			2010

2 Salivahanan S and Arivazhagan S, "Digital Circuits and Design", Vikas Publishing House Pvt. Ltd, New Delhi, 4th Edition, 2013.

- Bishnu Charan Sarkar and Suvra Sarkar, "Analog Electronics Devices and Circuits", Damodar Group, West Bengal , 2019.
- 4 B.L. Theraja, A.K. Theraja, "A Text Book of Electrical Technology, Electronic Devices and Circuits", S. Chand Reprint, 2013
 - Pre-requisite: NIL

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	60		РО											PSO	
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	2	3	2	3	3	1	1	1		3	2	2	3	2
50 MC 302 & Analog	CO2	3	3	3	3	3	1		2		3	1	1	3	2
Devices and Digital	CO3	2	3	3	2	3	1	2	1		2	1	1	2	2
Circuits	CO4	3	3	3	3	3	1		1		2	1	1	3	2
	CO5	3	3	3	3	2	1		2		3	2	1	3	2
Note: 2. Strong Contribution: 2. Average Contribution: 4. Some Contribution															

		K.S.Rar	ngasamy C	ollege of Te	chnology -	- Autonomo	ous	R2018					
			50 ME	004 - Streng	gth of Mate	rials							
			Co	mmon to M	ECH & MC1	Г							
Somoctor	Semester Hours / Week Total hrs Credit Maximum Marks												
Semester	L	Т	Р	Totarnis	С	CA	ES	Total					
III	3	1	0	60	4	40	60	100					
Objective(s)	 To bea To load The Und ess 	understand t ims, shafts, o calculate the ding e main object derstand the derstanding t ential for the	the nature of cylinders and e elastic defo tive of the co concept of b the adequac e design and	f stresses dev d spheres for ormation occu ourse will be t ouckling and sy of mechani safe evaluati	veloped in si various type irring in vario o show how be able to so cal and struction of any kin	mple geome es of simple l bus simple g to determine blve the prob ctural elemen nd of structu	tries such as loads. eometries for e the deflection lems related nts under diff re.	bars, cantilevers, r different types of on of various beams. to isolated bars. erent loads is					

2.3. a.

	At	the end	of the co	ourse,	, the s	stude	nt wil	l be a	ble to)							
	1.	Estimat	te the str	ess ir	ntensi	ity an	d defe	ormati	on in	solid	bodi	es su	bjecte	d to	variou	is typ	es of
_		loading	and com	pute t	he pr	incipa	l stres	ses a	nd str	ains b	by ana	alytica	and	graph	ical m	ethod	s.
Course	2.	Apply th	ne conce	pts of	shea	r force	e and	bendi	ng ma	oment	diagr	ams i	n desi	ign of	mach	ine	
Outcomes		elemen	ts.						-		•			-			
	3.	Estimat	te the slop	pe and	d defle	ection	in de	termir	ate b	eams							
	4.	Compu	te the def	flectio	n and	stres	s dev	eloped	d in sł	naft ar	nd spr	ings.					
	5.	Calcula	te the st	tresse	s. str	ains	and c	leform	ation	of th	ie thir	n. thic	ck cvl	indrica	al and	d sph	erical
Note: The ho	ours	given a	idainst ea	ach to	pic a	re of	indica	tive. T	he fa	aculty	have	the fi	reedo	m to o	decide	the l	hours
required for e	ach	topic ba	ased on i	mport	ance	and c	lepth (of cov	erade	e reau	ired.	The m	arks a	allotte	d for	auesti	onsin
the examinati	ons	shall no	t depend	on th	e nun	nber o	of hou	rs indi	cated							1	
Stress, strair	ו ar	nd defor	mation o	of soli	ds												
Deformation i	n so	olids- Ho	oke's law	, stre	ss and	d strai	in- ten	sion,	comp	ressic	n and	l shea	r stre	sses-	therm	alstre	sses-
elastic consta	nts	and the	ir relation	is- vol	umeti	ric, lin	ear ar	nd she	ar str	ains-	princi	pal st	resse	s and	princi	pal pla	anes-
Mohr's circle.																[0	9]
Transverse b	en	ding on	beams														
Beams and ty	pes	transve	rse loadir	ng on	beam	s- she	ear for	ce an	d ben	d mor	nent d	liagra	ms-Ty	/pes o	f bear	n sup	ports,
simply suppor	rted	and ove	er-hangin	g bea	ms, c	antile	vers.	Theor	y of b	endin	g of b	eams	s, ben	ding s	tress	distrik	oution
and neutral ax	kis,	shear st	ress distr	ibutio	n, poi	nt and	d distri	buted	loads	S.						[0	9]
Deflection of	Ве	ams															
Deflection of a	a be	eam usin	ng double	integ	ration	meth	od, co	omput	ation	of slo	pes a	nd de	flectio	n in b	eams	, Max	well's
reciprocal the	ore	ms.														[0	9]
Torsion																	
Torsion, stres	ses	and def	formation	in cir	cular	and h	ollow	shafts	s, step	oped :	shafts	, defle	ection	of sh	afts fiz	ked at	both
ends, stresse	s ar	nd deflec	ction of le	af and	d helic	al spi	rings.									[0	9]
Thin, Thick C	;yliı	nders, S	pheres a	and C	olum	ns											
Axial and ho	ор	stresses	in cylind	ders s	subjec	cted t	o inte	rnal p	ressu	ire, d	eform	ation	of thi	ck an	d thir	ı cylin	ders,
deformation ir	n sp	herical s	hells sub	jected	l to int	ernal	press	ure. C	olumr	ns - Ei	uler's	theory	/, slen	derne	ess rat	io, Ra	nkine
formula.																[0	9]
											То	tal Ho	ours:	45 + 1	5(Tut	orial)	= 60
Text book(s)	:																
1. Egor P.	Pop	oov, Eng	ineering I	Mecha	anics	of Sol	ids, P	rentic	e Hall	of Ind	dia, N	ew De	elhi, 20	015.			
2. Rajput F	κ.	, "A Text	book of S	Streng	th of	Mater	ials (N	/lecha	nics o	of Soli	ds)" 7	th edit	ion, S	Char	nd and	I Com	pany
Reference(s)	:	201	10.														
1. Subrama	ania	an, R., "S	Strength c	of Mat	erials	". Oxf	ord Ur	niversi	ty Pre	ess, 2	007.						
2. Rattan,	S.S	., "Streng	gth of Ma	terials	s", 2 nd	Editio	on, Ta	ta Mc	Grawl	Hill Pu	ublishi	ng Co	. Ltd.	, New	Delhi	2011	
3. James N	Л. G	ere and	Timoshe	nko, "	Mech	anics	of Ma	terials	s",CB	S Pub	lisher	, New	/ Delhi	i, 6 th E	dition,	2012	
4 Beer, F.	, Jo	hnston,	E.R., and	Dew	olf, J.	T., "M	echar	nics of	Mate	rials",	Tata	McGr	rawHil	l Publ	lishing	J Co. L	_td.,
New De	lhi 2	2011.															
Pre-requ	isite	e: Basic	Knowled	dge of	f Eng	ineer	ing M	echar	nics -	Statio	cs an	d Dyn	amic	S	0050		
	IG (ME		RSE OU	ICON	1ES, I	ROG	RAN	MEO	UICC	DIMES	AND	PRO	GRAI		SPEC	IFIC	
										0						D	<u>so</u>
COURSE			СО	1	2	2	4	5	<u>-</u> 6	7	8	Q	10	11	12	1 1	2
	/		CO1	3	2	5		5	0	2	5	3	10		1	1	–
				-													

1.	Subramanian, R., "Strength of Materials", Oxford University Press, 2007.
2.	Rattan, S.S., "Strength of Materials", 2 nd Edition, Tata McGrawHill Publishing Co. Ltd., New Delhi 2011.
3.	James M. Gere and Timoshenko, "Mechanics of Materials", CBS Publisher, New Delhi, 6th Edition, 2012.
4	Beer, F., Johnston, E.R., and Dewolf, J.T., "Mechanics of Materials", Tata McGrawHill Publishing Co. Ltd.,
	New Delhi 2011.
	Pre-requisite: Basic Knowledge of Engineering Mechanics –Statics and Dynamics
	MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC
	OUTCOMES

0010011120																
COURSE CODE &	<u> </u>	PO												PSO		
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
-	CO1	3	2					2					1	1		
EQ ME 004 8 Strongth of	CO2	3	3	1									1	2		
50 ME 004 & Strength of	CO3	3	3	2	1								1	3		
Materials	CO4	3	3	2	3	2							1	3		
	CO5	3	3	1	2									2		

	K.S.Rangasamy College of Technology – Autonomous												
50 ME 006 - Thermodynamics													
	Common to MECH & MCT												
Compostor		Hours / Wee	ek	Tatal has	Credit	N	laximum Mar	ks					
Semester	L	Т	Р	Total hrs	С	CA	ES	Total					
	3	1	0	60	4	40	60	100					

	To evaluate the properties of changes in open, closed and isolated systems.
Objec	tive(s) • To apply the concept of thermodynamics laws to various practical applications such as heat
	engines, heat pump and retrigeration systems.
	To analyze the performance of steam power cycles. To derive the methometical relation for thermodynamic properties.
	 To understand the properties and process of psychrometry.
	At the end of the course, the student will be able to
	1 Describe the basic concepts of zeroth law and first law of thermodynamics and apply the concepts
	of first law of thermodynamics to open and closed system.
Οοι	Irse 2. Relate the concept of second laws of thermodynamics to heat engine, refrigeration & air-
Outco	conditioning cycles and discuss the concept of increase in entropy.
	3. Recognize the behaviour of pure substances and the performance of Rankine cycle with reheat and
	regenerative cycle.
	4. Describe the concept of Joule Thomson effect, Clausius Clapeyron equation, Equation of state and
	Compressibility and apply the differential equations for energy, Maxwell's equations and specific
	neat relations.
	application of psychrometric processes
Nata	application of psycholic processes.
for eac	the nours given against each topic are of indicative. The faculty have the freedom to decide the nours required to topic based on importance and denth of coverage required. The marks allotted for questions in the examinations
shall n	ot depend on the number of hours indicated
Basic	Concepts and First Law
Basic	concepts - concept of continuum, macroscopic approach. Thermodynamic systems - closed, open and isolated
Proper	ty, state, path and process, quasistatic process, work, modes of work. Zeroth law of thermodynamics, concept
of tem	perature and heat. Concept of ideal and real gases. First Law of Thermodynamics- Concepts of Internal Energy,
Specif	c Heat Capacities, Enthalpy. Energy Balance for Closed and Open Systems, Energy Balance for Steady-Flow
Syster	ns. Steady-Flow Engineering Devices. Energy Balance for Unsteady Flow. [12]
Secon	d Law and Availability
Inerm	al energy reservoirs, near engines energy conversion, Keivin's and Clausius statements of second law, the Carnot
refrige	rator and heat nump COP Clausius inequality concept of entropy principle of increase of entropy perpetual-
motion	machines. Exergy- simple problems. [12]
Prope	rties of Pure Substance and Steam Power Cycles
Proper	ties of pure substances - Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces. Thermodynamic properties
of stea	m. Calculations of work done and heat transfer in non- flow and flow processes. Vapour and combined power
cycles	, including the Carnot vapor cycle, Rankine cycle: the ideal cycle for vapor power, the ideal reheat and
Thorm	erative and the second-law analysis of vapour power cycles. [12]
Gas r	nixtures – Equations of state Avogadro's Law Vander Waal's equation of state Compressibility factor
compr	essibility chart. Dalton's law of partial pressure. Exact differentials. TdS relations. Maxwell's relations. Clausius
Clapey	rron equations, Joule – Thomson coefficient. [12]
Psych	rometry
Psych	ometry and psychrometric chart, property calculations of air vapour mixtures. Psychrometric process – Sensible
heating	g / cooling - cooling and dehumidification - heating and humidification - adiabatic mixing, evaporative cooling.
Note:	[12] Ise of standard steam tables. Mollier diagram & Psychometric chart are permitted for examination
1010.	
Taxth	$\operatorname{rotal rotals.} +5 + \operatorname{rotaloral} = 60$
Textb	OOK(S):
1.	Senger, T. A., Thermodynamics - An Engineering Approach, o Edition, Tata McGraw Hill Pub., New Denii, 2015
2	Nag P.K. "Engineering Thermodynamics" 6 th Edition Tata McGraw-Hill Publications, New Delbi, 2017
Refere	nce(s) ·
Refere	Moran M L and Shaniro H N "Fundamentals of Engineering Thermodynamics" 8th Edition John Wiley and
1.	Sons, 2014.
2	Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., "Fundamentals of Thermodynamics", 6 th Edition, John Wiley
∠. ;	and Sons, 2003.
3.	Holman, J.P., "Thermodynamics", 4 th Edition, McGraw-Hill Publications, 1995.
4	Rajput, R.K., "A Textbook of Engineering Thermodynamics, 4 th Edition, Laxmi Publications, 2010.
L	

Pre-requisite: Mathematics MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO												PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	2	1	2	2								2	2
	CO2	3	2	3	2	2								2	2
50 ME 006 & Thermodynamics	CO3	3	2	3	2	2								2	1
mennouynamics	CO4	3	2	1	2	2								2	1
	CO5	3	2	2	2	2								2	2

K.S.Rangasamy College of Technology – Autonomous R2018														
50 MC 303 – Manufacturing Technology														
	•		B.E. Mechat	ronics Eng	ineering	•								
Semester	H	ours / Week	_	Total	Credit	N	laximum Ma	arks						
Ochicater	L	Т	P	Hrs	С	CA	ES	Total						
	3	0	0	45	3	40	60	100						
	 To enligit 	hten the lear	ners about	the concepts	s of basic ma	anufacturing	processes	and casting						
	techniqu	ies.												
	To impa	rt the fundar	nental know	ledge in the	area of met	al joining.								
Objectives	Objectives To endow with an overview of metal forming processes.													
	To understand the working of standard machine tools such as lathe, drilling, milling and alling machines													
	allied machines.													
	To gain adequate knowledge in the area of gear making and non-conventional machining													
processes.														
At the end of the course, the students will be able to														
 Discuss the basic concepts of casting and its inspection process. 														
Course 2. Gain the knowledge of various welding process.														
Outcomes	Course 3. Outline the various methods involved in forming processes. Outcomes 3. Outline the various methods involved in forming processes.													
	Outcomes 4. Illustrate the construction, working principles of various machine tools.													
	5. Identify the different methods of gear manufacturing, micro machining processes and need													
Motal Casting		nation proce	5565.											
Introduction to	casting proce	ss - Pattern	materials t	vnes allowa	ances - Moul	ldina: areen	sand mould	ing moulding						
sand and its p	roperties - Col	res: types a	nd making -	Casting: sar	nd mould cas	sting invest	ment casting	a die casting						
and continuou	s casting - Mel	lting furnace	s: Cupola ar	nd induction	furnaces - C	asting defe	cts: causes a	and remedies						
- Non-destruct	tive testina: lia	uid penetrat	e test, x-rav	diffraction a	nd ultrasonio	c test.		[09]						
Metal Joining	Processes		, ,					[]						
Introduction to	welding proce	ess - Principl	e of arc and	gas welding	- Tools and	equipments	- Filler and f	flux materials						
- Flame types	s - Weld defea	cts - Safety	in welding	- Other wel	ding proces	ses: Resist	ance weldin	ig, ultrasonic						
welding, gas t	ungsten arc w	elding and g	as metal are	c welding - E	ectron bea	m welding a	nd Laser be	am welding -						
Brazing and so	oldering							[09]						
Forming Proc	cesses													
Introduction to	hot and cold	working - Fo	orging: open	and close o	die forging, u	upsetting - F	Rolling: high	roll mills and						
shape rolling -	Extrusion: for	ward and ba	ickward, tub	e extrusion -	Drawing of	wires, Rods	and tubes	- Sheet metal						
work:Shearing	, bending and	drawing op	erations - St	retch formin	g –Introduct	ion of HERF	· methods [0)9]						
Machining Pr	ocesses		-	D										
	naterials, prop	perties, Cut	ing tiulas -	Basic maci	nine toois: c	centre latne	, radiai driili	ing machine,						
dovices Grip	ng machine a	and snaping	g machine-	Jonstruction	al leatures,	operations	, work and	tool nolaing						
Goar Manufa	uing. Sunace a	licromachir	ss grinding.					[09]						
Introduction to	dears - Gear t	tooth termin	ning Nogy - Meth	nds of dear r	nanufacturir	a. dear form	ning and dea	ar generating-						
Gear finishin	a processes	– Microm	achining.	ntroduction	to micron	nachining i	ning and gea	- Ultrasonic						
micromachinir	a Electrodisc	harge micro	machining.	Electron bea	m micromad	chining Lase	er beam mic	romachining						
Electrochemic	al micromachi	nina.	, indenning, i			, Lao	or boarnine	[09]						
	Total Hours: 45													
Text book(s)														
1 J. P. Ka	aushish, Manu 2010.	facturing Pr	ocesses, Pr	entice Hall c	of India Lear	ning Private	Limited, Ne	∍w Delhi, 2 nd						
2. Rajput.	R.K., "A Textb	ook of Man	ufacturing T	echnology".	Laxmi public	cations Ltd.	New Delhi, 2	2014.						
Reference(s)	•		U			. ,	,							

3 2.2.2 ~

1.	Hajra Choudhury S.K, "Elemets of workshop Technology, Vol I and II", Media Promotors, Bombay Edition 2011.															
2.	P. N. Rao, "Manufacturing Technology - Vol I and II", Tata McGraw-Hill Publishing Company Limited, New Delbi, 2018															
3.	V.K.Jain, "Introduction to Micromachining".Narosha Publishing House, New Delhi, 2014.															
4.	P. K. Mishra, "Non-Conventional Machining", Narosha Publishing House, New Delhi, 2014.															
	MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES															
	MAPPING OF COU OUTCOMES	RSE OU	TCON	IES, F	PROG	RAM	ME O	UTCC	OMES	AND	PRO	GRAM	/ME \$	SPEC	IFIC	
C	MAPPING OF COU OUTCOMES OURSE CODE &		TCON	IES, F	PROG	RAM	MEO	UTCC	OMES	AND	PRO	GRAN	ME \$	SPEC	IFIC	SO
C	MAPPING OF COU OUTCOMES OURSE CODE & COURSE NAME	RSE OU ⁻ CO	ТСОМ 1	1ES, F 2	PROG	RAM	ME O 5	UTCC P 6	OMES PO 7	AND	PRO 9	GRAN	ИМЕ \$ 11	SPEC	IFIC P: 1	SO 2
C(MAPPING OF COU OUTCOMES OURSE CODE & COURSE NAME	RSE OUT CO	TCON 1 1	1ES, F 2 3	PROG 3 2	RAM 4 3	ME O 5 2	UTCC P 6 3	OMES PO 7 2	AND	PRO 9	GRAM 10 3	11 2	SPEC 12 2	IFIC P: 1 1	SO 2

	CO5	2	3	1	3	3	2	2	3		2	
Note: 3 – Strong Co	ontributi	on; 2	– Ave	erage	Cont	ributi	on; 1	– Sor	ne Co	ontrib	ution	

CO3

CO4

Manufacturing

Technology

	ŀ	.S.Rangasa	my College	of Technolog	gy – Autonor	nous		R2018				
		50	MY 004 - Ur	niversal Hum	nan Value							
Somootor		Hours / Wee	k	Total	Credit	Max	kimum Marks					
Semester	L	Т	Р	Hrs	С	CA	ES	Total				
Ш	2 1 0 45 3 40 60 100											
Objective(s)	 To identify the essential complementarily between 'values' and 'skills' To ensure core aspirations of all human beings. To achieve holistic perspective towards life and profession To acquire ethical human conduct, trustful and mutually fulfilling human behaviour To enrich interaction with Nature. 											
Course Outcomes	At the end1.Becon2.Respo3.Mainta4.Comm5.Improv	of the cours ne more aware nsible in life, a in human rela itted towards re critical abilit	e, the studer of themselve and in handlin tionships and human values y and apply it	nts will be ab es, and their s g problems w l human natur s, human relat day-to-day li	l e to urroundings ith sustainable e ionship and h fe	e solutions uman society						
Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.												
Introduction to Understanding prosperity-the prosperity - cur	o value Edu value Educ basic huma rent scenari	cation ation-Self exp n aspirations o – method to	ploration as t -right unders o fulfill the ba	he process fo standing-relat sic human as	or value educ tionship and pirations.	ation-Contin physical fac	uous Happine ility –happine	ess and ess and [09]				

Harmony in the Human Being

Understanding Human being as the Co-Existence of the self and the Body-Distinguishing between the needs of the self and the body-the body as an instrument of the self-understanding harmony in the self-harmony of the self with the body – programme to ensure self-regulation and health. [09]

Harmony in the Family and Society

Harmony in the Family -the basic unit of human interaction-values in human- to - human relationship -'Trust' the foundation value in relationship - 'Respect' - as the right evaluation-understanding harmony in the society - vision for the universal human order. [09]

Harmony in the Nature/Existence

Understanding harmony in the Nature-Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature - realizing existence as co-existence at all levels - the holistic perception of harmony in existence. [09]
Implications of the Holistic Understanding

Natural Acceptance of human values- definitiveness of human conduct- a basis for humanistic education, humanistic constitution and universal human order- competence in professional ethics –holistic technologies, production systems and management models-typical case studies – strategies for transition towards value base life and profession [09]

Total Hours: 45

Text	Fext Book(s):								
1.	A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd								
	Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1								
2.	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R								
	Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2								
Refe	Reference(s)								
1	leevan Vidya: EkParichaya A Nagarai Jeevan Vidya Prakashan Amarkantak 1999								

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	60	PO												PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	3	2	2	3	3	3	2	3	3	1	3	3
	CO2	3	3	3	2		3	3	3	2	3	2	1	3	3
50 MY 004 & Universal Human Value	CO3	3	3	2			3	3	3	3	3	2	1	3	3
	CO4	3	3	3			3	3	3	3	3	2	2	3	3
	CO5	3	3	1			3	3	3	3	3	2	2	3	3

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

K.S.Rangasamy College of Technology – Autonomous R2018											
		50 MC 3P1	– Manufac	turing Tech	nology Lab	oratory					
			B.E. Mecha	tronics Eng	ineering			-			
Semester	H	ours / Week	_	Total	Credit	N	laximum Ma	rks			
	L	Т	P	hrs	C	CA	ES	Total			
111	0	0	4	60	2	60	40	100			
	 To enha 	 To enhance the students knowledge of various machine tools. 									
	To analy	ze the mach	ine setup ar	nd different o	operation tec	chniques of	machine too	ls.			
Objectives	To gain t	the knowledg	ge of various	s method to	perform the	operation us	sing machine	e tools.			
Objectives	Demons	 Demonstration and study of the milling and shaping machines. 									
	The main	n emphasis [,]	will be on a o	complete un	derstanding	of the mach	nine capabilit	ties and			
	Processes.										
	At the end of the course, the students will be able to										
	1. Perform the operation of plain turning (external and internal), facing and thread cutting										
	operation (internal and external) in a lathe.										
0	2. Develop the knowledge of eccentric turning, taper turning and knurling operations.										
Course	3. Make the operations using drilling machine and operations performed using shaping										
Outcomes	machine.										
	4. Develop a spur gear using milling machine and machining spur/ helical gear using gear										
	hobbling	machine.									
	5. Perform	the operatio	n of given w	orkpiece us	ing shaper a	nd grinding	machine.				
1. Machining	g a work piece	by facing, p	lain turning	operations u	ising a lathe						
2. Machining	g a work piece	by internal a	and external	I thread cutti	ng operation	ns using a la	the.				
3. Machinin	g a work piece	by eccentric	c turning ope	erations usin	ig a lathe.						
4. Machining	g a work piece	e by taper tur	ning and kn	uning opera	tion using a	iatne. .a. a drilling r	nachina				
6 Machinin	a work piece	e by drilling i	al compone	nt using sha	ning machir	ig a unining i ne					
7. Machinin	a a work piece	e by sour dea	ar usina milli	na machine							
8. Generatir	ng a work piec	e by spur/he	lical gear us	sing gear hol	bing machi	ne.					
9. Machinin	g a work piece	by dove tail	and key wa	ly using sha	ping machin	e.					

10. Grinding a work piece by flat and cylindrical surfaces using grinding machine.

Total Hours:60

Text	book(s) :
1	E.PaulDegarmo, J.T.Black, Ronald A.Kohser, "Materials and process in Manufacturing" Prentice – Hall of
1	India (p) Ltd., New Delhi.2005.
2	Roy A. Lindberg, "Processes and Materials of Manufacture", Prentice Hall of India Learning. Ltd., New
2	Delhi, 2015.
Refe	prence(s) :
1	Hajra Choudhury S.K, "Elemets of workshop Technology, Vol I and II", Media Promotors, Bombay Edition
1.	2011.
2	P. N. Rao, "Manufacturing Technology - Vol I and II", Tata McGraw-Hill Publishing Company Limited,
۷.	New Delhi, 2018
3.	Rajput, R.K., "A Textbook of Manufacturing Technology", Laxmi publications Ltd, New Delhi, 2014.
4	Phillip F. Ostwald and Jairo Munoz, "Manufacturing Processes and Systems", Wiley India, Bangalore,
4.	2008.
	Pre-requisite: Nil
	MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC
	OUTCOMES

COURSE CODE &	00	PO											PSO		
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	3	1	3	1	2		2		2	3	2	2	3
50 MC 3P1 &	CO2	2	2	2	2	2		2		2		2		3	1
Manufacturing	CO3	2	2	3	3	2	1		2		1		3	3	3
Technology Laboratory	CO4	1	2	3	2	1		1	3		2	2	2	3	2
	CO5	2	1	1	2	2	2	3				2	2	2	1

		K.S.Rangas	amy Colleg	e of Techno	ology – Auto	onomous		R2018
	5) MC 3P2- A	nalog Devi	ces and Dig	ital Circuits	Laboratory	/	
			B.E. Mech	atronics En	gineering			-
Semester	H	ours / Week		Total	Credit	N	laximum Mai	rks
Cernester	L	Т	P	hrs	C	CA	ES	Total
III	0	0	4	60	2	60	40	100
Objectives Course Outcomes	 To Learn the Volt-Ampere characteristic of semiconductor diodes and assessing performance of rectifier circuit using filter To Evaluate frequency response and understand the behavior of amplifier circuits To explore a basic knowledge of bit manipulation and Develop the ability to analyze and design digital electronic circuits To illustrate the different analog electronic circuits and their application in practice. To illustrate the different digital electronic circuits and their application in practice. At the end of the course, the students will be able to: Analyze the characteristics of semiconductor devices and determine the input and output parameters. Identify the various operating regions and analyze the characteristics of BJT Understand the fundamentals of digital electronic circuit and their application in practice. 							
	5. Design	and implem	ent synchro	nous and as	ynchronous	sequential c	ircuits.	
			LISTO	F EXPERIM	ENTS			
 Study the VI Characteristics of PN junction diode and Zener diode Study the ripple and regulation characteristics of full wave rectifier with and without capacitor filter. Construct the clipper and clamper circuit using PN junction diode Determination of Input and Output Characteristics of BJT Construct differential amplifier circuit using BJT and obtain CMRR value Design and verify the operation of 4-bit Magnitude Comparator using IC 7485. Design and implementation of 4 bit binary Adder/ Subtractor using IC 7483 Design and implementation of Multiplexer and De-multiplexer using IC 741XX Construction and verification of 4 bit ripple counter and Mod-10 Ripple counters Design and study the operation of a 3-bit synchronous up/down counter 								
Lab Manua								
"Analog Dev	vices and Digit	al Circuits La	ab Manual",	Department	of Mechatro	nics Engine	ering , KSRC	Т

S...... 3.3. a

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	<u> </u>	РО											PSO		
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	2	3	1	3	1	2		2		2	3	2	2	3
50 MC 3P2 & Analog	CO2	2	2	2	2	2		2		2		2		3	2
Devices and Digital	CO3	3	1	3	3	2	1		2	1	1		3	1	3
Circuits Laboratory	CO4	3	2	3	2	1		1	3		2	2	2	1	2
	CO5	2	1	1	2	2	2	3				2	2	2	1

K.S.Rangasamy College of Technology – Autonomous R2										
Semester III										
Course Code	Course Name	Но	urs/W	eek	Credit	Maxi	mum N	larks		
Course Coue	Course Maine	L	Т	Ρ	С	CA	ES	Total		
50 TP 0P1	Career Competency Development I	0	0	2	0	100	00	100		
Course Objectives	 To help learners to enrich their grammatical correctness and vocabulary efficacy in the academic and professional contexts. To help the learners to frame syntactical structures of sentences and comprehence meaning of reading passages effectively To help learners to adeptly sequence the information, draft letters and correct usage foreign words with correct spelling and punctuation. To help the learners to introduce themselves and involve in situation conversations professionally To help learners to make various modes of presentations and express their opinion conducive way. 									
Course Outcomes	 at the end of the course, the student will be able to Reinforce the essential grammatical correctness and vocabulary efficacy in the acades and professional contexts Generate syntactical structures and infer the semantics in the reading passages effective Reorganize and compose the sequential information, letter drafts, and interpret the appropriate usage of foreign words with correct spelling and punctuation Demonstrate their introduction and relate to situational conversations adeptly Exhibit various modes of presentations and organize their opinions in an expressive way 									
Unit–1	Written Communication-Part1 H									
Usage of noun, Preposition - Cl Using the same Materials: Instr	pronoun, adjective (Comparative Forms), Ve hange of Voice - Change of Speech - Synor Word as Different Parts of Speech- Odd Ma uctor Manual, Word power Made Easy Book	rb, Ad nyms a n Out	jective & Ante	es, Adv onyms	/erb, Tens - One W	ses, Article ordSubsti	es and tution-	8		
Unit–2	Written Communication –Part2									
Analogies - Ser Jumbled Senter Usage- Materia l	ntence Formation - Sentence Completion - S nces, Letter Drafting (Formal Letters) - Read Is: Instructor Manual, Word power Made Eas	Senter ing Co y Boo	nce C ompre k	orrecti hensio	on - Idion on (Level	ns & Phra 1) – Conte	ases - extual	6		
Usage-Materials: Instructor Manual, word power Made Easy Book Unit-3 Written Communication –Part3 Jumbled Sentences, Letter Drafting (Formal Letters)-Foreign Language Words used in EnglishSpelling& 4 Punctuation(Editing) Materials: Instructor Manual, Newspapers										
Unit–4	Oral Communication–Part1									
Self-Introduction-SituationalDialogues/RolePlay(TelephonicSkills)-OralPresentations-Prepared-'JustA Minute 'Sessions (JAM) Materials: Instructor Manual, Newspapers										
Unit–5	Oral Communication–Part2									
Describing Obje Materials: Instr	ects/Situations/People, Information Transfer-luctor Manual, Newspapers	Picture	e Talk	-News	Paper an	d Book R	eview	6		
							Total	30		

S...... 3.3. a.

Evaluati	on Criteria		
S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	50Questions–30 Questions from Unit 1 &2, 20 Questions from Unit3, (External Evaluation)	50
2	Evaluation2 Oral Communication 1	Self-Introduction, Role Play & Picture Talk from Unit-4 (External Evaluation by English and MBA Dept.)	30
3	Evaluation3 Oral Communication 2	Book Review & Prepared Speech from Unit-5(External Evaluation by English and MBA Dept.)	20
		Total	100

Reference Books

1. Aggarwal, R.S."A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint 2009, S.Chand&CoLtd., NewDelhi.

2. Word power Made Easy by Norman Lewis W.R.GOYAL Publications

Note:

- InstructorcancoverthesyllabusbyClassroomactivitiesandAssignments (5Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough workpages
- Each Assignment has 20 questions from Unit1, 2 and Unit5 and 5 questions from Unit3 and 4
- Evaluation has to be conducted as like Lab Examination.
 - Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	РО											PSO		
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	1	1	1		2	1	2	3	3	2	3	1	
50TP0P1-	CO2	1	1	1	1	1	2	1	2	3	3	3	3	1	1
Career Competency	CO3	1	1	1	1	1	2	1	2	3	3	2	3		1
Development I	CO4	1	1	1	1		2	1	1	2	3	2	3	1	1
	CO5	1	1	1	1	1	2	1	2	3	3	2	3	1	1

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

			K.S.Ranga	samy Colle	ge of Techr	ology – Aut	tonomous		R2018		
			50) MC 401- In	dustrial Dri	ves and Co	ntrol				
				B.E. Me	chatronics	Engineering	9				
Semester		H	ours / Week		Total	Credit	Ν	/laximum Ma	arks		
Ocificator		L	T	P	hrs	С	CA	ES	Total		
IV		3	0	0	45	3	40	60	100		
	٠	To learn the structure of Electric Drive systems and their role in various applications.									
	•	To impart the knowledge on control strategies of DC and AC motors.									
Objectives	•	To understand the operation of D.C motor speed control using converters and choppers.									
	•	To acqui	To acquire the knowledge of thyristor based speed control methods of A.C motors.								
To provide the knowledge on construction, working and control strate								gies of specia	al drives.		
	At	At the end of the course, Students will be able to									
	1.	Understand the need of electrical drives and their applications in various industries.									
Course	2.	Describe	e the speed of	control and b	oraking meth	ods of DC &	AC drives.				
Outcomes	3.	Apply the	e solid state	speed contr	ol technique	s in DC drive	es.				
	4.	Apply the	e solid state	speed contr	ol technique	s in AC drive	s.				
	5.	Understa	and the princ	ple of operation	ation of spec	ial drives and	d their applic	cations.			
Introductio	n of	Electrica	I Drives		· · ·						
Basic Elem	ents	of a drive	e system – -	Types of Ele	ectrical Drive	s - Choice	of electrical	l drives – Mu	ulti quadrant		
operation of	f driv	ves – Heat	ing and cool	ing curves -	- classes of c	luty – Select	ion of powe	r rating for dr	rive motors-		
Drive consid	Drive consideration for Textile mills, Steel rolling mills, Cement mills, Paper mills, Machine tools. [09]										
Starting an	d sp	peed Cont	rol of Drive	S							
Starting of D	DC N	lotors – Ty	pes of Braki	ng – Conver	ntional Speed	d Control of E	DC Motors: A	Armature Vol	tage Control,		
Field Flux (Cont	rol, Ward	Leonard Co	ontrol. Starti	ng of AC M	otors – Type	es of Brakin	ig – Convent	tional Speed		
Control of Ir	nduc	tion Motor	s: Stator Vol	tage Contro	I, Stator Free	quency Cont	rol, Rotor Re	esistance Co	ntrol. [10]		

Solid State Speed Control of DC Drives

Single Phase and Three Phase Fully controlled Converter: Principle of operation and waveforms of single phase and three phase fully controlled converter fed DC drive – Choppers Fed DC Motor Drive – Applications. [09]

Solid State Speed Control of AC Drives

Voltage/Frequency Control of induction motor, Voltage Source Inverter and Current Source Inverter–VSI fed Three Phase Induction Motors–CSI Fed Three Phase Induction Motors-Static Rotor Resistance Control–Static Scherbius and static Kramer Drives block diagram and explanation–Applications. [09] Special motor Drives

Stepper motors – Permanent magnet, Variable reluctance, Single and multi-stack configurations, Hybrid motor. Switched reluctance motors – AC & DC Servo motors – Brushless DC motors. [08]

Total Hours: 45

Iext	DOOK(S) :
1	Gopal.K.Dubey, "Fundamentals of Electrical Drives" Narosa Publishing House, 2 nd Edition, 2013.
2	Theraja,B.L and Theraja, A.K., "A text book of Electrical Technology–Volume II (AC & DC Machines)"S.Chand & Company Ltd., New Delhi, 2005.
Refe	rence(s):
1	Vedam Subrahmanyam, "Electric Drives Concepts and Applications" Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2001.
2	M.D.Singh and K.B. Khanchandani, "Power Electronics", Tata Mc Graw Hill Publishing Company Ltd.,New Delhi, 2008.
3	Shepherd Hullay&Liag, "Power Electronics & Motor Control", Cambridge University Press.
4	Partab. H., "Art and Science and Utilisation of Electrical Energy", Dhanpat Rai and Sons, 2017
	Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	<u> </u>	РО													PSO	
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
	CO1	3	3	1	3	1	2	1	2	1	2	3	2	2	2	
FO MO 404 9 la dustrial	CO2	2	2	2	2	2		2		2		2		3	2	
50 MC 401 & Industrial	CO3	3	3	3	3	3	1		2	1	1		3	2	3	
Drives and Control	CO4	3	2	3	1	1		1	3		2	2	2	1	2	
	CO5	3	1	1	2	2	2	3				2	2	2	1	

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

K.S.Rangasamy College of Technology – Autonomous R2018																
50 ME 005 - Fluid Mechanics and Fluid Machines																
Compoter		Hours / Wee	k	Tatal has	Credit	Μ	aximum Mar	ks								
Semester	L	Т	Р	Total hrs	С	CA	ES	Total								
IV	3	1	0	60	4	40	60	100								
	To learn about the properties of fluids, manometry and buoyancy To learn more and momentum some protion leave for fluid flows															
Objective(s)	To lea	 To learn mass and momentum conservation laws for fluid flows. To understand the pressure and velocity variation in flow of fluids through pipes To acquire the importance of dimensional analysis. 														
	• Tour															
	 To ac 															
	• To ar	 To analyze the flow in water pumps and turbines. 														
At the end of the course, the student will be able to																
	1. Expla	in and evalua	ate the vario	us properties	of fluids, ma	anometry and	d buoyancy.									
-	2. Estim	ate the mass	and momer	ntum conserv	ation laws fo	or fluid flows.										
Course	3. Evalu	ate the veloc	ity and pres	sure variation	n in flow throu	ugh pipes.										
Outcomes	4. Analy	 Analyze the similarity of motion between model and prototype 														
	5. Evalu	ate the perfo	rmance of p	umps and tur	bines.	-										
Note: The hou required for eac	rs given ag	gainst each to sed on import	opic are of i ance and de	ndicative. The pth of covera	e faculty ha	ve the freed The marks	om to decid allotted for	e the hours questions in								

the examinations shall not depend on the number of hours indicated.

2.3.2

Fluid Prope	rties and Flu Dimensions -	u id Static - Fluid F	:s Proper	ties -	- Den	nsity, S	Speci	fic gra	avity,	Visco	osity,	Surfac	ce ter	nsion,	capil	larity,
compressibil pressure and center and n	lity and bulk r d gauge pres neta center he	nodulus · ssure – s eight. uid Dyn:	Fluid	Statio and	cs - P differe	ascal' ential	s law manc	– Pre: meter	ssure s - B	meas uoyan	iurem icy –	ents – Centre	Atmo e of b	osphei ouoyai	ric, va ncy – [10	cuum meta 0]
Types of flu and moment	id Flow – typ tum equation	es of flor - stream	w line and p	– co otent	ntrol v ial fun	volum nction	e - ve – Eule	elocity er's ar	field nd Ber	and a noulli	iccele 's Equ	ration uation	- Cor and it	ntinuit ts app	y equa licatio [0	ation ns. 9]
Flow throug Laminar flow Darcy Weist	yh circular c v through circ pach equatior	onduits cular pipe n, friction	es - H factor	agen , Moo	Poise dy's c	euille diagra	equat m -Lo	ion – ss of	Turbu energ	ılent f y in pi	low - ipes.	Boun	dary I	ayer o	concej [0	pts – 8]
Dimensiona Need for dir	al Analysis nensional an	alysis – i	metho	ds of	dime	ension	al ana	alysis	- Sim	ilitude	e – typ	pes of	simil	itude	-	01
Hydraulic P	umps and T	rs – appli urbines	cation	or air	mensi	ionies	s para	amete	rs — IV		anaiys	SIS.			[U	8]
Impact of jet of Pelton wh characteristi working prin Types and a	of Pelton wheel and Francis turbines – head, losses, work done and efficiency – specific speed – operation characteristics – Governing of turbines – Classification of pumps – centrifugal pump and reciprocating pump - working principle – discharge, work done and efficiencies- cavitation in pumps – Submersible pumps – Types and applications. [10] Total Hours: 45+15(Tutorial)=60															
										1	[otal	Hours	: 45+	15(Tu	torial)=60
R.K.Ra): put A Textbo	ok of Flu	id Me	chani	cs and	d Hvdi	raulic	Mach	ines S	S.Cha	nd& c	ompa	nv Lto	1. 6 th E	dition	
1. 2015.	 ¹· 2015. Modi P. N and Seth S.M "Hydraulics and mechanics, including Hydraulic machines" standard book house, ²· Date: 2017. 															
2 Delhi 2017.																
Reference(s) : Bansal R.K. "Eluid Mechanics and Hydraulic Machines" Laxmi Publications (P) Ltd. New Delbi 9th																
Bansal, R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd., New Delhi, 9th Edition, 2017. Description Concel/Vursue A and Cimbola, John M. "Eluid Mechanics", Teta McCrew, Lill, New Delhi, 2rd Elivie, 2015.																
2. CengelYunus A. and Cimbala, John M., "Fluid Mechanics", Tata McGraw - Hill, New Delhi, 3 rd Edition, 2015.																
3. compar	rutham.S. "F iy (P) Ltd, Ne	lydraulics w Delhi,	s Fluid 2014.	d Me	chanic	cs and	d Flu	id Ma	chine	s", 8 ^{tr}	Editio	on, Dł	nanpa	itRai	Publis	hing
4. Ojha, C 4. Press, 2	.S.P., Chand 2010	ramouli,	P.N. a	and B	erndts	sson,	R., "F	luid M	lechai	nics a	nd Ma	achine	ery", C	Dxford	Unive	ersity
Pre-rec MAPPI OUTC(uisite: Nil NG OF COU DMES	RSE OU	тсом	ies, i	PROG	GRAM	ME O	UTCO	OMES		PRO	GRAN	ИМΕ	SPEC	IFIC	
COURSE	CODE &	со						P	0						P	SO
COURS	ENAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
		CO1	3	3	2	2	1	1	1	2	1	2	1	2	3	2
50 ME 00)5 & Fluid s and Fluid	CO2	2	2	2	2	1	1	1	2	1	2	1	2	2	2
Mechanic	hines	CO4	3	3	3	2	1	1	1	2	1	2	1	2	3	2
		CO5	3	3	3	3	1	2	1	2	1	2	1	3	3	2
Note: 3	8 – Strong Co	ontributi	on; 2	– Ave	erage	Cont	ributi	on; 1	– Sor	ne Co	ontrib	ution		Ū	Ű	
		K.S.Rai	ngasa	imy C	olleg	e of T	echn	ology	/ – Au	tonor	nous				R	2018
			5	50 MC	; 402	– The	ory o	f Mac	hines	i						
		Jouro /\A	look	B.E. I	Necha	atroni	ics Er	ngine	ering	-		Max		Mork		
Semester Hours / Week Total Credit Maximum Marks																
IV	3	1		0)	6	50 50		4		40		60		100	2
Objectives	To learnTo gene	n various erate the	mech cam p	anism profile	ns and for ra	d find t adial c	their v ams	velocit	y and	accel	eratio	n.		1		
0.0,000,000	To unde	erstand th	ne bas	ic cor	ncept	of too	thed g	gearin	g.	vorio	io otro	koc				
	 To plot To under 	erstand th	ne effe	ects of	f vibr	ation a	and in	nporta	nce o	f bala	ncing	in ma	chine	comp	onent	ts

	At	the end of the course the students will be able to
	1.	Acquaintance with basic mechanism and the layout of linkages in the assembly of system.
	2.	Design and analyze the velocity and acceleration of different mechanism and construct the
_		cam profile for the given follower motion
Course	3.	Determine speed ratio for simple, compound and planetary gear systems
Outcomes	4.	Understanding the process of providing continuous energy to the system when the energy
		source is discontinuous.
	5.	Identify the effects of vibration and balancing in machine components

Simple Mechanism

Introduction - Kinematic links, structure- comparison between machine and structure, joints, Kinematic pairs classification- types of constrained motion. Kinematic chain-classification- degrees of freedom – Kutzbach criterion, Gruebler's criterion - Grashof's law - Mechanism - Inversions of four bar and slider crank chain - Mechanical advantage – Description of straight line mechanisms: Peaucellier and Hart's mechanism. [12]

Kinematics Analysis of Linkages and Cam

Kinematic analysis of simple mechanism - Determination of velocity and acceleration by using Graphical method for four bar and slider crank mechanism. Classification of cams and follower - Radial cam nomenclature -Analysis of follower motions: uniform velocity, simple harmonic motion and uniform accelerationand retardation -Construction of cam profile for a radial cam. [12]

Gears and Gear Trains

Gear tooth profiles - gear tooth action - Interference and undercutting - requirement of minimum number of teeth in gears - Gear trains - Simple and compound gear trains -Determination of speed and torque in epicyclic gear trains. [12]

Turning Moments and Flywheels

Introduction, turning moment diagram for a single cylinder double acting steam engine - Turning moment diagram for a four stroke internal combustion engine - Fluctuation of energy- determination of maximum fluctuation energy - co-efficient of fluctuation of energy - Flywheel: co-efficient of fluctuation of speed - energy stored in a flywheel - Dimensions of the flywheel rim- Introduction to governors and gyroscope. [12]

Vibration and Balancing

Free, forced and damped vibrations of single degree of freedom systems, Critical speed of shaft logarithmic decrement - Force transmitted to supports. Static and dynamic balancing - balancing of revolving masses, single and multi-cylinder engines. Reciprocating masses - single cylinder engines. [12]

Text	book(s) :
1	R S Khurmi and J K Gupta, "Theory of Machines", S.Chand and Company Ltd., New Delhi, 2017.
2	Sadhu Singh, "Theory of Machines", Pearson Education, 2012.
Refe	erence(s) :
1	S S Rattan, "Theory of Machines", Tata McGraw-Hill Education (India) Pvt. Ltd., 2016.
2	J S Rao and R V Dukkipati, "Mechanism and Machine Theory", Bohem press, 2007.
3	P L Ballaney, "Theory of Machines", Khanna Publishers, New Delhi, 2005.
4	J S Brar and R K Bansal, "A Text Book of Theory of Machines", Laxmi Publications (P) Ltd., 2020.
	Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	РО													30
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	1	3	1	2	3	2							
	CO2	2	2	2	2	1	2								
50 MC 402 & Theory of Machines	CO3	3	2	3	2	2	2	1							
Machines	CO4	2	1	2	3	1	2								
	CO5	2	2	1		3		2							

		K.S.Rangas	amy Colleg	e of Techno	ology – Auto	onomous		R2018							
51 MC 403 – Hydraulic and Pneumatic Control															
	B.E. Mechatronics Engineering														
Somostor	H	ours / Week		Total	Credit	N	laximum Ma	arks							
Semester	L	Т	Р	hrs	С	CA	ES	Total							
IV	3	0	2	60	4	50	100								

2.5.2

		To fam	liarize abo	out the	e basio	cs fun	damer	ntals o	f hydr	aulic :	and pr	neuma	tic tra	nsmiss	sion po	ower u	using
		pressur	zed fluids.														
		 Io unde 	erstand wo	rking p	principl	es, op	eratior	n of hy	draulic	and p	neuma	atic coi	mpone	ents.		·	(. . .
Objec	tives	 To expo applicat 	ion	ous te	cnniqu	les for	choos	sing pu	imps,	vaives	s and p	oneum	atics c	compo	nents	for sur	table
		 Applicat Have ex 	non. mosure to	diagno	nse / tr	oubles	shoot h	vdrau	ic nne	umati	c elec	tro nne	oumati	c circi	uits		
		 To deside 	an the circ	uits us	ina pne	eumati	ic / hvc	raulic	comp	onents	for a s	small s	cale ir	ndustri	al appl	ication).
		At the end o	of the cou	rse th	e stud	ents v	vill be	able t	0								
		1. Explain	the fundar	nental	prope	rties o	f fluids	and u	nderst	and th	ie appl	licatior	ns, adv	antag	es of fl	uid pov	wer
		system.														•	
Cour	se	2. Identify	the various	s pump	os, val	ves, ad	ctuator	s and	its wor	king p	rinciple	es in h	ydrauli	ic circu	uit.		
Outco	mes	3. Describ	e and illus	trate th	ne con	structio	on and	worki	ng prir	nciples	of var	ious co	ompre	ssors,	pneun	natic va	alves
		and FRI	_ unit impo	ortance	e in phe bydrai	eumati		llt. motio	oirquit	forvo	ious o	nnligat	ione				
		5 Know th	e annlicati	on of f	luid no	nic and	ircuit ir	nindus	strv		10u5 a	pplical	.10115.				
Fluid	Power	System						1 IIIuu	,								
Introd	uction t	o fluid pow	er - prop	erties	of flu	ids [.] V	'iscosi	itv ind	ex O	xidati	on inc	dex D)emul	sibility	/ Lubi	ricity	Rust
preve	ntion. P	our point. F	lash poir	t and	Fire r	oint.	Types	of hv	drauli	c fluid	ds - Ad	dvanta	ages a	and dr	awba	cks of	fluid
power	r - App	lications of	fluid pov	ver –	Fluid	DOW	er con	npone	ents a	ind sv	/mbols	s- Pa	scal's	law:	Multic	olicatio	on of
Force	- Anal	vsis of sim	ole hvdra	ulic ia	ack - /	Applic	ations	s of P	ascal	's law	: Han	d ope	rated	hvdra	aulic i	ack. A	Air to
Hvdra	ulic Pre	ssure Boos	ster							-				,		[091
Hydra	aulic Pu	imps, Actu	ator and	Valv	es											•	•
Pump	s Pump	bing theory	- Pump	class	ificatio	on - w	/orking	g prin	ciple	of Ge	ear pu	imp, \	/ane	pump	, Scre	w pu	mp -
Hydra	ulic Ac	tuators: Hy	draulic m	otors	– gea	ar and	l vane	moto	ors, H	ydrau	ılic cyl	linder	s: sing	jle ac	ting a	ind do	buble
acting	cylinde	ers, Specia	I type cyl	inder	s: rod	less, ⁻	tande	m and	d tele	scopio	c - Hy	/drauli	c valv	/es: F	ressu	ire Co	ontrol
Valve	types,	Direction co	ontrol valv	e type	es, Fl	ow co	ontrol v	valve	types	, Coui	nter ba	alance	e valve	e.		[09]
Pneu	matic S	system															
Prope	rties of	air-Compre	essors: Ro	otary o	compr	essor	- Scre	ew co	mpres	ssor, \	ane c	ompro	essor	- Pist	ton Co	mpre	ssor:
Single	and M	ulti-Stage C	Compress	or - Fi	ilter, F	Regula	tor ar	nd Lub	oricato	or Unit	: - Valv	ves: D	irectio	on cor	ntrol va	alves,	Two
way,	Three w	ay, Four wa	ay valves	- Pne	umati	c che	ck val	ves -	Flow	contro	l valv	e, Pn	euma	tic shu	uttle va	alve -	AND
type v	alve - C	Quick exhau	ist valve.													[09]
Desig	Design of Hydraulic and Pneumatic Circuits Construction of Hydraulic circuits - Fail safe circuit - Regenerative circuit - pressure intensifier circuits -																
Const	Construction of Hydraulic circuits - Fail safe circuit - Regenerative circuit - pressure intensifier circuits - Accumulator circuits, Construction of Pneumatic circuits; Cascade method - sequence circuit Electro - pneumatic																
Accur	nulator	circuits. Co	nstructior	n of Pr	neuma	atic cir	CUITS:	Casc	ade m	nethod	a - sec	quenco	e circi	lit.Ele	ctro -	pneur	natic
CITCUIT		ased solen	old valve	•												I	[กล]
Fluid		itomation	vdraulia	broki	ina a	(ctom			or cir	suit fo	r rob	at arn	n for i	nick	and n	200	
Fiulu	power		yuraulic	Diak			-Fiuld	, pow							anu p	ace-	
Pneur	natic at	utomation fo	or Industr	y 4.0-	Hydra	ulic s	ystem	for Ir	dustr	y 4.0 -	Trou	ble sh	ooting	g of F	luid po	ower	
syster	n																[09]
Hand	s on Se	ession:	I P							•.							
1.	Assen	nbling of hy	draulic co	mpor	ients i	or ba	SIC HY	draui	C CILC	uit.							
2.	Assen	ibling of ph	eumatic (compo	nents	for N	asic P	meun ~ • •		ircuit.	o, uit						
3.	Assen	ibling of pr	eumatic (compo	nents	5 IOF IV		n & IV			Cuit						
4. 5			eumatic d	compo i+	Jnents	5 101 3	synchi	OHIZII	ig circ	uit.						r	151
Total		60		IL													13]
Text	book(s)	:															
1	Anthon	v Esposito, '	Fluid Pov	ver wit	h App	licatio	ns", P	earso	n Edu	cation	New I	Delhi,	2015.				
2.	Srinivas	san R ,"Hyd	raulic and	Pneu	matic	Contro	ols",2 nd	^d Editi	on', Vi	jay Ni	cole Ir	nprint	(P) Lto	d., Ch	ennai,	2016.	
Refer	ence(s)	:					,		,				<u> </u>	,	,		
1	S. R. M	ajumdar, "C	il Hydraul	ics", T	ata M	cGraw	/ Hill F	Publish	ing C	ompa	ny Pvt	Ltd. N	lew D	elhi, 2	014.		
~	S. R. M	ajumdar, "P	neumatic	syster	ms - P	rincip	es an	d Mair	ntenar	nce", T	ata M	cGraw	/ Hill				
	Publish	ing Compar	ny Pvt Ltd.	New	Delhi,	2014				,							
3	Andrew	Parr, Hydra	aulics and	Pneu	matics	s, Jaic	o Publ	lishing	Hous	e, 20'	15.						
4	James	L. Johnson,	"Introduc	tion to	Fluid	Powe	r", Del	mar T	homs	on Lea	arning,	, 2013	•				
P	're-requ	isite: Nil															
N	IAPPIN	G OF COU	RSE OU	TCON	IES, F	PROG	RAM	ME O	UTCO	OMES	AND	PRO	GRA	ИМЕ	SPEC	IFIC	
C	UTCO	MES	n														
CO	URSE	CODE &	СО					1	F	0			1	1		P	SO
C	DURSE	NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
			CO1	3	2	1	2	2	2	2	1	2	2	2	2	3	3
			CO2	2	2	2	1	1	1	2	1	2	1	2	2	2	2
50 M	C 403 8	Hvdraulic	CO3	2	2	1	2	2	1	2	1	2	1	2	2	3	2

and Pneumatic Control

CO4

CO5

	K.S.Rangasamy College of Technology – Autonomous R2018 50 MC 404- Applied Materials Technology												
				50 MC	404- Ap	plied Materi	als Techn	ology					
			Hour		S.E. Mecr	Tatal	ngineering		Maximum Marka				
Seme	ster			S/Week	D	lotal	Creat	C ^		Total			
IV	,		3	0	Г	45	3	 	E3 60	100			
10			To import	knowloda	o on thou		d proportio		00	100			
		•	To impan	tand heat	treatmer		and barde	s of alloys.					
Object	ives			e knowled	ae in ferr	ous and non	-ferrous m	atorials	1063.				
00,000		•	To impart	knowleda	e on Pow	/der metallur	av process	ses and ann	lications				
		•	To identit	v and sele	ct suitable	e characteriz	ation tech	niques for m	aterial testing				
		Δt	the end of	the cours	o the stu	dents will h	e able to						
		1	Understan	d the vario	ous types	of allov stru	ctures usir	ng iron carbi	de equilibrium dia	oram and			
			phase cha	indes of value	arious stru	uctures.		ig non oaror		gram ana			
		2.	Identify he	at treatme	nt proces	ss for engine	ering appli	cations and	case hardening p	rocess -			
Cour	rse		carburizing	g, nitriding	and cyar	niding.	0		0.				
Outco	mes	3.	Predict the	e effect of a	alloying a	dditions on f	errous and	l non- ferrou	is metals.				
 Comply the properties of ceramic materials and powder metallurgy for engineering applications and production of different metal powders. 													
applications and production of different metal powders.5. Utilize the mechanism of plastic deformation process, testing of mechanical properties and													
 Utilize the mechanism of plastic deformation process, testing of mechanical properties and metallographic procedures. 													
metallographic procedures.													
Constitu	ition of	allo	vs – Solid s	olutions s	ubstitutio	nal and inter	rstitial – ph	ase diagran	ns types and con	struction of			
phase d	liagram	is. Ir	on – Iron ca	arbide equi	librium di	agram, eute	ctic. perite	ctic. eutecto	id and peritectoid	reactions.			
1	5	-,				,	,	,		[08]			
Heat Tr	eatme	nt											
Definitio	on – full	lann	ealing, stre	ess relief a	nd recrys	tallisation -	normalising	g, hardening	and tempering o	f steel,			
austemp	pering,	mar	tempering ·	· TTT diag	rams -ha	rdenability, jo	ominy end	quench test	– case hardening), [10]			
carburis	sing, nit	ridin	g, cyaniding	g, flame ar	na inducti	on nardening	g.			[10]			
Classific	s anu r	of sta	renous ivi	t iron- offe	ct of allow	ing addition	s on staal (Mn Si Cr	Mo V Ti & W) - s	tainless			
and tool	l steels	– H	SIA - arav	white ma	lleable - :	allov cast iro	ns - conne	r and coppe	er allovs – aluminu	im and			
aluminu	im allov	/s – I	bearing allo	ys, Ni-bas	ed super	allovs and ti	tanium allo	VS.		[09]			
Non-Me	etallic Í	Mate	erials and F	owder Me	etallurgy								
Enginee	ering ce	eram	ics – prope	rties and a	pplication	ns of Al ₂ O ₃ , S	SiC - powd	er metallurg	y process - steps	involved-			
characte	eristics	of m	netal powde	ers - advan	tages an	d limitations,	major app	lications: ae	erospace, nuclear	, metal			
cutting a	and aut	omo	bile industr	ies.						[09]			
Mechan	nical P	rope	tio deforme	esting	and twin	ing types	of froaturo	Destructiv	o tooting: tooting	of motoriala			
under te	ansion	com	noression a	nd shear l	anu twini oads - h:	ardness test	s Brinell	/ickers and	Rockwell - impac	n materials			
and Cha	arov - 1	fatio	ue and cre	ep test – r	netallogra	aphy - prepa	aration of s	pecimen. m	netallurgical micro	scope and			
Scannin	ng Élec	tron	Microscope).				, ,	3	[09]			
Total H	ours: 4	15											
Text bo	ok(s) :												
1 K	(hanna	O P	"A Text B	ook of Mat	erial Scie	ence and Me	tallurgy" D	hannat Rai	Publishers 2016				
2 5	Sidnev	H.Av	ner "Introd	uction to P	hvsical N	letallurgy" Ta	ata McGrav	v-Hill Comp	anies Inc., New D	elhi. 2012			
Referen	nce(s)					<u> </u>							
1 V	1 William D. Callister, "Material Science and Engineering: An Introduction", Wiley India Pvt Ltd, New Delhi, 2012												
2 F	Raghav _td., Ne	an.V w D	/., "Material elhi, 2009	s Science	and Engi	neering: A F	irst Course	e",5 th Edition	, Prentice Hall of	India Pvt.			
3 0	George	E. D	Dieter, "Mec	hanical Me	etallurgy"	, Tata McGra	aw-Hill Con	npanies Inc.	, New Delhi, 2013				
4 F	R Balas	ubra	amaniyam, '	" Callister's	Materia	ls Science a	nd Enginee	ering", Seco	nd edition, Wiley,2	2014.			
LI							-	-					

Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO													SO
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	1	2	3	1	1	2	1	2	1	2	3	2	1
EO MC 404 8 Applied	CO2	2	3	3	3	2	2	1	1	1	2	2	3	2	1
50 MC 404 & Applied Materials Technology	CO3	3	2	1	1	1	2	2	1	2	1	2	3	2	1
Materials reenhology	CO4	3	2	1	2	1	2	1	2	1	2	3	2	1	1
	CO5	2	2	2	2	2	2	1	2	2	2	2	2	2	1

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

	K.S.Rangasamy College of Technology – AutonomousR201850 MY 014 – Start-ups and Entrepreneurship												
50 MY 014 – Start-ups and Entrepreneurship Common to all Branches Bemester Hours / Week Total Credit Maximum Marks													
			Commo	on to all Brar	iches			1 -					
Semester	F	iours / week		lotal	Credit	M	aximum iviar	KS Tatal					
1) /	L	1	P	nrs	U U		ES	I otal					
IV		0	0	30	-	100	-	100					
Objectives	 To provide creates v To build To impaie To inculo To know 	value for othe a winning str rt practical kn cate the habit the financing	ategy, how t owledge on of becoming g, growth and	to shape a ur business op g entreprene d new ventur	ning an idea nique value p portunities ur e & its proble	proposition, p	prepare a bus	siness plan					
	At the end o	of the course	, the stude	nt will be ab	le to								
 Transform ideas into real products, services and processes, by validating the idea, testing it, and turning it into a growing, profitable and sustainable business. Identify the major steps and requirements in order to estimate the potential of an innovative idea as the basis of an innovative project. Reach creative solutions via an iteration of a virtually endless stream of world-changing ideas and strategies, integrating feedback, and learning from failures along the way. Apply the 10 entrepreneurial tools in creating a business plan for a new innovative venture. Apply methods and strategies learned from interviews with startup entrepreneurs and innovators. 													
Introduction	n to Entrepren	eurship & En	trepreneur										
Meaning and role of Entr Entrepreneu The Entrepr	d concept of Ei epreneurship i irship. eneur: Meanin	ntrepreneursh in Economic g, the skills r	ip, the histor Developmer equired to b	y of Entrepre ht, Agencies he an entrepre	neurship devo in Entrepren eneur, the er	elopment, My eurship Man htrepreneuria	ths of Entrep agement and decision pro	breneurship, d Future of ccess, Role					
	nors and Supp			D	Diam			[U0]					
Business O Business ide preparing a l	eas, methods of Business Plan:	f generating ic Meaning and	leas, and opp significance	of a business of a business	gnition, Idea (plan, compo	Generation P ments of a bu	rocess, Feasi ısiness plan.	bility study, [06]					
Innovations Innovation a Analysing the in Innovation Ocean Strate Financing a	nd Creativity - I e Current Busir Management egy-I, Blue Oc Ind Launching	ntroduction, In ness Scenario , Participation ean Strategy- the New Ver financing, tw	nnovation in 6 , Challenges for Innovati II. Marketing nture Des of owner	Current. Envir of Innovation, on, Co-creation of Innovation	conment, Type Steps of Inno on for Innova , Technology	es of Innovatiovation Mana tition, Proto ty Innovation F	ion, School of gement, Expe /ping to Incul Process	Innovation, erimentation pation. Blue [06]					
debt-equity r	mix and finance	ial institutions	and banks	snip, venture	capital, type		unities, deten	mining ideal					
debt-equity mix, and financial institutions and banks. Launching the New Venture: Choosing the legal form of new venture, protection of intellectual property, andformation of the new venture. [06]													
Managing Growth and Rewards in New Venture Characteristics of high growth new ventures, strategies for growth, and building the new ventures. Managing Rewards: Exit strategies for Entrepreneurs, Mergers and Acquisition, Succession and exit strategy, managing failures													
Santioptoy	,.						Tota	Hours: 30					
Text book(s) :												
1 Stephe	n Key, "One S	Simple Idea fo	or Startups a	and Entreprei	neurs: Live Y	our Dreams	and Create	Your Own					

Profitable Company" 1st Edition, Tata Mc Grawhill Company, New Delhi, 2013. Charles Bamford and Garry Bruton, "ENTREPRENEURSHIP: The Art, Science, and Process for 2 Success", 2nd Edition, Tata Mc Grawhill Company, New Delhi, 2016.

2.3.2 ~...

Refe	erence(s) :															
1	Philip Auerswald, "T Oxford University Pre	he Comin ess, 2012	ig Pro	sperity	y: Hov	v Entr	eprene	eurs /	Are T	ransfo	orming	the	Globa	alEcon	omy",	
2	 Janet Kiholm Smith; Richard L. Smith; Richard T. Bliss, "Entrepreneurial Finance: Strategy, Valuation, and Deal Structure, Stanford Economics and Finance", 2011 Edward D. Hage, "Crowing on Entrepreneurial Publication and Capace", Stanford Rupingge Region 															
3	Edward D. Hess, "Growing an Entrepreneurial Business: Concepts and Cases", Stanford BusinessBooks, 2011															
4	Howard Love, "The Start-Up J Curve: The Six Steps to Entrepreneurial Success", Book Group Press, 2011															
	Pre-requisite: Nil															
	MAPPING OF COU	RSE OU	TCON	IES, F	PROG	RAM	ME O	UTCC	MES	AND	PRO	GRAN	MME \$	SPEC	IFIC	
	OUTCOMES															
C	OURSE CODE &	CO						Р	0						PS	30
	COURSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
		CO1	3	3	3	3	1	3	1	2	1		2	2	2	1

			2	י	Ŧ	5	0	1	0	9	10		12	•	2
	CO1	3	3	3	3	1	3	1	2	1		2	2	2	1
50 MY 014 &Startups	CO2	2	3	3	2	2		2	2	2		2	2	3	
and Entrepreneurship	CO3	3	2	3	1	2				1	3	1	3	3	
	CO4	3	3	3	3	3	2	2	1		1	3	3	3	
	CO5	3	2	3	3	3			2			3	2	2	

K.S.Rangasamy College of Technology – Autonomous R2018																
50 MC 4P1- Industrial Drives and Control Laboratory B.E. Mechatronics Engineering																
				B.E. N	lecha	tronic	s Eng	jineer	ing							
Semester	ŀ	Hours / W	'eek			То	tal	С	redit			Maxi	mum	Marks	i	
	L	Т		Р)	h	rs		С		CA		ES		Tota	al
IV	0	0		4		6	60		2		60		40		100)
Objectives	 To acqu To deter To provi To deter To deter To acqu At the end of 	ire knowle mine the de the kn mine the ire the kn f the cour	edge a perfo owled perfo owled se, St	about rmanc Ige ab rmanc Ige of	speed e chai out sp e chai <u>solid s</u> s will t	l contro racteria racteria state s be able	ol of D stics o ontrol stics o peed o e to	C driv f the g of AC f the g contro	ves. given [drives given / l of AC	DC dri s. AC dri C & DC	ves. ves. C drive	es.				
Course 1. Test and analyze the performance of DC motors under different load conditions. Outcomes 2. Test and analyze the performance of induction motors under different load conditions. 3. Analyze the performance of conventional speed control systems for DC motors. 4. Design power electronics based speed control systems for DC drives. 5. Design power electronics based speed control systems for Induction motor drives. 1. Load characteristics of DC shunt motor and compound motor																
 Load characteristics of DC shunt motor and compound motor. Load characteristics of DC series motor. Load test on three-phase squirrel cage induction motor. Load test on three-phase slip ring induction motor. Load test on single phase induction motor. Load test on single phase induction motor. Speed control of DC shunt motor using controlled rectifier. Speed control of DC shunt motor using chopper. Speed control of three-phase induction motor by V/F method. Speed control of three phase induction motor (Voltage control). 																
	-													Total	Hours	s: 60
Text book(s	5):															
¹ Gopal	l.K.Dubey, "Fu	Indament	als of	Electr	ical D	rives" l	Naros	a Pub	lishing	Hous	e, 2 ^{nc}	¹ Edition	on, 20	13.		
Reference(s	s):						<u> </u>									
1 Vedar Ltd., N	n Subrahman New Delhi, 200	yam, "Ele)1.	ctric E	Drives	Conce	epts ai	nd App	olicatio	ons" T	ata Mo	c Grav	v Hill F	Publish	ningCo	ompan	у
Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES																
COURSE	CODE &	CO	<u> </u>	-	-	-	_	F	<u>- 0</u>							50
COURSE NAME 1 2 3 4 5 6 7 8 9 10 11 12 1 2																
		CO1	1	3		3	2	4	3	4	1	3	1	──		3
50 MC 4P1	& Industrial	CO2	2	1		1	2 1	1	1	1	2	1	2	1	3	
		CO3	2			1	2	2		2	2 1		2 1	2	2	2
Labo	atory	CO4	<u> </u>	2	1	1	2	3		3	1	2		1	 1	2

	K.S.Rangasamy College of Technology – Autonomous R2018 50 MC 4P2 – Applied Mechanics Laboratory															
		5	0 MC	4P2	– App	blied I	Mecha	nics	Labo	rator	y					
	I	<u></u> ,		B.E. I	Mecha	atroni	cs Er	gine	ering							
Seme	ster	Hours /	Week	(_	T	otal	C	Credit			Max	imum	Mark	S	
					P 4		hrs		<u>C</u>		CA		ES		I ot	al
IV	0		0		4		60		2		60		40		10	0
Objecti	 To c torsi To fa To e To a To a 	onduct the on, deflect icilitates e mphasize nalyze the nalyze the	e expe tion a experir the co e perfo e perfo	erimer nd imp menta oncep orman orman	ntal sti pact te il knov ot of B ice cha ice cha	udy or ests. vledge ernou aracte aracte	e abou lli's pri ristics ristics	tural nciple of tur of pu	meml fficien e usin rbines imps.	oers u It of di g orifi S,	sing t schar ce me	ensior ge and ter.	n, com d fricti	on fac	sion, ctor.	
	At the e	nd of the	cours	se, the	e stuc	lents	will b	e able	e to							
Cour Outco	1. Understand the tensile and compressive behaviors of metals and springs. 2. Understand the impact, deflection and torsional behaviors of mechanical members. 3. Apply the Bernoulli's principle to estimate the rate of flow using orifice meter and determine the friction factor for various pipes. 4. Analyze the performance characteristics of turbines 5. Analyze the performance characteristics of pumps. Determination of tensile behavior of given metals.															
1. Dete	1. Determination of tensile behavior of given metals.															
 2. Dete 3. Dete 4. Dete 5. Dete 6 Dete 7. Dete 8. Dete 9. Dete 10. Det 	 Determination of tensile behavior of given metals. Determination of tensile and compressive behaviors of given helical springs. Determination of impact strength of given metal specimen using Charpy and Izod testers. Determination of deflection value on given simply supported beam. Determination of torsional strength on mild steel rod. Determination of coefficient of discharge of orifice meter. Determination of friction factor for a given set of pipes. Determination of Pelton wheel performance under various interval loads. Determination of Kaplan turbine performance under various interval loads. 															
													-	Total	Hours	s: 60
Text bo	ook(s) :															
1. 2.	Dr.R.K.Bansal,' Dr.R.K.Bansal,' New Delhi. 201	A Textboo A Textboo).	ok of S ok of	Streng Fluid	gth of Mech	Mater anics	ials", L and H	axmi Iydrau	Publi ulic N	catior Iachin	is (P) es", L	ltd., N .axmi	lew De Public	elhi, 2 cation	010. s (P)	Ltd.,
Refere	nce(s) :		_							_						
1.	R.Subramaniar	," Strengt	h of M	lateria	als", O	xford	Public	ation	s, 201	0.						
2.	R.K.Rajput," St	ength of I	Materi	als", L		Public	cation	s, 201	0.							
3.	Sadhu Singh,"F	luid Mech	anics	", Kha	inna F	ublish	ning H	ouse,	Delh	l						
4.	4. Modi and Seth. "Fluid Mechanics", Standard Publishers.															
Pre MA OL	Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES															
COU	IRSE CODE &							Ρ	0						P	SO
CO	URSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
50 MC	4P2 & Applied	CO1	2	1	1	2	2		3					1	2	3
Mecha	anics Laboratory	CO2	2	1	3	1	2		2						2	2

CO3

CO4

CO5

K.S.	Rangasamy College of Technology-A	utono	mous	Regula	tion		F	R2018						
	Semester IV													
Course Code	Course Name	Ho	ours/W	leek	Credit	Ма	ximun	n Marks						
		L	Т	Р	С	CA	ES	Total						
50 TP 0P2	100	00	100											

s..... 2.2. Qu

Cour Object	 To help the review texts To help the themselves To help the requirement To help the requirement To help the attend place To help the to attend place 	learners to paraphrase the reading passages, to draft continuous writes in the academic and professional contexts e learners to acquire the phonetic skills of the language and express precisely for effective professional presentations learners to enrich their verbal reasoning and ability to match the emploi ts of the corporates e learners to comprehend the preliminary level of aptitude skills requirement and competitive online exams learners to comprehend the Pre - Intermediate level of aptitude skills r acement and competitive online exams	ing and byability uired to equired								
	At the end of	the course the student will be able to									
Cour Outco	 At the end of 1. Interpret an review texts 2. Adapt to an professiona 3. Interpret the requirement 4. Infer the co and comparis 5. Infer the co 	d infer the meaning in the reading passages, organize continuous write both academically and professionally. Ind demonstrate the phonetic skills accurately for effective presentation lly. e various concepts of verbal reasoning and relate for the concepts ts of the competitive exams and employability incepts of preliminary level of aptitude skills pertaining to competitive my recruitments.	ing and s to the exams petitive								
	exams and	company recruitments.									
Unit–1	Written Communicati	on–Part3	Hrs								
Writing - Newspaper and Book Review Writing - Skimming and Scanning - Interpretation of Pictorial Representations. Practices: Sentence Completion-SentenceCorrection-JumbledSentences-Synonyms&Antonyms – Using the Same Word as Different Parts of Speech-Editing Materials: Instructor Manual, Word power Made Easy Book, News Papers											
Init_2		D-Part3									
Self-Introc Consonan Technical Material:	duction-Miming(BodyLar tts, Introduction to Stre Paper Presentation. Instructor Manual ,News	Anguage)-IntroductiontotheSoundsofEnglish-Vowels, Diphthongs & ess and Intonation - Extempore - News Paper and Book Review-	4								
Unit-3	Verbal Reasoning-P	art1									
Analogies among gro Material:	-Alphabet Test-Theme I oup of people) -Coding Instructor Manual, Verb	Detection-Family Tree- Blood Relations (Identifying relationships & & & & & & & & & & & & & & & & & & &	8								
Unit-4	Quantitative Aptitud	e –Part1									
Problemon Material:	nAges-Percentages-Pro Instructor Manual, Aptitu	ofitandLoss-Simple&CompoundInterest-Averages-Ratio, Proportion ude Book	6								
Unit-5 Quantitative Aptitude -Part2 Speed, Time&WorkandDistance-PipesandCisterns-MixturesandAllegations-Races-ProblemonTrains - Boats and Streams Practices: Puzzles, Sudoku, Series Completion, Problem on Numbers Material: Instructor Manual ,Aptitude Book											
	<u> </u>	Total	30								
Evaluation) Criteria										
Evaluation	o Criteria										
S.No.	Particular	Test Portion	Marks								
1 E	Evaluation 1 Written Test	50Questions–30 Questions from Unit 1 &2, 20 Questions from Unit3, (External Evaluation)	50								
2 E	Evaluation2 Dral Communication 1	Self-Introduction, Role Play & Picture Talk from Unit-4 (External Evaluation by English and MBA Dept.)	30								
3 E	2 Oral Communication 1 Evaluation by English and MBA Dept.) 30 3 Evaluation3 Book Review & Prepared Speech from Unit-5(External Evaluation by Oral Communication 2 20										

S....... 2.2. Qu

Total

Reference Books

- Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint20 S. Chand & Co.Ltd., NewDelhi.
- 4. Word power Made Easy by Norman Lewis W.R. GOYAL Publications

Note:

- InstructorcancoverthesyllabusbyClassroomactivitiesandAssignments (5Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough workpages
- Each Assignment has 20 questions from Unit1, 2 and Unit5 and 5 questions from Unit3 and 4
- Evaluation has to be conducted as like Lab Examination.

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO									PSO				
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	2	1	1	1	1	1	1	1	3	2	3	1	1
50 TP 0P2-	CO2		1		1	1	1	1	1	2	3	2	3	1	1
Career Competency	CO3	1	1	1	1	2	3	1	1	2	3	2	3	2	2
Development II	CO4	3	2	2	2	1	2	1	1	2	3	2	3	3	3
	CO5	3	2	2	2	1	2	1	1	2	3	2	3	3	3

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

	K.S.Rangasamy College of Technology – Autonomous R2018												
50 MC 501 – Microprocessors and Microcontrollers													
			B.E. Mecha	tronics Eng	jineering								
Compoter	Hours / Week Total Credit Maximum Marks L T P Hrs C CA ES Total												
Semester	L	Т	Р	Hrs	С	CA	ES	Total					
V	3	0	0	45	3	40	60	100					
Objectives	 To study t To study t To introdu To unders To introdu 	he architectu he addressiu ice the need stand the arcu ice the comr	ure of 8085, ng modes & & use of Int hitecture an nonly used	8086 micro instructions terrupt struct d programm peripheral / i	processors, sets of 8085 ture. hing of variou nterfacing IC	8051& ARM 5, 8086 8051 us advanced Cs and study	I microcontro & ARM. I microcontro / its simple a	ollers. oller. applications					
Course OutcomesAt the end of the course, the students will be able to 1. Understand the basic element, functions of microprocessor and assembly language programs.2. Understand the architecture concepts of 8086 microprocessor and its operation. 3. Understand functional and architectural characteristics of 8051 microcontroller and assembly language programs. 4. Compare advanced microcontroller concepts and memory organization techniques. 5. Interface and apply the concepts of microprocessor and microcontroller to mechatronics systems.													
8085 Microp Evolution of Timing diagr 8086 Microp Advanced mi diagram and address - Co 8051 Microc Microcontrolle 8051 Assemb	rocessor microprocess ams–Assemb rocessor icroprocessor f function of ea ncept of queue ontroller er Hardware- I oly Language F	ors- Archite ly language amily overvi ch pin, 8086 in 8086. /O Pins, Por Programming	cture–Func programm ew, Introduc programm ts- External g: Instruction	tionalblocko ing–Interrup ction to Harv ing model - memory–Co n set of 8051	diagram–Ins ots and men vard archited Memory Se ounters and , Addressing	structionset- nory interfa- ture - 8086 gmentation Timers-–Se g modes, Da	-Addressing cing. internal arch - Generation rial data I/O ata transfer i	gmodes– [09] hitecture, Pin n of Physical [09] - Interrupts- instructions,					
Arithmetic and Logical Instructions, Jump and Call Instructions. [09] ARM Microcontroller Introduction to ARM microcontroller - Internal architecture, I/O pins, Ports, Timers –Interrupts- Memory organization - Concept of Pipelining -Basic features and comparison of ARM, PIC, AVR, Arduino and Raspberry Pie Microcontrollers. [09] Applications Interfacing of ADC,DAC, stepper motor, speed control of DC motor interfacing, traffic light control and case study of washing machine control. [09]													

Total Hours: 45

Ł 2.3.2

To	Text book(s) : :															
Te															<u> </u>	
1	Krishna Kant, "Micro	oprocess	ors a	nd M	icroco	ntrolle	ers A	chite	cture,	Prog	ramm	iing a	nd S	ystem	Desi	gn
	8085, 8086, 8051, 80)96", Prei	ntice H	Hall of	India	, New	Delhi	, 8th I	ditio	n, 201	1.					
2	Ajay V. Deshmukh, "	Microcon	troller	s The	ory ar	nd Ap	olicati	ons", ˈ	Tata I	McGra	aw Hil	l Publi	ishing	comp	bany L	.td,
Ζ.	New Delhi 2011.															
Re	Reference(s) :															
1.	1. Mathur S, Panda J, "Microprocessor and Microcontrollers", PHI Learning, 2018.															
_	Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture,															
2.	Programming and Design", 2 nd Edition, Prentice Hall of India, 2015															
•	R.S. Goankar, "Microprocessor Architecture, Programming, and Applications with the 8085", 5 th Edition,															
3.	^{3.} Prentice Hall, 2010.															
4	A.K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", 2 nd Edition, Tata McGraw-															
4.	4. Hill Publishing company Ltd, 2010.															
	Pre-requisite: Nil															
	MAPPING OF COU	RSE OU	ICON	IES, F	PROG	RAM	ME O	UTCC	MES	AND	PRO	GRAN	ИМЕ 🕄	SPEC	IFIC	
	OUTCOMES															
(COURSE CODE &	<u> </u>						Ρ	0						P	SO
	COURSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
		CO1	1	1	1	1	1	2	1	1	2	3	2	3	1	1
		<u> </u>	2	4	2	0	4	2	4	4	2	2	2	2	2	2
	50 MC 501 & 002 2 1 2 2 1 2 1 2 1 1 2 3 3 3 2 2															
N	Microprocessors and CO3 2 1 2 2 1 1 1 2 3 2 3 2 2 2															
	Microcontrollers	CO4	2	2	2	2	2	1	1	1	2	3	3	3	3	3

CO5

	K.S.Rangasamy College of Technology – Autonomous R2018													
		51 M	C 502 - S	ystem Desig	gn and Co	ntrol								
		E	B.E. Mech	natronics Er	gineering									
Semester	Hours / V	Veek			Credit		Maximum Marks							
		–		Total hrs	0	<u></u>	F 0	Tatal						
	L	1	P	60			ES	100						
V	J Ta daaariba	1			4	40	60	100						
	I O describe	e Teedback	control a	ind basic cor	nponents (of control sy	stems	d doolan						
	 To understa of linear co. 	and the va	nous line	e domain and	inequency	/ domain too	of analysis and	u design						
Objectives		nii oi sysie	to analy	zo the stabilit	v of evetor	ne from trar	efer function form	C						
	 To describe the methods of designing compensators 													
 To understand the concept of state space analysis 														
I o understand the concept of state space analysis At the and of the course, the students will be able to														
At the end of the course, the students will be able to														
	1. Understand the open loop and closed loop control system and able to design develop mathematical model. Translations and Potational systems transfer function													
	2 Learn abou	t time don	nain snec	ifications and	l about var	ious types o	of test input							
Course	3. Learn abou	t frequenc	v domain	specification	ns and des	ion and dev	elop different fred	uencv						
outcomes	response p	lots.	,			.g		,,						
	4. Understand	I the conce	ept of stal	bility and kno	wledge at	out Root lo	cus, Routh Hurwitz	Z						
	Criterionan	d Nyquist	Plots.	-	•									
	5. Design Lag	, Lead, La	g-lead ne	etwork and kr	nowledge a	about State	space Analysis							
Systems and	d Their Represei	ntation												
Introduction	to Control Syste	em: Open	and Clo	sed loop Sy	stems Ex	amples –R	esidential Heating	g System,						
Automobile D	vrive System, and	Tempera	ture Cont	rol System. T	ransfer fu	nction: Math	ematical Model- M	lechanical						
Model- Trans	lational & Rotatic	nal Syste	ms, Elect	rical Model, I	Block Diag	ram Reduc	tion Techniques, S	Signal flow						
Graph using	Manson's Gain R	ule –Rela	tea proble	ems.				[09]						
Introduction	The Derformer	nco Spocif	ications	Transient P	osnonso-F	Pico timo P	ook time Dook (Warehoot						
Settling time	Measure of perf	ormance (of the Sta	ndard Secor	nd Order S	System -Ste	adv State Respon	se-Steady						
State Error C	onstants and Sv	stem Type	Number	s Types of T	Test Inputs	Step Ran	no Parabolic Imp	ulse -First						
and Second	Order System F	Response.	Feed B	ack Control	Svstem C	Characteristi	cs: - Proportional	I. Integral.						
Derivative, PID Modes of Feedback Control. [09]														
Frequency Response Analysis														
Introduction -	-The Performanc	e Specific	ations in I	Frequency D	omain- Th	e Bode Plot	s – The Polar Plot	ts–Nichols						
Chart-determ	ination of closed	loop respo	onse from	open loop re	esponse			[09]						

ą 2.2.2 ~

Stability of Control Systems

Introduction-Characteristic Equation, Location of Roots in S-plane for Stability. Stability Criterion: Bounded input Bounded output Stability, Zero input Stability, Routh Hurwitz Criterion. Root locus construction: Root locus Concept, Guidelines for Sketching Root Loci, Selected illustrative Root Loci-Gain Margin and Phase Margin. Nyquist Stability Criterion Selected illustrative Nyquist Plots. [09]

Compensator Design and Analysis Using Simulation Tool

Types of compensator - Lag ,Lead and Lag-lead networks-Compensator design using Bode Plot, Simulation tool - block diagram - Time Response Analysis - Frequency Response Analysis [09]

Total Hours: 45 + 15(Tutorial) = 60

Text book(s) :

1	I.J Nagrath and M.Gopal "Control System Engineering", New Age international publisher, New
	Delhi,2016

2 Katsuhiko Ogata, "Modern Control Engineering", 5th Edition, Pearson Education, New delhi, 2012 Reference(s) : :

M.N. Bandyopadhyay, "Control Engineering Theory and Practice", Prentice Hall of India, 2006. 1

Chesmond C.J. "Basic Control System Technology", Viva Low Priced Student Edition, 1998 2

Leonard N.E. and William Levine, "Using MATLAB to Analyze and Design Control Systems" 3

Gopal M. "Control System Principles and Design", 3rd Edition, Tata McGraw-Hill, New Delhi, 2010 4 Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO											PSO		
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	2	2	1	1	1	2	1	2	1	2	3	2
	CO2	3	3	3	3	1	1	1	2	1	2	1	2	3	2
Design and Control	CO3	3	3	3	2	1	1	1	2	1	2	1	2	3	2
Design and Control	CO4	3	3	3	3	1	1	1	2	1	2	1	2	3	3
	CO5	3	3	3	3	1	2	1	2	1	2	1	3	3	2

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

K.S.Rangasamy College of Technology – Autonomous R2018 50 MC 503 -Sensors and Instrumentation															
50 MC 503 -Sensors and Instrumentation B.E. Mechatronics Engineering															
	-		B.E. Mecha	tronics Eng	ineering										
Somostor	Н	ours / Week		Total	Credit	Ν	/laximum Ma	arks							
Semester	Seriester L T P Hrs C CA ES Total V 3 0 0 45 3 40 60 100 • To expose the students various sensors and transducers for measuring mechanical quantities. • To expose the students various sensors and transducers for measuring mechanical quantities.														
V	3	0	0	45	3	40	60	100							
Objectives	 To expose the students various sensors and transducers for measuring mechanical quantities. To make the students familiar with the specifications of sensors and transducers. To teach the basic conditioning circuits for various sensors and transducers. To introduce about advancements in sensor technology. To educate the advance trends and application of sensors. At the end of the course, the students will be able to														
Course Outcomes	At the end of 1. Explain 1 2. Examine applicati 3. Demons displace 4. Illustrate 5. Choose and envi	of the cours fundamental the suitable ons Outline trate the wo ment, load, the working the appropri ironmental a	e, the stude physical an e specification the various rking of elect light intensit and charact ate sensors pplications.	ents will be ad technical bon of mecha methods investrical transdu y and angle. steristics of s for machine	able to base of sens nical transdu olved in form ucers which mart sensors tools, manu	ors. Icers for diff ning proces can measur s. facturing pr	ferent measu ses. re the tempe rocess, mach	urement rature, nine vision							
Introduction Function blo Characteristic elements	ock of instru cs-Static & D	mentation)ynamic Ch	- Intelligen aracteristics	t instrumer s-Errors in	nts- classifio Measureme	cation of nt- Calibra	sensors ition and S	Performance tandards-I/O [09]							

Mechanical Transducer

Introduction-Temperature Measurement-Pressure Measurement-Force Measurement-Torque Measurement-Liquid Level Measurement-Flow Measurement-Displacement to pressure transducers. [09]

Passive Electrical Transducer

Resistive Transducers, Resistance thermometers, Hot wire resistance transducer, Resistive displacement transducers, Resistive strain transducers-Inductive Transducer, Inductive thickness transducer, Displacement

transducer, Moveable core type inductive transducer, Eddy current type inductive transducer-Capace [0] Transducers-Thickness, Displacement, Moisture	citive 9]
Active Electric Transducer	
Thermo electric transducers-Piezo Electric Transducers-Magnetostrictive Transducers-Hall-Effect Transducers	cers-
Photoelectric Transducers-Ionization Transducers-Digital transducers-electrochemical transducers. [0	9]
Recent Trends and Applications	
Film sensors - Micro-scale sensors - Particle measuring systems - Applications and case studies- Automo	obile
Engineering, Aeronautics, Machine tools and Manufacturing processes. [0	9]
Total Hours:	45
Text book(s) :	
1 Patranabis D,"Sensor and Actuators", Prentice Hall of India (Pvt) Ltd., 2017	
2. Renganathan S., "Transducer Engineering", Allied Publishers (P) Ltd., 2015	
Reference(s) :	
Murthy, D.V.S., Transducers and Instrumentation, 2 nd Edition, Prentice Hall of India Pvt. Ltd., NewDel	hi,
^{1.} 2010.	
2. Ian Sinclair, Sensors and Transducers, 3 rd Edition, Elsevier, 2012.	
3. J. P. Bentley, Principles of Measurement Systems, Addison Wesley Longman Ltd., UK, 2010	
K. Sawhney and P. Sawhney, A Course on Mechanical Measurement Instrumentation and Control,	
^{4.} Dhanpat Rai and Co, New Delhi, 2011.	
Pre-requisite: Nil	
MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC	
OUTCOMES	

001001120															
COURSE CODE &	6						Р	0						P	SO
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	3	3				3		2	3	1		3
50 MO 500 0 0	CO2	3	3	3	3			1	2	2	2	2	1		3
50 MC 503 & Sensors	CO3	3	3	2	2	2		2	2	1	2	1	1	3	3
	CO4	3	3	3		3	2	2		2		2	2	3	2
	CO5	3	3	3		3	2	2		2		2	2	3	2

K.S.Rangasamy College of Technology – Autonomous R2018														
			50 MC 504	– Machine	Design									
			B.E. Mecha	tronics Eng	jineering									
Compoter	H	ours / Week		Total	Credit	N	laximum Ma	arks						
Semester	L	Т	Р	Hrs	С	CA	ES	Total						
V	3	1	0	60	4	40	60	100						
	To familia	 To familiarize the various steps involved in the Design Process. To understand the principles involved in evaluating the shape and dimensions of a 												
Objectives	 Objectives To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements. To learn to use standard practices and standard data. 													
	To learnTo desig	to use catalo n the various	ogues and s machine c	tandard mac omponents a	chine compo as per stand	onents ards.								
	At the end of	of the cours	e, the stude	ents will be	able to									
	1. Analyze	stresses and	d dimension	s in machine	e elements a	at various loa	ads.							
Course Outcomes	 Understa Design a Exhibit tl Understa 	and the desig and analyze he design of and the threa	gn of shaft, the springs bearings ar aded fastene	couplings, ke and gears. nd connectin ers and abilit	eys and knu g rod. ty to design	ckle joint for of welded jo	different ap ints.	plications.						

Variable Stresses in Machine Members

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties – Direct, Bending and torsional stress equations – Impact and shock loading – eccentric loading – Design of curved beams – crane hook and 'C' frame - Factor of safety - theories of failure – stress concentration – design for variable loading – Soderberg, Goodman and Gerber relations. [09]

Shafts and Couplings

Design of solid shaft based on strength, rigidity and critical speed – Design of keys – Types - keyways - Design of rigid and flexible couplings - design of knuckle joints. [09]

Springs and Gears

Springs – Types of Springs, Design of helical, leaf and torsional springs under constant loads and varying loads – Concentric torsion springs – Gears, types, Terminologies-Design of spur and helical gears. [09]

Bearings and Connecting Rod

Study of bearings, Design of bearings – sliding contact and rolling contact types. – Cubic mean load – Design of journal bearings – Mckees equation – Lubrication in journal bearings – calculation of bearing dimensions – Design of connecting rod. [09]

Fasteners and Welded Joints

Threaded fasteners - Design of bolted joints including eccentric loading – Design of welded joints for pressure vessels and structures - theory of bonded joints. [09]

Total Hours: 45 + 15(Tutorial) = 60

lext	i book(s) :
1	Juvinall R.C, and Marshek K.M, "Fundamentals of Machine Component Design", John Wiley & Sons, Seventh Edition, 2019.
2.	J.K Gupta and R.SKhurmi, "A Textbook of Machine Design", Eurasia Publishing House, 2018.
Refe	erence(s) :
1.	Bhandari V.B, "Design of Machine Elements", Tata McGraw-Hill Book Co, 2008
2.	Norton R.L, "Design of Machinery", Tata McGraw-Hill Book Co, 2004.
3.	Orthwein W, "Machine Component Design", Jaico Publishing Co, 2003.

4. Spotts M.F., Shoup T.E, "Design and Machine Elements" Pearson Education, 2004.

Pre-requisite: Nil

•			
MAPPING OF COU	JRSE OUTCOMES, PROGF	RAMME OUTCOMES AN	ND PROGRAMME SPECIFIC
OUTCOMES			

COURSE CODE &	CO						P	0						P	PSO		
COURSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2		
	CO1	1	3	1	1	1	2		2		2	3	2	2	3		
	CO2	2	2	2	3	3		2		3		2		2	2		
50 MC 504 & Machine	CO3	2	3	1	3	2	1		1		1		3	3	3		
Design	CO4	1	3	3	2	1		2	3		2	1	2	2	2		
2 001gm	C:O5	2	1	1	1	2	2	3				1	2	2	2		

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

K.S.Rangasamy College of Technology – Autonomous R2018													
	50 MC 5P1 – Microprocessors and Microcontrollers Laboratory												
			B.E. Mecha	tronics Eng	jineering								
Somostor	H	ours / Week		Total	Credit	N	laximum Ma	arks					
Semester	L	Т	P	Hrs	С	CA	ES	Total					
V	0	0	4	60	2	60	40	100					
	To famili	arize the arc	hitecture of	8085, 8086	Microproces	ssor and 805	51 microcont	trollers.					
	To explo	ore a basic k	nowledge of	microproce	ssors and m	icrocontrolle	ers.						
Objectives	To learn	programmir	ig of microp	rocessors ar	nd microcont	trollers.							
To design and develop interfacing concepts of microprocessors and microcontrollers.													
Ability to develop microprocessor and microcontroller based small applications.													
At the end of the course, the students will be able to													
	1. Perform	the basic ar	ithmetic ope	rations usin	a 8085 micro	oprocessors	by developi	ng					
	assembl	y language	orograms.	·	0		, ,	5					
Course	2. Develop	an assembl	y language	program to c	convert hexa	decimal to c	lecimal and	decimal					
Outcomoo	to hexad	lecimal and	also perform	n sorting usir	ng 8085								
Outcomes	3. Perform	the basic pr	ogramming	operations u	ising 8086 m	nicroprocess	ors.						
	4. Perform	the basic ar	ithmetic ope	rations using	g 8051 micro	ocontrollers	by developir	ng					
	assembl	y language	orograms										
	5. Demons	trate the inte	erfacing of s	tepper moto	r and traffic I	ight controlle	er using 805	1					
List of Expe	riments												
Programmin	ng with 8085 M	licroproces	sors										
1. Arithmet	tic operations (addition, sul	otraction, m	ultiplication,	division) usiı	ng 8085							
2. Logical	operations prog	grams using	8085										
3. Sorting	numbers in asc	cending and	descending	order of 808	35								
4. 8-bit dec	cimal to hexade	ecimal conve	ersion of 808	35									
5. Hexade	cimal number t	o decimal nu	umber conve	ersion of 808	35								
Programmin	ng with 8086 M	licroproces	sors										
Basic Pr	rogramming wi	th 8086 Ass	embler										
Programmin	ng with 8051 M	licrocontro	lers										
7. Arithmetic operations (addition, subtraction, multiplication, division) using 8051													
8. Stepper	motor interfac	e using 805											
9. Interface	e Traffic light co	ontroller usir	ig 8051										
10. ADC and	d DAC Interfac	e.											



3_ 2.2. a ~

BoS Chairman

Text	: book(s) :																
1	R.S. Goankar, "Micr	oprocess	sor Ar	chited	cture,	Pro	ogra	mmir	ig, ai	nd Ap	plicati	ons \	with th	ne 808	85", 5 th	Editior	۱,
1	Prentice Hall, 2013.																
2	Ajay V. Deshmukh,	"Microco	ntrolle	ers Th	neory	and	d Ap	plicat	ions	"Tata	a McG	Graw	Hill P	ublish	ning con	npany	
۷.	Ltd, New Delhi 2011	l.															
Refe	erence(s) :																
1	Krishna Kant, "Micro	oprocess	ors ar	nd Mie	croco	ntro	ollers	s Arcl	nitect	ure, F	Progra	mmi	ng an	d sys	tem De	sign 8	085,
1.	8086, 8051, 8096",	Prentice	Hall c	of Indi	a, Ne	w D	Delhi	, 8 [≞] E	ditio	n,20	11.						
2.	Mathur S, Panda J,	"Micropro	ocess	or an	d Mic	roc	ontro	ollers	", P⊢	ll Lea	rning,	2018	8.				
2	Yu-Cheng Liu, Glen	n A. Gibs	son, "l	Micro	comp	ute	r Sys	stem	s: Th	e 808	6 / 80	88 Fa	amily	- Arcl	hitecture	э,	
З.	Programming and D)esign", 2	2 nd Ec	dition,	Prer	ntice	e Hal	l of li	ndia,	2015							
4	A.K. Ray and K.M. E	Bhurchan	di, "A	dvano	ced N	licro	opro	cess	ors a	nd Pe	ripher	als"	,Tata	McGi	raw- Hill		
4.	Publishing company	/Ltd, Sec	cond I	Editio	n, 20	10.											
	Pre-requisite: Nil																
	MAPPING OF COU	RSE OU	TCON	ΛES,	PRO	GR/	AMN	IE O	JTC	OMES	5 ANC	PR(OGR/	AMM	E SPEC	IFIC	
	OUTCOMES																
C	OURSE CODE &	CO							F	°0						PS	30
(COURSE NAME		1	2	3		4	5	6	7	8	9	10) 1'	1 12	1	2

		-	2	5	-	5	U	1	0	3	10		12	•	2
	CO1	2	1	2	3	2	1	2		3	2		3	2	3
50 MC 5P1	CO2	1	2	3	2	3	2	3		3	2	2	1	2	3
& Microprocessors and	CO3	2		1	2	2			2	2		2	2		3
Microcontrollers	CO4	2	1		2	1	2	1	2	2	2			2	2
Laboratory	CO5	1		1	3	3				1		2	1	2	2
		-						-	-						

	K.S	6.Rangasam	y College o	of Technolo	gy – Auton	omous		R2018				
50 MC 5P2 – Metrology and Dynamics Laboratory B.E. Mechatronics Engineering												
		()	B.E. Mecha	tronics Eng	ineering							
Semester	н	ours / Week		Total	Credit	N	laximum Ma	irks				
N/	L	1	P	Hrs	<u> </u>	CA	ES	I otal				
V	0	0	4	60		60	40	100				
	 I o be fail applicati Identify a 	miliar with di ons. and use refe	rence mater	surement eq	re good qua	nd quality in lity, accurate	spection for e, traceable	Industrial				
Objectives	measure	ement results	3.									
	To study	the principle	es of gyrosc	ope, Cam a	nd measure	ment of surfa	ace finish.					
	To calcu	late the mor	nent of inert	ia of connec	ting rod.							
-	 To analy 	ze the natur	al frequency	/ of different	types of vib	rations.						
Course Outcomes	 Describe experime Discrimit Measure Verify the Evaluate rod. 	e the basic c ents. nate betwee e the diamete e laws of gyn e the natural	n various sc on various sc or of the scre roscope and frequency c	Metrology an erews by mea ew thread. I plot the pro of spring mas	d classify di asuring their file of cam. ss system ar	fferent meas taper angle	suring tools i and pitch. of inertia of c	related to				
Introduction	to metrology	and measu	rement.									
1. Calibra	ation of micron	neter using s	lip gauges.									
2. a) Stud	by of Tool Mak		ope. nd nitch hyv	uning tool m	akar'a miara							
	dy of Gear Ter	aper angle a minology	nu pitch by	using toor m	aker S micro	scope.						
b) Mea	asurement of v	arious dime	nsions of the	e aiven com	ponent using	n profile proie	ector.					
4. Measu	rement of tape	er angle usin	a sine bar.	9		, p. ee p. e.						
5. a) Stud	dy of Screw th	read termino	logy.									
b) Mea	asurement of n	najor and eff	ective diam	eter of screw	/ thread usin	ng 2 wire me	thods.					
6. a) Stu	dy of various s	urface finish	measurem	ent techniqu	es.							
b) Mea	asurement of s	surface flatne	ess by using	autocollima	tor.							
7. Detern	nination of gyr	oscopic coup	ole using Mo	otorized Gyro	oscope.							
8. Plot th	e profile of car	n and study	of jump phe	nomenon.								
9. Detern	nination of nati	ural frequen	cy and critic	al speed of g	given shaft.							
10. Detern	nination of nati	ural frequen	cy of given s	spring mass	system.							

- Determination of Torsional frequency of a single rotor system.
 Calculate the moment of inertia of connecting rod by oscillation method.

3 3.3. Qu ~~

Text	Text book(s) : :															
1	Jain R.K., "Enginee	ering Met	rology	/", 21 ^s	st Rev	ised E	ditior	i, Kha	nna p	ublish	iers, N	lew D	elhi, 2	2015		
n	R.K.Bansal and J.S	S.Brar., "	A Te	tbook	of th	eory o	of ma	chines	s" 5 th	editio	on lax	mi pul	blicati	on(P)	LTD,	New
2	Delhi, 2015.															
Refe	erence(s) :															
1.	S. S. Rattan, "Theo	ory of Ma	chines	s" ,Mc	Graw	-Hill E	ducat	ion (Ir	ndia) I	Private	e, 201	4.				
0	Khurmi R.S., and C	Gupta J.k	K., "Th	neory	of ma	chine	s", S.0	Chano	3 & C	ompa	ny Lto	l., Nev	w Dell	hi, 14	th Edi	tion,
Ζ.	2014.									•						
~	Amitabh Ghosh and Malik, A.K., "Theory of Mechanisms and Machines", Reprint, Affiliated East West															
3.	^{3.} Press Pvt. Ltd., 3rd Edition, 2011.															
4.	Gupta. I.C., "Engine	eering M	etrolo	gy", D	hanpa	atrai F	Publica	ations	, 2018	3.						
	Pre-requisite: Nil															
	MAPPING OF COU	RSE OU	TCON	NES, F	PROG	RAM	ME O	UTCC	OMES	AND	PRO	GRA	име (SPEC	IFIC	
	OUTCOMES															
C	OURSE CODE &	~						P	0						P	SO
C	COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
		CO1	1	1	1	1	1	1	1	1	2	3	2	3	1	1
50 N	IC 5P2 & Metrology	CO2	2	1	2	2	1	2	1	1	2	3	3	3	2	1
30 10		002	2		2	2		2			2	0	0	0	2	
	and Dynamics	CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2

K.S.Rangasamy College of Technology – Autonomous R201 Semester V													
Course Course Name Hours/Week Credit Maximum Marks													
Course	Course Name	Hou	rs/W	eek	Credit		Maxim	um Marks					
Code		L	Т	Р	С	CA	ES	Tot	al				
50TP0P3	CAREER COMPETENCY DEVELOPMENT III	0	0	2	0	100	00	10	0				
Course Objectives	 To help the learners to enrich the writter professional contexts To help the learners to enrich their verbar employability requirements of the compan To help the learners to comprehend the placement and competitive online exams To help the learners to enhance their knowlinear equations. To help the learners to augment the core compete in coding contests 	en and ies Intern wledge technic	l oral logica nedia e in th cal an	com al rea te lev ne qua nd coo	munications noning a vel of ap- antitative ding skills	on skills bility to titude s aptitude s of their	in the meet o kills reo skills i r respec	e academin out the quired to a in algebrai ctive doma	c and attend ic and ins to				
Course Outcomes	 At the end of the course, the student will be 1. Examine the written and oral communicati 2. Interpret the concepts of verbal reasoning competitive exams and employability 3. Infer the concepts of intermediate level company recruitments. 4. Assess their comprehension in the quantit 5. Review the core technical and coding s contests 	e able on skil g and of apt ative a kills of	to Is in t relate itude ptituc f thei	he ac for t skills de ski r resp	ademic a he conce pertaini Ils in alge pective d	and prof epts to t ng to c ebraic ai lomains	essiona he requ competit nd linea to con	al contexts uirements tive exami tr equation npete in c	of the s and s. coding				
Unit–1	Written and Oral Communication- Part1								Hrs				
Reading Corr and Unstructu Practices: Se the Same Wo Materials: Ins	prehension Level 3 - Self Introduction - News F ured GDs Psychometric Assessment – Types & S entence Completion - Sentence Correction - Jurr ord as Different Parts of Speech-Interpretation of structor Manual, Word power Made Easy Book, N	Paper F Strateg Ibled S Pictori Newsp	Revie gies to Senter ial Re apers	w - So o ansv nces - prese	elf Marke wer the q - Synony entations-	eting - D uestion: ms & Ar -Editing	ebate- s ntonyms -GD-De	Structure s - Using bate.	6				
Unit–2	Init-2 Verbal & Logical Reasoning-Part1												
Syllogism - Assertion and Reasons - Statements and Assumptions - Identifying Valid Inferences - identifyingStrongArgumentsandWeakArguments-StatementsandConclusions-CauseandEffect- Deriving Conclusions from Passages - Seating Arrangements. Practices: Analogies - Blood Relations -Statement & Conclusions.													

Г

Laboratory

CO4

Z. 2.2.2 ~~~

Materials: Ins	tructor Manual, Verbal Reasoning by R.S.Aggarwal	
Unit–3	Quantitative Aptitude–Part3	
Probability-Ca	Iendar-Clocks-Logarithms –Permutations and Combinations	6
Materials: Ins	tructor Manual Aptitude Book	
Unit–4	Quantitative Aptitude–Part4	
Algebra-Linea	r Equations-Quadratic Equations –Polynomials.	6
Practices: Pro	bblem on Numbers -Ages-Train-Time and Work -Sudoku–Puzzles.	
Materials: Ins	tructor Manual, Aptitude Book	
Unit–5	Technical & Programming Skills–Part1	
Core Subject-	1,23	4
Practices: Qu	estions from Gate Material. Materials: Textbook, Gate Material	
	Total	30
Evaluation Cr	iteria	

Lvuluu			
S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	50Questions–30 Questions from Unit 1 &2, 20 Questions from Unit3, (External Evaluation)	50
2	Evaluation2 Oral Communication 1	Self-Introduction, Role Play & Picture Talk from Unit-4 (External Evaluation by English and MBA Dept.)	30
3	Evaluation3 Oral Communication 2	Book Review & Prepared Speech from Unit-5(External Evaluation by English and MBA Dept.)	20
		Total	100

Reference Books

1. Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint 2009, S.Chand&CoLtd., NewDelhi.

2. Word power Made Easy by Norman Lewis W.R.GOYAL Publications

Note:

- InstructorcancoverthesyllabusbyClassroomactivitiesandAssignments (5Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough workpages
- Each Assignment has 20 questions from Unit1, 2 and Unit5 and 5 questions from Unit3 and 4
- Evaluation has to be conducted as like Lab Examination.

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						Р	0						PSO	
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	1	1	1	1	1	1	1	2	3	2	3	1	1
50TP0P3 & Career	CO2	2	1	2	2	1	2	1	1	2	3	3	3	2	1
501P0P3 & Career Competency	CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2
Development III	CO4	2	1	2	2	1	1	1	1	2	3	2	3	2	2
	CO5	2	2	2	2	2	2	2	2	2	3	2	3	3	3

		K.	S.Rangasan	ny College	of Technolo	gy – Auton	omous		R2018					
			50 MC 60	1 – Progran	nmable Auto	omation Col	ntrollers							
				B.E. Mech	atronics En	gineering								
Somostor		Н	ours / Week	Σ.	Total	Credit	2	laximum Ma	arks					
Semester		L	Т	Р	hrs	С	CA	ES	Total					
VI		3	1	0	60	4	40	60	100					
	To gain the knowledge of various skills necessary for industrial applications of PLC.													
	• To provide the basic programming concepts and various logical instructions used in PLC.													
Objectives	•	To familiarize the learners in data handling of PLC.												
	•	To impa	rt the knowle	edge on adv	anced functi	ons of PLC.								
	•	To enab	le the stude	nts to trouble	eshoot and n	naintain the o	controller op	eration in in	dustries.					
	At 1	the end o	f the course	e, Students	will be able	to								
	1.	Describe	e the main fu	inctional uni	ts in a PLC a	and its eleme	ents.							
Course	2.	Develop	ladder logic	programmi	ng for indust	rial applicatio	ons.							
Outcomes	3.	3. Use PLC data handling instructions for industrial automation.												
	4.	Analyze the advanced functions in control of drives and interfacing techniques with PLC.												
	5.	Outline	different indu	istrial autom	ation applica	ations and tro	oubleshootir	ng procedure	.					

Automation Fundamentals and PLC

Introduction – Requirement, Architecture of Industrial Automation system – History & Architecture of PLC – Principle operation – PLC Input & Output modules –Selection criteria – PLCs versus computers – Programming devices – PLC programming: Ladder diagram, STL, Functional block diagram, Sequential flow chart, Instruction List. [09]

PLC Programming

Symbols in ladder diagram – Boolean logic & relay logic– input and output field devices – Bit logic instructions – ladder diagram examples, interlocking, latching, inter dependency and logical functions – PLC Timer & Counter functions: ON-delay timer, OFF-delay timers, retentive timers, pulse timers, up-counter, down-counter and up-down counter, industrial process examples using timer & counters. [09]

Data Handling Functions

Data move instructions– FIFO & LIFO, FAL, ONS, CLR, SWEEP functions – Math instructions – Data manipulation &conversion functions – Program control and interrupts: SKIP and MCR functions, jumps, subroutine, and sequence control relay – Simple programs. [09]

Advanced PLC Functions

Sink and Source concept – Analog PLC operation– PID functions – networking of PLC – Drives Control: AC Motor starter, DC motor controller, Variable Frequency Drive – Introduction to IEC61131 international standard for PLC. [09]

PLC Maintenance and Case Studies

PLC maintenance – internal & external PLC faults – programmed error – watch dogs – hardware safety circuits –troubleshooting. Case Studies:Robot controller – FMS – Factory automation – Process control –Materials handling applications – Automatic control of power plant – Simple programs. [09]

Text book(s) :

1. Frank D. Petruzella "Programmable Logic Controller", Tata McGraw-Hill Publication, 5th Edition, 2016.

2. John W. Webb and Ronald A. Reis "Programmable Logic Controllers: Principles and Applications" Prentice – Hall India Publication, 5th Edition, 2013.

Reference(s) :

1. W. Bolton, "Programmable Logic Controllers", Elsevier Publication, 5th Edition, 2009.

2. E.A.Parr "Programmable Controllers An Engineer's Guide", Elsevier Publication, 3rd Edition, 2014.

3. Stuart A Boyer, "SCADA Supervisory Control and Data Acquisition", ISA, 4th Revised Edition, 2016.

4. Krishnakant, "Computer based Industrial Control", PHI, New Delhi, 5th Edition, 2017.

Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						Р	0						PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	3	3		1		3		2	3	1		3
50 MC 601	CO2	3	3	3	3			1	2	2	2	2	1		3
& Programmable	CO3	2	3	2	2	2		2	2	1	2	1	1	3	3
Automation Controllers	CO4	2	3	3		3	2	2		2		2	2	3	2
	CO5	3	3	3		3	2	2		2		2	2	3	2

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

		K	.S.Rangasa	my College	of Technol	ogy – Auton	omous		R2018					
			50 MC 602 -	Computer	Aided Desi	gn and Man	ufacturing							
				B.E. Mech	atronics En	gineering								
Compostor		Н	ours / Week		Total	Credit	Μ	laximum Ma	arks					
Semester	Image: A state of the													
VI	3 0 0 45 3 40 60 100													
	To provide an overview of how computers are being used in component design.													
	•	To educa	ate concept o	of computer	graphics and	d graphics sta	andards.							
Objectives	•	To impai	rt the fundam	entals of ge	eometric mod	leling and its	application	in machine o	design.					
-	To provide knowledge on CNC machines and train the students in CNC part programming.													
	 To understand the application of computers in various aspects of Manufacturing. 													

2.3. a

Total Hours: 45 + 15(Tutorial) = 60 hours

	At 1	he end	of the co	ourse,	, the s	stude	nt will	be a	ble to)							
	1.	Acquire	knowled	ge ab	out th	e step	os invo	olved	in pro	duct c	ycle a	and fu	ndam	entals	of C/	AD/CA	۱M.
Course	2.	Recogn	ize and e	explair	n the 2	2D and	d 3D t	ransfo	ormati	ons a	nd dif	ferent	Stand	dards	in CA	D.	
Outcomes	3.	Explain	the funda	ament	tals of	parar	metric	curve	es, Su	rfaces	s and	Solids	5.				
	4.	Apply N	IC progra	mmin	g con	cepts	to dev	velop	part p	rogra	mme	for La	the &	Milling	g Mac	hines	
	5.	Recite t	he role o	f com	puters	s in G	T and	FMS.									
Introductio	n to	CAD/CA	M		-												
Product cyc	le, D	esign pr	ocess (Sl	higley	mode	el), Se	quent	tial an	d Cor	ncurre	nt En	ginee	ring. C	Compi	uter A	ided	
Design - A	pplica	ations of	Comput	ter in	Desig	gn, Be	enefits	of C	AD. (Comp	uter A	Aided	Manu	Ifactu	ring, (CAD/C	CAM
concept - A	utom	ation an	d CAD/C	AM, R	lole of	CAD	/CAM	in inc	lustry	4.0.						[(09]
Computer	Grap	hics	. One e h : e	- I			ام الارتيار		0					. <u> </u>	4		
	trop	omputer	Graphic	s - inp bility t	ooboi			evices	s. Gra	Cline	inpui	Liddo	liques	s - Ou	tput p	rinitiv Prightr	ves -
2D and 3D	and "	Shadina	Granhic	onity i e etar	.echni darde	ques. Star	brebe	s for c	y anu vcha	oge in	nny, r		an Gr	anhice	val, c	ongnu arv	less
(OpenGL) -	Data	exchan	de stand:	ards -	- IGES	S and	STEP)	,701101	ige in	lages	op.		apriloc		ير بر [(191
Geometric	Mod	elina	go otariat		1020	Juna	0121	•								Ľ	001
Introduction	to C	Seometri	c Modeli	ng - \	Nirefr	ame r	nodel	ing -	Repre	esenta	ation o	of cur	ves- H	Iermit	te cur	ve- B	ezier
curve- B-sp	line c	urves. T	echnique	es for s	surfac	e moo	deling	- surf	ace pa	atch-	Coons	s and	bicubi	c pate	ches-	Beziei	r and
B-spline sur	face	s. Solid r	nodeling	techn	iques	- CS(G and	B-rep).							[(09]
Fundament	tals o	of CNC I	nachine	s and	Part	Progr	amm	ing				_					
Introduction	to N	IC and (CNC syst	ems -	- Mac	hine a	axis ai	nd Co	-ordir	nate s	ystem	1 - Fu	nction	is and	Con	structi	onal
features of		- Classi	fication o	t CNC	mac	nines	- DNG	con	cepts	and t	ypes ·	- Adoj			I. Fun	dame	ntais
	amm	ning - ivia	anual Par	rFlog	Janni	iing. C	Jompt	lier as	siste	u pan	progr	amm	ng - N	ic pro	grann	ning t Ini	anna
Group Tecl	hnol	oov and	Flexible	Manı	ufactu	irina	Svste	m								10.	5]
Group Tech	nolo	av (GT).	Part Fan	nilies ·	- Parts	s Clas	sifica	tion a	nd coo	dina s	vstem	ns - Si	mple	Proble	ems ir	n OPIT	ΓZ
Coding system - Production flow Analysis - Group technology machine cells - Guidelines for implementing GT.																	
Coding system - Production flow Analysis - Group technology machine cells - Guidelines for implementing G1. Elexible Manufacturing System (EMS) - EMS Components and its types - Elexibility in EMS - EMS Control -																	
FMS lavout	conf	iguration	- FMS A	polica	ation 8	Bene	efits					,				0]	91
		garation													Total	Hours	s: 45
Text book(s) :																
_ K Lali	t Nar	ayan, K	Mallikarju	una Ra	ao an	d M N	1 M Sa	arcar,	"Com	puter	Aideo	l Desi	gn an	d Mar	nufact	uring"	,
PHI L	earn	ing (P) L	td, 2015.														
2 P Rad	dhakı	rishnan,	S Subran	nanya	in and	l V Ra	iju, "C	AD/C	AM/C	IM", N	lew A	ge Int	ernati	onal (P) Ltd	., 201	0.
Reference(<u>s):</u>					<u></u>									_		
	McN	lahon ar	id Jimmie	Brow	/ne, "	CAD/	CAM	Princi	oles, l	Practio	ce and	d Man	ufactu	uring I	Manag	gemer	nt″,
Addis		esley Lo	ongman E	nglar	nd, 20	00	utor C	rophi			+ + d	Now	Dalhi	2006			
2 Dona		am anu							28, P		t Lla.,	Tete	Deini,	2000			
3 2007	ΠZE		< Sivasui	Jiana	anian,	CAD		. me	Jiyai		clice	, Tala	IVICG	Iaw П		прапу	',
4 Sadh	u Sin	ah. "Cor	nputer Ai	ded D	esian	and N	Manuf	acturi	na". K	hann	a Pub	lisher	s. Nev	v Delł	ni. 201	1.	
Pre-rec	nuisite	e: Nil	iiputoi / u		ooigii	anan	mainai	aotan	<u>.</u> , .				0, 1101		, 20		
MAPPI	NG (OF COU	RSE OU	тсом	IES, F	ROG	RAM	ME O	итсс	OMES	AND	PRO	GRAM	име з	SPEC	IFIC	
OUTCO	OME	S															
COURSE	E CO	DE &	00						Р	0						P	SO
COURS	ENA	ME	0.0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
			CO1	1	2	3	3	3				1	2		1	1	2
			<u> </u>	-	-	2	2	2					_		4	4	-
50 MC 602	& Co	mputer	002	2	2	2	3	ა									2
Aided De	esign	and	CO3	2	2	2	3	3							1	1	2
Manufa	acturi	ing	CO4	2	2	2	3	3							1	1	2
1	Manufacturing CO4 2 2 2 3 3 1 1 1 2 CO5 1 2 2 3 3 1 1 1 2																

	K	.S.Rangasa	my College	of Technol	ogy – Autor	nomous		R2018					
		Ę	51 MC 603 -	- Robotics E	ingineering								
B.E. Mechatronics Engineering													
Semester	H	ours / Week		Total	Credit	N	laximum Ma	irks					
	L T P hrs C CA ES Total												
VI	VI 3 0 0 45 3 40 60 100												

	•	To devel	op the st	udent	's kno	wledg	ge in v	arious	s robo	t stru	ctures	and t	heir w	/orksp	ace.		
	•	To devel	op stude	nťs sl	kills in	perfo	orm kir	nemat	ics ar	alysis	s of ro	bot sy	stems	6			
.	. •	To provid	de the stu	udent	with k	knowle	edge o	of the	singu	larity	issues	s asso	ociated	d with	the o	perati	on of
Objec	ctives	robotic s	ystems														
	•	To provid	de the stu	udent	with s	ome l	knowle	edge a	and a	nalysi	s skills	s asso	ociated	d with	robot	ic ser	sors
	•	To provid	de the stu	udent	with s	ome l	knowle	edge a	and sl	kills as	ssocia	ted w	ith Ma	achine	visio	n syst	em
	At	the end o	of the co	urse,	the s	tuder	nt will	be al	ole to								
	1.	Express	the basic	c con	cepts,	laws,	comp	onen	ts and	l para	meter	s of ro	obots.				
	2.	Explain	the types	of gr	ippers	and	its fun	ctions									
Coi	Irse 3.	Know th	e basic ro	obot k	inema	atic ar	nd acc	quainta	ance	of hon	nogen	eous	transf	ormat	ion fo	r va	rious
Outco	omes	types of	robots.		_								_				
Culo	4.	Underst	and the s	enso	's prin	ciples	s for di	ifferen	it envi	ronm	ental o	condit	ion.				
	5.	Know th	he basis (of ma	chine	visior	and o	descri	bing t	he va	rious	progra	ammır	ng tec	hnique	es use	ed in
		Industria	al robots.														
Introd	uction and	Robot C	compone	ents													
Introdu	uction – bas	sic compo	onents of	robot	i – lav	vs of I	obotio	cs – c	lassifi	catior	of ro	bot –	robot	motio	ns wo	ork sp	ace –
precisi	on of move	ement – I	power tra	ansmi	ssion	syste	m – g	gear ti	ransm	issior	n - be	lt driv	es – I	rotary	to lin	ear m	notion
convei	rsion, rack a	and pinior	n drives, s	stepp	er mo	tors a	nd se	rvo m	otors.								[09]
	ffectors			т			(<u>.</u>	- 14									
RODOT		ors – Intr	oduction	- i ype	SOTE	ena er	rector	s — IVI	ecnar	nical g	grippe	r – typ	bes of	gripp	er me	ecnan	ISM -
grippe Bobot	Mochania	iysis – otr	ier types	or gri	pper -	- spec	a pu	rpose	gripp	ers.							[09]
Introdu	iction- Mat	s riv renreg	entation	- ria	id mo	tion -	hom	odene	ous t	ranef	ormati	on m	atrice	s - fo	rward	& in	verse
kinem	atics of rol	hot – de	aeneraci	/ and	l devi	eritv-	Intro	ductio	n to	USAF	RSim	simu	lation	ofR	ohot	Kinen	natics
kinem	atics using	USARSin	n	y unu	uchi	only	muo	auono	11 10	00/ 1	Conn	Sinta		01 10	0001		1001
Senso	ors																
Introdu	uction – Ch	naracteristics of sensor - types of sensors – Potentiometers – LVDT – Encoders – Velocity and															
accele	ration sens	ors – pre	ssure ser	nsor -	- toucl	h and	tactile	e sens	sor - p	roxim	ity ser	nsor –	- range	e & sr	niff ser	nsor.[091
Machi	ne Vision \$	System a	and Prog	ramn	ning								Ū			-	-
Introdu	uction - Ima	age acqui	isition - S	Sampl	ing ar	nd qu	antiza	tion -	Imag	e Pro	cessir	ng Te	chniqu	ues -	Noise	redu	ction
metho	ds - Edge d	letection -	 Segme 	ntatio	n - thr	reshol	ding –	- binar	y moi	pholo	gy an	d gray	/ morp	pholog	gy. Inti	roduc	tion -
Proced	dures and F	unctions	- Control	State	ement	s-On-	line pi	rograr	nming	j - Ma	nual ir	nput, l	ead th	hrough	n prog	ramm	ling
Total	Hours: 45																09]
Text	book(s) :	,															
1	Saeed B	Niku " In	troductio	n to R	oboti	cs: Ar	alvsis	s svst	ems	Annli	cation	" 2 nd	Editio	n Pe	arson	Educ	ation
	India 201	7				00.74	laryon	, oyot	01110,	, ppm	Julion	, -	Laitio	ii, i o	aroon	Laao	allon
2	Mikell P (Groover	"Industria	al Ro	hots -	Tech	noloc	v Pr	oaran	mina	and	Applic	ations	s" Mo	Graw	Hill	New
-	York. 2008	8.	maaoun		0010	1001		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ogran		and	, ppn		, m	oran	,	
Refe	rence(s) :	•															
1	John.J.Cra	raig. "Introduction to Robotics: Mechanics & control", Pearson Publication, 4th Edition, 2018.															
2	Jazar, "Th	neory of A	Applied R	obotic	s: Ki	nema	tics, D)ynam	ics ar	nd Co	ntrol",	Sprin	ger, 2	nd Edi	tion, 2	2016.	
3	Roland Se	eigwart, II	llah Reza	a Nou	rbakh	sh, a	nd Da	vide	Scara	muzz	a, "Int	roduc	tion to	o auto	nomo	ous m	obile
	robots", 2 ⁿ	nd Edition,	MIT Pre	ss, 20)11.	•					-						
4	Ramesh J	Jain, Ran	gachari I	Kastu	ri, Bra	ain G	.Schu	nck,"	Mach	ine V	ision"	, Tata	a McG	Graw H	Hill, U	SA.,	
	2 nd Edition	<u>(India),</u> 2	012.														
	Pre-requisit	te: Nil															
	MAPPING	OF COU	RSE OUT	TCON	IES, F	PROG	RAM	ME O	UTCO	OMES	AND	PRO	GRA	име (SPEC	IFIC	
	OUTCOME	S		r													
C	OURSE CO	DE &	CO		-	-	<u> </u>		P	0	-	-	· ·	-		P	SO
	OURSE N	AME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
			CO1	1	1	3	1	2	3	2		3			2	1	2
			CO2	2	2	2	2	1	2		2	2		2	3	1	3
51 N	/IC 603 & R	Robotics	CO3	3	2	3	2	2	2	1					2	3	3
1	Engineeri	ng	CO4	2	1	2	3	1	2		2	1		3	3	2	3

CO5

	ł	(.S.Rangas	amy Colleg	e of Techno	ology – Auto	onomous		R2018					
50 MC 6P1 – Robotics and Machine Vision Laboratory													
B.E. Mechatronics Engineering													
Semester	H	ours / Week		Total	Credit	Ν	laximum Ma	irks					
Semester	Semester L T P Hrs C CA ES Total												

VI	0	()		4		60		2		60		40		100)
	To int	roduce d	ifferer	nt type	es of r	obotic	s and	dem	onstra	te the	em to i	dentif	v diffe	erent p	arts a	nd
	comp	onents.		,,										'		
	• To wr	ite progra	ammir	na for	simple	e ope	rations	S.								
Objectives	s • The s	students	will le	arn to	, desi	an. bi	uild. p	roara	m. co	ontrol	roboti	c dev	ices a	and th	nink of	:
,	wavs	in mach	ine vi	sion s	svster	n.	, p	- 3	,							
	 To ec 	lucate re	cent	roboti		ncept	S.									
	• To co	anduct ac	lvanc	ed fui	ndam	ental	and a	polie	d rese	earch	in rot	ootics				
	At the en	d of the	cours	e the	stud	ents	will h	a ble	to							
	1 Descr	ihe the d	lifforo	nt tvn	es of	linke	drive	s inir	nte an	d end	1 offor	ntore i	ised i	inroha	nte	
	2 Analy	zo tho Si	nnal c	onver	cion o	f con	e nnia	od die	nitizin/	n tha i				nnlina	and	
Course	2. Analyz	ization	griai c	Unver	31011 0	1 3011	sing a	nu ul	Juzni	guio	mage	5 0311	iy san	iping	anu	
Outcome	es quant	za tha Ti	arach	ماط م	onnor		nois	a rodi	uction	band	odao	datac	tion c	of the	image	
	J. Analy	t the col	or to c	lifforo	otiato	the c	, 11013' omnor	onte	while	doinc	the r	ueleu lick ar	nd nla		oratio	o. o. of
	4. Inspec		mnor	ante	lliale		ompoi	ients	wille	uonių	y ine p	nor ai	iu pia	ce op	cialioi	101
	5 Dovol	on the ve	rique	mothe	de of	incoc	otion	and n	nointo	nonc	~					
1 Ctud	5. Devel	op ine va	nicus nico o			inspe	robo		mnon	nance	j of rob	oto w	ith dri		otom	and
I. Stud	y of uniferent ty	pes or in	of rol	nu jui hoto k			onfigu	s, co		onnli	ontion		iun un	ve sy	Stem	anu
2 Vorif	ication of trans	formation		ition a	nd ori	ontat	ion) w	ith roo	r anu	appii to arir	ballui	ı. nd wa	orld oc	ordin	ato	
		Iomation	Г (ГОЗ	nion a		entat	ion) w	linites	speci	to grip	phei a	nu we		orum	ale	
3 Pob	nt programmin	a ovorcia		Doint_t	o-noir	at and	d cont	inuou	ie nat	h nro	aramr	nina)				
4 Sign	al conversion	of sensin	n and	tinit F	izina 1	ho in		usin	n sam	nlina	and c	ning) manti	zatior	n ana	lveie	
5 Wind	lowing and dic	ital conv	ersio	n tech	nique	no in	he ca	nture	d con	nnone	ont im	ane fr	or dat	a red	uction	
Droc	ess		010101		inque			pruro	u 0011	pone		ugon	or dut	arou		
6. Thre	shold. connec	tivitv. noi	se re	ductic	n and	d eda	e dete	ection	of the	e con	npone	nt ima	ade fo	or furt	her	
sear	nentation analy	vsis of th	e cor	npone	ent.	g	0 0.010		•••••				.ge .e			
7. Text	ure analysis of	ure analysis of the captured image for feature extraction process.														
8. Dept	pth and volume analysis of the component in feature extraction techniques to pick the component.															
9. Anal	vsis of color ins	pection t	o diffe	erentia	te the	com	poner	ts wh	ile do	ina th	e pick	and	place	opera	tion	
of the	e desired com	onent.								5						
10. Tem	plate matchind	such as	s patte	ern ma	atchin	g and	d qeoi	netrio	c mate	china	exerc	ises f	for the	e com	poner	nt
reco	, gnition to pick	, the com	poner	nt usir	ng grij	opers				0						
	· ·				001									Total	Hours	s: 60
Text boo	k(s) :															
, Sa	eed B. Niku, "I	ntroducti	on to	Robo	tics: /	Analy	sis, S	ysten	ns, Ap	oplica	tions"	, Sec	ond E	ditior	١,	
¹ Pe	arson Education	on India,	PHI 2	2013	(ISBN	81-7	808-6	577-8) .							
2. Ra	mesh Jain, Ra	ngachar	i Kas	turi, B	rain C	G. Scl	nunck	, "Ma	chine	Visic	n", Ta	ata Mo	cGrav	v Hill,	2012	
Referenc	e(s):	0									· · ·					
M.F	Groover, "Ind	ustrial R	obotic	s-Te	chnolo	ogy, F	Progra	mmi	ng an	d App	olicatio	ons", l	McGr	aw Hi	II, US	A.
^{1.} 201	2.					0.	Ũ		U			,			,	
2. Joh	n.J.Craig, " Intre	J.Craig, "Introduction to Robotics: Mechanics & control", Pearson Publication, 4th Edition, 2018														
3. Jaza	ar, "Theory of A	pplied R	obotic	s: Kin	emati	cs, Dy	ynami	cs an	d Con	trol",	Spring	jer, 2 ⁿ	^d Edit	ion, 2	016.	
⊿ Dan	nian M Lyons.C	luster Co	mput	ing fo	Robo	otics a	and Co	mput	er Vis	sion, V	Vorld	Scient	tific, S	Singap	ore,	
4. 201	1.			5			_			, -	-		, -	0-1-	,	
Pre-r	equisite: Nil															
MAP	PING OF COU	RSE OU	TCON	IES, F	ROG	RAM	ME O	итсо	MES	AND	PRO	GRA	име з	SPEC	IFIC	
OUT	COMES			,												
COURS	SE CODE & PO PSO															
COUR	SENAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
		004	4	2	4		4	0		0	3		2	· · ·	-	2
		CO1	1	১	1	1	1	2		2			3	2	2	3
50 MC 6F	P1 & Robotics	CO2	2	2	2	2	2		2		3	2	2		3	2
and Ma	chine Vision	CO3	2	3	2	3	2	1		2				3	3	3
		000	-		-	0		1							6	0
Lai	oratory	CO4	1	2	3	2	1		2	3		1	1	2	3	2

CO5

		K.S.Ranga	samy Colle	ge of Techn	ology – Aut	onomous		R2018				
50 MC 6P2 - Computer Aided Manufacturing Laboratory												
B.E. Mechatronics Engineering												
Hours / Week Total Credit Maximum Marks												
Semester L T P hrs C CA ES To												

VI	0	0		4		6	0		2		60		40		10	0
	To prov Machine To bo for	ide know es	/ledge		consti	ruction	and	work	ing of	Con		Num	nerical	Con	trol (C	SNC)
Objectives		miliar wit	n on I	nterra	cing,	comm	unica	ing a	na co			, mac	inine t	DOIS.		
	• To impa	rt the kho	owled	ge on		manu	ai pari	prog	ramm		asics.	م اہ : ا		4.0.7		
	 To provi To goin 	ue skili u		granni rionco				ig cei	t prog	nu Cr	vo ma	Chinii	ig cer	iter.		
	• TO gain	practical	exper	the	tudor		bo ab	u pai	t prog	lanni	iiriy					
Course	1 Evolain	the const	urse,	n and	work	ing of		mach	ine to	nle						
Outcomes	2 Underst	and the v	ariou	s conc	onte	in CN(iramn	nina	010.						
Outcomes	3 Prenare	the prog	rame	to mai	nufac			nonte	in CN	C tur	nina ce	ontor				
	4 Prepare	the prog	rams	to mai	nufac	ture n	rismat	ic cor	nnone	ents u	sing C	NC n	nachir	ina c	enters	
	5 Underst	and the N		de ner	herati	on thr	nuah (nodel	s in C		oftwa	re	inig o	ontore	
CNC Turnir			10 00	uo goi	loradi		ougni	57101	110001			Jittia				
1. NC mar	ual part progr	am gene	ratior	n on st	ep tu	rning.										
2. NC mar	ual part progr	am gene	ratior	n on ta	, per tu	urning.										
3. NC mar	ual part progr	am gene	ratior	n on gr	oovir	ng cycl	e.									
4. NC mar	ual part progr	am gene	ratior	n on th	read	cutting	j .									
5. NC mar	ual part progr	am gene	ratior	n on dr	illing	and b	oring o	cycle.								
) 			I'	:-		lat'a									
6. NC mar	nual part program generation on circular interpolation.															
8 NC mar	nanual part program generation on contour milling.															
9. NC mar	C manual part program generation on drilling and peck drilling.															
10. NC mar	0. NC manual part program generation on Mirror imaging in CNC Milling.															
Computer /	Computer Aided Part Programming															
11. CL Da	11. CL Data Generation for the given component by using CAM Software.															
Total Hours	5: 60															
Text book(s	s):															
Lalit N	larayan. K, M	lallikarjun	na Ra	o. K a	nd Sa	arcar.	M. M.	М, "С	Compi	iter A	ided D)esigi	n and	Manu	Ifactu	ring",
PHIL 2 Dodb	earning (P) Lt	d, 2015.	tor Nu	morio		ntrol	loohin			ontro	Deal	. <u> </u>		001		
2 Rauli		Compu		Interic			acriii	165,1	vew C	entra		Age	ncy, z	001.		
	•). "Fundamenta	uls of Con	nnuta	r Num	orica	Cont	۰ ارس P		rning	nriva	to limit	od N		Jhi 2	000	
2 Sadhi	<u>Singh</u> "Com	nouter Aid	ded D	esian	and N	/anufa	acturin	a" K	hanna	Publ	ishers	New	/ Delh	i 201	1	
_ Ibrahi	m Zeld and R	Sivasub	orama	nian. "	CAD	/CAM:	Theo	rv an	d Prac	tice".	Tata	, ten McGr	aw Hil	l Con	 Ipanv	
3 2007.				,	•			.,		,						
4 Chris	McMahon and	d Jimmie	Brow	ne, "C	AD/C	CAM: F	Princip	les, F	ractic	e, an	d Man	ufacti	uring I	Nana	gemer	nt"
Pro-ro	nuisite: Nil	1 7310, 20	01.													
MAPP	NG OF COU	RSE OU	TCON	AES. F	ROG	RAM		итсо	MES	AND	PRO	GRAN	име з	SPEC	IFIC	
OUTC	OMES															
COURSE	ECODE &							Р	0						P	SO
COURS		CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
		CO1	2	1	2	1	2	ເ	1	2 2	1		2	2	2	2
50 MO 000	0.0		2	2	2	2	2	2	2	2	י ג	2	2	2	2	3
Aided Ma		CO3	2	1	2	3	2	1	~	2	5	2	1	3	3	3
Labo	ratory	CO4	3	2	3	2	2	3	2	3		1	1	2	3	2
	-	007			4		-		-	0		-		-		
1		UU5	2	1	1	2	2	2	3		1	2	2	2	2	3

	K.S.Rangasamy College of Technol	ogy –	Auto	nom	ous			R2018						
	Semester VI													
Course Code	Course Name	Hou	rs/W	eek	Credit	Maximum Marks								
Course Code	Course Name	L T P			С	CA	ES	Total						
50 TP 0P4	CAREER COMPETENCY DEVELOPMENT IV	0	0	2	0	100	00	100						

S...... 2.2.2

	 To help the learn academic and pro 	ners to enrich the advanced written and oral communication skills in fessional contexts	n the											
	 Course Objectives To help the learners to augment their advanced verbal and logical reasoning ability to meet out the employability requirements of the companies To help the learners to comprehend the advanced level of aptitude skills in the concepts of Geometry To help the learners to enhance the data interpretation and analytical skills in variedmethods 													
Cours	se out the employabi	lity requirements of the companies	of											
Objecti	Geometry		01											
	To help the learner	ers to enhance the data interpretation and analytical skills in variedme	thods.											
	To help the learn	ers to enrich the technical and programming skills to be focused on t	petter											
Cours	employability, cod	leathons and nackathons urse, the student will be able to												
Outcon	nes 1. Examine and corre	elate the written and oral communication skills in the academic and												
	professional conte	exts												
	2. Predict and discrift employability requ	minate advanced verbal and logical reasoning ability to meet out the irrements of the companies												
	3. Infer the concepts	s of advanced level of aptitude skills on Geometry pertaining to compe	etitive											
	exams and compa	any recruitments.												
	4. Illustrate the data 5. Formulate the tec	Interpretation and analytical skills in varied methods.												
	codeathons and h	ackathons												
Unit–1	Written and Oral Comm	unication– Part2	Hrs											
Self-Intro	oduction-GD-Personal Interv	riew Skills												
Writing-	SkimmingandScanning-Inter	pretationofPictorialRepresentations–SentenceCompletion-Sentence	4											
Correctio	on–Jumbled Sentences–Synd	onyms & Antonyms– Using the Same Word as Different Parts of												
Speech-	-Editing. Materials: Instructor	Manual,WordpowerMadeEasyBook,NewsPapers												
Unii–2 Analogie	Reason	Ing -Pariz												
and Effe														
Analytica	alogies – Blood Relations – Seating Arrangements – Syllogism – Statements and Conclusions, Cause d Effect – Deriving Conclusions from Passages – Series Completion (Numbers, Alphabets & Figures) – alyticalReasoning–Classification–CriticalReasoning Practices :Analogies–BloodRelations– Statement Conclusions. Materials: Instructor Manual, Verbal Reasoning by R.S.Aggarwal													
&Conclu	sions. Materials: Instructor Ma	anual, Verbal Reasoning by R.S.Aggarwal												
Geomet	rv-StraightLine-Triangles-O	undrilaterals_Circles_Co-ordinateGeometry_Cube_Cone	6											
-Sphere	. Materials: Instructor Manua	al, Aptitude book												
Unit–4	Data Interpretation and A	nalysis	0											
Data Inte	erpretation based onText-	-	0											
Chart. G	raphs representing Area. Ver	nn Diagram & Flow Charts, Materials:												
Instructo	or Manual, Aptitude Book													
Unit–5	Technical & Programming	g Skills-Part2	6											
Core Su	bject– 4, 5, 6 Practices: Que	estions from Gate Material. Materials: Text Book, Gate Material	0 20											
Evoluati	ion Critoria	Total	30											
S.No.	Particular	Test Portion	Marks											
1	Evaluation1 Written Test	15 Questions each from Unit1 2 3 485(External Evaluation)	50											
2	Evaluation2–	GD and HR Interview	30											
	Oral Communication (External Evaluation by English, MBA Dept.)													
3	Evaluation 3 – Technical Interview	Internal Evaluation by the Dept3CoreSubjects	20											
		Total	100											
Referer	nce Books													
1. Ag	garwal, R.S. "A Modern Appr	oach to Verbal and Non- verbal Reasoning", Revised Edition2008, Rep	orint											
2. Ab	hiiit Guha, "QuantitativeAptitu	ide". TMH.3 rd edition												
3. Ob	jective Instant Arithmetic by N	I.B.Lal & Goswami Upkar Publications.												
4. Wo	ord Power Made Easy by Nor	man Lewis W.R. GOYAL Publications												
• Inst	ructor can cover the syllabus	by Class room activities and Assignments(5Assignments/week)												
 Inst 	tructor Manual has Class wor	k questions, Assignment questions and Rough Workpages												

- Each Assignment has 20 questions from Unit 1,2,3,4,5 and 5 questions from Unit 1(OralCommunication) & Unit 5(Programs)
- Evaluation has to be conducted as like Lab Examination.

3 2.2. Qu ~~~~

BoS Chairman

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						Р	0						P	PSO		
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2		
50 TP 0P4 –	CO1	1	1	1	1	1	2	1	1	2	3	2	3	1	1		
Career Competency Development IV	CO2	2	1	2	2	1	2	1	1	2	3	3	3	1	1		
	CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2		
	CO4	2	2	2	2	2	1	1	1	2	3	3	3	2	2		
	CO5	2	2	2	2	2	2	2	2	2	3	2	3	3	3		

K.S.Rangasamy College of Technology – Autonomous R2018 50 MC 701 – Industrial Automation Protocols													
50 MC 701 – Industrial Automation Protocols B.E. Mechatronics Engineering Hours / Week Total Credit Maximum Marks													
			B.E. Mech	atronics En	gineering								
Somostor	H	lours / Weel	ĸ	Total	Credit	N	laximum Ma	arks					
Jemester	L	Т	Р	Hrs	С	CA	ES	Total					
VII	3	0	0	45	3	40	60	100					
Objectives(s)	 To impa To mak To fami To prov 	art the knowl e the studen liarize the le ride an impo	edge of Sup ts understar arners in ind tance of Inte	ervisory Cor nd role of Dis lustrial comm ernet of Thing	trol and Data tributed Con junication wi gs (IoT) and	a Acquisitior trol System th its protoco it's envision	n (SCADA) S in industrial a ol. ed deployme	ystem. automation. ent domains.					
	To enal industri	ble the stude	ents to under	stand the va	rious cyber s	security tech	nologies use	əd in					
At the end of the course, Students will be able to 1. Implement the Supervisory Control and Data Acquisition systems for particular applications. 2. Integrate the distributed control system and to differentiate the DCS over other automation systems. Outcomes 3. Select the proper communication buses and its protocol for industrial applications. 4. Adopt the concepts of Internet of Things (IoT) industrial automation. 5. Utilize the new tools and technologies to enhance the cyber security industrial communication. Supervisory Control and Data Acquisition System: Elements of SCADA Eurotionalities of SCADA Architecture: Hardware, Software: Development, Puntime mode													
Supervisory Elements of S Functions-Too and User Acc Protocols, SC Distributed C Distributed C computer fun with DCS, Sys Role of Netw Different Netw Physical layer reduction me availability, In Industrial Int Introduction to Anatomy of th Real Time Dia for IoT. IoT Sp	Supervisory Control and Data Acquisition System: Elements of SCADA-Functionalities of SCADA-Architecture: Hardware, Software: Development, Runtime mode Functions-Tools: Tag Database-Recipe database- Alarm Logging-Trends: Real Time, Historical Trends-Security and User Access Management-Management Information System-Report Function. Different Communication Protocols, SCADA systems in operation and control of manufacturing Plant, Trends in SCADA. [09] Distributed Control Systems: Distributed Control System (DCS) - Introduction, Flow sheet symbols, Architecture, Specifications, Supervisory computer functions and Algorithm, Computer displays, Control Techniques and Strategies, Computer interface [09] Role of Networking in Automation [09] Different Network protocols - ASI, CAN, Device net, Industrial Ethernet, Profibus – PA / DP / FMS, Fieldbus, HART, Physical layer and wiring rules, Safety Instrumented System (SIS) - Need for safety instrumentation- risk and risk reduction methods, hazards analysis, Process control systems and SIS, Safety Integrity Levels (SIL) and availability, Introduction to the international functional safety standard IEC61508. [09] Industrial Internet of Things Internet of Things-Overview of Internet of Things-the Edge, Cloud and the Application Development, Anatomy of the Thing, Industrial Internet of Things (IIOT -Industry 4.0), Quality Assurance, Predictive Maintenance,												
Cyber Security in Industrial Automation Emerging Approaches to Industrial Automation Security-Internet of Things, Open platform communications unified architecture, Security and privacy, Big data analytics and the industrial Internet of Things, The National Institute of Standards Technology (NIST) Cyber-Physical Systems (CPS) Framework, CPS and Cyber security, Critical Infrastructure security, Software-defined elements. [09] Total Hours: 45													
Text book(s)	Text book(s) :												
1 M. P. Gro Pearson	oover, Autom Education, U	ation, Produ K, 2016.	ction Systen	ns and Comp	outer Integrat	ted Manufac	turing, Fourt	h Edition,					

-<u>S____</u> 2.2. a

2	Stuart A.Boyer, "SCADA: 'Supervisory control and Data Acquisition', 4th Edition, ISA, 2010.
Ref	erence(s) :
1.	Natalia Olifer, Victor Olifer, "Computer Networks: Principles, Technologies and protocols for Network design",
	John Wiley & Sons, 2010.
2	Robert Radvanovsky, Jacob Brodsky, "Handbook of SCADA/Control Systems Security", 2 nd Edition,
۷.	CRC press, 2016.
3.	Alasdair Gilchrist, "Industry 4.0: The Industrial Internet of Things", Apress 1 st Edition, 2017.
4.	Lucas M.P, Distributed Control Systems, Van Nostrand Reinhold Company, Newyork, 1986.

Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						P	0						P	SO
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	1	1	1	1	1	1	1	2	3	2	3	1	1
50 MC 701 & Industrial Automation Protocols	CO2	2	1	2	2	1	2	1	1	2	3	3	3	1	1
	CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2
	CO4	2	1	2	2	1	1	1	1	2	3	2	3	2	2
	CO5	2	2	2	2	2	2	2	2	2	3	2	3	2	3

	K.S.Rangasamy College of Technology – Autonomous R2018													
		Į	50 MC 702 -	- Embeddeo	System									
			B.E. Mecha	tronics Eng	ineering									
Semester	Н	ours / Week		Total	Credit	N	laximum Ma	rks						
	L	Т	Р	Hrs	С	CA	ES	Total						
VII	3	0	0	45	3	40	60	100						
	 To impa developr 	rt knowledg	e on the E	Building Bloc	ks of Embe	edded Syste	em, Various	Embedded						
	 To endor 	w with an ov	erview of A	RM architect	ure and Me	mory organiz	zation.							
Objectives(s)	To bring	out the varie	ous network	s and buses	interfacing	protocols w	ith embedde	ed system						
Objectives(s)	and sche	eduling algoi	ithms.		, interfacing			a oyotom						
	To equip	students wi	th the know	ledae of sch	eduling and	multitaskind	i strategies c	of RTOS.						
	 To illustr 	ate the diffe	rent embedo	ded process	ors and their	application	in practice.							
	At the end o	of the cours	e, the stud	ents will be	able to	• •	•							
 Describe the function and operation of software and hardware components of embedded systems 														
Systems A Design ARM based systems and study about memory organization														
Systems Course 2. Design ARM based systems and study about memory organization. Outcomes 3. Design and discriminate various communication networks and their interfaces														
Outcomes	 Design ARM based systems and study about memory organization. Design and discriminate various communication networks and their interfaces Outline the features of RTOS and Configure the RTOS for operations involved in embedded 													
	 Design and discriminate valids communication networks and their interfaces Outline the features of RTOS and Configure the RTOS for operations involved in embedded applications. 													
	applicati	ons.				1								
	5. Develop	the nardwar	e for embed	daed system	application	based on th	e processors	S.						
Introduction	to Embedded	d Systems												
The build pro	cess for emi	bedded Sys	tems-Struct	ural units in	Embedded	d processor,	selection c	of processor						
&memory Dev	vices- i imer ar	a Counting	devices, vva		er, Real Time	E CIOCK-SOIT	ware Develo	pment tools-						
Lordwore Se	ftware Dortition	niker, simula	nor, debugg	jer, în circuit	emulator, i	arger naruw	are Debugg							
ARM Archite	cture and Me	mory Organ	sign.					[09]						
ARM architer	ture_ARM pr	ogramming'	s Model-Re	aisters_ Pin	elining arch	nitectureInt	terrunts and	Exceptions						
handlings-AF	RM Instruction	sets-THU	MB instruct	ion sets. Al	RM Program	nming-DMA	-Memory M	anagement-						
Cache mappi	ng techniques	, dynamic al	location-Fra	agmentation.		5	,	[09]						
Embedded n	etworking an	d communi	cation	0										
Sockets, port	s, UDP, TCP/	IP, client se	rver model,	, socket prog	gramming, 8	302.11, Blue	tooth, ZigBe	ee, firewalls,						
network secu	rity and I2C.	Wireless s	ensor netw	orks – Intro	duction – A	Applications	 Network 	Topology –						
Localization -	-Time Synchro	nization - Ei	nergy efficie	nt MAC prot	ocols.									
Types of In	terrupt-Progra	mmed I/O	Busy wait	approach	without ISN	M–ISR Con	cept–Interru	pt Handling						
Mechanism-0	Context Swite	ching-Interru	pt latency-	-Interrupt S	ervice Dea	dline-prever	nting Interru	pt overrun,						
disability inter	disability interrupts-interrupt driven I/O-writing interrupt service routine in C & assembly languages. [09]													
Real Time O	perating Syst	em(RTOS)	Dianakanta				Taska av 1							
	UKIUS -Adv	antage and	Disadvanta	ge of Using	KIUS – MI	uititasking –	Tasks and 1	lask states -						
Tack Driaritia	erriels - Schel	tion Muture	Freemptive	Nerriels - P	Clock ticks		una kopin s	scheduling -						
Task Priorities	s -Static Priori	ues – Mutua		- Deadlock -).		[09]						

Z. 2.2.2 ÷.,

Case Studies

Embedded System in Automobile-Adaptive Cruise Control Systems in a car- Case study of coding for a DigitalCamera -Elevator control -ATM Machine-Mobile Phone-Robotic ARM control.[09]

Total hours 45

Te>	kt book:															
1	P.Rajkamal,"Embed	Ided Syst	tem-A	Archite	ecture	, Prog	gramn	ning a	and D	esign'	',3 rd I	Editior	, Tat	a McC	Graw	Hill
	Publishing Co.Ltd,20	015.														
2.	Steve Furber, "ARM	System of	on chi	p Arcl	nitectu	ıre",2 ^r	nd Edit	ion ,A	ddiso	n We	sley, 2	2013.				
Ref	erence(s):			-												
1.	Frank Vahid, 'Embe	edded Sy	/stem	Desi	qn -	A Uni	fied H	lardw	are &	Soft	ware	Introd	uction	i', Joh	n Wil	ev.
	2002.	,			0									,		, ,
2.	2. Sriram V. Iyer, Pankaj Gupta, 'Embedded Real Time Systems Programming', Tata McGraw Hill, 2004.															
3.	3. Wayne Wolf, "Computers as Components: Principles of Embedded Computing System Design", 2 nd															
	Edition, Morgan Kaufman Publishers, 2013.															
4.	Dominic Symes, Ch	nris Wrigh	nt, Ar	ndrew	N.slo	ss, "A	RM S	ystem	s Dev	velope	er's G	uides-	Desig	ning8	Optin	nizing
	System Software", 2	2008, Els	evier.			,				•			Ŭ		•	Ű
	Pre-requisite: Nil	· · ·														
	MAPPING OF COU	RSE OU ⁻	TCON	IES. I	PROG	RAM	ME O	UTCO	OMES		PRO	GRAM	име з	SPEC	IFIC	
	OUTCOMES															
0	COURSE CODE &	CO						P	0						P	SO
	COURSE NAME 1 2 3 4 5 6 7 8 9 10 11 12 1 2															
		CO1	1	1	1	1	1	1	1	1	2	3	2	3	1	1

COURSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	1	1	1	1	1	1	1	2	3	2	3	1	1
	CO2	2	1	2	2	1	2	1	1	2	3	3	3	2	2
50 MC 702 &Embedded System	CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2
- ,	CO4	2	1	2	2	1	1	1	1	2	3	2	3	2	2
	CO5	2	2	2	2	2	2	2	2	2	3	2	3	3	3

	K.S.Rangasamy College of Technology – Autonomous R2018 50 MC 703 – Autonomous Vehicle												
		5	0 MC 703 –	Autonomou	us Vehicle								
			B.E. Mecha	tronics Eng	jineering								
Somostor	H	ours / Week		Total	Credit	N	laximum Ma	rks					
Semester	L	Т	Р	Hrs	С	CA	ES	Total					
VII	3	0	0	45	3	40	60	100					
Objectives(s)	 To introc system. To famili To enlig concepts To expe To gain 	duce the bas far and explain hten the leas s. rtise in the a knowledge a	sic concepts ain about dri arners abou utonomous about autono	e and commune ver assistan t the basics vehicle arch omous vehic	unication pro ce technique of unmanne itectures ane le projects a	otocols of au es and troub ed aerial ve d path planr nd data acq	tonomous ve leshooting m hicle and its ing system. uisition syste	ehicle nethods. s navigation em.					
 To gain knowledge about autonomous vehicle projects and data acquisition system. At the end of the course, the students will be able to Understand the basic working principles of autonomous vehicle system. Get expertise in advanced driver assistance and maintenance system. Acquire knowledge in basic design concept and control aspects of UAVs. Understand the autonomous vehicle architectures concepts and obstacle avoidance methods. Enhance knowledge in the successful autonomous vehicle case studies in different fields. 													
Introduction	to Autonomo	ous Vehicle	System (A)	/S)									
AVS - Missio Overview of E - Role of surr autonomy.	ns, capabilitie Electronic Cont oundings sens	s, types and rol Unit (ECI sing systems	d configurati J) - Basic C s - Telemetr	ions - Basic yber Physica y and comm	control syst al System (C unications, v	tem theory a PS) theory a wireless data	applied to an and autonom a networks a	utomobiles - ous vehicles and [09]					
	river Assistar	ice System		y ak iaawaa d	toobaical ior	waa and a							
Troubleshoot	in technology	- ivioral, leg	yai, roaubio wanced driv	ICK ISSUES, 1		failure mode	ecurity issue	ration -					
Sensor testin	and calibratio	on - Standar	d manufacti	iring principl	les - Redunc	ant systeme		[09]					
Concepts of Unmanned Aerial Vehicle (UAV)													
History of UA	History of UAVs – Ground surface water and underwater UAVs - Remotely Operated Vehicle (ROV) - Levels of												
autonomy - C	oordinate svst	ems - Equa	tions of mot	ion and trans	sformation for	or payloads	- Sensors ar	d actuators					
		- 1				0.02		q					

₽.

- Inte (PID Arch Cont arch Plate Auto Defe Gen dete ARC cont	ernal measurements) automatic control – hitectures for Autor trol architectures an itecture, models of v coning, main approac conomous Vehicle a ense Advanced Rese eric Obstacle for Lan ction, vehicle detecti GO prototype vehicle rol system.	and nav Guidance nomous d motion ehicles, of ches to tr nd Case earch Pro- e Detection, peder hardware	igatio e – N Vehic autor conce ajecto Stud i jects on (G strian re – F	n, Glo aviga Ie nomy pts of pry pla ies Ageno OLD) detec	bbal F tion - - Del senso nning cy (D/ syste tion - onaliti	vositio Visior berati or bas - Nor ARPA m - Th Softw es, D	ning S base ive, re eed ma n-Holo) Cha ne inve rare sy ata Ae	Syster d guid eactive aneuv nomie nomie llenge erse p vstem cquisi	n (GF dance er, re c path s cas erspe s arch tion S	PS) - for gr active plann e stud active hitectu	Prop round rchitec trajec ning dy, AF mappi re, Co n (DA	ctures ctures ctory - RGO p ing, la omput S), pr	nal Int les. Para prototy ne de ationa ocess	egral erview llel pa vpe ve tection al perf	Deriva [(v of sl rking- [(ehicle, n, obs ormar ystem [0]	ative)9] harp)9]. The tacle hces, and 9]
Text	book:													l otal	hour	s 45
1	Nicu Bison, Lucian D Ascalescu and Naser Mahdavit Abatabaei "Autonomous Vehicles Intelligent, Transport Systems and Smart Technologies", Nova Publishers, 2014. Bog Austin, 'Llamanned Aircraft Systems: LIAVs Design, Development, and Deployment', Eirst Edition															
 2. Reg Austin, 'Unmanned Aircraft Systems: UAVs Design, Development, and Deployment', First Edition, John Wiley and Sons Ltd., 2011. 																
Reference(s):																
1.	James M. Anderso Oluwatola, "Autono	n, Nidhi ł mous Ve	Kalra, ehicle	Karly Techr	n D. S nology	tanle /" Pub	y, Pau lishec	l Sore I by R	ensen and C	, Con: Corpor	stantir ation,	ne Sai 2016	maras	, Oluv	watobi	Α.
2.	Anthony Finn and S Vehicles", Springer	Steve Scl r, 2010.	neding	g, "De	velop	ments	and (Challe	enges	for Au	utonor	nous	Unma	Inned		
3.	Hong Cheng, "Auto	nomous	Intelli	gent \	/ehicl	es Th	eory, J	Algori	thms,	and I	mplen	nentat	ion", S	Spring	ger, 20)11.
4.	Thomas Gleason Sons Ltd., 2012.	and Paul	Fahl	strom	, 'Intr	oducti	on to	UAV	Syste	ems',	Fourt	h Edi	tion, 、	John	Wiley	and
	Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES															
С	OURSE CODE &	00						Р	0						P	SO
C	COURSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1 2 2 3 3 2 2 3 3 3 1 2 3															
	EO MO 702 8	CO2	3	2	3	2	2	3	2	3	2		1		3	3
Δ	JU IVIC 703 &	CO3	2	2	2	2	2	3	2	2	2	1		1	2	2
Au	Autonomous Vehicle CO3 2 2 2 2 3 2 2 1 1 2 2 CO4 2 2 3 2 2 3 2 2 1 1 2 2											3				

CO5

	K.S.Rangasamy College of Technology – Autonomous R2018								
			50 AC	: 001 - Resea	rch Skill De	velopment -l			
Semester			Hours / Wee	k	Total	Credit	Мах	kimum Marks	3
		L T P Hrs C CA ES Total							
VII		1	0	0	10	0	100	0	100
	•	 To learn about the effective usage of power point presentation 							
	•	To prepare presentation with various effects							
Objective(s)	•	To vis	ualize the dat	a in the prese	entation				
	•	To acc	quire knowled	lge about dat	a sources				
	•	 To investigate the research articles based on various applications 							
	At t	he enc	d of the cour	se, the stude	ents will be a	able to			
	1.	Devel	lop presentat	ion with visua	l effects				
Course	2.	Prepa	are a presenta	ation with sup	porting data				
Outcomes	3.	Attain	the importar	nce of researc	h and data c	ollection			
	4. Analyze the various sources of research articles								
	5. Interpret the tools and methods in preparing manuscript								
Note: Hours no	otified	l agair	nst each unit	in the syllab	ous are only	indicative bu	ut are not de	ecisive. Fac	ulty may
decide the number of hours for each unit depending upon the concepts and depth. Questions need not be									
asked based or	n the	numbe	er of hours no	tified against	each unit in	the syllabus.			

Z. 2.3.2 ~

Preparing a Presentatio	n									_					(03)
Presenting data using Po	ower Poi	nt- Po	ower displa	Point	prepa data	ration	i and	prese	entatio	n, De	sign p	orincip asic E	bles fo	or crea	ating
to create a presentation.		50215	uispie	iying (Jala.	110	ine, -i	TODIC	in, an	u a 30				nano,	use
Creating effective slides	s using F	owe	Point	t											(02)
Create effective slides u	sing Pov	verPo	int. T	ools v	within	Powe	erPoin	nt, str	ucture	story	/ line,	creat	e stor	y boa	ards,
identify primary elements	of slide of	desigr	n, disp	olay da	ata ar	nd fina	lize s	lide p	resent	ation.					
Research Designs and	Data Sou	irces			-									(03)
Overview of the topics: process of data collection and analysis. Starting with a research question - Review of															
existing data sources- Survey data collection techniques- Importance of data collection- Basic features affect															
Measurements and Ana	data analysis when dealing with sample data. Issues of data access and resources for access.														
(02) (02) Importance of well-specified research question and analysis plan: various data collection strategies - Variety of															
available modes for data collection – review of literature - Tools at hand for simple analysis and interpretation.															
Total Hours: 10															
Text Book(s):															
1. Judy Jones Tisdale, Effective Business Presentations, Gulf Coast Books LLC, ISBN-13: 978-															
0130977359, 2004	•	-									-	-		-	
2. Frauke Kreuter. Fra	amework	for Da	ata Co	ollectio	on and	d Anal	ysis,2	018.	https:/	/www	.cours	sera.o	rg/lea	rn/dat	a-
collection-framewor	rk														
Reference(s)															
1. Kothari, C.R. and	Gaurav (Garg,	"Res	earch	Meth	odolo	gy: N	1etho	ds an	d Tec	hniqu	es", N	lew A	ge	
International Publis	hers, 201	<u>13</u>							T	<u></u>				<u> </u>	
2. Srivastava, T.N. an Delhi, 2019.	a Rego,	S., "B	usine	SS KE	esearc	n Met	nodol	ogy",	Tata	NC G	rawHil	Edu	cation	Pvt. I	_ta.,
Pre-requisite: Nil															
MAPPING OF COUL	RSE OUT	CON	IES, F	PROG	RAM	ME O	UTCC	OMES	AND	PRO	GRAN	MME S	SPECI	FIC	
OUTCOMES															
COURSE CODE & CO PO PSO															
COURSE NAME 1 2 3 4 5 6 7 8 9 10 11 12 1 2															
	CO1	3	3	3	2	1	3	3	2	3	1	2	1	2	3
50 AC 001 8 Passarch CO2 3 2 2 1 1 2 1 1 3 2 3 2 2 2															
Skill Development -I CO3 3 1 3 1 1 3 3 1 1 3 2 1 3 3				3											
	CO4	3	2	3	3	2	2	1	1	2	1	3	2	3	2
	CO5	2	1	3	1	1	3	2	1	2	1	3	1	1	1
Note: 3 – Strong Contribution: 2 – Average Contribution: 1 – Some Contribution															

			K.S.Ranga	asamy Colle	ege of Techi	nology – Au	tonomous		R2018		
	50 MC 7P1 – Industrial Automation and Control Laboratory										
				B.E. Mech	atronics Eng	gineering					
Somostor		F	lours / Wee	k	Total	Credit	M	laximum Ma	irks		
Semester		L	Т	Р	hrs	С	CA	ES	Total		
VII		0	0	4	60	2	60	40	100		
	•	To trai	o train the students to be familiar with the software and hardware of PLC using ladder logic								
		codes.									
Objectives(s)	•	To fam	iliarize the s	tudent to de	velop PLC p	rograms for	different app	lications.			
	•	To faci	facilitate knowledge on PLC Control Principles and Applications with Field Devices.								
	•	To trai	train the students to create ladder diagrams for process control descriptions.								
	•	To imp	art knowled	ge on Config	gure commur	nication betw	veen the PLC	and PC.			
	At t	he end	of the cou	rse, Studen	ts will be ab	le to					
	1.	Write a	PLC progra	am for variou	is industrial a	applications.					
Course	2.	Contro	I the speed	of AC motor	s using VFD.						
Outcomes	3.	Interfa	face the sensors for flow, pressure and level monitoring and control in process								
Outcomes		industr	stries.								
	4.	Desigr	sign the of closed loop temperature controller.								
	5.	Explor	e the concep	ot of real-tim	e monitoring	and control	using HMI.				

S...... 2.2.2

BoS Chairman

Programming the PLC using ladder logic for:

1 Basic operations (Mathematical and Boolean).

- 2 Gray painting system.
- 3 Control the lamp by timer.
- 4 Material handling system.
- 5 Lift elevator control.
- 6 Traffic light control

Program and Interface the PLC using ladder logic for:

- 7 Bottle filling and stamping system
- 8 Water level control.
- 9 Speed control of AC motor.
- 10 Flow measurement
- 11 Pressure measurement.
- 12 Temperature control.
- 13 Human machine interface

Total Hours: 60

Тех	kt book(s) :
1	M. P. Groover, Automation, Production Systems and Computer Integrated Manufacturing, Fourth Edition,
1.	Pearson Education, UK, 2016.
2.	Stuart A.Boyer, "SCADA: 'Supervisory Control and Data Acquisition', 4th Edition, ISA, 2010.
Ref	ierence(s) :
1	Natalia Olifer, Victor Olifer, "Computer networks: Principles, Technologies and protocols for Network
1.	design", John Wiley & Sons, 2010.
2	Robert Radvanovsky, Jacob Brodsky, "Handbook of SCADA/Control Systems Security", 2 nd edition,
۷.	CRC press, 2016.
3.	Alasdair Gilchrist, "Industry 4.0: The Industrial Internet of Things", Apress 1 st Edition, 2017.
4.	Lucas M.P, Distributed Control Systems, Van Nostrand Reinhold Company, Newyork, 1986.
	Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00		PO											PSO	
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	3	3	3	1	1	1	3	3	3	1	3	3
50 MC 7P1 & Industrial	CO2	3	3	3	3	3		1		2	2	2	1	3	2
Automation and Control	CO3	3	3	3	3	3	2	1	1	3	3	3	1	3	3
Laboratory	CO4	3	3	3	3	3	2	1	1	3	3	3	1	3	3
	CO5	3	3	3	3	1	1	1		2	1	2	1	3	2

	K.S.Rangasamy College of Technology – Autonomous R2018								
		50 MC	7P2 – Emb	edded Syst	tem Labora	tory			
			B.E. Mecha	tronics Eng	jineering				
Semester	H	ours / Week		Total	Credit	N	laximum Ma	arks	
	L	Т	ES	Total					
VII	0	0	4	60	2	60	40	100	
Objectives(s) Course	 Understate Using End Arm arcle To exploit To train for the end of the end	Understand the programming concepts of Embedded Systems. Using Embedded C / Assembly Language using Keil IDE or Equivalent. Learn the working of Arm architecture in Atmel processor. To explore a basic knowledge of AT89X51ED2 Development board. To train the students for creating embedded control process for variety of applications. To conduct advanced fundamental and applied research in embedded systems. At the end of the course, the students will be able to Acquire the knowledge of basics of embedded system and Perform arithmetic operations in an embedded system with a combination of C and assemble language.							
Outcomes	 Demons Demons Interface processo 	trate the dua trate the cor the traffic I or.	al slope ADC ncept of 7 se ight signal, s	C and 8 char gment displ stepper mot	nnel 12-bit A ay and real t or and posit	DC using At time clock. ion control o	mel process	or. using ARM	

- 1. Real time operating system solutions with KEIL tools Introduction
- 2. Program to perform 8bit and 16bit Arithmetic operation using KEIL IDE.
- 3. Program to perform search and replacement a number using KEIL IDE.
- 4. Program to transmit a message from Microcontroller to PC serially using UART communication
- 5. Program to check the status of PORT1 (8051) signal using LEDs.
- 6. Interfacing and programming of 8 Channel 12 Bit ADC
- 7. Interfacing and programming of Dual Slope ADC
- 8. Interfacing and Programming of Seven Segment Display
- 9. Interfacing real time clock and serial port
- 10. Program to interface Traffic Light Controller
- 11. Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions
- 12. DC motor speed and position control using ARM Processor

Total Hours: 60

Text book:

1	P.Rajkamal, "Embedded System – Architecture, Programming and Design", 3rd Edition,
	TataMcGraw Hill Publishing Co. Ltd, 2015.

2.	David E. Simon,	, "An Embedded	Software Prim	ner", 3rd Edition	, Pearson	Education,	2014
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Reference(s):

1.010	
1.	Steve Furber, "ARM System on chip Architecture", 2nd Edition, Addision Wesley, 2013.
2.	Dr K.V.K.KPrasad, "Embedded /Real-Time systems: Concepts, Design & Programming",
	New Edition, Dream Tech Press, 2013.
3.	Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, "ARM System

Developer's Guide Designing and Optimizing System Software", Elsevier Publications, 2013.

4. Dominic Symes, Chris Wright, Andrew N.sloss, "ARM Systems Developer's Guides-Designing & Optimizing System Software", 2008,Elsevier.

Pre-requisite: Nil MAPPING OF CO

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	CO		PO											PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	2	3	1	2	2	1	1	1	1	1	2	2
50 MC 7P2 &Embedded System Laboratory	CO2	1	1	2	1	1	2	2	1	1	1	1	1	2	2
	CO3	2	2	2	2	1	2	2	1	1	1	1	1	2	2
	CO4	3	3	2	3	1	2	2	1	1	1	1	1	2	2
	CO5	3	3	2	3	1	2	2	1	1	1	1	1	2	2

		K.S.Rangasa	amy College	of Technolo	ogy – Autono	omous		R2018	
		50	MC 7P3 - Pr	oject Work	- Phase I				
Somootor		Hours / Wee	ek	Total	Credit	Max	kimum Marks		
Semester	L	L T P hrs C CA ES 1							
VII	0	0 0 4 60 2 100 00						100	
Objective(s)	 To accepted To accepted To accepted To accepted To idde works To accepted To accepted Coher 	 To apply the knowledge/concepts acquired in the Previous semesters to create/design/implement project relevant to the field of Electrical/Electronics/Robotics/Automation/ Mechanical domains. To acquire collaborative skills through working in a team to achieve common goals. To search for related area in which the students are going to do their project. To identify suitable project work, acquiring knowledge on that area, making preliminary works towards project phase II. To acquire the skills to communicate effectively and to present ideas clearly and coherently to a specific audience in both the written and oral forms. 							
Course Outcomes	At the en 1. Surve 2. Selec 3. Collec 4. Carry 5. Prepa	 t the end of the course, the students will be able to Survey the literature and market for availability of resources Select the title and collect relevant information related with selected title. Collect the literature based on survey and do the partially design of the system. Carryout partial design of the system 							

2.3. a.

Methodology	 Three reviews have to be conducted by the committee of minimum of three members one of which must be the guide. Problem should be selected. Students have to collect around 25 papers related to their work. Report has to be prepared by the students as per the format available in CTCMS. Preliminary implementation can be done if possible. Evaluation has to be done for 100 marks.
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Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO										PSO			
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
50 MC 7P3 & Project Work - Phase I	CO1	2	2									2	2	2	1
	CO2	2	3									2	1	2	
	CO3	2	2	3	1								1	3	2
	CO4	3		1	3	2				2			1	1	2
	CO5			1		2					2	2	2		2

K.S.Rangasamy College of Technology – Autonomous												
Semester VII												
Course	Course Name	Но	urs/\	Neek	Credit	Max	cimui	n Marks				
Code		L	Т	Ρ	С	CA	ES	Total				
50 TP 0P5	CAREER COMPETENCY DEVELOPMENT-V	0	0	2	0	100	00	100				
Course Objectives	 To help the learners to practice the written and oral communication skills in the academic andprofessional contexts To help the learners to practice the verbal and logical reasoning ability to meet out th requirements of both competitive exams and companies To help the learners to practice effectively the aptitude modules for company based recruitments and competitive exams To help the learners to practice effectively the data interpretation and analysis module company based recruitments and competitive exams To help the learners to practice effectively the data interpretation and analysis module company based recruitments and competitive exams 											
Course Outcomes	 At the end of the course, the student will be able to 1. Reinforce the written and oral communication skills in the academic and professional contexts 2. Discriminate and assess the verbal and logical reasoning ability to meet out the employabilityrequirements of the companies 3. Relate the aptitude modules for company based recruitments and competitive exams effectively 4. Compare and illustrate the data interpretation and analysis modules effectively for company basedrecruitments and competitive exams 5. Formulate and integrate the technical and programming skills to be focused on better 											
Unit–1	Written and Oral Communication							Hrs				
Self-Introduction–GD–HR Interview Skills–Corporate Profile Review-Practices on Company Based Questions andCompetitive Exams Materials: Instructor Manual												
Unit–2	Verbal &Logical Reasoning											
Practices on Co	ompany Based Questions and Competitive Exams							6				
Materials: Instructor Manual												
Unit-3 Quantitative Aptitude												
Practices on Company Based Questions and Competitive Exams												
Unit-4	Data Interpretation and Analysis											
Practices on Company Based Questions and Competitive Exams												
Materials :Inst	ructor Manual											
Unit–5	Programming & Technical Skills–Part3											

S...... 2.3. a.

30

Total

Evaluati	ion Criteria		
S.No.	Particular	Test Portion	Marks
1	Evaluation1 – Written Test	15 Questions each from Unit1,2,3,4&5 (External Evaluation)	50
2	Evaluation2- Oral	GD and HR Interview	30
	Communication	(External Evaluation by English ,MBA Dept.)	
3	Evaluation3– Technical	Internal Evaluation by the Dept3 Core Subjects	20
	interview		
		Total	100

Reference Books

- 1. Aggarwal, R.S. "A Modern Approach to Verbal and Non- verbal Reasoning", Revised Edition2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
- 2. Abhijit Guha, "QuantitativeAptitude",TMH,3rd edition
- 3. Objective Instant Arithmetic by M.B.Lal & Goswami Upkar Publications.
- 4. Word Power Made Easy by Norman Lewis W.R.GOYAL Publications

Note:

- Instructor can cover the syllabus by Class room activities and Assignments(5Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough Workpages
- Each Assignment has 20 questions from Unit 1,2,3,4,5 and 5 questions from Unit 1(OralCommunication) & Unit 5(Programs)
- Evaluation has to be conducted as like Lab Examination.
 Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO										PSO			
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	1	1	1	1	2	1	1	2	3	2	3	1	1
50 TP 0P5 &	CO2	2	1	2	2	1	2	1	1	2	3	3	3	1	1
Career Competency Development V	CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2
	CO4	2	2	2	2	2	1	1	1	2	3	3	3	2	2
	CO5	2	2	2	2	2	2	2	2	2	3	2	3	3	3

	K.S.Rangasamy College of Technology – Autonomous												
	50 HS 003- Total Quality Management												
Somostor		Hours / Wee	k	Total	Credit	Max	kimum Marks	i					
Semester	L	Т	Р	hrs	С	CA	ES	Total					
VIII	3	0	0	45	3	50	50	100					
Objective(s)	 To faci To equ sectors To equ To equ To imp for rea To mal 	 To facilitate the understanding of total quality management principles, tools and techniques. To equip the students to apply the TQM principles, tools and techniques in manufacturing sectors. To equip the students to apply the TQM principles, tools and techniques in service sectors. To impart knowledge on quality management principles, tools, techniques and quality standards for real life applications To make the students understand the importance of standards in the quality assurance process 											
Course Outcomes At the end of the course, the students will be able to 1. Recognise the need for quality concepts and its application in organizations. 2. Apply the TQM principles for survival and growth in world class competition 3. Apply the traditional tools and new tools for quality improvement. 4. Apply the tools and techniques like quality circle, QFD, TPM and FMEA for quality improvement. 5. Apply QMS and EMS in organizations.													
Note: The hours given against each topic are of indicative. The faculty have the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions													
in the examinat	in the examinations shall not depend on the number of hours indicated.												

2.3.2

BoS Chairman
Introduction

Introduction, definitions of quality, need for quality, evolution of quality, dimensions of quality, product quality and service quality; Basic concepts of TQM, TQM framework, contributions of Deming, Juran and Crosby. Barriers to TQM; Quality statements, customer focus, customer satisfaction, customer complaints, customer retention; costs to quality. [09]

TQM Principles

TQM principles; leadership, strategic quality planning; Quality councils- employee involvement, motivation; Empowerment; Team and Teamwork; Quality circles, recognition and reward, performance appraisal; continuous process improvement; PDSA cycle, Kaizen, 5S & 7S; Supplier partnership, Partnering, Supplier rating and selection. [09]

TQM Tools and Techniques I

The seven traditional tools of quality; New management tools - applications to manufacturing, service sector, Statistical Fundamentals, Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, control charts, process capability, concepts of six sigma's, Bench marking - Reasons to benchmark, Benchmarking process. [09]

TQM Tools and Techniques II

Quality circles, Quality Function Development (QFD), Taguchi quality loss function; TPM- concepts, improvementneeds, performance, measures. FMEA- stages, Types-Design FMEA and Process FMEA.[09]

Quality Management System

Introduction-Benefits of ISO Registration-ISO 9000 Series of Standards-Sector-Specific Standards - AS 9100, TS16949 and TL 9000 - ISO 9001, ISO 9001:2008 Requirements-Implementation-Documentation-Internal Audits-Registration-Environmental Management System: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001-Benefits of EMS. [09]

Total Hours: 45

Text	Book(s):
1.	Dale H. Bester field ., et. al, "Total Quality Management", 3 rd Edition., Pearson Education South Asia, 2013.
2.	Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd. 2006.
Refe	rence(s)
1.	Joel.E. Ross, "Total Quality Management – Text and Cases", 3rd Edition, Routledge, 2017.
2.	James R. Evans, James Robert Evans, William M. Lindsay, "The Management and Control of Quality", 8th Edition, South-Western, 2010.
3.	Kiran.D.R, "Total Quality Management", Key concepts and case studies, Butterworth – Heinemann Ltd, 2016.
4.	Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, Third Edition, 2003.

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	РО												PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	3	2	1	3	3	2	3	1	2	1	2	3
50 HS 003 &Total	CO2	3	2	2	1	1	2	1	1	3	2	3	2	2	2
Quality Management	CO3	3	1	3	1	1	3	3	1	1	3	2	1	3	3
	CO4	3	2	3	3	2	2	1	1	2	1	3	2	3	2
	CO5	2	1	3	1	1	3	2	1	2	1	3	1	1	1

	K.S.	Rangasan	ny College	e of Technolo	ogy – Autonoi	mous		R2018
		50 AC 00)2 - Resea	rch Skill Dev	elopment -II			
Somostor	Hou	ırs / Week		Total Ura	Credit	Max	ximum Mark	s
Semester	L	Т	Р		С	CA	ES	Total
VIII	1	0	0	15	0	100		100
Objective(s)	 To identify To organize To attain kr To apply fo To develop 	the ethics e manuscri nowledge f r copy righ and deplo	in preparin ipt for subr or filing Pa it by Mobile A	g research pa nission tent topp. in play sto	aper			

2.3. a.

		At the e	nd of the	cours	se, th	e stu	dents	s will l	be ak	ole to)								
		1. Prep	are a ma	nuscri	pt for	journ	al pub	olicatio	on.										
С	ourse	2. Appl	y the ma	nuscrip	ot for	public	cation												
Ou	tcomes	3. Inter	pret the p	proces	s of o	btaini	ing co	pyrigh	nt and	d pate	ent								
		4. Anal	yze the v	rious	provi	sions	to sh	are th	e app	olicati	ion								
		5. Crea	ate and p	ublish	the m	obile	applic	cation	in the	e digi	tal s	stor	е						
Note	: The hou	rs given a	against ea	ach top	oic ar	e of i	ndicat	tive. T	he fa	aculty	/ ha	ve	the	freedo	om to	o deci	de 1	the h	ours
requ	ired for ea	ch topic b	ased on	import	ance	and o	depth	of co	verag	ge rec	quire	ed.	The	mark	s all	otted f	for	ques	tions
in the	e examinat	tions shall	not depe	end on	the n	umbe	er of h	ours i	ndica	ated.									
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Data	necessary	y before w	riting a pa	aper: tl	he co	ntext	in whi	ch the	e scie	entist i	is pı	ubli	shin	g. Lea	arnin	g and	ide	ntific	ation
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in pu	ıblishing.																		[03]
Writ	ing the pa	per																	
Writi	ng researd	h paper -	structure	of the	pape	r - us	age o	f bibli	ograp	ohical	l toc	ols -	abs	stract	prep	aratio	n ar	nd to	do a
peer	review for	the abstra	act of the	others	s, as i	n rea	l acad	lemic	life. F	Plagia	arisr	n o	f the	prep	ared	manu	scr	ipt.	
Сор	yright									Ū				• •				•	[02]
Copy	right law i	n India-Me	eaning of	copyri	ight-C	lasse	es of v	vorks	for co	opyric	ght p	orot	ectio	on -Ov	wner	ship o	f Co	opyri	ght-
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Pate	nts																		
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for fi	ling -Docu	ments req	uired Pub	olicatio	n and	l Exai	minati	on of	Pate	nt Ap	plica	atio	ns -	Grant	of P	atent-			
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Defir	ning Manife	est, Certify	ring App,	Create	Store	e Listi	ing, Sl	haring	Scre	ensh	nots,	, Sh	narin	g App	Cre	dentia	ls f	or tes	sting.
L																Tot	al F	lours	s: 15
Text	Book(s):																		
1	Mathis P	lapp. How	to Write	and P	ublish	a Sc	cientifi	c Pap	er (P	roject	t-Ce	ente	ered	Cours	se).				
	https://w	ww.course	era.org /le	arn/hc	<u>w-to-</u>	write-	-a-scie	entific	-pape	er #in	stru	icto	rs						
2	Rajkuma	r S. Aduki	a ,Handb		n Inte	llectu	al Pro	perty	Righ	ts In I	India	a,20	007						
3	Dr. M. Ka	antha Bab	u, Text b	OOK OF	n Inte	ellectu	iai Pro	operty	Rign	its",20	019.	•							
Refe	erence(s):	<u></u>		<u> </u>		<u> </u>		<u> </u>						<u> </u>					
1	Kothari, (J.R. and	Gaurav (' arg, ف	Rese	earch	Meth	odolo	gy: N	/letho	ds	and	a le	chniq	ues"	, New	Ag	ge	
<u> </u>	Internatio	nal Publis	ners, 201	13							. –				<u>-</u>		-		
2	Srivastav	a, T.N. an	d Rego,	S., "Bı	usines	ss Re	esearc	h Mei	hodo	ology"	', Ta	ata	McG	Fraw	III E	ducatio	on I	Pvt. I	_td.,
	Delhi, 20'	19.	. 1		/						205								
3	nttps://su	pport.goo	gie.com/g	poogle	olay/a	Indroi	d-dev	elope	r/ans	swer/S	9828	915	2						
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5	https://do	cs.micros	oft.com/e	n-us/w	/indov	vs/uw	/p/pub	lish/a	pp-sı	ubmis	SSIO	ns							
	Pre-requis	ite: NII																	
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50 AC 002 &	CO2	3	3	3	3			1	2	2	2	2	1		3
Research Skill	CO3	3	3	2	2	2		2	2	1	2	1	1	3	3
Development -II	CO4	3	3	3		3	2	2		2		2	2	3	2
	CO5	3	3	3		3	2	2		2		2	2	3	2

	I	K.S.Rangasa	my College	of Technolo	gy – Autono	mous		R2018											
		50	MC 8P1- Pro	oject Work -	Phase II														
Somostor		Hours / Wee	k	Total	Credit	Max													
Semester	L	Т	Р	hrs	С	CA	ES	Total											
VIII	0	0	16	240	8	50	VIII 0 0 16 240 8 50 50 10												

Objective(s)	 To enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the branch of study. To have guidance for an every project team, by the faculty member of the concerned department. To receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide. To present in periodical seminars on the progress made in the project To produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.
Course Outcomes	 At the end of the course, the students will be able to Make links across different areas of knowledge and to generate, develop and evaluate ideas and information Apply these skills to the project Design the project work. Model and fabricate the project work Prepare and present the project work along with report.
Methodology	 Three reviews have to be conducted by the committee of minimum of three members one of which should be their project guide. Progress of project has to be monitored by the project guide and committee regularly. Each review has to be evaluated for 100 marks. Attendance is compulsory for all reviews. If a student fails to attend review for some valid reasons, one more chance may be given. Final review will be carried out by the committee that consists of minimum of three members one of which should be their project guide (if possible include one external expert examiner within the college). The project report should be submitted by the students around at the first week of April
	• The project report should be submitted by the students around at the first week of April.

Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	CO	PO												PSO		
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
	CO1	3	2									2	2	2		
	CO2	2	3										1	2		
50 MC 8P1&Project Work - Phase II	CO3	2	2	3	1								1	3	2	
	CO4	2		1	3	2				2		2	1	1	2	
	CO5			1		2					2	2	2		2	

	K.S.Rangasamy College of Technology – Autonomous R2018												
		50 M	C E11 – Wi	reless Sens	sor Network	s							
			B.E. Mecha	tronics Eng	jineering								
Somostor	Н	ours / Week		Total	Credit	N	laximum Ma	arks					
Semester	L	Т	Р	Hrs	С	CA	ES	Total					
V	3	0	0	45	3	40	60	100					
Objectives	 To introd To illustr To provi To ident To provident To provident To and mar 	3 0 0 45 3 40 60 100 • To introduce the basic concepts in Wireless sensor networks. •											
Course Outcomes	At the end of 1. Learn th 2. Explore 3. Understa 4. Have an 5. Produce	of the cours e component the different and the diffe in-depth knows safe and se	e, the stude ts of wireles layers in win rent routing owledge on ocure wireles	ents will be s sensor ne reless netwo protocols in sensor timin s communic	able to tworks. orks. Wireless ne g synchroni: cation netwo	tworks. zation and lo	ocalization.						

Introduction

Introduction to wireless sensor networks, Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks, Advantage of Sensor Networks, Applications of Sensor Networks, Mobile Adhoc NETworks (MANETs), Sensor Node Hardware and Network Architecture: Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, Optimization goals and figures of merit, Design principles for WSNs, Service interfaces of WSNs, Gateway concepts. [09]

Networking Sensors

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy- Efficient Routing, Geographic Routing. [09]

Network Layer

Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols Node and Network Management: Power Management, Local Power Management aspects, Dynamic Power Management, Conceptual Architecture. [09]

Time Synchronization

Clocks and the Synchronization Problem, Time Synchronization in Wireless Sensor Networks, Basics of Time Synchronization, Time Synchronization Protocols Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, Event Driven Localization. [09]

Security

Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks, Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, IEEE 802.15.4 and Zig Bee Security. [09]

Total Hours: 45

Text	book(s) :
1	Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and
I	Practice", Wiley 2010.
2.	Mohammad S. Obaidat, SudipMisra, "Principles of Wireless Sensor Networks", Cambridge, 2014.
Refe	erence(s) :
1.	Fei Hu, Xiaojun Cao, "Wireless Sensor Networks", CRC Press,2013.
2.	Jun Zheng, Abbas Jamalipour, "Wireless Sensor Networks: A Networking Perspective", Wiley, 2009.
3.	C S Raghavendra, K M Sivalingam, TaiebZnati, "Wireless Sensor Networks", Springer, 2010.
4.	Ian F. Akyildiz, Mehmet Can Vuran, "Wireless Sensor Networks", Wiley, 2010

Pre-requisite: Nil MAPPING OF COUF

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	CO		РО												SO
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	3	1	1	2			3	2			1	1	1
	CO2	3	3	1	1	2			2	2			1	1	1
50 MC E11 & Wireless Sensor Networks	CO3	3	3	2	1	2			2	2			1	1	1
	CO4	3	3	3	2	2	3	2	2	1			1	2	2
	CO5	3	3	3	2	2	3	2	3	2			1	2	2

	K.S.Rangasamy College of Technology – Autonomous R2018 50 MC E12– Automobile Technology B.E. Mechatronics Engineering B.E. Mechatronics Engineering emester Hours / Week Total Credit Maximum Marks V 3 0 0 45 3 40 60 100 V 3 0 0 45 3 40 60 100 • To impart knowledge on the constructional details and principle of operation of various automobile components. • To provide knowledge on the working of fuel supply and electrical system in various automobiles. • To learn the function of various components in transmission and drive lines of a vehicle. • To study the concept and working of steering, brakes and suspension systems in automobiles.							
		50	MC E12- A	utomobile	Fechnology	,		
			B.E. Mecha	tronics Eng	jineering			
Somostor	H	ours / Week	Ι.	Total	Credit	N	/laximum Ma	arks
Semester	L	Т	P	Hrs	С	CA	ES	Total
V	3	0	0	45	3	40	60	100
Objectives	 To impa automol To provi automol To learn To study automol To acqu automol 	rt knowledge bile compon- de knowledg biles. the functior the concep biles. ire knowledg biles.	e on the con ents. ge on the wo n of various o t and workir ge on techno	structional d orking of fue components ng of steering ologies relat	etails and p I supply and in transmiss g, brakes an ed to various	rinciple of op electrical sy sion and driv d suspensic s alternative	peration of v ystem in var ve lines of a on systems i e energy sou	arious ious vehicle. n rces for the

2.2.2

	At the end	d of the	cours	e, the	stud	ents	will b	e able	e to							
Course	1. Demo	nstrate th	ne var	IOUS 2	autom	obile (compo	onents	sand	engin	e part	s.				
Course	2. Explai	in the fun		of rue	i supp	biy and		trical s	syster	ns.	مصطط	rivo lin	oo of	o vob	iolo	
Outcomes	3. Explai	in the lun	ICTION	or var	ious c	ompo	ing ov	in tra	nsmis	oncio	ana ai		ies oi	a ven	licie.	,
	5. Discus	ss the us	age o	f vario	bes of	ernat	e ene	rav so	urces	in au	itomol	oiles.	iu bia	King s	system	1.
Vehicle Stru	cture and E	ingines	0					0,								
Types of Auto	mobiles - ve	ehicle cor	nstruc	tion, c	hassi	s, fran	ne an	d body	y. Veh	icle a	erody	namic	s (var	ious r	esista	nces
and moments	s involved).	Engine -	Types	and (Consti	ructior	n. Lub	ricatio	on sys	stem -	Туре	s and	const	tructio	n. Co	oling
system -Type	es and cons	truction.	Engin	ie emi	ission	contr	ol by	3 Wa	y Cata	alytic	Contr	oller.			[09	9]
Fuel Supply	and Electri	cal Syst	ems													
Spark ignitio	n engine-	Electron	ic fue	el inje	ection	syst	em, i	mono	-point	and	mult	i Poiı	nt inje	ection	syst	ems.
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and turbo cha	bit is and intervention of the provided and the provid															
system –Star	ting motor a	nd drives	S.												[09	9]
Power Trans	ower Transmission Systems Clutch- Types- single plate clutch, multi plate clutch. Gearbox - Types- synchromesh gearbox, sliding mesh gear ox, constant mesh gearbox. Automatic transmission system. Fluid flywheel, torque convertors, propeller shaft, ip joint, universal joints. Differential and rear axle drives - Hotchkiss drive and torque tube drive.[09] /heel, Steering, Brakes and Suspension /heels and Tyre Construction. Steering geometry and types of steering - rack and pinion steering gear, ecirculating ball type steering gear and Power steering - construction and working principle. Suspension systems Types - rear europension and frant europension.															
Clutch- Type	s- single pla	te clutch	, mult	i plate	clutcl	h. Gea	arbox	- Туре	es- sy	nchro	mesh	gearb	oox, sl	liding	mesh	gear
box, constant	mesh gear	box. Aut	omatio	c trans	smissi	ion sy	stem.	Fluid	flywh	ieel, t	orque	conv	ertors	, prop	eller s	haft,
slip joint, uni	versal joint	s. Differe	ential	and r	rear a	ixle d	rives	- Hot	chkiss	s driv	e and	torq	ue tul	be dri	ve.[09	9]
Wheel, Steer		s and Su	spen	sion		-	d turn	~~ ~f	otoo	rina	rook	and	niniar	, ata a	rina	
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Alternate En	erav Sourc	es													[-1
Use of Natura	Ise of Natural Gas, LPG, Bio diesel, Gasohol and Hydrogen in Automobiles. Electric and Hybrid Vehicles - layout f electric and hybrid vehicles, components, transmission requirements, advantages and limitations. FuelCells –															
of electric and	d hybrid veh	icles, co	mpon	ents, t	transn	nissio	n requ	uireme	ents, a	advan	tages	and li	mitati	ons. F	FuelCe	ells –
classification,	assification, working principle, components and applications. [09]															
	Total Hours: 45															
Text book(s)	:				/ 1			6 – 114								10
1 Kirpal Si	ngh, "Autom		ginee	ring, \			1 ^{°°} , 13 [°]	" Editi	ion, S	tanda	Ind Pul	blishe	rs, Ne	ew De	ihi, 20	13.
2. Rajput R		bolle Eng	ineen	ng , z	Eal	lion, L	axmi	Public	ation,	, new	Deini	, 2014	+.			
1 Gunta S	/- K "Automa	bile Eng	inoori	na" S	Char		hlichir		mnan			ni 202	20			
1. Gupta 5. Sethi H	M "Automo	bile Ling	noloc	<u>пу, о</u> w" Та	ata Mo	Graw		ly Col Publick	npan ning ($\dot{\mathbf{y}}$		ii, 202	.u. Limita	d No		ni
2. 2007.	2. Sethi H. M. "Automobile Technology", Tata McGraw Hill Publishing Company Private Limited, New Delhi, 2007.															
Jain K.K. and Asthana R.B., "Automobile Engineering", 1st Edition, Tata McGraw Hill Publishers, New																
Delhi, 20	²¹ Delhi, 2002. 4 L Hussain "Electric & Hybrid Vehicles - Design Eurodamentals" Boca Paton: CPC Press, 2011.															
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50 MC E12 &	Automobile	CO1 CO2 CO3	1 1 2 2	2 2	3	4 1 1 1	5 3	6 3 2 3	7 2 1 2	8 1 1 1	9	10 2 2 2	11	12 1 1 3	1 2 2 2	SO 2 1 3 1
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 Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

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		50	MC E15 – N	lodern Vehi	icle System	1										
			B.E. Mecha	tronics Eng	jineering											
Somostor	H	ours / Week		Total	Credit	N	laximum Ma	arks								
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V	3	3 0 0 45 3 40 60 100														
	To enlighten the learners about the concepts of basic vehicle safety features.															
	To expla	ain latest adv	ancement i	n hybrid eng	ine technolo	ogy.										
Objectives	To unde	rstand the d	lesign conce	pts of body	for safety.											
	To famil	iar with adva	anced featur	es in comfoi	rt vehicle teo	hnology.										
	To broad	den the adva	anced techn	ologies in m	odern vehic	le systems.										

Course	At the en 1. Under techn 2. Analy	d of the rstand va ologies ii ze the va	cours rious n auto arious	s e, the syster mobile advar	e stud ms tha e indu nced e	ents at enh stries quipn	will be ance nent's	e able vehicl in Hy	e to e safe brid v	ety, pa ehicle	assen(e.	ger C	omfor	t, rece	ent	
Outcomes	3. Know	about th	e acce	elerati	on an	d dec	elerat	on im	pact v	with o	bstacl	es.				
	4. identii	ty the cor	nfort s	systen	n and	conve vehicl	enient	syste	m in a	a vehi worl	cle. kina sv	/stam	ic.			
Vehicle Safety	Concepts		e ieai				e anu	anary			xing sy	/510111	5.			
Active safety -	Driving sat	fety, Con	ditiona	al safe	ety, Pe	ercept	ibility	safety	, Ope	rating	a safet	v, Pa	ssive	safet	v - Ext	erior
safety, Interior	safety, De	formatio	n beha	avior	of veh	icle b	ody, s	Speed	and	acce	Íeratio	n cha	racter	ristics	of ve	hicle
body, Velocity	and time g	raph.		_											[()9]
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Collision Avo	idance Sys	stems		Com	ologio	o into	200,	101,	1 D1, V			, varv	0 11111	ig oyt		.0]
Collision warni	ng system,	Causes	of rea	r end	collisio	on, Fr	ont ar	d rea	r vehi	cle ob	oject de	etecti	on sy	stem,	Autor	natic
braking system	n, Lane dep	parture w	arning	gs sys	tem, E	Electro	onic b	rake f	orce	distrib	ution	syste	ms, È	merg	ency b	rake
assist system.	.														[()9]
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sensor system	, Garage c	loor oper	ning s	vstem	, Envi	ronm	ent in	fotain	ment	svste	m, Ve	hicle	seatir	ig sy	sitions	and
height adjustm	ents, Lamir	nated wir	ndshie	ld pro	, tectior	n and	trans	baren	cy.	- ,	, -			511	[()9]
Modern Intelli	gence Veh	icle Sys	tem													
Introduction -	Basic struc	ture-visio	on bas	ed au	Itonon	nous	road	/ehicl	es-arc	chitec	ture fo	or dyn	amic	VISIO	syste	em -
robot vision to	vehicle info	visual co	nuoi s svster	n-ohie	r using	y imag rection	je pro n	cessi	ig and		y theo	ry- Ai	appi	icatio		obile al
		maton	Syster											Tota	hours	s 45
Text book:																
1 Gilbert I	Held "Inter a	and Intra	Vehic	le Co	mmun	icatio	ns", A	uerba	ich Pu	ublica	tions, 2	2008.				
2. Bosch,	"Automotive	e Handbo	ook", 8	th Edi	tion, S	AE p	ublica	tion, 2	2011.							
Keterence(s)	: Phine "Erg	onomioo	in the	Auto	motive	Dooi	ian Dr		" Dhia	o puk	liohor	Cror	rooo	Toyle	rond	
1. Francis	Group, 20	12.		Auto	nouve	Des	ign Fi	000055	DHIS	e pur	JISHE	CICL	JIESS,	Taylo		
 Tao Zhang, Luca Delgrossi, "Vehicle Safety CommunicationsProtocols, Security and privacy", Information Communication Technology Series, 2012. Jullian Happian, Smith, "An Introduction to Modern Vehicle Design", SAE, 2002. 																
 ² Information Communication Technology Series, 2012. 3. Jullian Happian, Smith, "An Introduction to Modern Vehicle Design", SAE, 2002. 4. Richard Bishop, "Intelligent Vehicle Technology and Trends" Artech House, Inc. 2005. 																
 Jullian Happian, Smith, "An Introduction to Modern Vehicle Design", SAE, 2002. Richard Bishop, "Intelligent Vehicle Technology and Trends" Artech House, Inc,2005. 																
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BoS Chairman

	At the en	d of the	cours	e, the	e stud	ents	will b	e able	e to							
	1. Reco	gnize the	need	and c	harac	teristi	cs of	the co	mpos	ite ma	aterial	s.				
	2. Descr	ribe the p	ropert	ties ar	nd app	olicatio	ons of	meta	l, cera	amic a	and po	olyme	r matr	ix con	nposit	е
Course	mater	ials.			1				ام ما د		fabric		of oo		4.0	
Outcomes	3. Portra	ay the var	ious r	nanut	acturii	ng pro	cesse	es invo	oivea	in the	Tabric	cation	OT COI	mposi	te	
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	5 Descr	ihe the n	roces	sina r	ronei	ties a	nd an	nlicati	ions o	f adv	anced	nano	comp	osites		
Introduction	to Compos	sites	00000	9, p	ropoi	100 0	na ap	priouti		i uuvi		nano	oomp	001100		
Definition of a	composite r	naterial –	- need	d for c	compo	sites	– aen	eral c	harad	cterist	ics of	comp	osites	s – cla	assific	ation
of composites	s. Fibers –	Types of	fibers	. Glas	ss. Ca	rbon.	Aram	id. Ke	evlar a	and n	atural	fibers	6 – Ma	atrices	: polv	mer.
metal cerami	c matrices	 polym 	er ma	atrix c	ompo	sites	- the	rmo s	set po	olyme	rs – c	couplin	ng ag	ents,	fillers	and
additives.					•							•	0 0	-	[09	9]
Types of Cor	nposite Ma	aterials														_
Properties of	metal matr	rix compo	osites	(MMC	C)- int	er me	etallic	and a	alloys	used	for N	IMC a	ind th	eir pro	opertie	es –
characteristic	s and appl	ications of	of MN	1C –	Class	ificatio	on of	ceran	nics a	and th	neir po	otentia	al role	as n	natrice	es –
properties an	d applicatio	on ceram	ic ma	trix co	mpos	ites (CMC)	using	g fine	cerar	nics, o	carbo	n, gla	ss, ce	ment	and
gypsum as m	atrices, poly	ymer mat	rix coi	mposi	tes(P	MC)- (chara	cterist	ics ar	nd app	olicatio	ons of	PMC	•	[09	9]
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Mechanics a	nd Perform	nance													[0,	0]
Introduction to	o micro-me	chanics -	- unidi	irectio	nal la	mina -	– bi di	rectio	nal la	mina	– Iam	inates	s – typ	es of	lamina	ates,
symmetric lar	ninate, anti-	-symmetr	ic larr	ninate.	, balaı	nced I	amina	ate, qu	uasi-is	sotrop	ic lam	inates	s, cros	s ply	lamina	ates,
angle ply lam	inate – inter	-laminar	stress	ses – s	static i	mecha	anical	prope	erties	– fatig	jue pr	operti	es – ir	npact	prope	erties
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Advanced Co	omposites															1.2.1
Carbon-Carbo	on compos	ites-proce	essing	j, proj	perties	s and	appii	cation	is-sar	dwicr	n-struc	cturea	com	posite	s – ny	ybrid
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Mallick,	P. K, "Fibe	r-reinforc	ed co	mposi	ite: Ma	aterial	s, Ma	nufac	turing	and [Desigi	n", 3rc	d Editi	on, CF	RC pre	ess,
¹ 2010.	,			•			,		0		Ŭ	,		,	•	,
, Krishan	K. Chawla	, "Compo	site N	lateria	als- So	cience	e and	Engin	eering	g", Th	ird Ed	ition,	Spring	ger Sc	ience	&
^{2.} Busines	ss Media,20)14.												-		
Reference(s)):															
1 Michae	IW Hyer, "S	Stress An	alysis	of Fib	ber – F	Reinfo	orced (Comp	osite	Mater	ials", I	DESte	ech Pu	ublicat	tions,	Inc.
¹ 2008, IS	SBN: 19320)7886X														
2. Bhagwa	an.D. Agarv	val, Lawre	ence.	J.Brou	Itman	and k	Cha	ndras	ekara	, "An	alysis	and F	Perfor	mance	e of Fi	iber
Compo	sites", John	Wiley an	d Sor	ns,3rd	Editio	on, 20	06, IS	BN: 0	04/12	68917	(/"				
3. F.Matth	ews & R.Ra	awlings, "	Comp	osite	Mater	riais, E	ngine	ering	and	Scienc	ce", W	oodh	ead P	ublish	ing, N	lew
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 Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

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Course Outcomes	1. Awar 2. Know 3. Acqu 4. Know 5. Apply	e of the r v about P ire knowl v the type v suitable	ole of lannin edge es of le contr	mana ng, for on de eaders olling	agers ecasti centra ship, n techn	ng an alizatio notiva iques	d dec on, de tion te	sion legati chnic	makin on an ques a	g d dep and pr	oartme ocess	entatio s of co	n mmur	nicatio	n	
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Organizing Nature and Pl and Staff auth Process - Tech	Organizing Nature and Purpose- Formal and Informal-Organization Chart- Structure and Process-Departmentation –Line and Staff authority- benefits and limitations-Decentralization and Delegation of Authority-Staffing –Selection Process - Techniques-Human Resource Development-Managerial Effectiveness [09] Directing Scope-Human Factors-Leadership-Types of Leadership- Motivation-Hierarchy of Needs-Motivation Theories-Mathematical Process of Communication Process of Communication Process															
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Globalization a	and Liberali	zation- Ir	nterna	tional	Mana	geme	ent and	a gioi	oal the	eory c	of Man	agem	ent	Tatal	105	<u>)</u>
Text book(s)	•													Tota	Hour	S: 45
1 Stephen	P Robbins	& Marv (Coulte	r"M	anade	ment	" Prei	ntice I	Hall (I	ndia)	⊃vt It	d 10	th Edi	tion 2	2009	
2 JAF Ston	er Freema	$\frac{\alpha}{n R F an}$	d Dan	iel R	Gilber	t "Mai	nagen	nent"	Pear	son F	ducati	ion 61	h Edit	$\frac{1011}{2}$	004	
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1. Stephen Education	A. Robbins n, 7th Editic	& David on, 2011.	A. De	cenzo	o & Ma	ary Co	oulter,	"Fun	dame	ntals	of Mai	nagen	nent"	Pears	on	
2. Robert K	reitner & Ma	amata M	ohapa	tra, "	Mana	geme	nt", Bi	ztantr	a, 200	28	<u> </u>					
3. Harold Ke	oontz & Hei	nz Weihr	ich "E	ssent	als of	man	ageme	ent" T	ata M	cGra	W Hill,	1998.				
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BoS Chairman

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Course Outcomes	1. Unde 2. Demo 3. Acqui smart 4. Desc 5. Realiz broug	rstand th onstrate o ire knowl t services ribe Robo ze the va ht about	e driv conce edge s otic te rious a by Ind	ers ar ptual about chnol applic dustry	framev framev smart ogy ar ation o	blers work a tness nd Au of Ind	of Ind and ro in Sm gment ustry 4	ustry ad m art Fa red re 1.0 ar	4.0 ap of In actories eality for nd unde	dusti , Sm Indu rstar	ry 4.0 lart cit ustry 4 nd the	ies, s .0 oppo	mart p ortuniti	orodu es, cł	cts an nallen	ıd ges
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Introduction, c state of industr A Conceptual	ore idea of y4.0 – Tecl Framewor	Industry hnologies rk for Inc	4.0,c s – Ho dustry	origin ow is I / 4.0	conce ndia p	pt of repar	indust ing for	ry 4. Indu	0 - Indu Istry4.0	Istry	4.0 p	roduc	ction s	systen	n – ci	urrent [09]
Framework for	Industry4.).	Comp	bonen	15 01 11	lausti	y4.0 -	Slate	e of Art,	Sup	portivo	erec		gies -	Flop	[09]
Introduction – Product and P	Proposed Proposed rocess Dev Robotics in	Framew elopmen	ork for t Phase	or Te se. dustr	chnolc	ogy R	loadm	ap –	Strate	gy P	hase	– St	trategy	y Pha	ise -	New [09]
Introduction – F Things – Cloue Manufacturing	Recent Tec d Robotics , Maintenar	ecent Technological Components of Robots - Advanced Sensor Technologies – Internet of Robotic Robotics – Cognitive Architecture for Cyber-Physical Robotics - Industrial Robotic Applications- Vaintenance and Assembly. [09] Framework Conditions for Industry4.0 Il Strategy alongside Resource Scarcity – Lack of standards and poor data security – Financing														
Obstacles and Lack of A Digit conditions – av	and Framework Conditions for Industry4.0 igital Strategy alongside Resource Scarcity – Lack of standards and poor data security – Financing availability of skilled workers – comprehensive broadband infra-structure – state support – legal - protection of corporate data – liability – handling personal data. [09]															
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Text book(s) -														Jiarri	ours.	43
1 Sudip Mis andIndus	sra , Chand stry 4.0 Pap	ana Roy erback –	, Ana ∙1 ,Ap	indaru press	ip Muk 2020.	cherje	e," Int	roduo	ction to	Indu	strial I	ntern	net of	Thing	S	
2. Alp Ustur Technolo	ndag and Ei Igyand Eng	mre Cevi ineering,	ikcan, 2017.	"Indu	stry 4.(0: Ma	nagin	g the	Digital	Fran	sforma	ation"	', Spri	nger		
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 [09] Thermal Energy Based Processes Laser Beam machining and drilling (LBM), plasma Arc machining (PAM) and Electron Beam Machining (EBM) Principles – Equipment –Types - Beam control techniques – Applications. [09] Total Hours: 4! Text book: K K Singh, "Unconventional Manufacturing Process", Dhanpat Rai & Company, New Delhi, 2012. P C Pandey and H S Shan, "Modern Machining Processes" Tata McGraw-Hill, New Delhi, 2017. Reference(s): Paul De Garmo, J.T. Black, and Ronald.A. Kohser, Material and Processes in Manufacturing, Prentice Hall of India Pvt. Ltd., New Delhi, 2011. Serope Kalpakjian and Steven Schmid, "Manufacturing Engineering and Technology", 7th Edition, Pearson education India Ltd, New Delhi, 2013. P. K. Mishra, Non-Conventional Manufacturing processes", CRC press, 2011 Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES
Inermal Energy Based Processes Laser Beam machining and drilling (LBM), plasma Arc machining (PAM) and Electron Beam Machining (EBM) Principles – Equipment –Types - Beam control techniques – Applications. [09] Total Hours: 45 Text book: 1 1 K K Singh, "Unconventional Manufacturing Processs", Dhanpat Rai & Company, New Delhi, 2012. 2 P C Pandey and H S Shan, "Modern Machining Processes" Tata McGraw-Hill, New Delhi, 2017. Reference(s): 1 Paul De Garmo, J.T. Black, and Ronald.A. Kohser, Material and Processes in Manufacturing, Prentice Hall of India Pvt. Ltd., New Delhi, 2011. 2 Serope Kalpakjian and Steven Schmid, "Manufacturing Engineering and Technology", 7th Edition, Pearson education India Ltd, New Delhi, 2013. 3 P. K. Mishra, Non-Conventional Machining, Narosa Publishing House, New Delhi, 2010. 4 Gary F Benedict, 'Nontraditional Manufacturing processes", CRC press, 2011 Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES OUTCOMES Setor Course outcomes, Programme outcomes and processes", CRC press, 2011
Laser Beam machining and drilling (LBW), plasma Arc machining (PAW) and Electron Beam Machining (EBW), Principles – Equipment –Types - Beam control techniques – Applications. [09] Total Hours: 4! Text book: 1 K K Singh, "Unconventional Manufacturing Process", Dhanpat Rai & Company, New Delhi, 2012. 2 P C Pandey and H S Shan, "Modern Machining Processes" Tata McGraw-Hill, New Delhi, 2017. Reference(s): 1 Paul De Garmo, J.T. Black, and Ronald.A. Kohser, Material and Processes in Manufacturing, Prentice Hall of India Pvt. Ltd., New Delhi, 2011. 2 Serope Kalpakjian and Steven Schmid, "Manufacturing Engineering and Technology", 7th Edition, Pearson education India Ltd, New Delhi, 2013. 3 P. K. Mishra, Non-Conventional Manufacturing processes", CRC press, 2011 Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES
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	L	7	Γ		P		Hrs		С		CA		ES		Tot	al
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	 To ga 	in knowle	edge o	on the	types	s of po	ower T	ransr	nissio	n syst	tems.					
	 To ga 	in knowle	edge a	about	the w	orking) princ	iples	of pov	ver tra	ansmi	ssion	syster	ns.		
Objectives	 To un 	derstand	the p	roced	ure us	sed to	desig	n the	powe	r tran	smiss	ion el	ement	ts.		
	 To lea 	arn to use	e stan	dard p	oractic	es an	d star	dard	data.							
	To lea	arn to use	e cata	logue	s and	stand	lard m	achin	e tran	smiss	sion e	lemen	ts			
	At the en	d of the (cours	e, the	stud	lents	will b	e able	eto							
	1. Apply	the conc	epts of	of des	ign fo	r belts	s, chai	ns an	d rope	e drive	es.					
Course	2. Desig	n of spur	and r	nelical	gears	s with	amere	ent ap	plicat	ions.		unation				
Outcomes	3. Desig	n or beve	alvzo	tho w	ars Da			or bo		kingna	am ec	Juation	15.			
	4. Desig	the conc	aiyze	nt des	ian fo	r clute	s ur ye shas a	nd br	x. akos							
Design of Fl	vible Flem	ante conc		Ji ues	Ignio		nes a		anes.							
Design of Fla	t helts and i	oullevs -	Selec	rtion o	f V he	elts ar	nd null	evs -	Selec	rtion c	of hois	tina w	<i>i</i> re ro	nes a	nd nul	levs
– Design of T	ransmission	chains :	and S	prock	et-rec	ircula	tina ba	all des	sian.			ing n		poou	[0]	91
Spur Gears a	and Helical	Gears							.g						[•	-1
Speed ratios	and numbe	r of teeth	-Forc	e ana	lysis -	Tooth	stres	ses –	Dyna	mic e	ffects	– Fat	igue s	streng	th – F	actor
of safety - 0	Gear mater	ials – D	esign	of st	traight	t toot	h spu	r&ł	nelical	gea	rs ba	sed o	n stre	ength	and	wear
consideration	s – Pressur	e angle ir	n the r	norma	land	transv	verse p	lane-	Equiv	valent	numl	per of	teeth-	forces	s for h	elical
gears- helix	angles -Cr	oss helic	al: T	ermin	ology	Es	stimati	ing th	ne siz	e of	the p	air of	cros	s heli	ical g	ears.
herringbone g	gears.														[0	9]
Bevel, Worm	Gears															
Straight beve	l gear: Too	th termin	ology	, tootl	h forc	es an	d stre	sses,	equiv	/alent	num	ber of	teeth	. Esti	mating	j the
dimensions of	of pair of st	raight be	vel ge	ears.	vvorm	Gea	r: Mer	its ar	id der	nerits	- tern	ninolo	gy. Tr	nerma	al capa	acity,
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Geometric pr	progression – Standard step ratio – Ray diagram, kinematics layout -Design of sliding mesh gear gn of multi speed gear box for machine tool applications – Constant mesh gear box – Speed reducer															
box – Design	of multi so	- Stanual Ped dear	hox f	or ma	chine	tool a	innlica	tions	– Cor	s iayo Istant	mest	n dear	hox -	- Sne	ed rec	yeai lucer
unit – Variab	of multi speed gear box, Fluid Couplings, Torque Converters for automotive applications [09]															
Design of Cl	utches and	Brakes		, o ap in	.ge, .	orqui	0011	onton	0 101 0		00	appilo			[0]	0]
Role of clutch	es - positive	and gra	dually	enga	ged c	lutche	es, too	thed o	claw c	lutche	es, de	sign of	f clutc	hes-s	single	plate
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self energizin	g and de-er	nergizing	brake	es.				-			-				[09)]
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Text book(s)	:															
1 Bhanda	ari V, "Desig	n of Mac	hine E	Eleme	nts", 3	3rd Ec	lition,	Tata	McGra	aw-Hil	ll Boo	k Co,	2010.			
2 Joseph	Shigley, Cl	narles Mi	schke	, Rich	ard B	udyna	as and	Keitł	n Nisb	ett "N	lecha	nical E	Engine	ering	Desig	3n",8 th
Edition,	Tata McGr	aw-Hill, 2	2008.													
Reference(s)):															
1. Sundar	arajamoorth	<u>ıy T. V, S</u>	hanm	lugam	□ .N, "I	Machi	ne De	sign"	Anur	adha	Publi	cation	s, Che	ennai,	2003	
2. Prabhu	. T.J., "Desi	gn of Tra	nsmis	ssion I	Eleme	ents",	Mani (Offset	, Chei	nnai, i	2000.					
3. C.S.Sh	arma, Kaml	<u>esh Puro</u>	hit, "D)esign	of Ma	achine	e Elem	ients'	<u>', Prer</u>	ntice H	Hall of	India,	Pvt.	Ltd., 2	2003	
4. Gitin M	aitra, L. Pra	sad "Han	id boc	ok of N	/lecha	nical	Desigi	า", 2 nd	¹ Edition	on, Ta	ata Mo	Graw	-Hill, 2	2001		
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			50 MC E24	 Industrial 	l Design and	Applied Er	gonomics								
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		Course	imparts stude	ents to poss	ess essentia	l knowledge	on ergonom	nics.							
		 Insights 	s on psycholo	gical and an	thropometric	al developm	ent leads stu	udent into a g	good						
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00,000	••••	 Empha 	sis given on in	dustrial wor	ker's health a	and safety pe	ertaining to i	ndustrial des	ign.						
		 Course 	deals with Via	able Ergonoi	mic principle:	s and their ap	plication.								
		 Concer 	ntrates on Erge	onomic desig	gn in terms o	of social and	legal aspec	ts.							
		At the end	of the course	e, the stude	nts will be a	ble to									
0		1. Apply e	rgonomic prin	ciples and to	ools for a saf	er and effecti	ve work atm	nosphere.							
Cours	se	2. Assess	ergonomic ris	sk and mitiga	ate ergonomi	c nazards.									
Outcom	nes	3. Formula	ate control me	asures for e	rgo risk area	S. al diaordora									
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Introdu	uction	to France	mics and Ind	ustrial Desi	an	igonomic pri	icipies.								
Franno	mics	– The focus	of ergonomic	rs and its a	911 rea of applic	ation in the v	work system	n- anatomy:	human body-						
structur	re and	I function –	oosture and h	ealth			None System	r anatomy.	naman body						
Industri	ial De	sign: An a	poroach to in	dustrial des	ian- workpla	ce design a	nd assessn	nent -eleme	nts of design						
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human	facto	rs- human m	achine interfa	ce- health a	nd safety led	islation and	ergonomics		[09]						
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Human	char	acteristics a	nd limitations	-human erro	or-team work	and ageing-	fitting the	job to the pe	erson and the						
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– shift v	memory-signal detection theory and vigilance- stress – cause, preventive and protective measures- organization – shift working and overtime. [09]														
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Anthrop	pomet	rics- body	growth and s	omato types	s- static and	dynamic ar	nthropometr	y performan	ce support -						
ergonoi	mics	approach a	nd design int	ervention to	work statio	n - standing	– anthrop	ometry landi	marks- sitting						
posture	es- an	thropometry	/ - squatting	and cross-l	egged postu	ires- measur	ing techniq	ues- data a	nd percentile						
calculat	tion –	work statio	n design- vert	ical and hor	izontal work	surface-mov	ement – wo	ork counter-r	isk factors for						
muscul		etal disorde	r in the work	place - env	rironmental i	actors influe	ncing work		IDIIIty-Posture						
Evaluat		bols- Rapid	Upper Limb As	ssessment (I	RULA), Rapi	a Entire Body	Assessme	nt (REBA) –							
	n-⊓a ation	of Ergonon	evel.						[09]						
Principl	alion	uman skill &	nerformance	and display	control and	virtual enviro	nmente-coo	unitivo organy	omice human						
informa	ation n	rocessing-r	periormance pemory: readir	anu uispiay, na-nercentio	n-navigation	-nroblem solv	vina- decisio	n making hi	uman						
	nuter i	interaction	innut/outnut te	chnology	isability- eva	aluation- hea	lth problem	s research i	techniques in						
eraonoi	mic d	ata general	tion interpret	ation and a	polication of	stastiscal m	nethods er	annomic des	sign process-						
ergono	mic d	esian metho	doloav- eraon	omics criter	ia/check- de	sian process	involving-ch	pecklist for ta	isk easiness						
orgene	inite a	oolgii moaro	delegy elgen			sign proceed	internig ei		[09]						
Macro	ergor	nomics and	Case Studie	s					[00]						
Macro	ergo	nomic met	hods- particij	batory ergo	nomics-para	allel suggest	tion involve	ement, job	involvement,						
implem	enting	a issues- de	sign for physi	cally challer	nged -design	ergonomics	in India- so	cope for expl	loration -case						
studies	. `		0 1 7		0 0	U			[09]						
								То	tal Hours: 45						
Text bo	ook(s):													
1 N	/ark S	Sanders,E	rnest J Mccor	mick, "Huma	an Factors in	Engineering	& Design",	McGraw-Hill	Education						
P	Private	Limited,7th	Edition,2016.												
2 K	۲noz,	Stephan A,J	ohnson,Steve	n ,Holcomb	Hathaway,S	cottsdale, "W	ork Design/	: Industrial E	rgonomics",						
7	^{′th} Edit	tion, 2007.													
Refere	nce(s):													
1 B	Bridge	r R.S., "Intro	oduction to Er	gonomics",C	CRC Press, 3	d Edition,200	8.								
2 K	Khan M	/I I, "Industri	al Ergonomics	s", PHI Learr	ning Private I	_imited, New	Delhi,2013.								
3 N	/layall	W H, "Indus	strial Design fo	or Engineers	[,] , London Hi	ffee Books L	imited,1988								
4 "I	Introd	uction to Wo	ork Study", IL	D,Oxford an	d IBH Publis	hing Compar	iy,Bombay,3	3 rd Edition,20)08.						

-<u>P-----</u> 3.3. am

Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						Р	0						P	SO
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	2	3		2			3	2		3		2	3
50 MC E24 & Industrial	CO2		2				2	1				3		2	3
Design and Applied	CO3	2	2	1		1		2	2		1			2	3
Ergonomics	CO4		3	1		3				2		3		2	3
	CO5	3	2		2	3		2						2	3

K.S.Rangasamy College of Technology – Autonomous	R2018
51 MC E25-Virtual Reality and Augmented Reality	
B.E. Mechatronics Engineering	
Semester Hours / Week Total Credit Maximum	
L I P nrs C CA ES	lotal
VI 3 0 0 45 3 40 60	100
Explore the potential of a virtual world for delivering application.	
Determine possible instructional designs.	
• Understand the barriers solutions and costs associated including required train	ina
 Understand the various applications of virtual reality technique. 	
At the end of the course, the student will be able to:	
1. Demonstrate an understanding of fundamental techniques, processes, technolo	gies and
Course equipment used in immersive virtual reality.	
Outcomes 2. Function as a member of an engineering design team.	
3. Understand the human interferences in VR.	
4. Develop the VR Programming.	
5. Understand the various application of VR in real time.	
The historical development of VR: Scientific landmarks Computer Graphics, Real-time computer	araphics Elight
simulation Virtual environments. Requirements for VR benefits of Virtual reality	[09]
Hardware Technologies for 3D user Interfaces	[00]
Visual Displays Auditory Displays, Haptic Displays, Choosing Output Devices for 3D User Interfac	es. [09]
Human Factors	
Methodology and terminology-user performance studies-VR health and safety issues-Usability	of virtual reality
system- cyber sickness -side effects of exposures to virtual reality environment.	[09]
VR Programming	
Introducing Java 3D-loading and manipulating external models using a lathe to make shape	s. 3D Sprites-
Anniated 3D sprites-particle systems.	[09]
Applications Medical applications-military applications-robotics applications- Advanced Real time Tracking-oth	r applications.
ames, movies, simulations, therapy.	[09]
	otal Hours: 45
Text book(s) :	
1 C. Burdea & Philippe Coiffet, "Virtual Reality Technology", Second Edition, Gregory, John	Viley & Sons,
Inc.,2014.	
2 Adams, "Visualizations of Virtual Reality", Tata McGraw Hill, 2015.	
Reference(s):	
1 Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Application of Effective Design", Morgan Kaufmann, 2016.	: Foundations
2 Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2014.	
3. Alan B. Craig, "Understanding Augmented Reality, Concepts and Applications", Morgan Kau	fmann, 2013.
4 Matjaz Mihelj and Janez Podobnik, "Haptics for Virtual Reality and Teleportation", Springer	Publishing
Company, 2012.	

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Pre-requisite: NII MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						P	0						P	SO
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	2	2	3	3	3	2	2	3	3	3	3	1	2	3
50 MC E25 & Virtual Reality and Haptics	CO2	3	2	3	2	2	3	2	3	2		1		3	3
	CO3	2	2	2	2	2	3	2	2	2	1		1	2	2
	CO4	2	2	3	2	2	2	3	3	2	1		3	2	3
	CO5	3	3	2	3	3	3	2	2	3	2	3	1	2	2

		K.S.Rangasa	my College	of Technol	logy – Auto	nomous		R2018					
	-	50	ME E31 – (Operations	Research								
Semester		Hours / Week		Total	Credit	N	<u>/laximum Ma</u>	arks					
	L	Т	Р	Hrs	С	CA	ES	Total					
VI	3	0	0	45	3	40	60	100					
	• To im	part knowledge	e about Op	erations Re	search techi	niques and	enable stud	lents to take					
	effect	ive engineering	and manag	gerial decision	ons.								
	• To tra	ain students to	apply Ope	rations Res	earch techn	iques for th	ne effective	utilization of					
Objectives	availa	ible resources i	n engineerii	ng and busir	ness.			· · .					
	• 10 ec	luip students to	find the op	timum solut	ion for trans	portation pi	roblems and	assignment					
		ems.											
		 I o impart knowledge a-bout network models and train students to apply these concepts to solve the real world problems. 											
	Solve	 solve the real world problems. To train students to apply simulation techniques to solve inventory and queuing problems. 											
		• To train students to apply simulation techniques to solve Inventory and queuing problems.											
	1 Form	Linear Program	e ine sidde	als and solve	able to								
Course	2 Apply	transportation	models and	Assignmen	t models to s	solve real w	orld problem	IS					
Outcomes	3 Const	truct Networks	and find opt	imum solutio	n			10.					
	4. Apply	Inventory mod	els to solve	inventory pr	oblems.								
	5. Apply	Queuing mode	els to solve p	problems an	d analyze th	em using si	mulation tec	hniques.					
Linear Prog	amming Pro	oblems	-		-			•					
OR-definition	 Phases c 	of OR - Models	, Concept o	of linear pro	gramming n	nodel-Devel	opment of L	P models –					
Graphical sol	ution - Simpl	ex method - Big	g M method	- Two phas	e method, Ir	ntroduction t	o duality the	ory. [09]					
Transportati	on Problem	s0											
Transportatio	n problems-	Balanced and I	Jnbalanced	TP- Basic fe	easible solut	ion, Optima	l solution by	MODI					
method - Deg	generacy, Pr	oduction proble	ms. Assign	ment proble	ms - Hunga	rian method	I – Balancec	and					
Unbalanced a	assignment p	problems - Prob	liem with as	signment re	strictions-, I	ravelling sa	lesman proc	biem. [09]					
Shortost rout	a model Min		roo model	Movimum f	low model	Project not	work constru	uction					
Network logic	e mouel- Min	's rule - Critical	Path Metho	d (CPM) an	d Project Ev	aluation and	NOIR CONSIL Review Te	chnique					
(PERT) – Pro	bability of co	moleting a proi	ect in a sch	eduled date	- Crashing o	of project ne	tworks						
Inventory M	odels	inpleting a proj			orabiling c		works.	[00]					
Types of inve	entory models	s - Inventory co	st - Determi	nistic Invent	ory models	- Economic	Order Quan	tity (EOQ) -					
Purchase and	d Production	models with an	d without sl	nortages - D	eterminatior	n of buffer st	tock and re-	order levels -					
EOQ with priv	ce breaks - N	/lulti product EC	Q models -	- ABČ, VED	& SDE ana	lysis in inve	ntory - Introc	duction to					
Stochastic in	ventory probl	ems –discrete	case and co	ntinuous ca	se.	-	-	[09]					
Queuing The	eory and Sin	nulation											
Queuing syst	em - termino	logies of queui	ng problem	 application 	is of queuing	g model - Po	oisson distrik	oution and					
exponential of	listribution	Single server of	queuing mo	idels – Simu	lation - Nee	ed for simula	ation – Adva	ntages,					
disadvantage	es and applic	ations of simula	ation - Rand	om number	generation -	- Monte Cai	rlo technique	e- Inventory					
and Queuing	problems in	simulation.					Tat	[09]					
Taxt book(s)	\ -						101	al nours: 45					
1 Hamdy	Δ Taha "Οι	neration Resea	rch - An Intr	oduction" 9		arson India	Education	Services					
Pvt.Ltd	., New Delhi.	2014.											
2. Pannee	erselvam, R.,	"Operations Re	esearch" 2nd	Edition, Pre	entice Hall of	f India Priva	te Ltd, New	Delhi, 2006.					
Reference(s):			- ,			,	,					
1. Wayne	L. Winston, "	Operations Rese	arch – Appli	cations and	Algorithms",	4 th Edition, C	Cengage Lea	rning					
India Pi	rivate Limited	New Delhi, 201	1.			, 		-					

3 2.2. a ~~~

2.	Frederick S. Hillier And Gerald J. Lieberman, "Introduction To Operations Research", 9th Edition, McGraw
	Hill Publishing Co., New Delhi, 2011.
3.	Perm Kumar Gupta, D.S. Hira, "Operations Research", S.Chand and Company Ltd., 2008.
4.	Srinivasan G, "Operations Research Principles and Applications", 3 rd Edition EEE PHI, 2017.
5.	Sharma J K, "Operations Research Theory and Applications", 5th Edition, Macmillan India, 2013.
	Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00		РО											PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	2		2	2						3	2		3
	CO2	2	3	3	2	2						2	3	1	2
50 MC E31 & Operations	CO3	3	2	2	2	2						1	2		3
Research	CO4	3	3	2	2	2						1	3	2	
	CO5	3	2	2	2	2						2	2		2

K.S.Rangasamy College of Technology – Autonomous R2018											
	50 MC E32– Design of Material Handling Equipments										
			B.E. Mecha	tronics Eng	ineering	•					
Semester	F	lours / Week	_	Total	Credit	N	laximum Ma	urks			
Ochicater	L	T	P	Hrs	С	CA	ES	Total			
VI	3	0	0	45	3	40	60	100			
Objectives	 To enlig equipme To impa drums a To unde gears. To end applicat To gain escalato 	 To enighter the learners about the concepts of basic operational reatures of materialhandling equipment. To impart the fundamental knowledge design flexible hoisting appliances, pulleys, sprockets, drums arresting gear and brakes. To understand the motor rating and determination of torque during transient motion inhoisting gears. To endow with an overview of specific requirements of conveyors systems and their applications. To gain adequate knowledge in the area of designing cage elevators, fork lift truck and escalators. 									
Course Outcomes	 At the end of the course, the students will be able to Describe the importance of material handling equipment and select proper material handling equipment for specific applications. Design flexible hoisting appliances, pulleys, sprockets, drums, load handling attachments, arresting gear and brakes Design the drives used in hoisting equipment and determination of torque during transient motion in hoisting gears. Understand the specific requirements of conveyors systems design and their applications. 										
Materials Ha	ndlina Equip	ment	, -	y ,							
Introduction - of material h machines, su Design of Ho Designing of sprockets and magnets - Gr	Interplant trar andling equip rface and ove bist hoisting eleme d drums - Loa abbing attach	nsporting fac ment – type rhead equipr ents: Welded d handling at ments – Lad	lities - Type s of materia nent- applic and roller tachments es - Arrestir	es - Principle al handling e ation- AGVs chains - Hen - Forged hoo ng gear and	groups of m equipment – - ASRs. np and steel oks and eye Brakes.	aterial, hand - General ch wire ropes - hooks - Cra	dling equipm naracteristics - pulleys, pul ne grabs – E	nent - Choice s of Hoisting [09] Iley systems, Electric lifting [09]			
Hoisting Gea Drives of Hoi monorail crar Cogwheel dri Conveyors Conveyor typ – Design and Elevators	ar sting gear - H nes – Trackles ve. es - Belt conv applications.	land and pov ss travelling r reyor - Pneur	ver drives – nechanism: natic conve	- Traveling g s - Slewing, yor - Screw	jear - Rail tr jib and luffir conveyor - <i>I</i>	aveling meo ng gear - Se Apron conve	chanism - Ca lecting the r yor - Vibrato	antilever and notor ratings [09] ory conveyor [09]			
Bucket eleva	tors - design	- Loading ar	nd bucket a es – Fork lift	rrangements t truck – Esca	s - Cage ele alators.	evators - Sh	aft way, gui	des, counter [09]			

2.2.2 ~

Text book(s) :															
1 Rudenko, N., "Mate	erials Har	ndling	Equip	ment	", Pea	ce Pu	blicat	ions,	Masc	ow, 20	014.				
2. Spivakovsy, A.O ar	nd Dyach	kov, \	/.K., "	Conve	eying	Machi	ines",	Volur	nes I	and II	, MIR	Publis	shers,	2012	
Reference(s) :					, ,										
1. Alexandrov, M., "M	aterials F	landli	ng Eq	uipme	ents",	MIR F	ublis	hers, 2	2010.						
2. Arora,.K.C and Vik 2008.	Arora, K.C and Vikas V. Shinde., "Aspects of Material handling", First Edition, Laxmi Publications (P). Ltd, 2008.														
3. Fayed,.M.E and Th press,2010.	Fayed,.M.E and Thomas S.Skoair, "Mechanical Conveyors", Selection and operation", First Edition, CRC press,2010.														
4. P.S.G. Tech, "Desi	P.S.G. Tech, "Design Data Book", Kalaikathir Achchagam, Coimbatore, 2011.														
Pre-requisite: Nil															
i ic-icquisite. Mil															
MAPPING OF CO OUTCOMES	URSE C	опс	OME	S, PF	ROGF	RAM	ME O	UTC	OME	S AN	D PR	OGR	AMM	ie sp	EC
MAPPING OF CO OUTCOMES COURSE CODE &	URSE C	OUTC	OME	S, Pf	ROGI	RAM	ME O		OME	S AN	D PR	OGR	AMM	IE SP	PEC
MAPPING OF CO OUTCOMES COURSE CODE & COURSE NAME	URSE C	OUTC	ОМЕ 2	S, PF	ROGI	RAMN 5	ИЕ О Р 6	UTC O 7	OME:	S AN	D PR	OGR 11	AMM 12	IE SP	PEC SO 2
MAPPING OF CO OUTCOMES COURSE CODE & COURSE NAME	URSE C CO CO1	0UTC 1 3	ОМЕ 2 3	S, Pf 3	4	S 1	ME O P 6 1	UTC 0 7 1	OME: 8	S AN 9	D PR 10	OGR 11 2	AMM 12 3	IE SP P: 1 3	2 2 3
MAPPING OF CO OUTCOMES COURSE CODE & COURSE NAME	CO CO CO2	1 3	оме 2 3 2	3 3	4 2 2	S	ME O P 6 1 2	UTC 0 7 1 2	OME : 8 1	S AN 9 1	D PR 10 1 1	OGR 11 2 2	AMM 12 3 3	IE SP P: 1 3 3	SO 3 3
MAPPING OF CO OUTCOMES COURSE CODE & COURSE NAME	URSE C CO CO1 CO2 CO3	DUTC 1 3 3 3	OME 2 3 2 2	3 2 3 3	4 2 2 2	S 1 1 1	ME O P 6 1 2 2	UTC 7 1 2 2	8 1 1 1	S AN 9 1 1	D PR 10 1 1 1 1	OGR 11 2 2 2	AMM 12 3 3 3	E SP 1 3 3 3	SO 3 3 3

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CO4

CO5

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		K.S.Rang	asamy Colle	ege of Techr	ology – Aut	onomous		R2018				
			51 PT T(01 – Creo foi	^r Design							
Somostor		Hours / Wee	k		Credit	Μ	aximum Marl	(S				
Semester	L	Т	Р		С	CA	ES	Total				
VII	2	0	2	45	3	50	50	100				
Objective(s)	 To provof new Study t Undersdrawing To provof To acq 	 o provide the fundamental concepts of drawing and elaborating on how to concretize the idea if new structure such as a machine element. Study the conventions and rules to be followed by engineers for making accurate drawings. Inderstand the basic dimensioning practices that have to be followed in the preparation of lrawings. o provide hands on exposure of mechanism design and simulation using Creo. o acquire design knowledge on the sheet metal design and advanced surfacing modeling. 										
Course Outcomes	At the end 1. Creatin develop 2. Unders prepara 3. Interpre produc 4. Crafting develop 5. Develo and de	of the cours g knowledge oment of view tanding the in ation of the pa- etation of mark tion drawings g knowledge oment of view ping knowledge velopment of	se, the stude about the va ws. mportance of art drawings chine drawings about the val vs in sheet m lge about the views in suff	ent will be ab arious practice the linking fu gs that in turn rious practice etal. various prac face model.	le to es with regar inctional and help the stu- s with regard tices with reg	d to the dime visualization dents in the p d to the dime gard to the di	ensioning, see aspects in th preparation o nsioning, sec mensioning,	ctioning and ne f the tioning and sectioning				
Advance Par	rt Modeling) chniques -		atum Featur	es - Advanc	ed Sketchin	a Technique	s - Create				

advanced holes - Create advanced drafts and ribs - Create advanced shells - Create advanced rounds and chamfers - Use relations and parameters - Create advanced blends - Create sweeps with variable sections -Create helical sweeps - Create swept blends - Advanced Layer Techniques - Advanced reference management techniques - Create family tables - Reuse features - Advanced copy techniques - Create advanced patterns. [11]

Advance Assembly Design

Use advanced component selection - Use advanced assembly constraints - Create and use component interfaces - Utilize intelligent fasteners Extension (IFX) - Create and use flexible components - Restructure and mirror assemblies - Use assembly features and shrink wrap - Replace components in an assembly - Understand the basics of simplified reps - Create cross-sections, display styles, and combined views - Substitute components by reps, envelopes, and simplified reps - Understand advanced simplified rep functionality - Create and use assembly structure and skeletons - Utilize design exploration, extension (DEX). [12] Sheet Metal Design

2.3.2

Sheet metal Model Fundamentals - Creating Primary Sheet metal Wall Features - Creating Secondary Sheet metal Wall Features - Bending and Unbending Sheet metal Models - Sheet metal Form Features - Modifying Sheet metal Models - Sheet metal Setup and Tools - Detail sheet metal designs. [11]

Advanced Surfacing

Describe surface modeling and its terminology - Create various boundary surfaces - Utilize surface analysis tools - Additional Surface Analysis Tools - Extend and trim surfaces - Manipulate surfaces - Create and edit solid models using surface quilts - Utilize the master model technique - Style Surfacing. [11]

Total hours 45

Text	Book(s):
1.	Sham Tickoo, "PTC Creo Parametric 7.0 for Engineers and Designers", Revised and updated edition (MISL-DT), Dreamtech Press, 2018.
2.	Kelly D.S, Pro / Engineer 3.0 for Engineers and Designers, Mcgraw Hill, 2014.
Refe	erence(s):
1.	Creo Work Book, Dysmech Consultancy Servicers Private Limited, Pune, 2016.
2	David S. Kelley, Pro/Engineer wildfire 5.0 instructor, McGraw-Hill, 2016.
3	Sham Tickoo, Designing with Pro Engineer, Dreamtech Press, 2001.
4	Creo Work Book, Dysmech Consultancy Servicers Private Limited, Pune, 2016.

Pre-requisite: Engineering Drawing

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	CO	РО												PSO	
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	2					1		2		2			2	2
E1 DT T01 9 Orea for	CO2	2					2		2		2			2	2
Design	CO3	2					2		2		1			3	2
Design	CO4	3					3		3		1			3	3
	CO5	3					3		3		1			3	3

	K	.S.Rangasa	my College	of Technol	ogy – Auto	nomous		R2018				
			0 MC E34 -	- MEMS an								
Somostor			S.E. Mechat		Crodit	N	Antimum Ma	rke				
Semester			P	Hrs	Clean		FS	Total				
VI	3	0	0	45	3	40	60	100				
_	To devel	op the basic	knowledge	about the M	IEMS syster	n	1 1					
	To practice the concepts and principles of MEMS											
Objectives	To gain adequate knowledge micro fabrication and manufacturing techniques.											
	To equip students to Nano electronics											
	To Reali	zing the vari	ous applicat	tion of NEM	S and MEMS	3						
	At the end o	of the cours	e, the stude	ent will be a	ble to:							
	1. Understa	and the Fund	lamentals a	nd working p	principles of	microsysten	ns and micro	electronics				
Course	2. Practice	the concept	on both mic	ro fabricatio	n and manu	facturing teo	chniques.					
Outcomes	3. Acquire knowledge about micro system design and its various applications											
	4. Study at	bout the bas	ic concepts	of Nano ele	ctronics with	n various de	evices and ai	so discusses				
	5 Realized	the various a	nnlication o	f NEMS and	Architectur	o of MEMS						
Introduction	J. Realize		application o		Architectur							
Fundamentals	– Micro syster	ns and micro	electronics	- workina pri	nciple of mid	crosystems -	- Micro senso	ors. acoustic				
sensor, Bio se	ensor, chemic	al sensor, p	ressure ser	nsor, Tempe	erature sens	sor - micro	actuation te	echniques -				
Actuation using	g thermal force	es, actuation	using SMA,	Actuation u	sing piezo e	lectric effect	t, Actuation u	using electro				
static forces -	micro gripper	 micro mote 	ors – micro v	valves – mic	ro pumps, ty	/pes – micro	heat pipes.	[09]				
Micro Fabrica	tion And Man	ufacturing	Techniques	5								
Materials for n	nicro systems	 Substrate 	es and wafe	er- Silicon, C	Quartz, Piez	oelectric cry	/stals, polym	iers - Photo				
Lithography –	Diffusion- Ox	idation – C	/D- PVD, E	Etching, type	es - Bulk m	icro manufa	icturing – Su	urface micro				
machining - Mi	cro system pa	ickaging-ma	terials, die le	evel, device	level, syster	n level - Pa	ckaging tech	niques – die				
preparation - S	urrace bondin	g-wire bond	ng - sealing	tiono				[09]				
Basic concepts	Bending of	thin plates	Mechanica	uuuis al vibration	Thermo me	chanics - Fi	racture mech	anice _				
Dasic concepts		unit plates -				Charlics - FI	acture mech	iai 1165 —				

2.3. a

Fluid mechanics at micro systems- Design considerations - Process design-mask layout design – Mechanical design-Applications of micro system in automotive industry, bio medical, aerospace and telecommunication. [09]

Nano Electronics

Basics of nano electronics – Nano electronics with tunneling devices – Nano electronics with super conducting devices - Molecular nano technology – Applications of MNT - Direct self-assembly-device assembly - electrostatic self-assembly-nano tubes – Nano wire and carbon-60 - Dielectrophoretic nano assembly. [09] Architecture And Applications

Architecture of MEMS – Requirements of nano systems - Development of nano electronics and structuring – Application of NEMS – Deposition of coatings – Three dimensional materials – Dewatering.

Total Hours: 45

[09]

Text book(s) :

Goser.K, Dienstuhl .J, "Nano Electronics & Nanosystems ", Springer International Edition, 2010.
 Tai – Ran Hsu,"MEMS & Microsystems: Design and Manufacture ", Second Edition Tata McGraw Hill, 2008.

Reference(s) :

1. Michael Pycraft Inrushes, "Nano Electro Mechanics in Engineering & Biology ", CRC Press New York, 2002.

Charles P.Poojlejr Fran K J.Owners, "Introduction to Nano Technology", Willey Student Edition 2008.
 Gregory Timp, "Nano Technology", Spinger International Edition, 1999.

 Julian W.Gardner, Vijay K.Varadan, Osama O.Awadel Karim, "Microsensors MEMS and Smart Devices", John Wiby & Sons Ltd., 2001

Pre-requisite: Nil MAPPING OF COU

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00		PO											PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
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	CO5	3	2		2	3		2					1	2	3

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

	K.S.Rangasamy College of Technology – Autonomous R2018											
	50 MC E35 – Product Design and Costing											
	r		B.E. Mecha	atronics Eng	gineering	1						
Semester	F	lours / Week		Total	Credit	M	laximum Ma	irks				
	L	Т	Р	hrs	C	CA	ES	Total				
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Objectives	 To enable develop To educe To train To impate To educe 	To enable the student to understand the various aspects of the product design and development. To educate the concept of customer need and product architecture. To train the student in the concept of product development economics in product design. To impart knowledge on various types of costs associated with production of components. To educate the concept of work study and ergonomics and its influence in production.										
Course Outcomes	At the end of the end	of the course and the funda- and the signi- e economic a e various type g, milling, grir- he process of e the standar	e, the stude amentals of ficance of cu analysis prod es of costs f ading, weldir work study d time.	ent will be all product desi ustomer satis cess, factors or producing ing and forgin , method stu	ble to gn, planning affection and affecting it a component g. udy, tools an	, developme issues asso and trade-off is by turning ad technique	ent and produciated with it fs. , drilling, sha	uct life aping, and able to				
Product De Principles of	sign and Dev creativity in c	relopment lesign - Prode	uct developr Design for c	nent plannin ustomer and	g - Planning I design for r	process - P	roduct analy	sis – Criteria				

[09]

Customer Needs and Product Architecture

Customer satisfaction - Voice of customer, Types of customer needs, customer need model - Organizingand

prioritizing customer needs. Product architecture – Architecture types - Implication - Establishing product modularity – types. [09]

Product Development Economics

Elements of economic analysis - Quantitative analysis- Qualitative analysis. Economic Analysis Process - builda base- Case financial model - Sensitivity analysis - Understand the project trade-offs - Influence of the qualitative factors on project success. [09]

Cost Estimation of Manufactured Jobs

Cost estimation to find out labor and total costs for simple machining works such as Turning, Drilling, Shaping Planning, Milling, Grinding, Cast, Welded and forged components. [09]

Work Study and Ergonomics

Method study - definition - objectives - Motion economy principles - Tools and techniques – applications. Work and Measurement - purpose - use - procedure techniques - Standard time. Ergonomics - tools - principles applications. [09]

Total Hours: 45

Text book(s) : 1 Karl T. Ulrich, Steven D. Eppinger, "Product Design and Development", Tata Mc Graw-Hill edition, 4th Edition, 2012. 2 Kevin Otto, Kristin Wood, "Product Design: Techniques in Reverse Engineering and New Product Development", Pearson education, 2012.

Reference(s) :

1	George E Dieter, " Engineering Design: A Materials and Processing Approach", McGraw Hill Publishing
	Company, London, 2000.

2 Stanley Walker Jones, "Product Design and Process Selection", Butterworth Publications, 1973.

3 Sameul Eilon, "Elements of Production Planning and Control", McMillan and Company, 1962.

4 R Kesavan, C Elanchezhian and B Vijaya Ramnath, "Process Planning and Cost Estimation", New Age International (P) Ltd., Publishers, 2015.

Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO												PSO	
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
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Design and Costing	CO3	1	2	3	1								2		2
Design and Costing	CO4	2	2	3	2								2		2
	CO5	2	2	2	2			2					1		1

	K.S.Rangasamy College of Technology – Autonomous R2018											
			50 MC E45	Drone Tec	hnology							
	B.E. Mechatronics Engineering											
Somostor	Semester Hours / Week Total Credit Maximum Marks											
Semester	L	Т	Р	Hrs	С	CA	ES	Total				
VII	VII 3 0 0 45 3 40 60 100											
	The main aim of this course is to understand the basics of Drones and its components.											
	 To introduce the various types, functions of UAV, and Rules and Regulation of Aerial vehicles. 											
Objectives	Objectives • To make the students understand the basic working principle and different Sensors used in											
		lo the stude	nto to idontif	v and under	stand variou			votomo				
		rstand the n	nts to lueritin	erating unm	anned vehic	ls haviyation	loads	ystems.				
	At the end of	of the cours	e the stude	onte will be	ahle to	ics and pay	10003					
Course Outcomes	At the end of the course, the students will be able to 1. Explain the fundamental ideology about unmanned and micro air vehicles. 2. Classification of unmanned systems, Parts and function of UAVs, UGV, UWV. 3. Demonstrate the design process of UAVs fixed wing multi copter and electronic components used in Drones and its specification. 4. Apply guidance and trajectory control algorithm to navigate the unmanned system. 5. Describe the applications and payloads of aeriavehicles.											

2.3. a

Intro Basic Oper Unm	duction Drone ations anned	on to Drone e terminolog and Advanta	y- Histori ages of L	ical d JAVs.	evelo	pmer	nt-Typ	es of	drone	es- Co	ompo	nents	for U	IAV P	rototy	pes-F	unctio [09	onal]
Unm Class Elect vehic	Unmanned Aerial Vehicle - Basics of UAV piloting - Unmanned ground vehicle-, Unmanned Water vehicle – Classification of UGV and UWV- Parts and function of UGV and UWV- Launching and Recovery of US – Electronics components of US- Amphibious Vehicle- Lighter Than-Air Systems- Rules and Regulation of Aerial vehicles. [09] Integration of Aerial Robots and Sensors Fixed wing UAVs- Multi copter UAV- Flapping wing UAV- Swarm Robot. Integration of Aerial robot- IOT based																	
Fixed Aeria sense sense	d wing I robo ors – a or and gation	UAVs- Multi t- Safety pro cceleromete chemical se	i copter L ocedure er-barome ensor. nce Svst	JAV- of Ae eter-C	Flapp Flapp Frial F Gyro s of Aer	s ping v Robot senso rial Ve	ving L - Mat r and	JAV- erial i magr	Swari for Ae neto s	m Rol erial F enso	bot, lı Robot r- oth	ntegra . Intro er ser	ation o oducti nsors	of Aei ion to – dist	rial rol sens ance	oot- I ors – sensc	OT ba type or-ther [09	ased s of rmal)]
Fligh funct Appli rescu	Flight Control System –Path planning- Way point Navigation system - Obstacle's avoidance Techniques – functional block of lateral and longitudinal guidance- GPS – GCS-Telemetry –Transmitter & Receiver. [09] Applications and Payloads of Aerial Vehicles Applications of Aerial Vehicles - Remote sensing, Aerial mapping, Disaster response, Surveillance Search and rescue, Transportation Payload delivery, Image acquisition for cinematography, Aerial Observations Military Operations, Civilian and Private Applications-of Payload -Classification of payloads -Camera and sensors.[09]																	
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Text	book:														- 1	Utar	liours	5 4 5
1	Theo	ry, Design, a	nd Appli	catior	ns of l	Unma	nned	Aeria	al Veh	icles-	by A	. R. JI	na Ph	.D., 2	016			
2.	Reg Austin, "Unmanned Air Systems: UAV Design, Development and Deployment "First Edition, Wiley Dublishere, 2015																	
Refe	^{2.} Publishers, 2015. Reference(s):																	
1.	Hand	book of Unm	nanned A	erial	Vehic	les- E	Editor	s: Val	avani	s, K.,	Vach	tseva	nos, (Georg	ae J. (Eds.)	, 2014	ł
2.	 Handbook of Unmanned Aerial Vehicles- Editors: Valavanis, K., Vachtsevanos, George J. (Eds.), 2014 Guidance of Unmanned Aerial Vehicles- by Rafael Yanushevsky (Author), 2011 																	
3.	Mirosaw Adamski, "Power units and power supply systems in UAV", New Edition, Taylor and Francis																	
0.	3. Group publishers, 2014.																	
4.	4. Droneprep, "Unmanned Aircraft Systems Logbook for Drone Pilots & Operators", Create Space																	
	Pre-re	quisite:	liernig i i	allon	<u>, _a</u>		antion	, _0.	0.									
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			CO5	2	3	3	1	1		2					2	3	1	
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		To knoTo lear	w the diff n the ND	ferent T me	t type ethod(of se (s) be	rvice st suit	and p ed to	oroces evalu	ss def uate th	ects. ne ma	anufad	ctured	l prod	ucts.			

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2	Prakas	sh F	Ravi, "No	ndestruct	ive Te	esting	Tech	nique	s", Ne	w Ag	e Inte	ernatic	nal p	ublish	ers, 1	st Rev	ised	
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1	Balde	/ Ra	aj, Jayak	umar.T, 1	Thava	simuti	nu.M,	"Prac	tical N	Ion D	estru	ctive	Testin	ig", Na	arosa	Publis	shing	
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50 MC Hours / Wee L	E43 - N B.E. N ek	lew and Iechatro	Renewabl	e Energy	Sources									
Hours / Wee	B.E. N ek	/lechatro	50 MC E43 - New and Renewable Energy Sources B.E. Mechatronics Engineering											
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3	0	0	45	3	40	60	100							
 The students are expected to identify the new methodologies / technologies for effective utilization of renewable energy sources. Create awareness about sources of energy and able to estimate how long the available conventional fuel reserves will last. Learn the fundamental concepts about solar energy systems and devices. Design wind turbine blades and know about applications of wind energy for water pumping and electricity generation. Understand the working of OTEC system and different possible ways of extracting energy from ocean, know about Biomass energy, mini-micro hydro systems and geothermal energy system. At the end of the course, the student will be able to 														
he end of th Sain knowled Provide impo Jnderstand th Set the utiliza Jnderstand th	e cour dge abc rtance he role ation of he cond	se, the sout worki of Wind of ocear Biogas cept of e	student wil ng principle Energy. n energy in plants and g nergy Cons	I be able t of various the Energy geotherma ervation.	o solar ener Generatio I energy	gy systems n.								
Solar Energy Solar radiation - Availability- Measurement and estimation- Isotropic and an isotropic model - Introduction to solar collectors (liquid flat- Plate collector - Air heater and concentrating collector) and thermal storage - Steady state transient analysis - Photovoltaic solar cell - Hybrid systems - Thermal storage- Solar array and their characteristics evaluation – Solar distillation – Solar drying. Wind Energy Wind energy - General considerations - Wind Power plant design – Horizontal axis wind turbine - Vertical														
	lization of rer eate awarene nventional fu earn the funda- esign wind tu imping and el nderstand the ergy from oc- othermal ene he end of the Bain knowled Provide impo Jnderstand t Eat the utiliza- Jnderstand t bility- Measu flat- Plate c analysis - Pr aluation – So	The students are expe lization of renewable eate awareness abore not the fundamental easign wind turbine of easign wind turbine of easign wind turbine of easign wind turbine of easign wind turbine of more and electricity inderstand the working easing from ocean, kr eathermal energy system of the end of the court of the more and the court of the transformer of anderstand the role of the utilization of anderstand the content bility- Measurement flat- Plate collector analysis - Photovolt aluation – Solar dist I considerations - V	The students are expected to id lization of renewable energy eate awareness about source nventional fuel reserves will I earn the fundamental concept esign wind turbine blades a imping and electricity generate inderstand the working of O ergy from ocean, know about othermal energy system. The end of the course, the Sain knowledge about workite Provide importance of Wind Understand the role of ocean Set the utilization of Biogas Understand the concept of e bility- Measurement and est flat- Plate collector - Air he analysis - Photovoltaic solar aluation – Solar distillation – I considerations - Wind Pow	The students are expected to identify the milization of renewable energy sources. The estudents are expected to identify the milization of renewable energy sources. The eate awareness about sources of energy noventional fuel reserves will last. The fundamental concepts about solated and the fundamental concepts about solated are sign wind turbine blades and know all imping and electricity generation. The end of the working of OTEC system are from ocean, know about Biomass of the end of the course, the student will be blades and the molecular system. The end of the course, the student will be blades about working principle Provide importance of Wind Energy. Inderstand the role of ocean energy in Bet the utilization of Biogas plants and guiderstand the concept of energy Constitution. Set the utilization of Biogas plants and guiderstand the concept of energy Constitution. Inderstand the collector - Air heater and constitution - Solar distillation - Solar dryin aluation - Solar distillation - Solar dryin aluation - Solar distillation - Solar dryin - Solar dryin - Solar distillation - Solar dryin - Solar dryin - Solar distillation - Solar dryin - Solar - Wind Power plant de - Solar - Wind Power plant dryin - Solar -	 b 1 0 1 0 1 43 1 3 b 1 0 1 43 1 3 c 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	 b i c i c i c i c i c i c i c i c i c i	 are students are expected to identify the new methodologies / technologies for efficient of renewable energy sources. eate awareness about sources of energy and able to estimate how long the avareness about sources of energy and able to estimate how long the avareness about sources about solar energy systems and devices. easign wind turbine blades and know about applications of wind energy for imping and electricity generation. inderstand the working of OTEC system and different possible ways of extra ergy from ocean, know about Biomass energy, mini-micro hydro systems and othermal energy system. inderstand the course, the student will be able to Sain knowledge about working principle of various solar energy systems Provide importance of Wind Energy. Juderstand the role of ocean energy in the Energy Generation. Get the utilization of Biogas plants and geothermal energy Juderstand the concept of energy Conservation. bility- Measurement and estimation- Isotropic and an isotropic model - Introof flat- Plate collector - Air heater and concentrating collector) and thermal analysis - Photovoltaic solar cell - Hybrid systems - Thermal storage- Solar aluation – Solar distillation – Solar drying. I considerations - Wind Power plant design – Horizontal axis wind turbine 							

axis wind turbine - Rotor selection - Design considerations - Number of blades - Blade profile - Power regulation - Yaw system - Choice of power plant - Wind mapping and selection of location - Cost analysis and economics of systems utilizing renewable sources of energy. [09]

Ocean Thermal Energy Conversion

Wave and Tidal energy - Availability - Geographical distribution - Power generation using OTEC - Wave and Tidal energy - Scope and economics - Geothermal energy - Availability - Limitations. [09] Hydrogen Energy

Electrolytic and thermo chemical hydrogen production – Metal hydrides and storage of hydrogen – Hydrogen energy conversion systems hybrid systems – Economics and technical feasibility- Applications of fuel cells. [09]

New Energy Sources

Bio fuels classification – Biomass production for energy forming – Energy through fermentation – Pyrolysis - Gasification and combustion - Aerobic and Anaerobic bio conversion process - Feed stock - Properties of bio- gas composition - Biogas plant design and operation - Alcoholic fermentation – Phase change materials. [09]

Text book:

1.	G. S. Sawhney, "Non-Conventional Resources of Energy", PHI Learning Pvt. Ltd 2012
2.	Rai G.D, "Non-conventional Energy sources", Khanna Publishers, New Delhi, 2010.
Refer	rence(s):
1.	Bent Sorensen., "Renewable Energy", Academic Press, Elsevier, New Delhi, 2011.
2.	Kothari.D.P, Singal.K.C and Rakeshranjan., "Renewable energy sources and emerging technologies", PHI learning Pvt Ltd, New Delhi,2011.
3.	Tasneem abbasi and Abbasi.S.A, "Renewable energy sources", PHI learning Pvt Ltd, New Delhi, 2011.
4.	Tiwari. G.N., Solar Energy – "Fundamentals Design, Modeling & Applications", Narosa Publishing House, New Delhi, 2002.

Pre-requisite: NIL MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00						P	0						PSO	
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	1	2
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50 MC E43 & New and	CO2	2	3	3	2	2			2	1	2		2	2	2
Renewable Energy	CO3	2	3	3	2	2			2	1	2		2	2	3
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	50 MC E44 - Machine Learning and Condition Monitoring B.E. Mechatronics Engineering											
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		To unde	rstand the m	nachine fron	n data witho	ut human in	tervention.					
		To know	the principl	e methods	of machines	by simula	iting the hu	uman ability	v to			
Ohi	octivos	understa	and machine	e language.								
0.05	To understand different types of condition monitoring techniques. To be ferrilize with the Wayslet Tenneform on deihertise menitoring											
	To be familiar with the Wavelet Transform and vibration monitoring.											
	To know the different applications of non-destructive testing techniques in fault diagnosis.											
	At the end of the course, the students will be able to											
	 Familiarize the different machine learning techniques. 											
Co	ourse	2. Underst	and the Na	itural Langu	lage Proces	sing (NLP)	and deep	Learning w	innoustnai			
Out	comes	3 Familiar	ize with dif	fferent sign	al processi	na techniai	ues and its	s advantage	s inindustries			
		4. Underst	and the role	of Wavelet	Transform a	and vibratior	n monitoring	ı.				
		5. Underst	and the sigr	nificance of	fault diagno	sis and non	-destructive	testing tecl	nniques.			
Intro	duction	to Machine	_earning									
Linea	ar Regre	ssion-Linear I	Regression	Assignment	-Logistic Re	gression-Na	aive Bayes-	Model Sele	ction-Advanced			
Regr	ession-T	ree Models	-Model Se	lection -	Practical C	Consideratio	ons-Boosting	g-Unsupervi	sed Learning:			
Clust	tering, Pi	rincipal Comp	onent Analy	SIS - Investi	ment Case S	Study - I elec	com Churn (Case Study.	[09]			
	ral Proce	ssing-Syntac	tic Processi	anu Kenno		r-Doon Loor	ning: Introd	uction to Ne	oural Natworks-			
Con	olution l	Neural Netwo	rks -Industr	ial Applicati	ons. Classic	al Reinforc	ement Lear	ning-Deep-	Reinforcement			
Intro	duction	to condition	monitoring	and Basic	signal pro	cessina tea	chniques		[09]			
Basi	c concep	t. techniques	- visual mor	nitorina. tem	perature mo	nitorina. vib	ration moni	torina. Iubric	ant monitoring.			
crack	, monito	ring, thickne	ss monitori	ng, noise a	and sound	monitoring.	Basic sigi	nal process	ing techniques-			
Prob	ability di	stribution and	density, For	urier analys	is, Digital filt	ering.	-	-	[09]			
Wav	elet Trai	nsform and V	ibration Mo	onitoring								
Intro	duction t	o Wavelets, (Continuous	Wavelet Tra	ansform (CV	VT), Discret	e Wavelet	Transform (I	DWT), Wavelet			
Pack	tet Trans	storm (VVPT),	types of wa	Velets – Ha	arwavelets,	Shannon w	avelets, IVI	eyer wavele	ts, Daubechies			
	ction ter	shniques inst	ruments tra	neducere e	election me		location tin	ne domain a	nalvsis [09]			
Mec	hanical f	ault diagnos	is and Non	destructive	e testing tec	hniques			narysis. [00]			
Wea	Wear monitoring and lubricant analysis - sources of contamination. Spectrometric Oil Analysis Procedure											
(SOA	SOAP) and ferrography. NDT-Measurement of surface and subsurface flaws - liquid penetrant inspection, eddy											
curre	ent inspe	ction, radiogra	aphic inspec	tion, ultrasc	onic inspection	on.			[09]			
	Total hours 45											
Text	lext book:											
1	Robert Bond Randall – Vibration-Based Condition Monitoring – Industrial, Aerospace and Automotive applications, John Wiley & Sons Ltd., 2011.											
2	R A Co	llacot – Mech	anical Fault	Diagnosis -	- Chapman a	and Hall Ltd	.,2007.					

Refe	erence(s):
4	Dr.K.Balaveera Reddy, ISTE Summer School on Machinery Diagnostics and Preventive Maintenance,
1.	KREC, Surathkal, June 19-25,2005.
2.	Dr.A.Ramachandra, ISTE-STTP on Maintenance of Machinery, SJCE, Mysore, June 18-31,2000.
3.	P Baldi, and S Brunak, Bioinformatics: A Machine Learning Approach. Cambridge, MA: MIT Press, 2002.
4.	C Bishop, Pattern Recognition and Machine Learning, Berlin: Springer-Verlag, 2006.
	Pre-requisite: NIL

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE & COURSE NAME	60						Р	0						PSO	
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	1	2		2			3		1	2		2	1	2
50 MC F44 & Machine	CO2			2	3	1		2		2				1	2
Learning and Condition	CO3			1		2	1					2		1	2
Monitoring	CO4			2		2						1		1	2
	CO5	1	2		2	2	2			2				1	2

	ł	K.S.Rangas	amy Colleg	e of Techno	ology – Aut	onomous		R2018				
	50 MC E46 – Finite Element Method B.E. Mechatronics Engineering											
	•		B.E. Mecha	tronics Eng	ineering	•						
Semester	H	ours / Week	_	Total	Credit	N	laximum Ma	rks				
Ochicator	L	Т	P	Hrs	С	CA	ES	Total				
VII	3	0	0	45	3	40	60	100				
Objectives	 To explo To practi To learn To apply mechani To learn 	re the mather ice the vario to use stand the finite elecs, heat tran the usage o	ematical the us steps inv dard practice ement meth osfer. f catalogues	ory keystone rolved in the es and stand od by solvin s and standa	es in finite el finite eleme lard data. g the proble	ement analy nt analysis o ms in solid a hine transmi	vsis. of a problem. and structura ssion elemer	l nts.				
At the end of the course, the students will be able to1. Apply the Variational methods of approximation for solving continuum structural problems.2. Formulate the one dimensional bar element and apply it for solving solid mechanics problems.3. Estimate the steady state heat transfer through composite wall and thin fins.4. Solve the structural problems with plane stress, plane strain assumptions and axis symmetric problems using triangular element.5. Formulate the Quadrilateral element for iso parametric conditions and Implement the Gauss- Legendre guadrature technique for numerical												
Fundamental Mathematical – Weighted re element methe elimination me One Dimension element equat to Bars and Pl One Dimension conditions – S – Application t Two Dimension Triangular elem – Plane stress and heat trans	s models of phys esidual method od (FEM) – Ba ethod. onal Problems nal elements – tions – Connect ane Trusses. onal Beam and nal beam eleme colution - Applic o steady state I onal Problems ment – Interpole and Plane stra ofer problems.	ical systems Galerkin, L asic features Interpolation ivity of eleme d Heat Trans ent – formulat ation to anal heat transfer ation and Sha in assumptio	- Analytical east square - steps of f and Shape ents - Impos sfer Problen tion - hermite ysis of bean in composite ape function ns - Elemen	solutions - Ves and Colloc FEM – Nume functions - P ition of bound s shape funct ns. One dime e walls and th s – Strain-Dis t equations –	/ariational metho cation metho crical solution rinciple of mi dary conditio cion - Elemen ensional heat nin fins. splacement r Axis symme	ethods of app ods. Piecewis n of finite ele inimum poter ns – Solution t equations - transfer - Co elations - Str tric problems	proximation – se approxima ement equation ntial energy - of equations Load vector a onduction and ess-Strain rel s - Application	Ritz method Ition – Finite ons – Gauss [09] Derivation of - Application [09] and boundary d Convection [09] lations to Structural [09]				
Quadrilateral equations - Ap	Natural co-ordinate systems - Legrangian and Serendipity Rectangular elements - Isoparametric formulations - Quadrilateral elements – Coordinate transformations – Jacobian transformation matrix -Shape functions - Element equations - Application to plane stress problems - Numerical integration – Gauss-Legendre quadrature. [09]											

-9------3.3. a

Text	book(s) :			
1	Chandrupatla T.R	and Bele	gundu A.D., "Introduction to Finite Elements in Engineering", 4 th Editi	on,
1	Pearson Education	, New De	elhi, 2011.	
2	SingiresuS.Rao, "T	he Finite	Element Method in Engineering", 5th Edition, Butterworth-Heineman	n, New
2	Delhi, 2011.			
Refe	erence(s) :			
1	Reddy J.N., "An Inf	roductior	n to Finite Element Method", 3rdedition, McGraw Hill Education Ltd, I	New
1.	Delhi, 2006			
2.	Daryl L.Logan, "A F	irst cours	e in the Finite Element Method", 5th Edition, Cengage Learning, 201	1.
3.	Zeinkiewicz.O.C, "	The Finite	e Element Method: Its Basis and Fundamentals", 7th Edition, Elsevier	, 2013.
1	Cook R D, Malkus	D S,Ples	ha M E, "Concepts and Applications of Finite Element Analysis", Fou	rth
4.	Edition, John Wiley	and Sor	ns, New Delhi, 2011.	
	Pre-requisite: Nil			
		RSE OU	TCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPEC	FIC
	OUTCOMES			
C	OURSE CODE &		PO	PSO
		CO		

COURSE CODE &	00		РО											PSO	
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	2	3	2	2	1	1	1	1	1	1	2	3	3	3
	CO2	3	3	3	2	1	2	2	3	2	1	2	3	3	3
50 MC E46& Finite Element Method	CO3	2	2	3	2	1	2	2	1	1	1	2	3	3	2
	CO4	3	2	2	2	1	2	1	1	1	1	1	3	2	3
	CO5	1	3	3	2	1	1	1	1	2	1	1	3	2	3
			-		-			-	-		-				

K.S.Rangasamy College of Technology – Autonomous R2018											
	51 PT T02 – Creo for Production Engineering										
Semester		Hours / Wee	k	Total Hrs	Credit	M	aximum Mar	ks			
	L	Т	Р		С	CA	ES	Total			
VII	2	0	2	45	3	50	50	100			
Objective(s)	 To enable the students with various concepts in mold design using Creo software. To understand the basic operations of CAM and automation of manufacturing industries. To ensure that the error rate is decreased, uniformity of the product is high and the precessionin the process can achieved. To impart the mathematical formatting and documentation related to manufacturing process in order to become professionally efficient. To create an ability to make a design and production model using rapid prototyping methods respectively. 										
Course Outcomes	At the end 1. Create 2. Create 3. Create 4. Ability 5. Relate	I of the court e, modify and geometries, geometries, to retrieve th the concepts	se, the stude analyze mole tool paths ar tool paths ar e mathematic s of rapid pro	ent will be al d component nd generate N nd generate N cal functions totyping to cr	ble to s and assem NC codes for NC codes fo during design eate real tim	blies. turning using r milling using n process. e products.	g Creo softwa g Creo softwa	are. are			
Mold design Basic Mold F Shrinkage – Splitting Mole Manufacturin Manufacturin Models - Usin Center - Crea	Mold design Basic Mold Process - Prepare design models for the mold process - Design Model Analysis - Mold Models – Shrinkage – Work pieces - Mold Volume Creation - Parting Lines - Skirt Surfaces – Parting Surface Creation - Splitting Mold Volumes - Mold Component Extraction - Mold Features Creation - Filling and Opening the Mold. [15] Manufacturing Process Manufacturing Process Overview - Creating Manufacturing Models – Configuring Operations - Using Reference Models - Using Work piece Models - Creating and Using NC Model Assemblies - Creating and Configuring a Work Center - Creating and Configuring Tools - Using Manufacturing Parameters - Creating Sequences										
Creating Volu- Sequences - Sequences - Finishing Se Engraving Se Rapid Proto RPT assignm	ume Milling - Creating F - Advanced -quences -C equences - typing: Intr nent.	Sequences From Surface Surface Mill Creating Traj Using the Pro oduction to F	- Creating Pr e Isolines Su ing Options ectory Milling ocess Manag RPT - Data Pr	ofile Milling S urface Milling - Creating R g Sequences Jer - Creating reparation - F	Sequences - Sequences oughing and – Creating and Post- P PT Data Pro	Creating Str - Creating Re-roughin Hole makin rocessing CL pcessing - Da	aight Cut Su Cut Line Su g Sequence g Sequence Data Files. ta Post Proc	rface Milling fface Milling s - Creating [20] ressing - [10]			

Total hours 45

Z. 2.2. Q ~

Text Book(s):															
1. Sham Tickoo, updated editio	"Pro / Engine on (MISL-DT),	er PT(Drean	C Crec n tech	Para Press	metri s, 201	c 3.0 f 5.	or En	ginee	rs and	l Desi	gners	", Rev	vised a	and	
2 Chua C.K., Le Scientific, Nev	ong K.F. and v Jersey, 2010	Lim C).	.S., "F	Rapid I	Protot	yping	: Prine	ciples	and A	Applic	ations	", 3 rd I	Editio	n, Woi	ld
Reference(s):															
1. Chee Kai Chu Edition, Singa	a, "Rapid Prot pore, 2010.	otypin	g: Prii	nciple	s and	Applio	cation	s", Wo	orld S	cientil	ic put	olicatio	ons, 3	rd	
2. Philip. J. Pritc	hard, "Mathca	d: a To	ool for	Engir	neers	and S	cienti	sts", V	Viley	oublic	ations	, India	ana, 2	013.	
3. Jacobs P.F., New York, 20	"Rapid Protot 10	yping	and I	Manuf	acturi	ng: F	undar	nenta	ls of	Stere	olitho	graph	y", Mo	Graw	-Hill,
4. David S. Kelle	y, Pro/Engine	er wild	lfire 5.	0 inst	ructor	, McG	raw-H	lill,20	16						
Pre-requisite:	Nil					,		,							
MAPPING OF	COURSE OU	TCON	NES, F	PROG	RAM	ME O	UTCC	MES	AND	PRO	GRA	име з	SPEC	IFIC	
OUTCOMES															
COURSE CODE	&						Р	0						P	SO
COURSE NAM	E	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	2		3										2	2
51 DT T02 8 Croc	CO2	2												2	2
Production Engine	ering CO3	2												2	2
	CO4 2 3 2 2														
	CO4 2 3 2 2 CO5 2 2 2 2														

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

		K.S.Rangas	amy Colleg	e of Techno	ology – Aut	onomous		R2018		
			51 MC E55	– Rapid Pro	totyping					
			B.E. Mecha	tronics Eng	ineering					
Semester	H	ours / Week		Total	Credit	N	laximum Ma	ırks		
	L	Т	Р	Hrs	С	CA	ES	Total		
VII	2	0	2	45	3	50	50	100		
Objectives	• To understand the various rapid prototyping, process and its applications. • To know the principle methods, areas of usage, possibilities and limitations as well as environmental effects of the Additive Manufacturing technologies. • To understand different types of tooling in additive manufacturing. • To know the different applications additive manufacturing role in the medical field.									
Course Outcomes	At the end of 1. Understa 2. Understa 3. Learn the 4. Initiate a 5. Understa	of the cours and the need and the Prince Principle, p continuous and the differ	e, the stude h, history, gro siple, process process para improvement rent types of	ents will be owth and cla s parameter ameters, app nt in medical rapid tooling	able to ssification o s, applicatio lications of and bio add g and applic	f RP system ns of SLA, F SLS, 3DP ai litive manufa ations.	n. FDM and LO nd LENS. acturing.	M.		
Introduction Overview – Manufacturin Applications. Liquid Based	to Additive N History - Ne g Technology d and Solid Ba	lanufacturin ed for the in produc ased Additi	ng time comp t Developr ve Manufac	oression in nent-Materia	product de als for Add ems	evelopment- litive Manut	Classification facturing Te	on -Additive echnology – [09]		
Classification applications applications, Powder Base	 Liquid base Solid based Laminated Ob Ed Additive M 	d system – S system –Fi ject Manufac anufacturin	Stereo Litho used Depos cturing (LON og Systems	graphy Appa sition Modeli /)- Principle	ratus (SLA) ng(FDM) - process, ac	- Principle, p Principle, p dvantages a	process, adv rocess, adva nd applicatio	antages and antages and ons. [09]		
Classification advantages a Laser Engine Medical and	Classification – Powder based system, Selective Laser Sintering(SLS) – Principles of SLS process - Process, advantages and applications, Three Dimensional Printing - Principle, process, advantages and applications- Laser Engineered Net Shaping (LENS)- Principle, process, advantages and applications. [09] Medical and Bio-Additive Manufacturing									
Customized Tissue Engine Software& T	Customized implants and prosthesis: Design and production, Bio-Additive Manufacturing- Computer Aided Tissue Engineering (CATE)-Applications. [09] Software& Tools									

S...... 3.3. a

DesigningforAdditiveManufacturing(DAM)-SoftwareToolsvs.Requirements-Pre-&Post-processing-3DScanning & the Scanning Process –Modifying &Repairing Data-AM File Formats-STEP File Format-More Detail on NURBS - Model Validation-Working with DICOM Files for 3DPrinting Medical Imagery. [09]

Hands on Session:

1. Design and develop the geometrical shapes using any one additive manufacturing machine.

2. Design and develop the 3D components using any one additive manufacturing machine.

Design and produce an own simple model using design software, and make the product using 3D printing machine

			I Otal	nouis. 45
Tex	t book(s) :			
1	Hari Prasad I and A	A.V. Sure	sh, "Additive Manufacturing Technology", 1 st Edition, Cengage Publis	hers,2019.
2.	Subramanian Sent	hilkannar	n Muthu and Monica Mahesh Savalani, " Handbook of Sustainability i	n
	Additive Manufactu	ıring", 1 st	Edition, Springer, 2016.	
Ref	erence(s) :			
1.	Jing Zhang and Yeo	n-Gil Jun	g, "Additive Manufacturing: Materials, Processes, Quantifications and	ł
	Applications", 1st Ed	lition, But	tterworth-Heinemann, 2018.	
2.	David Ian Wimpenny	y, Pulak I	M.Pandey and L.Jyothish Kumar, " Advances in 3D Printing & Additive	3
	Manufacturing Tech	nologies	", 1 st Edition, Springer, 2017.	
3.	Amit Bandyopadhya	iy and Su	Ismita Bose, "Additive Manufacturing", 1 st Edition, CRC Press, 2015.	
4.	Ian Gibson, David Ro	osen and	Brent Stucker, "Additive Manufacturing Technologies: 3D Printing, F	₹apid
	Prototyping, and Dir	ect Digita	al Manufacturing", Springer Nature, 2 nd Edition, 2015.	
	Pre-requisite: Nil	0		
	MAPPING OF COU	RSE OU	TCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPEC	FIC
	OUTCOMES			
С	OURSE CODE &	00	PO	PSO
		00		

COURSE CODE &	0.0	FU												P30		
COURSE NAME		1	2	3	4	5	6	7	8	9	10	11	12	1	2	
	CO1	3	3			1				2			2	2		
E1 MC EEE P Danid	CO2	3	2			1				2			2	2	1	
Manufacturing	CO3	2	3			1				-			2	2		
CO4		3	2			-				-			3	З		
	CO5	3	3			1				2			2	2		
		-	-		-		-	-	-		-					

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

		K.S.Rangas	amy Colleg	e of Techno	ology – Auto	onomous		R2018					
		51 M	C E56 – PC	Based Inst	trumentatio	n							
			B.E. Mecha	tronics Eng	ineering								
Somostor	ŀ	lours / Week		Total	Credit	N	laximum Ma	rks					
Gemester	L	Т	P	Hrs	C	CA	ES	Total					
VII	2	2 0 2 45 3 50 50 100											
	To under	erstand the fu	indamentals	s of virtual in	strumentatio	n and basic	concept of	Graphical					
	program	nming with th	eir functions	s in Lab VIE\	Ν.								
Ohiectives	To impa	art the fundam	nental know	ledge on the	software to	ols in virtual	instrumenta	ition.					
00/00/100	To deve	elop programi	ning throug	h Lab VIEW	graphical pr	ogramming	environmen	t.					
	To know	w about the da	ata acquisiti	on and varic	ous types Int	erfaces use	d in VI.						
	 To fami 	liarize studen	ts with vario	ous application	ons of VI.								
	At the end	of the cours	e, the stude	ents will be	able to								
	1. Unders	tand the basic	c concepts a	about virtual	instrumenta	tion.							
Course	2. Interpre	et the software	e tools in vir	tual instrume	entation.								
Outcomes	3. Develo	o programmin	g through L	ab VIEW gra	aphical prog	ramming en	vironment.						
	4. Describ	e the function	is and the ir	tions and ad	lirements in	Data acquis	sition system	•					
Introduction		tanu trie ullie	rent applica	lions and ad	Ivanceu com								
	reportive on	d Traditional	hongh ton	inetrumente	Conorol	functional	description	of a digital					
instrument	Block diagram	n of a Virtual	Instrument	Dhysical		d analog int	orfaces H	or a uigitar					
Software $-\Delta$	dvantages of V	/irtual Instrum	nonte over c	- Filysical C	instruments	– Architectu	re of a Virtus	al Instrument					
and its relation	on to the oper	ating system		onventional	manumenta			[09]					
VI Software		anng system.						[00]					
The solution	10013												

Graphical user interfaces – Controls and Indicators – Modular programming – Data types – Data flow programming – Editing, Debugging and Running a Virtual Instrument – Graphical programming palettes and tools – Function and Libraries – VI and sub-VI, Structures: FOR Loops, WHILE loops, Shift Registers, CASE

2.2.2

Doto Acquisi	ition and h	torfago	Such	~ m											[0	09]
Introduction to Installing Har Real time Dat and Bus Inter	o data acqu dware and a Acquisitio faces.	isition or drivers – n – USB	PC, Conf base	Samp iguring d DAC	ling fu g and Q. Con	indan addro nmon	nental essing Instru	s. Cor the h iment	ncepts nardw Interf	s of D are – aces:	ata Ao Digita Curre	cquisit al and ent loo	ion ar Analo p – RS	nd terr og I/O S 232	minolo functi C – R [(ogy – ion – S485 09]
Advantages a – Motion Con	and Applicat trol – Signa	ions – Ao I process	dvanc sing –	ed co Signa	ncepts Il anal	s – TC ysis: I	CP/IP Power	Vl's – [·] spec	PXI – tral ar	Instr alysis	ument s – Co	t Cont ontrol o	rol – I desigr	mage n and	acquis simula [0!	sition ation. 9]
Hands on Se	ssions:														-	-
1) Debugging	a VI, sub V	'I's using	Lab	VIEW.	nd Fil	_ I/O I	ucina	l ah V	/IE\//							
3) Control of t	temperature	e using da	ata ac	quisiti	ion ca	rd.	using		1 .							
4) Model and	simulate a	LED inte	rface	unit u	sing D	AQ.										
													То	tal Ho	ours: 4	45
Text book(s)	Trovio lim	Kring "I	ah \/II					hinal							" (Ord	
1 Jeffrey	I ravis, Jim Prentice F	Kring, Li Iali 2012	ad VII	EVV TO	r Ever	yone	: Grap	nicai	Progr	ammi	ng ivia	ide Ea	asy an	a Fur	i (3 ^{iu}	
2. Sanjeev	v Gupta, "Vi	rtual Inst	rume	ntatior	n usin	g Lab	VIEV	/", TM	H, 20	13.						
Reference(s)):					0		,	,							
1. Jovitha	Jerome, "V	irtual Inst	trume	ntatio	n usin	g Lab) View	", PHI	Lear	ning F	⁰vt. Lt	d, Nev	v Delł	ni, 201	0.	
2. Gary W	. Johnson, I	Richard .	Jennir	ngs, "L	_ab-vie	ew Gr	raphic	al Pro	gram	ming"	, McG	raw H	ill Pro	fessio	onal	
Publish	ing, 2011.	Loorning	with	Loh V	/IE\//"	Drop	tion L		112							
3. Robert Kevin I	n. bishup, ames "PC	Interfacio	y with na and	Lau v I Data		isition		hnique	no.	Meas	urem	ont In	strum	entat	on an	d
4. Control	". Newness	. 2010.	ig and	Data	Acqu	1311101	1. 100	innqui	03 101	meas	urenn	cint, in	Strum	icinat	onan	u
Pre-requ	isite: Nil	,														
MAPPIN	NG OF CO	URSE C	DUTC	OME	ES, PF	ROG	RAM	ME O	UTC	OME	S AN	D PR	OGR		1E	
SPECIF		DMES														
COURSE	CODE &	со	4	2	2	4	E	P	<u>0</u>	0	•	10	44	10	P:	50
COURSE		001	1	1	3	4	2	4	1	0	3	2	2	12	1 2	2
		001			2		5					2	2	3	2	2
51 MC E56 &	PC Based	CO2	3	2	1	1	2	1	1	1	1	1	1	1	1	1
Instrume	ntation	CO3	2	3	2	1	1	1	3	1	1	2	1	2	2	2
		CO4	2	2	2	1	1	2	2	1	1	1	2	1	1	1
		CO5	3	2	3	1	2	1	1	1	1	2	1	2	1	1
Note: 3 -	- Strong Co	ontributi	on; 2	– Ave	erage	Cont	ributi	on; 1	– Sor	ne Co	ontrib	ution				
		K.S.Ra	ngas	amy C	Colleg	e of	Techr	ology	<u>y</u> – Αι	itono	mous	5			R	2018
			51		<u> 100 –</u>	ivied stropi	ical IV	ecna	tronic	;s						
Semester		Hours /	/Wee	b.c. i k	NECH		Total	igine (Credit			Ma	ximun	n Mar	ks	
	L		T		Р		Hrs		C		CA		ES		To	tal
VII	2		0		2		45		3		50		50		10)0
	To ur	nderstand	d the o	differe	nt typ	es of	electr	odes a	and its	s plac	emen	t for va	arious	reco	ding.	
	To di	scuss the	e lates	st idea	as on o	device	es use	d for	the m	easur	emen	t of ph	nysica	l and	mode	rn
Objectives	meth	ods of im	aging	techi	niques	S :										
		immarize		rent b	nrinci	nicai nicai	meas	ureme	ents.	dovid	200					
		eate the	aware	eness	of ele	ctrica	l safe	tv of n	nedica	al eun	iomer	nts				
	At the en	d of the	cour	se, th	e stu	dent v	will be	able	to:	oqu	101101					
	1. Unde	rstand th	ne cor	ncepts	s of bi	o am	plifier	for va	arious	phys	iologia	cal red	cordin	gs an	d illus	strate
	the d	ifferent e	lectro	des.			-				U			-		
	2. Analy	ze the p	roced	ures i	nvolve	ed in t	the ph	ysical	recor	ding	syster	ns me	edical	imagi	ng	
Course	techn	iques.	diff a	nth:-	ohar			0000	+ +!-	niaura	•					
Outcomes	J. Demo	unstrate (unction	ns and	icnem	ical m		io-tel	it tech	nique	s. humo	n acci	et dos	vices		
		เวอ แทย เป		is diil	иппро	nanc			-metr	yanu	nund	11 0551	งเ นยุง	1063.		

Arrays and Clusters: Array operation – Bundle/Unbundle and Bundle/Unbundle by name – Plotting data: graphs and charts – String and File I/O: High level and Low level file I/O's – Attribute nodes – Local and global variables.

structure, Formula nodes, Sequence structures, Timed looped structures.

VI Programming Techniques

Z. 2.2.2 ~

[09]

5. Stuc	y the imp	ortanc	ce of t	he ele	ctrica	l safet	ty of n	nedica	al equ	ipmer	nts.				
Bio-Instrumentation Sy	stem	stem													
Introduction – Block diag	ram of bio	of bio-medical system – Role of Instrumentation in Medicine - Review of sensors and													
transducers: ultrasonic,	electro	chem	nical	and	electr	o-mec	chanic	al-se	lectior	n crit	eria.	Revie	w of	Amp	olifier:
Instrumentation Amplifie	r, Isolated	ated DC amplifier and AC carrier amplifier. Electrodes: Electrode Theory – Limb													
electrodes – floating elec	trodes – p	rodes - pre-gelled disposable electrodes - Micro, needle and surface electrodes- textile													
electrodes.		[09]													
Physical and Medical I	naging M	easu	remei	nts											
X-ray machine - Radio g	raphic an	nic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography –									phy –				
Endoscopy – Gamma ca	mera – Tl	hermo	ograph	ny – D	iffere	nt type	es of b	biotele	emetry	y syste	em an	id pati	ent m	onitor	ing.
ECG – EEG – EMG – EF	RG – EOG	G- Lea	id syst	tems a	and re	cordir	ng me	thods	– Tyj	oical v	wavefo	orms.		[09	9]
Biochemical Measurem	ent and I	Biose	nsors	6			-								-
Biochemical sensors - pl	H, pO2 an	d pCC	D2, lo	n sele	ctive	Field I	Effect	Trans	sistor	(ISFE	T), Im	nmunc	ologica	ally	
sensitive FET (IMFET), E	Blood gluc	ose s	ensor	s, Blo	od ga	s ana	lyzers	-colc	orimet	èr, So	dium	Potas	sium	Analy	ser,
spectrophotometer, bloo	d cell coui	nter, a	auto a	nalyze	er (sim	nplified	d sche	ematio	desc	ription	n) – Bi	iosens	sors –		-
Principles – amperometr	ic and volt	tomet	ric tec	hniqu	es. El	ectrop	horet	ic tec	hniqu	es.	,			[09	91
Bio-Telemetry and Hun	nan Assis	t Dev	vices	•		•			•					•	-
Medical Stimulator, Tele	metry prin	ciples	s, freq	uencv	selec	ction,	Bio-te	lemet	rv, tel	e-stin	nulatio	n and	l tele-i	nedic	ine,
electrical safety. Cardiac	pacemak	ers, D	C De	brillat	ors, H	eart L	ung N	/lachir	ne and	d Ane	sthetic	c Mac	hine.	[09	91
Electrical Safety of Med	ical Equi	ipmer	nt		,		0							•	-
Physiological Effects of	- Electricity	- Lea	akade	Curre	ents a	nd Me	ethods	s of A	ccide	nt Pre	eventio	on - N	licro s	shocks	s and
Macro Shocks Hazards	- Special	Safet	tv Me	asures	s for I	Electri	cal S	uscer	tible	Patier	nts - F	Power	Distri	butior	n and
Protection System of the	Hospital	- Elec	trical	Safet	/ Code	es and	d Stan	dards	5.					[09	91
Hands on Session				,										1	1
1. ECG wave analy	sis usina	simul	ator												
2. Heart sound me	asuremen	t usin	a PCC	3											
3. Blood Pressure	Measurem	nent	9.00	-											
												Total	Hour	s: 45	
Text book(s) :															
1 Leslie Cromwell	'Biomedi	cal In	strun	nenta	tion a	and m	easu	reme	nt" 2	nd ed	ition	Pear	son F	duca	tion
Now Dolbi 2015	Diomean		Struit	icina			Cubu	i cinc	, inc., 2	. cu	nuon,	r car		uuuu	uon,
	Madiaal	inotru	monto	stion"	Anur	adha	Aaaaa		h 0	012					
2. Arumuyami.w, Bic	ivieuicai	IIISUU	mema	ation,	Anura	auna /	Agenc	les r	ub., Z	013.					
Reference(s):					lianti				4h 🗖 -13	4. a.a. 1	A/:1				
1. John G. Webster, IV	edical ins	strume	entatic	on App	ncatio	on and	Desi	ign ,5	th Ea	tion, v	viieyi	ndia F	Vt Ltc	i,ivew	
Deini,2020.															
2. Khandpur R.S, "Ha	ndbook of	Biom	nedica	l Instr	umen	tation	", 3rd	Editic	n, la	ta Mc	Graw-	HIII N	ew		
Delhi,2014.		_													
3. Joseph J. Carr and	John M. I	Brown	n, "Intr	oduct	ion to	Biom	edical	Equi	pmen	t Tech	nolog	jy", Ρε	earsor	1	
Education,2004.															
4. Anandanatarajan.R	., "Biome	dical I	nstrur	nenta	tion a	nd Me	easure	ement	s", PH	II Lea	rning	Privat	te Lim	ited, N	New
Delhi, 2011.															
Pre-requisite: Nil															
MAPPING OF COL	IRSE OU	TCON	NES, F	PROG	RAM	ME O	UTCC	OMES	AND	PRO	GRA	име (SPEC	IFIC	
OUTCOMES															
COURSE CODE &							Р	0						P	so
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CO3

CO4

CO5

		K.S.Rangas	amy Colleg	e of Techn	ology – Aut	onomous		R2018					
		51 N	1C E53 – Fu	Indamental	s of Arduin	0							
			B.E. Mecha	tronics Eng	ineering								
Somootor	H	ours / Week		Total	Credit	N	laximum Ma	arks					
Semester	L	L T P Hrs C CA ES Total											
VII	2	2 0 2 45 3 50 50 100											

Mechatronics

s..... 2.2. Qu

BoS Chairman

	I o provide knowledge of different processor and controllers
	To understand concepts of Arduino system
Objectives	To familiarize students with Arduino as IDE, programming language& platform.
	To provide knowledge of Arduino boards and basic components.
	 To Develop skills to design and implement various smart system sensors
	At the end of the course, the students will be able to
	1. Learn the basics of electronics, including reading schematics
	Learn how to prototype circuits with a breadboard.
Course	Program the Arduino microcontroller to make the circuits work
Outcomes	4. Connect the Arduino microcontroller to a serial terminal to understand communication and
	stand-alone use
	5. Explore the provided example code and online resources for extending knowledge about the
	capabilities of the Arduino microcontroller

Introduction

Introduction to embedded system - Understanding Embedded System - Overview of basic electronics and electronics- Microcontroller vs. Microprocessor - Common features of Microcontroller. - Different types of microcontrollers- ATmega328 Microcontroller. [09]

Arduino i/o Functions

Pins Configured as INPUT -Pull-up Resistors - Pins Configured as OUTPUT – pin Mode Function – digital Write Function – analog Read function - Arduino Interrupts. [09]

Arduino Sensors

Arduino Humidity Sensor - Arduino Temperature Sensor - Arduino Water Detector / Sensor- Arduino PIR Sensor - Arduino Ultrasonic Sensor - Arduino Connecting Switch (Magnetic relay switches). [09]

Input to the controller& Communications

Using serial input. -Controlling LEDs with keys. - Keys as toggle switch. - Interfacing a piezo Buzzer - Using a buzzer as an alarm unit.

Parallel Communication - Serial Communication Modules - Types of Serial Communications - Arduino UART - GSM/GPRS Arduino Interfacing [09]

Applications (Arduino case studies)

Intelligent home locking system- Intelligent water level management system- Home automation using RFID-Real time clock-based home automation- Intelligent Automatic Irrigation System [09] Experiments:

1. Study about basic interfacing various actuators

2. General hardware interfacing(LED, switch, seven segment display, Relay, LCD, buzzer)

Interfacing arduino with different sensor (Touch sensor, Temperature sensor, LDR, Humidity sensor, Moisture sensor, Accelerometer, IR sensor, Proximity sensors)

Total hours= 45

Text	: book:
1	Rajesh Singh, Anita Gehlot, Bhupendra Singh, and SushabhanChoudhur "Arduino-Based Embedded
1	Systems, Boca Raton, 2017 first edition
2	Andrew N Sloss, Dominic Symes, Chris Wright ,"ARM System Developer's Guide -Designing and
2	Optimizing System Software", 2004, Elseiver .
Refe	erence(s):
1.	ARM System -On -Chip Architecture, Furber, Steve.
2	J. M. Hughes,"Arduino: A Technical Reference: A Handbook for Technicians, Engineers, and
Ζ.	Makers", O'Reilly Media, Inc.", 16-May-2016
2	Jeremy Blum, "Exploring Arduino: Tools and Techniques for Engineering Wizardry"1st Edition,
з.	NovellaBargains ,2017
4.	Simon Monk" Programming Arduino: Getting Started with Sketches (Tab) 2 nd Edition, Kindle Edition, 2016

Pre-requisite: NIL MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	00	PO											PS		
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	2	2	3	2	3							1		2
51 MC E53 & Fundamentals of Arduino	CO2	2	2	3									1		3
	CO3	1	2	3	1								2		2
	CO4	2	2	3	2								2		2
	CO5	2	2	2	2			2					1		1

2.3. a

					Ger	eral	Electi	ve								
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		į	50 GE	001 -	- Natio	onal	Cadet	Corp	os(Air	Wing	g)					
Semester		Hours	/Wee	k			Tota		Cre	dit		Ma	aximu	m Ma	rks	
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IV	2	(C		2		60		3		5	0		50		100
	Deve	lop cha	racter	, cam	arade	rie,										
	 Inculo 	cate dis	cipline	, seci	ular ou	itlook										
Objective(s)	Enric	h the sp	oirit of	adver	nture, s	sports	sman	spirit	معاداتهم							
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	At the en	d of the	e cou	rse, t	he stu	dent	s will	be al	ole to							
0	1. Displa	ay sens	e of p	atrioti	sm, se	cular	value	es and	d shal	be tr	ansfor	med i	nto m	otivat	ed yo	uth
Course	2 Demo	/III carry	the s	ation	of disc	ig thr	ougn	natior	nai un	and h	ave ba	al con Isic kr	esion	dae o	f	
Outcomes	z. Demo	onsand	their	use a	nd hai	ndling		Sman	11033				IOWIE	uye u	1	
	3. Illustr	ate vari	ous fo	rces	and m	omer	, nts act	ing oi	n aircr	aft						
	4. Outlin	ne the c	oncep	ts of a	aircraf	t engi	ine an	d roc	ket pr	opulsi	on					
5. Design, build and hy chuck gliders/model airplanes and display static models Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may																
decide the num	Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be															
asked based o	sked based on thenumber of hours notified against each unit in the syllabus.															
NCC Organiza	tion & Nat	ional In	tegra	tion											[0	9]
NCC Organizat	ion – Histor	ry of NC	C-NC	COr	ganiza	tion-	NCC	Traini	ng- _, N	CC Ur	niform	– Pro	motio	n of N	CC ca	adets
- Aim and adva	antages of l'	NCC I fa	aining [.]	- NCC	badg	es of	Rank	- HON	orsa	1071	/ards -	- Incel	ntives	S TOP IN	CC Ca	adets
Integration- Un	itv in divers	sitv- cor	anu C htributi	ion of	vout	h in n	ation	u-rar buildi	na- n	ationa	l integ	ration		oaya ncil- Ir	nades	and
Slogans on Nat	tional Integ	ration.	in its at	011 01	your		auon	bana	ng n		a niceg	lation			nagee	/ and
Drill & Weapou	n Training														[0]	aı
Drill-Words of	commands	- positio	n and	comr	nands	- sizir	na and	l form	ina- s	alutin	a- mar	china	- turni	ina on	the m	harch
andwheeling- s	saluting on	the ma	arch- s	ide p	ace, p	ace	forwa	d and	d to th	ne rea	ar- ma	rking	time-	Drill	with a	arms-
ceremonial dril	I- guard mo	ounting.	(WITH	I DEN	IONS	TRAT	ION).	Mair	n Parts	s of a	Rifle-	Char	acteri	stics	of .22	rifle-
loading and un	loading – p	osition	and h	olding	- safe	ty pre	ecautio	ons –	range	proc	edure	· MPI	and E	Elevat	ion- G	roup
and Snap shoo	ting- Long/	Short ra	ange fi	ring (WIIH	PRA		: SES	5101	1)					ΓO	01
Laws of motion	n-Forces ac	ctina on	aircra	aft_Be	ernoull	i's th	eorem	-Stal	lina-P	rimarv	/ contr	ol su	rfaces	s – se	conda	arv
controlsurfaces	Aircraft re	cognitic	n.		Jinoun		001011		inig i	, in the second	, 00110	01 001	naoot		oonat	, y
Aero Engines		0													[0]	91
Introduction of	Aero engir	ne-Type	s of e	ngine	-pisto	n enc	ine-ie	t ena	ines-T	urbo	orop e	ngine	s-Bas	sic Flio	ght [0	0]
Instruments-Mo	odern trend	s.		0	•		, ,	0			•	0		•	,	
Aero Modeling	9						_								[0	9]
History of aero	modeling-N	Vaterial	s use	d in A	ero-m	odelir	ng-Typ	pes of	f Aero	-mode	els – S	static I	Mode	ls-Glio	ders-	
Control interno		Control	woue	15-DU	nung	anu r	Tying	UI AE	10-1110	ueis.				Tota	l Hou	rs: 45
Text Book(s):																
1. "National	Cadet Cor	ps- A C	oncise	han	dbook	of NO	CC Ca	dets"	by Ra	amesh	ו Publi	shing	Hous	se, Ne	W	
Delhi,201	4.	•							,			0				
2. "NCC OT	A Precise"	by DG	VCC, I	New [Delhi,2	014										
Kelerence(S)	Jandhook	Comm		hiact		<u> </u>		NCC	Now	Dolhi	2010					
1. Cauels r	landbook	- Comin					" by DG		, New		,2019	17				
2. Cauels r	тапароок -	- Specia	aliseu	Subje		J/3VV	Dy L	GINC	JC, INE	ew De	emi,∠0	17				
MAPPING OF CO	OURSE OL	лсом	ES. P	ROGI	RAMN	E OL	оот	MES		PROG	RAM	ME S	PECI	FICO	итсо	MES
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		CO1						3	3	3	3	3		3		
50 GE 001 &	National	CO2					3		<u> </u>	ļ			3	2		<u> </u>
Cadet Corps (A	Air Wing)	003	3	2		1					$\left - \right $				3	2

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 Image: Contribution

 Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

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CO4

3

3

3

2

2

				K.S.Rangas	amy College	of Technol	ogy – Auton	omous	F	२२०१८
				50 GE 0	02 – Nationa	I Cadet Cor	ps (Army Wi	ng)		
0	monter			Hours / Wee	k	Total	Credit	Max	kimum Marks	;
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		• D	evelo	p character,	camaraderie	,				
		• In	culca	ate discipline	, secular outle	ook				
Obi	ective(s)	• Ei	nrich	the spirit of a	adventure, sp	ortsman spir	it			
0.05		• Id	leals	of selfless se	ervice among	st cadets by	working in tea	ams		
		• In	nprov	e qualities s	uch as self-di	scipline, self-	-confidence, s	self-reliance a	and dignity of	labour
		in At the	the o	cadets.	a the stud	anto will bo	abla ta			
)ienla	N sense of n	se, me siuu	ular values a	able to and shall be to	ransformed ir	nto motivated	lvouth
		1. L W	vho v	vill carry out r	nation buildin	a through na	tional unity ar	nd social coh	esion	youth
		2. D	Demo	Instrate Heal	th Exercises.	the sense of	f discipline. in	nprove bearir	na. smartnes	s.
С	ourse	tı	urnou	ut, develop th	e quality of ir	nmediate an	d implicit obe	dience of orc	lers.	- /
Ou	tcomes	3. E	Basic	knowledge c	of weapons a	nd their use a	and handling.			
		4. A	Aware	e about socia	l evils and sh	all inculcate	sense of whi	stle blowing a	against such	evilsand
		V	vays	to eradicate	such evils					
		5. A	Acqua	aint, expose	& provide kno	wledge abou	ut Army/Navy	/ Air force an	d to acquire	~~
Note		If otified a		ation about o	in the syllar	Armed Force	indicative bu	bjects and in	portant battle	es Ity may
decid	the num	nher of	hou	rs for each i	init dependir	na upon the	concepts an	d depth Que	estions need	not be
aske	d based or	n the nu	umbe	r of hours no	tified against	each unit in	the syllabus.			
NCC	Organiza	tion &	Natio	onal Integrat	ion		,			[09]
NCC	Organizat	ion – Hi	istory	of NCC-NC	C Organizatio	on- NCC Trai	ining- NCC Ui	niform – Pron	notion of NCC	C cadets
– Air	n and adva	antages	of N	CC Training-	NCC badges	s of Rank- Ho	onors' and Aw	vards – Incen	tives for NCC	cadets
by ce	entral and	state go	ovt.			, , , , ,				
Natio	onal Integr	ation -	Unity	y in diversity	- contribution	n of youth in	n nation build	ling- nationa	Integration	council-
Basi	c Physica	I Traini	ina 8	norial integra						1001
Basi	c physical	Training	n ig o n – va	arious exerci	ses for fitness	s (with Demo	nstration)-Fo	od – Hvaiene	and Cleanin	less
Drill-	Words of	comma	nds-	position and	commands-	sizing and fo	rming- salutin	ia- marchina-	turning onth	e
marc	h and whe	eling- s	saluti	, ng on the ma	rch- side pac	e, pace forw	ard and to the	e rear- marki	ng time- Drill	with
arms	s- ceremon	ial drill-	gua	rd mounting.	WITH DEMO	NSTRATIO	N)		-	
Wea	pon Train	ing								[09]
Main	Parts of a	a Rifle-	Char	acteristics of	f .303 rifle- C	haracteristic	s of .22 rifle-	loading and	unloading -	position
and	holding- sa	atety pro	ecau	tions – range	e procedure-	MPI and Ele	vation- Group	p and Snap s	shooting- Lor	ng/Short
rang	e firing (vv	nachine		ICE SESSIO	JN) - Charac	cteristics of 5	56mm rifle-	Characterist	ICS OF 7.62m	m SLR-
Soci	al Awaren	less an	d Co	mmunity De	velonment					[09]
Aims	of Social	Service	-Vari	ious Means a	and ways of s	ocial service	es- family plar	nning – HIV a	and AIDS- Ca	ancer its
caus	es and pre	eventive	e mea	asures- NGC	and their ac	tivities- Drug	g trafficking- F	Rural develop	oment progra	ammes -
MGN	IREGA-SO	SY-JG	SY-N	SAP-PMGS	Y-Terrorism a	and counter t	errorism- Co	rruption – fen	nale foeticide	-dowry
-chil	d abuse-R	TI Act-	RTE	Act- Protecti	on of childrer	n from sexual	l offences act	- civic sense	and respons	ibility
Spee	cialized Su	ubject (IY)		,				[09]
Basi	c structure	of Arm	ed Fo	orces- Militar	y History – W	ar heroes- b	attles of Indo	-Pak war- Pa	aram Vir Chal	kra-
Care	er in the D	elence	TOICE	es- Service le	ests and inter	views.			Total Ho	
Toyt	Book(s).								Total Inc	/413. 45
1	National	Cadet (Corns	- A Concise	handbook of	NCC Cadete	s by Ramesh	Publishing H	ouse New D)elhi
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2.	Cadets H	andboo	ok- S	pecialized Su	ubjects SD/S	N published	by DG NCC,	2, New Delhi	014	
Refe	rence(s)			·	-		- ,			
1	"Cadets I	Jandbo	ok –	Common Su	biects SD/SV	V" by DG NC	C. New Delhi	.2019		
2	"Cadets I	Handbo	ok –	Specialised	Subjects SD/	SW" by DG N	NCC. New De			

-<u>P-----</u> 2.3. a

Pre-requisite: Nil MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	<u> </u>	РО												
COURSE NAME	0	1	2	3	4	5	6	7	8	9	10	11	12	
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50 GE 002 – National Cadet Crops- Army Wing	CO2								2					
	CO3						1		3					
	CO4								2					
	CO5								3					

		K.S.Ranga	asamy Colle	ge of Techr	nology – Au	tonomous		R2018
		50) MC L05-R	obotics and	Automatio	n		
			B.E. Mech	atronics Er	gineering			
Semester		Hours / Wo	eek	Total	Credit	I	Maximum Ma	arks
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Open Elective	3	0	0	45	3	40	60	100
Objectives	 To de To de To pro opera To pro inspec To pro 	velop the studer ovide the studer tion ofrobotion ovide the studer ovide the studer ovide the studer	ident's kills in p ident with kn c systems. ident with so sting. ident with so	medge in var perform kinen owledge of t me knowled me knowled	matics analys he singularit ge and analy ge and skills	vsis skills as associated	system. sociated with ssociated with	h the h automated
Course Outcomes	At the en 1. Expla 2. Analy 3. Equip 4. Solve 5. Selec	d of the cou in the basic ze the functi students to the problem t and employ	Irse, the stu concepts of on of sensor write progra is related to y suitable rol	ident will be working of ro is in the robo ms for auton robot design pots for a sp	a able to: boot. hatic functior and control. ecific applica	ning of a rob .tion.	pot.	
Basic Conce Definition and offreedom-L Power Source	pts d origin of r aws of robot es and Sen	obotics – D ics – Dynam sors	ifferent type ic stabilizatio	s of robotic on of robots.	s – Various	generation	ns of robots	– Degrees [09]
Hydraulic, Pr arrangements – Magnetic, F Automated M	eumatic and – Path dete iber optic an laterials Ha	d Electric dri ermination – Id tactile sen ndling	ives – Deter Micro machi sors.	mination of nes in robot	HP of moto	r and gear e vision – F	ing ratio – Va Ranging – Las	ariable speed ser – Acoustic [09]
systems, Des Automated I	ign of the sy	stem, Conve nd Testing	eyor systems	s, Automated	l guided vehi	icle system	S.	[09]
Inspection a technologies Machine visio	nd testing, for automat n, Other opti	Statistical c ed inspectio ical inspectio	quality contr n, Coordina on methods.	ol, Automat te measurin	ed inspectio g machines	on principle , Other cor	es and meth ntact inspecti	ods, Sensor on methods, [09]
Multiple robo Design–Seleo manufacture–	ts–Machine ction of a r - CNC(Comp	interface–R robot –PUN outer Numeri	obots in m IA 560 & s cal Control).	anufacturing SCARA rob	and not-m ots-Automat	nanufacturir ic inspectio	ng application on- Compute	n–Robot cell er integrated [09]
1. Study of dia andend effect 2. Robot prog	iferent types ors, classific ramming exe	of links and ation of robo ercises for p	joints used in ots based on ick and place	in robots, co configuratic e (Point-to-p	mponents of on and applic pint and cont	robots with ation. tinuous path	n drive systen n programmir	n ng).
3. Signal conv	version of se	nsing and di	gitizing the i	mages using	sampling ar	nd quantiza	tion analysis.	tal Hours:45
Text book:								
1 Saeed Second	B.Niku,"Intro I Edition, 201	duction to R	obotics Ana	lysis, Systen	ns, Applicatio	ons", Wiley	India Private	limited,
2 MikellP Program	.Groover, Mi mming and A	tchell Weiss	, Roger N.N ", McGraw H	agel Nichola ill Book Con	is G.Odrey, ' npany, 2016.	"Industrial F	Robotics Tech	nnology,
Reference(s)	:							
1 Mikell F Educati	 Groover, "A on Asia, 201 	Automation, 15.	Production	Systems and	I Computer I	ntegrated N	Manufacturing	g", Pearson

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2	Deb. S.R., "Robotics Technology and Flexible Automation", John Wiley, USA 2010.
3	Vokissw. Anadham and Y.Narahari, "Performance Modeling of Automated Manufacturing Systems",
	Prentice Hall India Pvt. Ltd, 2015.
4.	John.J.Craig, "Introduction to Robotics: Mechanics & Control", Pearson Publication, Fourth Edition,
	2018
	Pre-requisite: Nil
	MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &	CO						P	0						PSO		
COURSE NAME	00	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
	CO1	3	3	3	2	1	2	2		2	1	2	3	3	2	
	CO2	3	3	3	2	1	2	3		2	1	2	3	2	1	
50 MC L05 & Robotics - and Automation -	CO3	3	3	3	2	1	2	3		2	1	2	3	3	2	
	CO4	3	3	3	2	1	2	3		2	1	2	3	2	1	
	CO5	3	3	3	2	1	2	3		2	1	2	3	2	1	

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

		K.S.R	angasam	y College	e of Techno	logy – Aut	onomous		R 2018
			5	0 MC L06	-Applied E	rgonomic	S		
		1	MC	: B.E. Me	chatronics	Engineeri	ng		
Semeste	٥r	F	lours / We	ek	Total hrs	Credit		Maximum Marks	
Comesie	,	L	Т	Р	Totarms	С	CA	ES	Total
Open Elec	tive	3	0	0	45	3	40	60	100
Objective(s)	 C In E C C 	ourse im sights or mphasis ourse de ourse pre	parts basi n importan on the fac als with P ovides an	c knowled ce of orga tors affec hysical ar idea abou	dge on ergor anization erg ting ergonor nd cognitive ut man-work	nomics ana onomics. nic design. ergonomic place interf	itomy and bi s. face in regar	omechanics. d with ergonomics	S.
Course Outcomes	At the 1. U 2. A 3. C 4. D 5. In	e end of nderstan nalyze th orrelate etermine terface b	the cours ad the basi he factors of the param the factor between m	e, the stu c concept contributir eters invo s influence an machi	udent will be t of ergonom ng to human lived in desig cing physical ne and work	e able to ics and hu error. gning ergo ergonomi environmo	man anaton workplace. cs. ent pertainin	ny.	
Introduction and Biomecha cardiovascular Organization errors-brief de ergonomics – organization m ergonomics – enrichment wo Ergonomics f process – anti tools – measur components-m Physical ergo strength and e of Material har Cognitive erg –hearing sen ergonomics – cognitive work lighting system	toErgo inics – a r system Ergond escriptic - responotivatic job sat for desi hropom ring tool nachine onomic ndurand ndling- p se and Commo c senso n-audito	nomics application prespira prices Jacons of tan sibility on of work isfaction nization. ign Hum etric data s – softw compone s: Physic ce- heat lo cower zo cs Workp importar on cognit ry recep ry enviro	Definition, in of biome tory syster ob Factors axonomy and auth k-Maslow -signs of an oriente a – measu vare tools- ients-envir ology - wor balance – one-Lifting olace ergon nce of aud ive tasks - tion and p	domains chanics-on r - structo - fitting p of huma ority-type gratificatio job satis d design rements- designing onmental k physiolo thermo re and mech homics - H itory perfe- decisior erception	and Applic overview of h ure and func- person to job n error, job so of decisi- on theory- we faction-job –anthropom how to use for static an components ogy –energy gulations – con nanical hand Human sense ormance. –Lo making –pli – Visual er pise.	ations of E numan bod tion-postur and fitting factors, on-line or orkers mot rotation-jol etry –anthi anthropom d dynamic s Tools. expenditu climate of w ling guidel ory system ong term to anning- pr	rigonomics- y- Musculos e and health a job to a p environment ganization ivation -Job o specializa ropometry da ropometry da ropometry da ropometry da work- Human re of the bo vork place-he ines-lift plan -human cog memory and oblem solvin and lighting	Basics of Humar keletal system- m berson(FPJ & FJF tal conditions Or and staff functio evaluation in orga ition-job enlargen ata – anthropome statistical essenti an –machine syste dy and oxygen del eat stress-cold stre is and risk assess nitive system - hur d its importance in ng. Guidelines for g –physics of ligh	1 anatomy etabolism- [09] ') -Human ganization ns matrix anizational nent –Job [10] tric design ials - Ergo m- human [10] bt- muscle ess-ABC's ment. [08] man vision n cognitive it-visibility- [09] Hours 45
Taxt Deals(a)								TUIDI	110013 40
Text Book(s):									

1. R.S.Bridger,"Introduction to Ergonomics",CRC Press,3rd edition,2008.

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2. Mai Priv	Mark S Sanders, Ernest J Mccormick," Human Factors in Engineering & Design", Mcgraw-Hill education Private Limited, 7 th edition, 2016.																	
Reference	e(s) :																	
1. M.I.	Khan,"In	dustr	ial Erg	jonc	mics"	', PHI	Learr	hing P	rivate	Limite	ed,Ne	w Del	hi,20′	13.				
2. Chr Eng	istoper E aineering) Wic ". Pea	kens, arson-	Sall Pre	ie E.C ntie H	Gordo all, 2 ^r	n-Beo	cker, Y ion,20	7ili Liu 04	ı,Joh	n D.L	.ee "A	n intro	oductio	on to	Huma	n Fac	tors
3. Mik Pre	ell P Gro ntice Hal	over,	" Woi / Delhi	rk s i,2 nd	ystem ¹ editic	is and on,20 [,]	d the 06	Metho	ods,Me	easure	emen	t and	Mana	geme	nt of \	Nork"	,Pears	son-
4. Kno Des	z,Stepha sign:Indu	an strial	A,Joh	nsor	n,Stev	en,Ho	lcom	o Ergo	nomi	cs",7 th	editio	on, 20	07 Ha	athawa	ay, Sc	ottsda	ile, "W	/ork
Pre-requisite : Nil																		
MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC																		
OUTCOMES																		
COURS	ECODE	&	co	o I						P	0				-		PS	30
COUR	COURSE NAME 1 2 3 4 5 6 7 8 9 10 11 12 1 2 COURSE NAME CO1 3 3 3 2 1 2 2 2 2 3 3 2																	
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	monnos		CO)4	3	3	3	2	1	2	3		2	2	2	3	2	2
	CO5 3 3 2 1 2<																	
Note:	3 – Stro	ng C	ontrib	outic	on; 2 ·	– Ave	rage	Contr	ributi	on; 1	– Sor	ne Co	ontrib	ution				
			K.S.Ra	ang	asam	ıy Co	llege	of Tec	chnol	ogy –	Auto	onom	ous				R	2018
				50	MC I	_01 -	Indus	strial S	Safety	/ Engi	ineer	ing						
				<u> </u>	B.E	Mec	hatro	nics E	Engin	eering	g							
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Openi		n imn:	art kno	owle	dae c	n fun	dame	ntals (of safe	otv en	ainee	ring	5		00			00
Objectives	• To	o fore	front t	he s	afety	mana	ageme	ent pra	actices	3. 3.	ginee	anng.						
,	• To	o stre	ss the	imp	ortan	ce of	safe	operat	ing pr	actice	s in i	ndustr	ies.					
To give deep insight into occupational health and safety practices followed in industries.																		
To relate the legislations pertaining to industrial safety.																		
	At the	end o	of the	cou	rse th	e stud	dent v	vill be	able t	0								
Course	1. C	ompre	ehend	the	histo	ry, sa	fety o	rganiz	ation	and fu	unctio	ons of	safety	orga	nizatio	on.		
outcomes	2. In	vestig	gate ad	ccid	ents a	and do	ocum	ent ac	cident	repoi	rts.	ماسطنم	a firo i	fightin	a ond	firsts	id	
	4. Id	entifv	OCCUR	patic	onal h	ealth	and h	vgien	e issu	es at	indus	tries.	yme	ngnun	y and	msta	iu.	

- 5. Summarize the legislations and standards pertaining to occupational safety, health and environment.
- envir

Safety Management Introduction-Key concepts, terminologies of safety-History and development of industrial safety-Formation of factories act and safety council-safety and productivity- safety and reliability-safety policy-safety organization, safety committee, safety budget- safety training. Role of management and government in industrial safety. [09] Accident Prevention

Definition and theories-accident-injury- -near miss-theories and principles of accident causation-principle of accident prevention- unsafe act and conditions – Human error analysis and safety-cost of accidents-accident reporting and investigation – reportable and non reportable accidents- accident indices. [09]

Safety in Engineering Industries

Hazard, risk, general safety rules- Hazard identification Techniques - Housekeeping – standard operatingprocedures - machine guarding - types and its application- benefits of good guarding systems.

Safety in welding and gas cutting - general safety consideration in material handling - manual handling - mechanical handling - Ergonomic consideration in material handling. Safety in use of electricity- Fire triangle -Classes of fire - Fire fighting equipments – First aid. [09]

Occupational Health and Industrial Hygiene

Toxicity, exposure limits and levels, Lethal Dose and Concentration -LD50,LC50- MSDS - types of hazards- exposure, acute effect, chronic effect- routes of entry: dose- response relationship- occupational diseases, - control measures - Industrial hygiene -functional units and activities of occupational health services, pre- employment and post-employment medical examinations –exposure monitoring - stress, fatigue. [09]

Safety Regulation and Certifications

Overview of Factories Act 1948 and Tamil Nadu Factories Rules 1950 – ISO 9001, ISO 14001, OHSAS 18001and Integrated Management System – ISO 45001. [09]

Text	books(s):
1.	John V Grimaldi and Rollin H Simonds, "Safety Management", All India Traveller Book Seller, 5th Edition,
	New Delhi , 2001.
2.	Roger L Brauer, "Safety and Health for Engineers", Wiley, Third Edition, 2016
Refe	rence(s) :
1.	Deshmukh. L M , "Industrial Safety Management: Hazard Identification and Risk control", 6th Edition, Tata
	Mcgraw Hill,New Delhi, 2010
2.	Phillip E Hagan, John F.Montgometry, James T.O'Reilly "Accident Prevention Manual for business and
	Industry", 13thEdition, National Safety Council, Chicago, 2009.
3.	"The Factories Act 1948", Madras Book Agency, Chennai, 28th Edition, 2017
4.	Heinrich, H.W., "Industrial Accident Prevention", 5th Edition, McGraw-Hill, California, 1980.
	Pre-requisite: Nil

MAPPING OF COURSE OUTCOMES, PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COURSE CODE &		РО										PS		60	
COURSE NAME	СО	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	2	2	3		3	3	3		2	3	2	1	2	3
50 MC L01 & Industrial Safety Engineering	CO2	1	2	3		3	3	3		2	3	1	1	2	2
	CO3	1	1	2		2	2	2		2	2	2	1	3	2
	CO4	3	3	3	1	2	2	2	1	2	3	2	1	3	1
	CO5	1	1	3	2	2	3	3		3	3	1	1	3	2

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

K.S.Rangasamy College of Technology – Autonomous R2018 50 MC L08 – Fire Safety													
50 MC L08 – Fire Safety Open Elective – Common to All Branches													
		Оре	en Elective	- Common to A	II Branches								
Semester		Hours/Week		Total hours	Credit	Max	kimum Marks	5					
	L	Т	Р		С	CA	ES	Total					
V / VII	3	0	0	45	3	40	60	100					
Objectives	 Help la Ability Condu Have Aware 	earners know to extinguish uct mock drill knowledge al about the In	about the different cl and sugges bout firefigh dustrial and	formation of fire a lasses of fire. st fire extinguishin ting suit and fire s l societal fire acci	nd fire hazards ng agents. suppression sy dents.	s. stems.							
 Aware about the Industrial and societal fire accidents. At the end of the course the student will be able to Understand the basic science behind fire. Classify the types of fire. Classify the types of fire. Recognize the legal requirements pertaining to fire safety. Devise methodology for fire prevention and protection. Infer from the fire case studies. Basics Chemistry and Physics of Fire Combustion- types of combustion – fire properties- Products and effects of combustion-Properties of the 													
5. Infer from the fire case studies. Basics Chemistry and Physics of Fire Combustion- types of combustion – fire properties- Products and effects of combustion-Properties of the													
Basics Chemistry and Physics of Fire [9] Combustion- types of combustion – fire properties- Products and effects of combustion-Properties of the materials which influences the fire hazard- exothermic reaction and endothermic reaction – transmission of heat– Flash and fire point, Ignition temperature – Auto ignition – fire triangle and fire tetrahedron-fire spread													
Fire Classifi Classes of fi bucket, hose refilling.	cation re – causes e reel, fire e	of fire – prir extinguishers-	nciples of fi types of fi	re extinguishing-f ire extinguisher n	irst aid firefigh nethod of oper	ting equipn ation, mair	nents like fire ntenance and	[9]					
Statutory no National Build fire extinguis Overview of Factories ruld – Overview of report.	orms and A ding code po hing system Indian stan es 1950 - Fi of Tamil Nac	uthorities ertaining to fir n - Overview dards - Prov re certificate du fire service	e safety – E of Nationa ision pertai – directora act & rule	Building fire safety I Fire protection a ning to fire in Th te General Fire S s -Tamil Nadu Fir	r - Fire extinguis association (N he factories Ac ervices, Civil D e & Rescue se	shing agen FPA) life c t 1948 and Defense & H ervices – M	ts - Automatic ode – TAC – I Tamil Nadu Iome Guards ock drill – fire	[9]					
Fire Protecti Passive fire p sprinklers, do system- fire alarms.	ion and Pre protection sy eluge syste tenders- pu	evention stem & / ms, co2 bas irpose of fire	Active fire p ed suppres towers -fi	rotection system- ssion systems,ine refighting suits	fire hydrant – f rgen, clean ag Introduction to	firesuppres gent based Fire dete	sion systems; suppression ctors and fire	[9]					

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Total Hours: 45
Case studies

Bombay port fire 1944 – Dabwali fire 1995 – Uphaar Cinema Fire 1997 - Kumbakonam School Fire 2004 - Jaipur oil fire 2009 – AMRI Hospital Fire 2011 - Sivakasi fireworks factory fire 2012- Kollam temple fire 2016 – SURAT Fire 2019.

Total Hours = 45

[9]

Text B	Book(s):															
1.	Jain V K, "Fire Sa	afety in B	Buildin	gs", N	lew A	.ge Int	ernati	onal (P) Lin	nited F	Publis	shers,	New	Delhi,		
	2 nd Edition, 2015.	•		-		•			,							
2.	Sesha Pakash N	, "Manua	l of Fi	ire Sa	fety",	CBS	Publis	hers a	& Dist	ributo	rs Pri	vate L	.imited	d, New	/ Delh	i
Refere	ence(s):															
1.	Derek James, "Fi	ire Preve	ention	Hand	Book	κ", But	terwo	th-He	einema	ann, L	.ondc	n, 198	36.			
2.	Gupta R S, "Han	d Book o	f Fire	Tech	nolog	y", Or	ient Lo	ongma	an, Bo	mbay	',2 nd E	Edition	, 201	0		
3.	D.D.Purandare, A	Abhay D.	Purar	ndare	, P&A	public	cations	s, Vad	dodara	a						
4.	Edward D.Hess,	"Growing	g an E	intrep	reneu	irial B	usines	s: Co	ncept	s and	Case	es",Sta	anford	Busir	less	
	Books, 2011															
5.	Howard Love,"Th	ne Start-L	JpJ C	urve:	The S	ix Ste	ps to I	Entrep	oreneu	urial S	ucce	ss", B	ook G	iroup		
	Press,2011															
Pi	re-requisite: Nil															
Μ	APPING OF COU	RSE OU	TCON	ΛES,	PROC	GRAM	ME O	UTC	OMES	S AND	PRC	GRA	MME	SPEC	IFIC	
0	UTCOMES	-													-	
COURS	SE CODE &							F	<u>0</u>	-	-				PS	30
COURS	SE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2

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COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
50 MC L08 – Fire	CO1	2	2	3		3	3	3		2	3	2	1	2	3
Safety	CO2	1	2	3		3	3	3		2	3	1	1	2	2
	CO3	1	1	2		2	2	2		2	2	2	1	3	2
	CO4	3	3	3	1	2	2	2	1	2	3	2	1	3	1
	CO5	1	1	3	2	2	3	3		3	3	1	1	3	2
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		K.S.Ra	angasan	ny College of Te	chnology – Auton	omous		R2018						
			50 M	C L10 Robotics	and Control									
		(Open Ele	ctive – Commor	n to All Branches									
Semester	ŀ	lours / Weel	k	Total hrs	Credit	Ma	ximum Mark	S						
	L	Т	Р		С	CA	ES	Total						
V / VII	3	0	0	45	3	40	60	100						
	• To (develop stud	lenťs ski	lls in performing t	he time response	of second c	order system							
	• To (develop stud	lenťs ski	lls in perform kine	ematics analysis of	robot syster	ns							
Objectives	• To (develop the	student's	knowledge in va	rious robot sensors	6								
	• To	provide the s	student w	ith knowledge sk	ills associated with	machine vis	sion system.							
	• To	provide the s	student w	ith knowledge an	d skills associated	with robot c	ontrol							
At the end of the course the student will be able to 1. Explain the fundamentals of robotics control systems														
 Course 2. Understand the concepts of Time response of second-order systems 														
 Explain the fundamentals of robotics control systems Understand the concepts of Time response of second-order systems illustrate the Kinematics and Dunamics of robotics ourtements 														
outcomes	Course 2. Understand the concepts of Time response of second-order systems outcomes 3. illustrate the Kinematics and Dynamics of robotics systems													
	4. Enii	gnten the co	oncepts c	of sensors and ins	strumentation in rot	DOTICS								
Introduction	5. App	ly the conce	epts of ma	achine vision sys	tem in rodotics									
Industrial Co	ntrol eva	amples-Trans	for func	tion- System res	nonse-Control har	dware and	their models	·						
potentiometer	s- svnch	ro's- LVDT-	DC and	AC servomotor	s-Tachogenerators-	electro hv	draulic valve	S-						
hydraulic serv	omotors-	Electro pneu	umatic va	lves- pneumatic a	actuators. Closed-lo	op systems.	Block diagra	m [09]						
and signal flo	w graph	analysis. St	ability- st	eady-state accura	acy- stability conce	pt- relative s	stability- Rou	th						
stability criteri	on.													
Time response	se of sec	ond-order sy	ystems											
Steady-state	errors and	error consta	ints. Perfo	ormance specifica	tions in time-domain	h. Lead and la	ag Numuiat	[00]						
compensation	. Frequer	ritorion Porf	analysis	Polar plots- Bode	plot- stability in Free	quency doma	ain-inyquist	[09]						
compensation	Stability C	interiori. Ferri	ormanice			eau anu Lay								
Robot Arm K	inematic	S												
Introduction-	Direct Kir	ematics -Inv	verse Kin	ematics-Rotation	Matrices-Composite	e Rotation M	latrix- Rotatio	n						
matrixabout a	ın arbitraı	y axis- Rota	tion mati	rix with Euler ang	le representation-	Geometric ir	nterpretation	of						
Homogeneou	s transfor	mation matric	ces- com	posite homogeneo	ous transformation n	natrix- Links	joints and the	eir [09]						
parameters-	The Dei	navit Harter	berg re	presentation- Kir	ematic Equations	for manip	ulators- Oth	er						
specifications	of the	locations	of the	End-Effector- Cla	assification of Ma	anipulators-	The invers	se						
Kinematicspro	nv -meid	erse Transfo	rm Lechr	nque for Euler Ang	gies Solution.									

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Sens Proxi	or for Re mity sen	obotics sing- Induct	ive senso	ors- H	all eff	fect se	ensors	- Ca	pacitive	e Sen	sors-	Ultras	onic s	ensor	s- Opt	ical	[00]
Proxi Wrist	mity Sen	sors- Touch	sensors-	Binar	y sens	sors- A	Analog	sens	sors- Fo	orce a	nd To	rque s	ensing	g- Elei	ments	of a	loal
Mac	nine Visi	on System															
Imag trans	e acquis formatior	ition- illumi ns. Higher-Le	nation Te evel Visio	chniq n: Sec	ues- ament	imagir ation-	ng ge Edae	ometi Linkii	ry- sor ng and	ne ba Boun	isic tr darv d	ansfoi letectio	rmatio on	ns- p	erspec	tive	[09]
		- J -			,		- 3-		9				-	То	tal Ho	urs	45
Tex	t Book(s):				- 112				0	<u></u>		1	M-0			
1.	Ogata.k	K. "Modern (Control E	ngine	erina	". Prer	nce, r ntice F	lall.s	econd	editio	$\frac{alez}{n.201}$	9.5.G	. Lee,	NICGI		1, 20	0
Refe	rence(s)):			<u>e</u>	,		,.		• • • • • •	,	•					
1.	Introduc	ction to Rob	otics Med	chanic	cs and	d cont	rol,Jo	<u>hn J.</u>	Craig,	2nd E	dition	, Pea	rson e	ducat	tion,20	16	
2.	Nagratr	1&Gopal, "IV G Keramas	"Robot	ontrol Fechr		1eerin	<u>g″, Ne</u> Iamer	ew A <u>(</u> Male"	Cena	rnatio age le	nal, N Parnin	<u>lewDe</u> a 201	91hi,20 7	18			
Pre	-requisi	te: Nil	, Robot	COM	lology	i uno	amer	itais	,oeng	age ie	2011111	9,201					
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COURSE NAME	СО	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	2	3	2	3	2				2		3	2	1
50 MC L11 & Digital	CO2	2	3	3	2	2	2				3		3	3	2
Transformation in	CO3	2	2	2	2	3	2				2		2	1	2
I ransformation in Manufacturing	CO4	2	3	2	3	3	2				3		3	2	1
	CO5	2	3	3	2	3	2				2		2	2	1

K. S. Rangasamy College of Technology (Autonomous Institution affiliated to Anna University, Chennai)



CURRICULUM AND SYLLABI

of

B.E. Mechatronics Engineering Honours Degree - Robotics and Automation

R 2018

Accredited by NAAC with 'A++' Grade, Approved by AICTE, Affiliated to Anna University, Chennai.

> KSR Kalvi Nagar, Tiruchengode – 637 215. Namakkal District, Tamil Nadu, India.

2.3.2

BoS Chairman

K. S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637 215 DEPARTMENT OF MECHATRONICS ENGINEERING Honours Degree – Robotics and Automation

S.No	Course Code	Course Name		L	Т	Ρ	Credits
1.	50 MC H01	Medical Robotics		03	0	0	03
2.	50 MC H02	AI for Robotics		03	0	0	03
3.	50 MC H03	Robot Kinematics and Dynamics		03	0	0	03
4.	50 MC H04	Applied and Industrial Robotics		03	0	0	03
5.	50 MC H05	Robotic Programming		03	0	0	03
6.	50 MC H06	Sensors and Machine Vision Systems		03	0	0	03
			Total	18	0	0	18

		K.S.	Rangasam	y College	e of Technolo	gy – Auton	omous		R	2018			
				Honou	rs Degree								
			50 M	C H01- M	edical Roboti	ICS ~							
		Lleure		chatronic	s Engineerin	g Gradit		Maxim	Marka				
Seme	ster	Hours	т		Total hrs	Credit	<u> </u>		Marks	- 1			
<u> </u>	/ \ //I	L 2	0	P 0	45		40	E5 60	100	ai o			
V / VI /	/ 11	 Identify and desc 	ribe differe	nt types o	45 f medical robo	J sts and their	notential	annlicatio	10	0			
		 Know basic conc 	ents in kine	ematics d	vnamics and	control relev	ant to su	raical mai	nipulator	s			
	<i>(</i>)	 Develop the anal 	vtical and e	experimen	tal skills neces	ssarv to desi	ian and i	mplement	Motion	0			
Objecti	ve(s)	control and force	control in r	nedical ro	botics		.g						
		• Be familiar with the	ne state of	the art in a	applied medica	al robotics a	nd Haptie	c Tele ma	nipulatio	n.			
		• Understand the v	arious role	s that robo	otics can play	in Minimally	Invasive	Surgery.	-				
		At the end of the cou	rse, the stu	dents will	be able to								
		1. Classify the differ	rent types o	lesign of c	control archite	ctures							
Cour	se	2. Identify the functi	on of -assis	sted minin	nally invasive	surgery.		tion of me	مأتمما برما	o oto			
Outcol	mes	Jesign of control Describe the han	tic tele mar	inulation	olic-assisted t	ele-medicine	e. Evalua		edical rol	JOIS			
5. Discuss the different techniques minimal invasive surgery Introduction to Medical Robots													
5. Discuss the different techniques minimal invasive surgery Introduction to Medical Robots Introduction to medical robotics-Assistive technologies - rehabilitation robotics - surgical robotics- robotics													
Introduction to Medical Robots Introduction to medical robotics-Assistive technologies - rehabilitation robotics - surgical robotics- robotics for diagnosis - Historical perspective.													
Introduction to medical robotics-Assistive technologies - rehabilitation robotics - surgical robotics- robotics [09] for diagnosis - Historical perspective. Design of Surgical Manipulators													
Design	n of Sı	urgical Manipulator	S										
Securit	ty issu	ues-Manipulators wi	th serial	and para	llel configura	tions-Europe	ean dire	ctives-Mir	nimally	[09]			
Invasiv	e surg	ery-Passive and acti	ve joints-Re	emote rota	ation center-M	aster-slave	mechatro	onic systei	m - Da	• •			
Motio	n conf	trol and force contro	ol in medic	al roboti	~ c								
Motion	Contro	ol: Joint space contro	l and task s	space conf	trol - Force Co	ntrol: Indired	t force co	ontrol (cor	noliant				
control	l, impe	dance control) - dire	ect force co	ontrol (hyb	orid position/fc	orce control,	external	force col	ntrol) -	[09]			
Kalma	n Activ	e Observers - Desigi	n of null spa	ace / task	space controll	lers for minir	nally inva	asive surg	ery.				
Haptic	: Tele I	manipulation.											
Haptic	contro	ol architectures- Tel	e presence	e - stabili	ty and robust	iness analys	sis - Co	ntact para	ameter	[09]			
estima	tion.												
Minima	ally Inv	asive Surgery	on orotion	Comoro		an Dartal			Dahat	1001			
Humar	n-macr	nne interfaces - Tele	operation -	 Cooperation 	tive manipulati	on - Port pla	acement	for MIS -	RODOT	[09]			
uesign	COLICE	pis - video intages i		igmenteu	Teality			Total	Hours	45			
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1	Khalil	W Dombre E Mode	ling Identi	fication an	d Control of P	Pohote HPS	2022						
1.	Ciovio	on and Siciliana Mar	doling and (Control of	Robot Monin	ulatora Sprir	2022	า					
Z.			dennig and t	CONTROLOT	Robot Manipt	nators, Spri	igei.2020	J					
Refere	nce(s)	: ~				<u>, </u>							
1.	Cortes	sao, R., Medical Rob	otics Cours	e, DEEC-	FCTUC.(2018)							
2.	Anand	lanatarajan.R., "Biom	edical robo	ots", PHI L	earning Privat	te Limited, N	lew Delh	,2011.					
3.	Cromv	well, Leslie, Weibell.	Fred J. and	d Pfeiffer.	Erich A., "Bio	-Medical and	d electro	nics ", Se	cond Ed	ition,			
	Pears	on Education, New L	eini, 2012.	diadiast	umontofice"	Tata MaOra		ublicking (Now			
4.	Delhi,	יויטטטטו 2014.			umentation,	Tata MCGra		unishing (50 Lta.,	INEW			

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50 MC H01 & Medical Robotics	CO2	3	3	3	2	2	2	2			3		3	3	2
	CO3	2	3	2	2	3	2			3	2		2	1	2
	CO4	2	3	2	3	3	2	1			3		3	2	2
	CO5	2	3	3	2	3	2	2			2		2	2	2

Note: 3 – Strong Contribution; 2 – Average Contribution; 1 – Some Contribution

	K.S.R	angasam	v College	of Technolog	av-Autono	mous		R	2018				
		Jacan	Hond	ours Degree	,								
		50	MC H02	- Al for Robot	ics								
		М	echatron	ics Engineeri	ng								
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Cours Outcom	 Evaluate Artificial Intelligence (AI) methods and describe their foundations. Apply basic principles of AI in solutions that require problem-solving, inference, perception, knowledge representation and learning. Demonstrate knowledge of reasoning, uncertainty, and knowledge representation for solving real-world problems Analyse and illustrate how search algorithms play a vital role in problem-solving Introduction Evaluate Artificial Intelligence (AI) methods and describe their foundations. Apply basic principles of AI in solutions that require problem-solving, inference, perception, knowledge representation for solving real-world problems Analyse and illustrate how search algorithms play a vital role in problem-solving 												
4. Analyse and illustrate how search algorithms play a vital role in problem-solving Introduction													
Introduc	tion- Evolution of AI, St	ate of Art	-Differen	t Types of Art	tificial Intelli	igence A	oplications	of Al-	[09]				
Subfield	s of AI-Intelligent Agents	- Structure	of Intellig	gent Agents Er	nvironments	5							
Problen Introduc – Unifor deepeni	n Solving based on Sea tion to Problem Solving b rm Cost Search, Bread ng depth-first, Informed S	r ching by searchir Ith First S Search Me	ng Methoo Search- D thods- Be	ls-State Space Depth First Se est First Search	e search, Ur earch-Depth n, A* Search	ninformed I limited	Search Me search, Ite	thods rative	[09]				
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							Total I	Hours	45				
Text Bo	ok(s):												
1. F	Russell, S. and Norvig, P.	," Artificial	Intelligen	ce - A Modern	Approach"	, 3rd Editi	ion, Prentice	e Hall,2	015.				
2. F	Robin R Murphy, "Artificia	I Intelligen	ce for Ro	botics", 2nd Ed	dition, Bradi	ford book	s,2019.						
Reference	;e(s):												
1. K	. R. Chowdharv, "Funda	mentals of	Artificial	Intelligence". S	Springer, 20	20.							
2. A	Ipavdin, E. " Introduction	to Machir	ne Learnir	ng". 2nd Edition	n. MIT Pres	s.2010							
3. F	rancis X. Govers," Artific	ial Intellia	ence for R	obotics". Pac	kt Publishin	g ltd.2018	3						

3.3. a

BoS Chairman

COURSE CODE &							Р	0						PS	60
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
	CO1	3	2	3	2	3	2	3			2		3	3	3
50 MO 1100 8 AL fam	CO2	3	2	2	3	2	2	3		2	3		3	2	3
50 MC H02 & AI for Robotics	CO3	2	2	2	2	3	2			3	2		2	2	2
Robolics	CO4	2	3	2	3	3	2	1			3		3	2	2
	CO5	2	3	3	2	2	2	2			2		2	2	2

	K.S.Ra	ingasamy	College o	f Technology	v – Autonon	nous		R	2018					
			Honour	s Degree										
	50	MC H03 -	Robot Kir	nematics and	Dynamics									
		Me	chatronic	s Engineerin	g	T								
Semester	Hours	/Week		Total hrs	Credit		Maximum	Marks						
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V / VI / VII	3	0	0	45	3	40	60	100)					
Objective(s	 Provide a mather To retain the bes Derive from first Understand basic Articulate scientif 	matical and t traditions principles re c robot con fic results to	geometrie of tradition obot dynai trol archite o your pee	cal description nal calculus. mics and knov ectures rs	n of robotic n v how to sim	nanipulat	ors m							
Course Outcomes	At the end of the cou 1. To impart knowle 2. To control both th 3. The relationship 4. Planning trajecto 5. To precisely cont	rse, the stu edge about ne position between th ries for the rrol the high	dents will kinematic and orient e joint vari tool to foll speed m	be able to and dynamic ation of the to ables and the ow on order to otion of the sy	analysis of r ol in the thre position and perform mo stem.	obot mar ee dimen d the orie eaningful	nipulators. sional spa entation of tasks.	ice. the tool						
5. To precisely control the high speed motion of the system. Introduction Introduction, position and orientation of objects, objects coordinate frame Rotation matrix, Euler angles														
Introductio	p. To precisely control the high speed motion of the system. ntroduction ntroduction, position and orientation of objects, objects coordinate frame Rotation matrix, Euler angles Roll, pitch and yaw angles coordinate Transformations, Joint variables and position of end effector. Dot													
Roll, pitch	ntroduction ntroduction, position and orientation of objects, objects coordinate frame Rotation matrix, Euler angles Roll, pitch and yaw angles coordinate Transformations, Joint variables and position of end effector, Dot													
Roll, pitch and yaw angles coordinate Transformations, Joint variables and position of end effector, Dot and cross products, coordinate frames, Rotations, Homogeneous coordinates.														
Direct Kin	ematics								1001					
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The invers	e kinematics problem (General pro	nerties of	solutions Too	ol configurati	on Inver	se kinema	atics of	[00]					
four axis S	CARA robot and three	and five ax	is Articula	ated robot	n ooningaraa				[00]					
Workspac	e Analysis and Traied	tory Plann	ina											
Workspace fixtures, th motion, str	e Analysis, work envelo le pick and place oper aight line motion and C	pe of a Fou rations, Joi artesian sp	r axis SCA nt space ace techn	ARA robot and technique - c ique in traject	five axis art continuous p ory planning	iculated i bath moti I.	obot work on, Interp	space	[09]					
Manipulat	or Dynamics	1		' '	21 0									
Introductio Manipulato of a Two-a	n, Lagrange's equation or inertia tensor. Gravity xis planar robot, Newto	on kinetic y, Generaliz on Euler for	and poter zed forces mulation, I	ntial energy. , Lagrange-E Lagrange Eul	Link inertia uler Dynami er formulatio	Tensor c model, on, proble	, link Jao Dynamic ems.	cobian model	[09]					
							Total	Hours	45					
Text Book	(s):													
1. Rol	pert J. Schilling, Funda	mentals of	Robotics A	Analysis and C	Control, PHI	Learning	, 2009.							
o Ric	hard D. Klafter, Thon	nas .A, Ch	ri Elewsk	i, Michael N	egin, Robot	ics Engi	neering a	n Integ	rated					
2. Apr	proach, Phi Learning., 2	2009.			0	0	0	0						
Reference	e(s):													
1. Joh	n J. Craig, Introduction	to Robotic	s Mechan	ics and Contro	ol, Third Edit	tion, Pea	rson, 2008	3.						
2. Tsi	ineo Yohikwa. Foundat	ions of Rob	otics Anal	vsis and Cont	rol. MIT Pres	ss., 2003								
Bija	ay K. Ghosh, Ning Xi,	T.J. Tam,	Control i	n Robtics and	d Automatio	n Senso	r - Based	d integra	ation,					
S. Aca	ademic Press, 1999.							-						
4. Ber	nard Hodges, Industria	I Robotics,	Second E	dition, Jaico F	Publishing ho	ouse, 199	93.							

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BoS Chairman

COURSE NAME CO 1 2 3 4 5 6 7 8 9 10 11 12 1 2 S0 MC H03 - Robot CO2 3 2 2 3 2 2 3 2 3 2 3 2 2 2 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 3	COURSE	CODE &							P	0						P	SO
COI 3 3 2 3 2 3 2 3	COURSE	NAME	со	1	2	3	4	5	6	7	8	9	10	11	12	1	2
50 MC H03 - Robot Kinematics and Dynamics CO2 3 2 2 3 2 3 2 3 3 2 3 2 3 3			CO1	3	3	3	2	3	2	3			2		3	3	3
Kinematics and Dynamics CO3 3 2 2 3 2 2 3<	50 MC H03	8 - Robot	CO2	3	2	2	3	2	2	3			2		3	2	3
Dynamics CO4 2 3 3 2 2 1 3	Kinemati	cs and	CO3	3	3	2	2	3	2				2		3	3	3
COS 3 3 2	Dynan	nics	CO4	2	3	2	3	3	2	2			3		3	3	3
Note: 3 - Strong Contribution; 2 - Average Contribution; 1 - Some Contribution R2018 K.S.Rangasamy College of Technology - Autonomous R2018 Honours Degree 50 MC H04 - Applied and Industrial Robotics Mechatronics Engineering Semester Hours/Week Total hrs C CA ES Total V/VI/VII 3 0 0 45 3 40 60 100 0 10 45 3 40 60 100 0 10 45 3 40 60 100 0 10 develop knowledge in Grippers and Sensors for Robotics. 10 60 10			CO5	3	3	3	2	2	2	2			2		2	2	2
K.S.Rargasamy College of Technology – Autonomous R2018 Honours Degree Sol MC H04 - Applied and Industrial Robotics Mechatronics Engineering Mechatronics Engineering Mechatronics Engineering V/VI/VII 3 doi: 100 V/VI/VII 3 doi: 100 V/VI/VII 3 doi: 100 V/VI/VII To develop knowledge in Grippers and Sensors for Robotics. To develop knowledge in the Artificial Intelligence for Robotics. To develop knowledge in the Artificial Intelligence for Robotics. To develop knowledge in the Artificial Intelligence for Robotics. To develop knowledge in the Artificial Intelligence for Robotics. Course Query develop knowledge in the Artificial Intelligence for Robotics. Course Course Outperstand the automation concepts for Industrial Application. Metrevelop knowledge in a forbot sor types for Robotics	Note: 3 -	- Strong Co	ontributi	ion; 2	– Av	erage	Cont	ributi	on; 1	– Sor	ne Co	ontrib	ution				
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 2. John.J.Craig, "Introduction to Robotics: Mechanics & control", Pearson Publication, 4th Edition, 2018. Reference(s): Dilip Kumar Pratihar, Fundamentals of Robotics. Narosa Publishing House. 2019 	1. S. K.	Saha, Intro	duction t	o Rob	otics	, 2nd E	dition	<u>i, TAT</u>	A Mc	Graw	Hills E	Educa	tion,2	014.			
Reterence(s): 1. Dilip Kumar Pratihar, Fundamentals of Robotics. Narosa Publishing House. 2019	2. John.	J.Craig, " Ir	ntroductio	on to F	lopo	tics: Me	echar	IICS &	contr	ol″, P	earso	n Pub	licatio	on, 4th	Editi	on, 20	18.
1. Dilip Kumar Pratihar, Fundamentals of Robotics. Narosa Publishing House. 2019	Reterence(s)):						<u>.</u> .									
	1. Dilip I	Kumar Prati	ihar, Fun	dame	ntals	ot Rob	otics	, Naro	sa Pu	ublishi	ng Ho	use, 2	2019	0 nd 5		001	<u>^</u>
2. Jazar, "Theory of Applied Robotics: Kinematics, Dynamics and Control", Springer, 2 nd Edition, 2016.	2. Jazar	, Ineory of		KODO	LICS:	KINEM	atics,	Dyna	mics a	and C	ontrol	, Spr	inger,		altion	1, 201	0.
3. I robots" 2nd Edition MIT Press 2011	3. Kolar	iu Seigwaft s"2nd ⊑difi	, man Ke ion MIT	za NO Proce	201	лнын, а 1	anu D	aviue	Scara	amuzz	.a, IN	0000		เบ ลนเต		วนร เท	onie
4. S.R. Deb. Robotics Technology and flexible automation. 2nd Edition Tata McGraw-Hill Education 2017	4. SR I	Deb. Roboti	ics Tech	noloav	and	flexible	e auto	matic	n, 2n	d Edit	ion. T	ata M	cGrav	v-Hill	Educa	ation	2017

COURSE CODE &							Р	0						PSO		
COURSE NAME	СО	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
50 MC H04 & Applied and Industrial Robotics	CO1	2	2	3	2	2	3	3		2	2		3	3	3	
	CO2	3	2	2	3	2	2	3			2		3	2	3	
	CO3	3	3	2	2	3	3		2		2		2	2	2	
	CO4	3	3	3	3	3	2	2			3		3	3	3	
	CO5	3	3	3	2	3	3	2			2		2	2	2	

		K.S.Ra	ngasamy	College o	f Technology	/ – Autonom	nous		R	2018					
	Honours Degree 50 MC H05 - Robotics Programming														
			50 MC F	105 - Rob	otics Program	nming									
		Llaura		cnatronic	s Engineerin	g Oradit		Maxima	Marka						
Seme	ester	Hours	т	Б	Total hrs	Credit	<u> </u>								
	/ \/II	L	0	P 0	45		40	E3 60	100	<u>ลเ</u> ว					
V / VI	/ 1	J To introduce the	U	U Detalo of rok	40		40	00	100)					
		To introduce the To understand t			ouc programi	ning									
		 To understand t To introduce etc 	ne ROS tu	ndamenta	IS.										
Objecti	ive(s)	 To introduce students the criteria for selecting a sensor and actuator for a particular ROS robotic application. To familiarize with various bardware based robotic application. 													
		Learn about various sensors, actuators, robot programming													
		Learn about various sensors, actuators, robot programming Linderstand the robotics design and implementation													
		1. Understand the r	1. Understand the robotics design and implementation.												
Cou	rse	2. Gain the knowled	ige on tunc		behavior of c	different type	a of cond	ore and a	otuotoro						
Outco	mes	3. Comprehend, da	NS funda	montolo		inerent type	S OF Sens	sors and a	iciuaiors						
		5 Design robotic ar		using ROS	3										
Introd	uction	to Robotics	plications												
Fleme	onts of	Robotic Systems Rol	hot anatom	W DOF C	lassification of	f Robotic svs	stems -w	ork volum	e tvne						
of driv	e Ass	ociated parameter - r	esolution a	accuracy	reneatability c	lexterity con	noliance	Remote (Center	[09]					
of Con	nnliand	ce Introduction to Prin	ciples & St	rategies o	f Automation	Types & Lev	els of Aut	tomations	Need	[00]					
of auto	omatio	n.		inatogioo o	i / latoination,	1)poo a 201		Connacionio	, 10000						
Gripp	ers an	d Sensors for Robo	tics												
Grippe	ers for	Robotics - Types of	Grippers.	Guideline	s for desian fo	or robotic ari	ipper. Fo	orce analv	sis for						
variou	s basio	c aripper system. Sen	sors for Ro	bots - Tv	bes of Sensors	s used in Ro	botics. C	lassificatio	on and	[09]					
applica	ations	of sensors, Characte	ristics of se	ensing dev	vices, Selectio	ns of senso	rs. Need	for senso	rs and						
vision	systen	n in the working and o	control of a	robot.	,										
Drives	s and (Control for Robotics	6												
Drive -	- Type	s of Drives, Types of	transmissio	on system	s, Actuators a	nd its selecti	on while	designing	а	[09]					
robot s	system	 Control Systems: T 	ypes of Co	ntrollers, I	ntroduction to	closed loop	control.								
Al in F	Roboti	CS													
Socio-	Econo	mic aspect of robot	tisation. Ec	conomical	aspects for	robot design	n, Safety	/ for robo	ot and						
standa	ards, Ir	troduction to Artificial	Intelligenc	e, Al tech	niques, Need	and applicati	on of Al,	mobile ro	botics,	[09]					
New tr	rends a	& recent updates in ro	obotics. Mo	bile Robo	t locomotion:	Types of loce	omotion,	hopping r	obots,						
legged	d robot	s, wheeled robots, sta	ability, mar	noeuvrabili	ty, controllabil	lity.									
Applic	cation	s and Digital Manufa	acturing												
Robot	s Man	ufacturing, Construc	tion, Medi	cal, Defer	nce, Logistics	& Storage,	, Packin	g & Palle	etizing,						
Inspec		Quality Control, Har	vesting, Pa	ainting & C	bating, Clean	ing & Hygiei	ne, Aeros	space, ba	sics in	[03]					
cyber-	pnysic	al production system	ns, data- (ariven pro	bauction, indu	strial interne	et of thir	ngs, aigita	ai twin						
techno	biogy a	ind simulation method	lologies.					Tatal	110	AE					
Toyt F	Pook(r							Total	Hours	40					
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1.	Publi	shing, 2016	., Robol p	rogrammir	ig. a guide to	controlling a	utonomo	us rodois.	Que						
2.	Quig Robo	ley, M., Gerkey, B. ar ot Operating Svstem.	nd Smart, V O'Reillv Me	V.D., Prog edia, Inc.".	ramming Robo 2015	ots with ROS	3: a pract	ical introd	uction to) the					
Refer	ence(s	s):		-,,											
	Lenti	, n Joseph, Robot Ope	erating Svs	stem (ROS	S) for Absolute	e Beginners:	: Robotic	s Program	nmina N	/lade					
1.	Easv	, 1st Edition, APress.	2018. 2 Jo	nathan Ca	acace; Lentin	Joseph, Mas	tering R	OS for R	5	-					
2.	Jona	than Cacace; Lentin J	loseph, Ma	stering RC	DS for Robotic	s Programm	ing: Desi	gn, build,	and sim	ulate					

	complex robots using the Robot Operating System, 2nd Edition, Packt Publishing, 2018
3.	Anil Mahtani, Luis Sanchez, Enrique Fernandez, Aaron Martinez, Lentin Joseph. ROS Programming:
	Building Powerful Robots. Packt Publishing, 2018.
4.	Robotic Engineering by Richard D.Klafter, Prentice Hall

COURSE CODE &	PO													SO	
COURSE NAME	CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
50 MC H05 & Robotics Programming	CO1	2	2	3	3	3	2	2			2		3	3	3
	CO2	3	2	2	3	2	2	3			2		3	2	3
	CO3	3	3	2	2	3	3	3			2		2	3	3
	CO4	3	3	2	2	2	2	2			З		3	3	3
	CO5	3	3	3	2	3	3	2			2		3	2	2

	K.S.R	angasamy	College of	of Technolog	y – Autonor	nous		R	2018				
			Honour	s Degree									
	50	<u>MC H06 - S</u>	ensors a	nd Machine \	ision Syste/	m							
		Me	chatronic	s Engineerin	g	r							
Semester	Hours	/Week		Total hrs	Credit		Maximum Marks						
	L		С	CA	ES	Tot	al						
V / VI / VII	3	0	0	45	3	40	60	100)				
Objective(s)	 Provide students with the validus types of sensors, their principles, and their applications in diverse fields. Provide students with a comprehensive overview of machine vision systems, image processing techniques, and their role in automation and analysis. Develop practical skills in interfacing sensors, processing visual data, and designing simple vision-based systems. Enable students to apply sensor and machine vision knowledge to solve real-world challenges in fields like robotics, manufacturing, and healthcare. Foster an understanding of the ethical considerations related to data collection, privacy, and bias in machine vision applications 												
Course Outcomes	At the end of the course, the students will be able to 1. Identify and classify various sensor types based on their principles and applications. 2. Assess the suitability of different sensors for specific tasks based on their characteristics. 3. Describe the optical components, image formation process, and image sensor technologies in machine vision systems. 4. Apply image enhancement, transformation, and segmentation techniques to preprocess images for analysis. 5. Utilize image processing libraries and tools to extract relevant features from images												
Introduction	to Sensors								[09]				
Definition a	nd importance of s	ensors-Ser	nsor class	sification bas	ed on phys	sical pro	perties-Se	ensing					
mechanisms	: electrical, mecha	anical, opti	cal, therr	nal-Sensor c	haracteristic	s: sensi	tivity, acc	uracy,					
precision, res	solution												
Sensor Tecl	hnologies								[09]				
Introduction	to different sensor ty	ypes: temp	erature, p	oressure, prox	imity, motio	n- Resis	tive, capa	acitive,					
inductive, an	nd piezoelectric sens	sors- Optic	al sensor	s: photodiode	es, phototra	nsistors,	lasers- S	sensor					
Sensor Inter	rfaces and Signal C	niques	N						[00]				
Analog and	digital sensor interf	aces. Amr	J	and filtering	of sensor s	ianals.	Analog-to-	dinital.	[09]				
conversion (ADC) and digital-to-a	nalog conv	ersion (D	AC)- Noise re	duction and	error ha	ndlina in s	sensor					
data				,									
Vision Syste	ems Fundamentals								[09]				
Basics of hu	man vision and perce	eption- Ima	ge format	ion: lenses, c	ameras, opt	ics- Colo	r represer	ntation					
and perception	on- image sensors: C		103						[00]				
Image Proce Image enhar transform, H corners, edg	essing rechniques ncement: filtering, hist lough transform- Im- es, texture	ogram equ age segme	alization, o entation: t	contrast adjus hresholding,	tment- Imag edge detect	e transfo ion- Fea	ormation: F ature extra	ourier action:	[09]				
							Total	Hours	45				

-9------2.2.2

Text	Book(s):
1.	Orlando E. Ruiz "Introduction to Sensors" CRC Press,2018
2	Carsten Steger, Markus Ulrich, and Christian Wiedemann "Machine Vision Algorithms and Applications"
۷.	Wiley,2018
Refer	rence(s):
1.	Ramon Pallas-Areny and John G. Webster "Sensors and Signal Conditioning" Wiley, 2010
2.	Jon S. Wilson "Sensor Technology Handbook", Newnes 2010
3.	Krzysztof Iniewski "Smart Sensors for Industrial Applications" CRC Press,2013
4.	E. R. Davies "Computer and Machine Vision: Theory, Algorithms, Practicalities" Academic Press, 2015

COURSE CODE &	РО													60	
COURSE NAME	СО	1	2	3	4	5	6	7	8	9	10	11	12	1	2
50 MC H06 & Sensors and Machine Vision System	CO1	3	3	3	3	3	2	2			2		3	3	3
	CO2	3	2	2	3	2	2	3	2	2	2		3	2	3
	CO3	3	3	2	2	3	3	3			2	3	2	3	3
	CO4	2	2	2	3	3	3	2			3		2	2	3
	CO5	3	3	3	2	3	3	2			2		3	2	2

2.2.2