# K.S. Rangasamy College of Technology

(Autonomous Institution affiliated to Anna University, Chennai)



## **CURRICULUM AND SYLLABI**

## FOR

# **B.E. Mechatronics Engineering**

(For the batch admitted in 2022– 2023)

## R2022

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

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

BoS Chairman

### 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)**

- **PEO1:** Core competencies: Our graduates apply engineering knowledge to solve problems in Mechatronics and relevant fields.
- **PEO2:** Employability: Our graduates demonstrate technical and professional skills to ethically address the industrial and societal needs.
- **PEO3:** 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.

BoS Chairman

## MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) WITH PROGRAMMEOUTCOMES (POs) The B.E. Mechatronics Engineering Programme outcomes leading to the achievement of the

objectives are summarized in the following Table.

Programme					Prog	gramme	Outco	mes				
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	Sem.	Course Name						P	0					
rear	Sem.		1	2	3	4	5	6	7	8	9	10	11	12
		Professional English-I								2	3	3	2	3
		Matrices and Calculus	3	3	3	2	2							2
		Engineering Physics	3	3	3	3	2	2	3	2	1	1	1	1
		Basic Electrical Electronics Engineering and	2	3	1	2	-	_	3	2	_	-	2	3
		Measurements		_			_		5	2	_	_	2	
	I	Engineering Mechanics	3	3	3	3	3	1		1		3	1	1
		Environmental Studies and Climate Change	3	3	3	3	3	3	3	3	3	2	2	
		Fabrication and Reverse Engineering	3	3	3	2	3	3	2	3	3	1	1	:
		Laboratory	9	5	5	2	5	5	2	5	5			
		Basic Electrical Electronics Engineering and	3	2	1			3	1		3		3	2
•		Measurements Laboratory			-								_	
		Professional English-II	1	2	1	2	1	2	1	2	3	3	2	(
		Integrals and Partial Differential Equations	3	3	2	2	3							1
		Engineering Drawing	3	1	1	1	2				2			1
		C Programming	1	3		2	3			2				1
	Ш	Chemistry for Mechanical Sciences												
		Heritage of Tamils							3	3		2		
		Physics & Chemistry Laboratory	3	2	2	1	3	2	2	3	1	2	2	
		C Programming Laboratory	1	3		2	3			2				2
		Career Skill Development-I												
		Statistics and Numerical Methods	3	3	3	2.6		0	0	0	0	0	0	
		Analog Devices and Digital Circuits	3	1.6	1.6			0	0	0	0.6	1	0.4	
		Sensors and Instrumentation	3	1.4	2.2	0.8	0.8	0.2	0.2	0.4	0.4	1	1.2	
		Manufacturing Technology	3	0	0	0	2.2	0	3	0	0	0	2	
		Mechanics of Solids	3	3	3	1.8	3	2	0	0	0	2	0	
	ш	Universal Human Values	0	0	0	0	0	2.4	1.8	3	2.8	0.6	0.4	
		Tamils and Technology	0	0	0	0	0	0	3	3	0	2	0	
		/ தமிழரும் தொழில்நுட்பமும்	0	0	0	0	0	0	3	3	0	2	0	
		Analog Devices and Digital Circuits	2	2.2	4	0 0	2	0	0	<u> </u>	1 0	4 4	0.0	
П		Laboratory	2	2.2	1	0.8	2	0	0	0.0	1.2	1.4	0.0	
11		Manufacturing Technology Laboratory	3	2	2	0	0	0	0	0	2	0	2	
		Career Skill Development-II	0	0	0	0	0	0	0	2	3	3	2	
		Industrial Drives and Control	3	2.6	3	2.6	2.8	0	0	1.8	1.2	0.8	0.8	
		Fluid Mechanics and Thermodynamics	3	3	2	2	0	0	0	0	1	0	0	
		Metrology and Statistical Quality control	3	3	2	2	0	0	0	0	1	0	0	
	IV	Hydraulic and Pneumatic control	3	3	0	2	3	2	0	0	0	2	0	
	10	Virtual Instrumentation and Applications	3	3	3	2	0	0	0	3	0	0	2	
		Industrial Drives and Control Laboratory	2	2.2	1	0.8	2	0	0	0.8	1.2	1.4	0.8	
		Applied Mechanics Laboratory	3	2	0	0	0	2	3	0	2	2	0	
		Career Skill Development-III	2.6	2.6	2.6	2.8	0	2.4	0	0	0	2	3	
		Microprocessors and Microcontrollers	3	3			2.6	0	0	0	0	0	0	2
	v	System Design and Control	3	1.6	1.6	1.6	1	0	0	0	0.6	1	0.4	2
III	v	Kinematics and Dynamics of Machines	3					0.2	0.2		0.4		1.2	2
		Total Quality Management	3	0	0	0	2.2	0	3	0	0	0	2	

	Start-ups and Entrepreneurship	2.8	2.6	3	2.4	2.2	1	1	1.4	0.8	0.8	2.2	2.4
	Microprocessors and Microcontrollers Laboratory	2	2.2	1	0.8	2	0	0	0.8	1.2	1.4	0.8	1
	Metrology and Dynamics Laboratory	3	2	2	0	0	0	0	0	2	0	2	2
	Career Skill Development-IV	0	0	0	0	0	0	0	2	3	3	2	3
	Industrial Automation Controllers	3	2.6	З	2.6	2.8	0	0	1.8	1.2	0.8	0.8	1
	Machine Design	3	3	2	2	0	0	0	0	1	0	0	1
VI	Computer Aided Design and Manufacturing	3	3	2	2	0	0	0	0	1	0	0	1
VI	Computer Aided Manufacturing Laboratory	3	2	0	0	0	2	3	0	2	2	0	2
	Design Thinking and Industrial Automation Laboratory	2.6	2.6	2.6	2.8	0	2.4	0	0	0	2	3	3

### K.S. RANGASAMY COLLEGE OF TECHNOLOGY

### Credit Distribution for B.E(MCT)Programme-2022 -2023 Batch

S.	Cotogony			Cred	lits Pe	r Semes	ster			Total	Percentage
No.	Category	I	II	III	IV	V	VI	VII	VIII	Credits	%
1.	HS	2	2	-	-	3	-	-	-	07	4.29
2.	BS	7	9	4	-	-	-	-	-	20	12.27
3.	ES	11	9	-	-	-	-	-	-	20	12.27
4.	PC	-	-	18	21	15	15	13	-	82	50.31
5.	PE	-	-	-	-	3	6	3	3	15	9.20
6.	OE	-	-	-	3	3	3	-	-	09	5.52
7.	CG	-	-	-	-	-	-	2	8	10	6.14
8.	MY	-	MY I	MY II	-	MY III	-	-	-	-	-
9.	AC	-	-	-	-	-	-	AC I	AC II	-	-
10.	GE*	-	1*	1*	-		-	-	-	2*	-
	Total	20	20	22	24	24	24	18	11	163	100

# General Elective- Extra credits is offered

- HS HUMANITIES AND SOCIAL SCIENCES
- **BS BASIC SCIENCE**
- ES ENGINEERING SCIENCES
- PC PROFESSIONAL CORE
- PE PROFESSIONAL ELECTIVES
- **OE OPEN ELECTIVES**
- CG CAREER GUIDANCE COURSES
- **MY MANDATORY COURSES**
- AC AUDIT COURSES
- **GE GENERAL ELECTIVE**

Open Electives are courses offered by different departments that do not have any prerequisites and could be of interest to students of any branch

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#### K.S.RANGASAMY COLLEGE OF TECHNOLOGY,TIRUCHENGODE -637215 (An Autonomous Institution affiliated to Anna University) HUMANITIES AND SOCIAL SCIENCES (HS)

S. No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С	Pre-requisite
1.	60 EN 001	Professional English - I	HS	2	1	1	0	2	-NIL-
2.	60 EN 002	Professional English - II	HS	2	1	1	0	2	-NIL-
3.	60 HS 003	Total Quality Management	HS	3	3	0	0	3	-NIL-
4.	60 AB 00*	NCC/NSS/NSO/YRC/RR C/Fine Arts*	HS	4	2	0	2	3*	-NIL-

#### S. Course Contact Category Ρ **Course Title** L т С Pre-requisite No. Code Periods 60 MA 001 Matrices and Calculus BS 3 4 -NIL-1. 4 1 0 2. 60 PH 001 Engineering Physics BS 3 3 0 0 3 -NIL-Chemistry for Mechanical 3 3. 60 CH 001 BS 3 0 0 3 -NIL-Sciences Physics and Chemistry 4. 60 CP 0P1 BS 4 0 0 4 2 -NIL-Laboratory Integrals, Partial Differential Equations and 5. 60 MA 003 BS 4 3 1 0 4 -NIL-Laplace Transform Statistics and Numerical 6. 60 MA 007 BS 4 3 1 0 4 -NIL-Methods

### **BASIC SCIENCE (BS)**

### **ENGINEERING SCIENCES (ES)**

S. No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С	Pre-requisite
1.	60 ME 001	Engineering Drawing	ES	6	2	0	4	4	-NIL-
2.	60 ME 004	Engineering Mechanics	ES	4	3	1	0	4	-NIL-
3.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2	-NIL-
4.	60 CS 001	C Programming	ES	3	3	0	0	3	-NIL-
5.	60 EE 003	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3	-NIL-
6.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2	-NIL-
7.	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	ES	6	2	0	4	4	-NIL-

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### **PROFESSIONAL CORE (PC)**

S. No.	Course Code		Category	Contact Periods	L	т	Ρ	С	Pre-requisite
1.	60 MC 301	Analog Devices and Digital Circuits	PC	3	3	0	0	3	NIL
2.	60 MC 302	Sensors and Instrumentation	PC	5	3	0	2	4	NIL
3.	60 MC 303	Manufacturing Technology	PC	3	3	0	0	3	Engineering Physics
4.	60 MC 304	Mechanics of Solids	PC	4	3	1	0	4	Applied Mechanics
5.	60 MC 3P1	Analog Devices and Digital Circuits Laboratory	PC	4	0	0	4	2	Analog Devices and Digital Circuits
6.	60 MC 3P2	Manufacturing Technology Laboratory	PC	4	0	0	4	2	Manufacturing Technology
7.	60 MC 401	Industrial Drives and Control	PC	3	3	0	0	3	Basic Electrical and Electronics Engineering
8.	60 MC 402	Fluid Mechanics and Thermodynamics	PC	4	3	1	0	4	Mechanics of Solids
9.	60 MC 403	Metrology and Statistical Quality control	PC	3	3	0	0	3	NIL
10.	60 MC 404	Hydraulic and Pneumatic control	PC	5	3	0	2	4	Fluid Mechanics and Thermodynamics
11.	60 MC 405	Virtual Instrumentation and Applications	PC	4	3	1	0	4	NIL
12.	60 MC 4P1	Industrial Drives and Control Laboratory	PC	4	0	0	4	2	Industrial Drives and Control
13.	60 MC 4P2	Applied Mechanics Laboratory	PC	4	0	0	4	2	Metrology and Statistical Quality Control
14.	60 MC 501	Microprocessors and Microcontrollers	PC	3	3	0	0	3	Analog Devices and Digital Circuits
15.	60 MC 502	System Design and Control	PC	4	3	1	0	4	NIL
16.	60 MC 503	Theory of Machines	PC	4	3	1	0	4	NIL
17.	60 MC 5P1	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2	Microprocessors and Microcontrollers
18.	60 MC 5P2	Metrology and Dynamics Laboratory	PC	4	0	0	4	2	Metrology and Statistical Quality Control
19.	60 MC 601	Industrial Automation Controllers	PC	3	3	0	0	3	System Design and Control
20.	60 MC 602	Machine Design	PC	4	3	1	0	4	Theory of Machines
21.	60 MC 603	Computer Aided Design and Manufacturing	PC	3	3	0	0	3	NIL
22.	60 MC 6P1	Computer Aided Manufacturing Laboratory	PC	4	0	0	4	2	Computer Aided Design and Manufacturing
23.	60 MC 6P2	Design Thinking and Industrial Automation Laboratory	PC	4	0	0	4	2	Industrial Automation Controllers
24.	60 MC 701	Robotics Engineering	PC	3	3	0	0	3	NIL
25.	60 MC 702	Embedded System	PC	3	3	0	0	3	Microprocessors and Microcontrollers
26.	60 MC 703	Automation in Automobiles	PC	3	3	0	0	3	Industrial Automation Controllers
27.	60 MC 7P1	Embedded System Laboratory	PC	4	0	0	4	2	Embedded System
28.	60 MC 7P2	Robotics and Machine Vision Laboratory	PC	4	0	0	4	2	Robotics Engineering

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BoS Chairman

Elective	(Vertical I) Robotics	(Vertical II) Electric Vehicle	(Vertical III) Drone	(Vertical IV) Manufacturing	(Vertical V) Design and Analysis	(Vertical VI) Logistics and Supply Chain Management
ELECTIVE I	Design of Robot Elements	Mechatronics System	Drone Technology	Design of Manufacturing	Finite Element Analysis	Automation in Process Industries
ELECTIVE II	Mobile Robotics	Electric Vehicle	Aircraft Mechatronics	Applied Materials Technology	Design of Experiments	Supply Chain Management
ELECTIVE III	Robots and Systems in Smart Manufacturing	Automotive Electronics	Design of UAV Systems	Non- conventional Machining Processes	Product Design and Costing	Ware House Management
ELECTIVE IV	Agricultural Robotics and Automation	Design of Transmission Systems	Navigation and Communication Systems	Non Destructive Testing	Optimization Techniques	Process Planning and Cost Estimation
ELECTIVE V	Robotic Welding Technology	Smart Mobility and Intelligent Vehicles	Aerodynamics of Drones	AI/ML for Manufacturing	Rapid Prototyping	Container Logistics

### PROFESSIONAL ELECTIVES (PE): Vertical

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BoS Chairman

	Semester V Elective –I										
S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite		
1.	60 MC E11	Mobile Robotics	PE	3	3	0	0	3	<b>Robotics Engineering</b>		
2.	60 MC E12	Electric Vehicle	PE	3	3	0	0	3	Industrial Drives and Control, Sensors and Instrumentation		
3.	60 MC E13	Aircraft Mechatronics	PE	3	3	0	0	3	Applied Mehanics		
4.	60 MC E14	Applied Materials Technology	PE	3	3	0	0	3	NIL		
5.	60 MC E15	Design of Experiments	PE	3	3	0	0	3	NIL		
6.	60 MC E16	Automation in Process Industries	PE	3	3	0	0	3	Industrial Automation Controllers		
		Compoter \									

### PROFESSIONAL ELECTIVES (PE) Semester V Elective –I

### Semester VI Elective –II

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite
1.		Agricultural Robotics and Automation	PE	3	3	0	0	3	Robotics Engineering
2.	60 MC E22	Design of Transmission Systems	PE	3	3	0	0	3	NIL
3.	60 MC E23	Navigation and Communication Systems	PE	3	3	0	0	3	NIL
4.	60 MC E24	Non Destructive Testing	PE	3	3	0	0	3	NIL
5.	60 MC E25	Optimization Techniques	PE	3	3	0	0	3	NIL
6.	60 MC E26	Supply Chain Management	PE	3	3	0	0	3	NIL
		Semester V	I Electiv	/e –III					

		Semester v	Electiv	/e –III					
S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite
1.	60 MC E31	Robots and Systems in Smart Manufacturing	PE	3	3	0	0	3	Robotics Engineering
2.	60 MC E32	Automotive Electronics	PE	3	3	0	0	3	Sensors and Instrumentation
3.	60 MC E33	Design of UAV Systems	PE	3	3	0	0	3	NIL
4.	60 MC E34	Non-conventional Machining Processes	PE	3	3	0	0	3	NIL
5.	60 MC E35	Product Design and Costing	PE	3	3	0	0	3	Manufacturing Technology
6.	60 MC E36	Ware House Management	PE	3	3	0	0	3	NIL

### Semester VII Elective –IV

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite
1.	60 MC E41	Design of Robot Elements	PE	4	2	0	2	3	<b>Robotics Engineering</b>
2.	60 MC E42	Mechatronics System	PE	4	2	0	2	3	Sensors and Instrumentation
3.	60 MC E43	Drone Technology	PE	4	2	0	2	3	NIL
4.	60 MC E44	Design of Manufacturing	PE	4	2	0	2	3	NIL
5.	60 MC E45	Finite Element Analysis	PE	4	2	0	2	3	NIL
6.	60 MC E46	Process Planning and Cost Estimation	PE	4	2	0	2	3	NIL

### Semester VIII Elective –V

S. No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С	Pre-requisite
1.	60 MC E51	Robotic Welding Technology	PE	3	3	0	0	3	<b>Robotics Engineering</b>
2.	60 MC E52	Smart Mobility and Intelligent Vehicles	PE	3	3	0	0	3	NIL
3.	60 MC E53	Aerodynamics of Drones	PE	3	3	0	0	3	NIL
4.	60 MC E54	AI/ML for Manufacturing	PE	3	3	0	0	3	Manufacturing Technology
5.	60 MC E55	Rapid Prototyping	PE	3	3	0	0	3	NIL
6.	60 MC E56	Container Logistics	PE	3	3	0	0	3	NIL

### MANDATORY COURSES (MY)

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite
1.	60 IVIY 001	Environmental Studies and Climate Change	MY	2	2	0	0	0	Nil
2.	60 MY 002	Universal Human Values	MY	3	3	0	0	3	Nil
3.	60 MY 003	Start-ups and Entrepreneurship	MY	3	3	0	0	3	Nil

### SEMESTER VII & SEMESTER VIII, AUDIT COURSES (AC)

S. No	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite
1	. 60 AC 001	Research Methodology - I	AC	1	1	0	0	0	Nil
2	60 AC 002	Research Methodology - II	AC	1	1	0	0	0	Research Methodology - I

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

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite
1.	60 MC L003	Applied Ergonomics	OE	3	З	0	0	3	Nil
2.	60 MC L004	Automation in Process Industries	OE	3	З	0	0	3	Nil
3.	60 MC L005	Introduction to Occupational Health	OE	3	3	0	0	3	Nil

### **CAREER GUIDANCE COURSES (CG)**

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite		
1.	60 CG 0P1	Career Skill Development	CG	2	0	0	2	1*	Basic knowledge of reading and writing in English		
2.	60 CG 0P2	Career Skill Development II	CG	2	0	0	2	1*	Basic knowledge of reading and writing in English		
3.	60 CG 0P3	Career Skill Development III	CG	2	0	0	2	1*	Career Skill Development – II		
4.	60 CG 0P4	Career Skill Development IV	CG	2	0	0	2	1*	Career Skill Development – III		
5.	60 CG 0P5	Comprehension Test	CG	2	0	0	2	1*	Career Skill Development I, II, III, IV		
6.	60 MC 7P3	Project Work - Phase I	CG	4	0	0	4	2	Nil		
7.	60 MC 8P1	Project Work - Phase II	CG	4	0	0	4	8	Nil		
8.	60 CG 00*	Internship*	CG	0	0	0	0	3*	Nil		

### **GENERAL ELECTIVE (GE)**

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С	Pre-requisite
1.		Heritage of Tamils / தமிழர் மரபு (Common to all Branches )	GE	1	1	0	0	1*	Nil
2.	60 GE 002	Tamils and Technology / தமிழரும் தொழில்நுட்பமும் (Common to all Branches )	GE	1	1	0	0	1*	Nil

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### K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

(An Autonomous Institution affiliated to Anna University)

### COURSES OF STUDY

### (For the candidates admitted from 2022-2023 onwards)

### SEMESTER I

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С				
		Induction Programme	-	-	-	-	-	0				
	THEORY											
1.	60 EN 001	Professional English-I	HS	3	1	0	2	2				
2.	60 MA 001	Matrices and Calculus	BS	4	3	1	0	4				
3.	60 PH 001	Engineering Physics	BS	3	3	0	0	3				
4.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3				
5.	60 ME 004	Engineering Mechanics	ES	4	3	1	0	4				
6.	60 MY 001	Environmental Studies and Climate Change	MY	2	2	0	0	0				
		PRACTICALS										
7.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2				
8.	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	ES	4	0	0	4	2				
			Total	27	15	02	10	20				

### I to VII semester

NCC<sup>%</sup> - Course can be waived with 3 credits in VII semester or offered as extra credits NSS/NSO/YRC/RRC/Fine Arts<sup>%</sup> 3 credits is not accounted for CGPA

Career Skill Development (CSD) - additional credit is offered not accounted for CGPA.

### I to VIII semester

Internship 3 additional credits not accounted for CGPA is offered based on the Internship duration

#### SEMESTER II

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С				
	THEORY											
1.         60 EN 002         Professional English-II         HS         3         1         0         2         2												
2.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	4	З	1	0	4				
3.	60 ME 001	Engineering Drawing	ES	6	2	0	4	4				
4.	60 CS 001	C Programming	ES	3	3	0	0	3				
5.	60 CH 001	Chemistry for Mechanical Sciences	BS	3	3	0	0	3				
6.	60 GE 001	Heritage of Tamils / தமிழர் மரபு	GE	1	1	0	0	1 <sup>&amp;</sup>				
		PRACTICALS										
7.	60 CP 0P1	Physics & Chemistry Laboratory	BS	4	0	0	4	2				
8.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2				
9.	60 CG 0P1	Career Skill Development-I	CG	2	0	0	2	1*				
			Total	30	13	1	16	20				

Heritage of Tamils<sup>&</sup> additional 1 credit is offered and not account for CGPA.

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### SEMESTER III

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С					
		THEORY											
1.	1.         60 MA 007         Statistics and Numerical Methods         BS         4         3         1         0         4												
2.	60 MC 301	Analog Devices and Digital Circuits	PC	3	3	0	0	3					
3.	60 MC 302	Sensors and Instrumentation	PC	5	3	0	2	4					
4.	60 MC 303	Manufacturing Technology	PC	3	3	0	0	3					
5.	60 MC 304	Mechanics of Solids	PC	4	3	1	0	4					
6.	60 MY 002	Universal Human Values	MY	3	3	0	0	3#					
7.	60 GE 002	Tamils and Technology / தமிழரும் தொழில்நுட்பமும்	GE	1	1	0	0	1 <sup>&amp;</sup>					
		PRACTICALS											
8.	60 MC 3P1	Analog Devices and Digital Circuits Laboratory	PC	4	0	0	4	2					
9.	60 MC 3P2	Manufacturing Technology Laboratory	PC	4	0	0	4	2					
10.	60 CG 0P2	Career Skill Development-II	CG	2	0	0	2	1*					
11.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3\$					
			Total	35	19	02	12	22					

• Tamils and Technology<sup>&</sup> additional1 credit is offered and not account for CGPA.

• UHV# additional 3 credit is offered and not accouted for CGPA

### **SEMESTER IV**

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Р	С					
	THEORY												
1.         60 MC 401         Industrial Drives and Control         PC         3         3         0         0         3													
2.	60 MC 402	Fluid Mechanics and Thermodynamics	PC	4	3	1	0	4					
3.	60 MC 403	Metrology and Statistical Quality control	PC	3	3	0	0	3					
4.	60 MC 404	Hydraulic and Pneumatic control	PC	5	3	0	2	4					
5.	60 MC 405	Virtual Instrumentation and Applications	PC	4	2	0	2	3					
6.	60 MC L0*	Open Elective-I	OE	3	3	0	0	3					
		PRACTICALS											
7.	60 MC 4P1	Industrial Drives and Control Laboratory	PC	4	0	0	4	2					
8.	60 MC 4P2	Applied Mechanics Laboratory	PC	4	0	0	4	2					
9.	60 CG 0P3	Career Skill Development-III	CG	2	0	0	2	1*					
10.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*					
			Total	33	17	2	14	24					

### SEMESTER V

S. No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С					
		THEORY											
1.													
2.	60 MC 502	System Design and Control	PC	4	3	1	0	4					
3.	60 MC 503	Kinematics and Dynamics of Machines	PC	4	3	1	0	4					
4.	60 HS 003	Total Quality Management	HS	3	3	0	0	3					
5.	60 MY 00*	Start-ups and Entrepreneurship	MY	2	2	0	0	0					
6.	60 MC E1*	Elective-I	PE	3	3	0	0	3					
7.	60 MC L0*	Open Elective-II	OE	3	3	0	0	3					
		PRACTICALS											
8.	60 MC 5P1	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2					
9.	60 MC 5P2	Metrology and Dynamics Laboratory	PC	4	0	0	4	2					
10.	60 CG 0P4	Career Skill Development-IV	CG	2	0	0	2	1*					
11.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*					
			Total	32	20	02	10	24					

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### SEMESTER VI

S. No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С					
THEORY													
1.	1.         60 MC 601         Industrial Automation Controllers         PC         4         3         1         0         4												
2.	60 MC 602	Machine Design	PC	4	3	1	0	4					
3.	60 MC 603	Computer Aided Design and Manufacturing	PC	3	3	0	0	3					
4.	60 MC E2*	Elective-II	PE	3	3	0	0	3					
5.	60 MC E3*	Elective-III	PE	3	3	0	0	3					
6.	60 MC L0*	Open Elective-III	OE	3	3	0	0	3					
		PRACTICALS											
7.	60 MC 6P1	Computer Aided Manufacturing Laboratory	PC	4	0	0	4	2					
8.	60 MC 6P2	Design Thinking and Industrial Automation Laboratory	PC	4	0	0	4	2					
9.	60 MC 6P3	Mini Project	PC	2	0	0	2	1 <sup>&amp;</sup>					
10.	60 CG 0P5	Comprehension Test	CG	2	0	0	2	1*					
11.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*					
			Total	30	18	02	10	24					

Comprehension Test\* -one additional credit is offered and not accounted for CGPA calculation Miniproject<sup>&</sup> - 1 additional credit is offered and not accounted for CGPA calculation

### SEMESTER VII

S. No.	Course Code	Course Title	Category	Contact Periods	L	Т	Ρ	С
		THEORY						
1.	60 MC 701	Robotics Engineering	PC	3	3	0	0	3
2.	60 MC 702	Embedded System	PC	3	3	0	0	3
3.	60 MC 703	Automation in Automobiles	PC	3	3	0	0	3
4.	60 MC E4*	Elective-IV	PE	4	2	0	2	3
5.	60 AC 001	Research Methodology – I	AC	1	1	0	0	0
6.	60 AB 00*	NCC\NSS\NSO\YRC\RRC\Yoga\Fine Arts <sup>%</sup>	HS	4	2	0	2	3%
		PRACTICALS						
7.	60 MC 7P1	Embedded System Laboratory	PC	4	0	0	4	2
8.	60 MC 7P2	Robotics and Machine Vision Laboratory	PC	4	0	0	4	2
9.	60 MC 7P3	Project Work - Phase I	CG	4	0	0	4	2
10.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*
			Total	26	12	0	14	18

NCC<sup>%</sup> - Course can be waived with 3 credits in VII semester or offered as extra 3 credits. NSS/NSO/YRC/RRC/Fine Arts<sup>%</sup> 3 extra credits not accounted for CGPA

#### SEMESTER VIII

S. No.	Course Code	Course Title	Category	Contact Periods	L	т	Ρ	С						
	THEORY													
1.	60 MC E5*	Elective-V	PE	3	3	0	0	3						
2.	60 AC 002	Research Methodology – II	AC	1	1	0	0	0						
		PRACTICALS												
3.	60 MC 8P1	Project Work - Phase II	CG	16	0	0	16	8						
4.	60 CG 0P6	Internship	CG	-	-	-	-	1/2/3*						
			Total	20	4	0	16	11						

#### Internship<sup>\*</sup>, MY<sup>\*</sup> & GE<sup>\*</sup> - Extra Credit is offered TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 163

**Note:** HS- Humanities and Social Sciences including Management Courses, BS- Basic Science Courses, ES-Engineering Science Courses, PE-Professional Core Courses, PE-Professional Elective Courses, GE- General Elective Courses, OE- Open Elective Courses, CG - Career Enhancement Course, MY- Mandatory Courses

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BoS Chairman

### K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

(An Autonomous Institution affiliated to Anna University)

### B.E. / B.Tech. Degree Programme SCHEME OF EXAMINATIONS (For the candidates admitted from 2022-2023 onwards) **FIRST SEMESTER**

S.	Course		Duration of	Weighta	Minimum Marks for Pass in End Semester Exam			
No.		Name of the Course	Internal Exam	Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
			THEOF	RY				
1	60 EN 001	Professional English-I	2	40	60	100	45	100
2	60 MA 001	Matrices and Calculus	2	40	60	100	45	100
3	60 PH 001	Engineering Physics	2	40	60	100	45	100
4	60 EE 001	Basic Electrical and Electronics Engineering	2	40	60	100	45	100
5	60 ME 004	Engineering Mechanics	2	40	60	100	45	100
6	60 MY 001	Environmental Studies and Climate Change	2	40	60	100	45	100
			PRACTI	CAL				
7	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	3	60	40	100	45	100
8	60 EE 0P1	Basic Electrical and Electronics Engineering Laboratory	3	60	40	100	45	100

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

R1/w.e.f.27/12/2023

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60 EN 001	Professional English – I	Category	L	Т	Ρ	Credit
00 EN 001	Fiolessional English – I	HS	1	0	2	2

### Objective

- To help learners improve their vocabulary and to enable them to use words ٠ 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 effectively in English in real life and career • related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

### Prerequisite

Basic knowledge of reading and writing in English.

### Course Outcomes

	On the successful completion of the course, students will be able to	
CO1	Listen and comprehend complex academic texts	Understand
CO2	Read and infer the denotative and connotative meanings of technical texts	Analyze
CO3	Write definitions, descriptions, narrations, and essays on various topics	Apply
CO4	Speak fluently and accurately in formal and informal communicative contexts	Apply
CO5	Express their opinions effectively in both oral and written medium of communication	Analyze

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								2	3	3	2	3	2	2
CO2								2	3	3	2	3	2	2
CO3								2	3	3	2	3	2	2
CO4								2	3	3	2	3	2	2
CO5								2	3	3	2	3	2	2
3- Str	3- Strong;2-Medium;1-Some													

Assessment Pattern			
Bloom's Category	Continuous /	End Sem Examination	
Bloom'sCategory	1	2	(Marks)
Knowledge (Kn)	10	10	10
Apply (Ap)	20	20	40
Analyse (An)	30	30	50
Create (Cr)	0	0	0

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		C		to All Branche					
•	, Hours	/Week			Credit	Ν	/laximum	Marks	
Semes	ter L	Т	Р	Total hrs	С	CA	ES	To	tal
	1	0	2	45	2	40	60	10	
Listenin video (fo Speakin Reading relevant Writing: Languag phrasal Narratio Listenin Speakin	<ul> <li>ction to Fundamentals of g: General information-sommal &amp; informal).</li> <li>ig: Self Introduction; Introduction; Self Introduction; Introduction; Introduction; Introduction; Introduction; Introduction brochures to technical contexts and Writing letters – inform ge Focus: Present Tens verbs; abbreviations &amp; action and Summation</li> <li>ig: Podcast, anecdotes / ig: Narrating personal</li> </ul>	of Commu specific def oducing a f (technical d emails. aal and forr es; word fo cronyms (a stories / e experien	Inication tails-conv friend; co context) mal – bas ormation as used in vent narra ces / ev	ersation: introd nversation - po ), telephone r ics and format (affixes); synol technical con ation; documer vents; Intervie	duction to cl bliteness str nessages corientation nyms, antor texts).	assmates ategies. ' social r nyms and	s – audio / nedia me contranyr	essages ms, and ebrities.	[09]
Reading blogs. Writing: Languag	izing of documentaries / g: Biographies, travelog Paragraph writing, sho ge Focus: Past tenses a	ues, news ort report of and prepos	paper rep n an ever	oorts, excerpts nt (field trip etc	.).	ure, and t	travel & te	echnical	[09]
Listenin Speakin Reading Writing: Languag discours	tion of a process / proc g: Listen to a product ar g: Picture description; gi g: Advertisements, gadge Definitions; instructions; ge Focus: Imperatives; e markers (connectives)	nd process iving instru et reviews ; and produ comparati & sequenc	iction to u and user uct /proce ve adject	se the product manuals. ss description	; presenting	a produc	ct.		[09]
Listenin Speakin Reading Writing: graph et	cation and Recommend g: TED Talks; scientific l g: Small Talk; Mini prese y: Newspaper articles ar Note-making / Note-tak c, to verbal mode) ge Focus: Articles; Pro- ons.	lectures; a entations nd Journal king; recon	reports nmendatio	ons; Transferri	•				[09]
Express Listenin Speakin Reading Writing: Languag		ebates & ro blogs. ive or narra	ole plays. ative).				ntences.		[09]
Toxt Po	ok(s):						Iota	I Hours	45
1. 2	English for Engineers 8 University, 2020 Norman Lewis, 'Word Po	wer Made	Easy - T			•		U ·	
Referen	Book', Penguin Random	House Ind	lia, 2020						
1.	Paul Emmerson and Nic Press, New York, 2005 Arthur Brookes and Po							-	-
2.   3	ntermediate Learners', C Michael McCarthy and I	Cambridge Felicity O	Universit	y Press, New `	York, 2003			-	
	University Press, N.York Lakshmi Narayanan, 'A (		ok on Ter	hnical English	'Scitech Pu	blications	(India) Pv	/t. 1. td 20	020
	- 04- Quality Education				Joneon T u				
	f.27/12/2023 in the BoS Meeting Held on 24	/11/2023				-	a.		<u>~</u>

han BoS Chairman

### **Course Contents and Lecture Schedule**

S.No	Торіс	No. of Hours
1	Introduction to Fundamentals of Communication	
1.1	Listening for general information and Specific details	1
1.2	Self-introduction	1
1.3	Narrating personal experiences	1
1.4	Reading relevant to technical contexts and emails	1
1.5	Writing letters – informal	1
1.6	Writing letters - formal	1
1.7	Present Tenses	1
1.8	synonyms, antonyms and contranyms, and affixes	1
1.9	phrasal verbs; abbreviations & acronyms	1
2	Narration and Summation	
2.1	Listening to podcasts, documentaries and interviews with celebrities	1
2.2	Narrating personal experiences	1
2.3	Summarizing of documentaries	1
2.4	Reading travelogues, and excerpts from literature	1
2.5	Paragraph writing	1
2.6	Short report on an event (field trip etc.).	1
2.7	Past tenses	1
2.8	Prepositions	1
2.9	One-word substitution	1
3	Description of a process / product	· · ·
3.1	Listen to a product and process descriptions	1
3.2	Picture description	1
3.3	Giving instruction to use the product	1
3.4	Reading Advertisements, gadget reviews and user manuals	1
3.5	Writing Definitions and instructions	1
3.6	Future Tenses	1
3.7	Homonyms and Homophones	1
3.8	Imperatives	1
3.9	Comparative adjectives, and discourse markers	1
4	Classification and Recommendations	
4.1	Listening to TED Talks and educational videos	2
4.2	Listening to scientific lectures	1
4.3	Small Talk and mini presentations	2
4.4	Reading newspaper articles and journal reports	2
4.5	Note-making / Note-taking	1
4.6	Recommendations	1
4.7	Transferring information from non-verbal	1
4.8	Articles and Pronouns	2
4.9	Subject-verb agreement and collocations	
5	Expression	
5.1	Listening to debates and panel discussions	1
5.2	Group discussions	2
5.3	Role plays	1
5.4	Reading editorials and opinion blogs	1
5.5	Essay Writing (Descriptive or narrative)	1
5.6	Punctuation and cause & effect expressions.	1
5.7	Compound Nouns	1
5.8	Simple, compound & complex sentences	1
5.0		
	Total	45

### **Course Designers**

### 1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

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BoS Chairman

		Category	L	Т	Р	Credit
60 MA 001	MATRICES AND CALCULUS	BS	3	1	0	4

### Objective

- To familiarize the students with basic concepts in Cayley-Hamilton theorem and orthogonal transformation.
- To get exposed to the fundamentals of differential calculus in various methods.
- To acquire skills to understand the concepts involved in Jacobians and maxima and minima.
- To solve various linear differential equations and method of variation of parameters.
- To learn various techniques and methods in solving definite and indefinite integrals.

### Prerequisite

NIL

#### Course Outcomes On the successful completion of the course, students will be able to

CO1	Apply Cayley-Hamilton theorem and reduce the quadratic form into canonical form.	Remember, Apply, Evaluate
CO2	Apply differential calculus in solving various Engineering problems.	Remember, Understand, Apply
CO3	Analyze Jacobian methods and constrained maxima and minima of the functions.	Remember, Understand, Analyze
CO4	Apply various methods in solving the differential equations.	Remember, Apply
CO5	Evaluate definite and indefinite integrals using different techniques.	Remember, Apply, Evaluate

### Mapping with Programme Outcomes

	mapp	ning wi	urriog	jianni		11103								
Cos	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3							2		3
CO2	3	3	2	2	2							2		3
CO3	3	3	3	2	2							2		3
CO4	3	3	3	3	2							2		3
CO5	3	3	3	2	3							2		3
3 - Str	ong; 2	- Mediu	im; 1 - S	Some	•	•	•	•		•	•	•		

Assessment F	Pattern			
Bloom's Category	Continuous Asse (Mark		Model Exam	End Sem Examination
	1	2	(Marks)	(Marks)
Remember (Re)	10	10	10	10
Understand (Un)	10	10	10	10
Apply (Ap)	30	20	40	40
Analyze (An)	0	20	20	20
Evaluate (Ev)	10	0	20	20
Create (Cr)	0	0	0	0
Total	60	60	100	100

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		K.S.Rar	ngasamv C	college of Tecl	noloav_Aı	Itonomous		R2	2022
				01 - Matrices a					
				, EEE, CSE, N					
Semeste	er	Hours / We		Total Hours	Credit		Maximum Mar		
	L	Т	Р		С	CA	ES		otal
	3	1	0	60	4	40	60	1	00
and Eiger diagonal f of quadrat	vectors - Ca orm - Reductio ic form - Appli	ayley-Hamil on of quadra	ton theore atic form to	en vectors of a m - Orthogona canonical form an elastic mem	al transformann by an Orth	ation of a sy	ymmetric matri	x to	[09]
product, q	ation of functi	rules) - Suc	ccessive D	ion - Continuity ifferentiation - I					[09]
Partial dif	of two variab	-lomogened les - <b>Appl</b>	ications: I	ns and Euler's Maxima and r e's Method of	minima of	functions o	f two variable		[09]
Linear diff e <sup>ax</sup> , sin a Legendre'	$x$ , cos $\alpha x$ , $x^{\pi}$ s form of linea	n, n > 0 - D	oifferential e	her order with equations with of variation of p	variable coe			vrm	[09]
Integration	nd Indefinite in of rational fur	nctions by p	partial fract	n rule - Techr ion, Integration noments and c	of irrational	functions - I			[09]
			·			Total Hours	: 45 + 15 (Tuto	orial)	60
Text Boo							-		
1. Gre	wal B.S, "High	er Engineei	ring Mather	matics", 44 <sup>th</sup> Ec	lition, Khanr	na Publishers	s, Delhi, 2017.		
	/szig Erwin, "A / Delhi, 2016.	dvanced E	ngineering	Mathematics",	10 <sup>th</sup> Edition	ı, John Wiley	and Sons (Asi	a) Limi	ited,
Referenc	e(s):								
'. Nev	/ Delhi, 2014.	-	-	atics", 3 rd (Rev				-	
/	rarajan T, "Er lishing	ngineering	Mathemati	cs", for Semes	sters I &am	p; II, 1 st E	Edition, Tata M	/lcGrav	v Hill
<b>X</b>	dasamy P, T npany Ltd, Nev	• •		Sunavathy K,	"Engineering	g Mathemat	ics - I", S.Ch	and &	amp;
	N P and Mani _td, 2016.	sh Goyal," /	A text book	of Engineering	g Mathemati	cs",10th Edit	ion, Laxmi Pub	licatior	าร
	– Quality Edu	ucation							

SDG: 4 – Quality Education

BoS Chairman

### **Course Contents and Lecture Schedule**

S.No.	Торіс	Number of Hours
1	Matrices	
1.1	Characteristic equation	1
1.2	Eigen values and Eigen vectors of a real matrix	1
1.3	Properties of Eigen values and Eigen vectors	1
1.4	Cayley-Hamilton theorem	1
1.5	Tutorial	2
1.6	Orthogonal transformation of a symmetric matrix to diagonal form	1
1.7	Reduction of quadratic form to canonical form by Orthogonal transformation	1
1.8	Nature of quadratic form	1
1.9	Stretching of an elastic membrane	1
1.10	Tutorial	2
2	Differentiation	
2.1	Representation of functions	1
2.2	Limit of a function and Continuity	1
2.3	Differentiation rules (sum, product, quotient, chain rules)	2
2.4	Successive differentiation	1
2.5	Tutorial	2
2.6	Leibnitz's theorem	1
2.7	Maxima and minima of functions of one variable	2
2.8	Tutorial	2
3	Functions of Several Variables	
3.1	Partial differentiation	1
3.2	Homogeneous functions and Euler's theorem	1
3.3	Jacobians	2
3.4	Tutorial	2
3.5	Taylor's series for functions of two variables Maxima and minima of functions of two variables	1
3.6		1
3.7	Lagrange's Method of Undetermined Multipliers	2
3.8		2
4	Differential Equations	
4.1	Linear differential equations of second and higher order with constant co-efficient	1
4.2	R.H.S is of the form $e^{\alpha x}$ , $\sin \alpha x$ , $\cos \alpha x$ , $x^n$ , $n > 0$	2
4.3	Tutorial	2
4.4	Differential equations with variable coefficients: Cauchy's form of linear equations	2
4.5	Differential equations with variable coefficients: Legendre's form of linear equations	2
4.6	Method of variation of parameters	1
4.7	Tutorial	2
5	Integration	
5.1	Definite and Indefinite integrals	1
5.2	Substitution rule	1
5.3	Techniques of Integration: Integration by parts	1
5.4	Integration of rational functions by partial fraction	1
5.5	Tutorial	2
5.6	Integration of irrational functions	1
5.7	Improper integrals	1
5.8	Hydrostatic force.	1
5.9	Pressure, moments and centres of mass.	1
5.10	Tutorial	2
	Total	60

### **Course Designers**

1. Dr.C.Chandran - cchandran@ksrct.ac.in

2. Mr.G.Mohan - mohang@ksrct.ac.in

BoS Chairman

List of MATLAB Programmes:

- 1. Introduction to MATLAB.
- 2. Matrix Operations Addition, Multiplication, Transpose, Inverse and Rank.
- 3. Solution of system of linear equations.
- 4. Computation of Eigen values and Eigen vectors of a Matrix.
- 5. Finding ordinary and partial derivatives.
- 6. Solving first and second order ordinary differential equations.
- 7. Computing Maxima and Minima of a function of one variable.
- 8. Computing Maxima and Minima of a function of two variables.

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BoS Chairman

60 PH 001	ENGINEERING PHYSICS	Category	L	Т	Р	Credit
	COMMON TO MECH, MCT	BS	3	0	0	3

### Objective(s)

- 1. To make the students to understand the basics of crystallography, crystal growth and its importance in studying materials properties.
- 2. To establish a sound grasp of knowledge on optics, laser and its applications
- 3. To understand the dielectric properties of materials including magnetic materials, applications of dielectrics and magnetic materials
- 4. To introduce advanced materials and nano technology for various modern engineering applications
- 5. To instil the knowledge on next generation energy device and its applications

### Prerequisite

Nil

### **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Comprehend the basics of crystallography and its importance for varied materials properties	Understand, Apply & Analyse
CO2	Assess the fundamentals of optics, laser technology and apply the concepts in industry	Understand & Apply
CO3	Impart the knowledge on magnetic properties of materials and their applications in sensors	Understand & Apply
CO4	Interpret the properties of advanced materials and nano materials for potential applications	Apply & Analyse
CO5	Recognize the next generation energy device and its applications in electric vehicles	Understand & Apply

### Mapping with Programme Outcomes

map														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	3	2	2	3	3	3	3	-	2
CO2	3	3	3	3	2	3	3	3	3	2	3	3	2	2
CO3	3	3	3	3	2	3	3	3	2	3	3	3	2	2
CO4	3	3	3	3	2	3	2	2	3	2	3	3	2	2
CO5	3	3	3	3	3	2	3	2	3	3	3	3	2	2
2 Ctr		La diuma u	1 Sama	•	•									

3- Strong;2-Medium;1-Some

#### Assessment Pattern

	Continuous Assess	End Sem Examination	
Bloom's Category	1	2	(Marks)
Remember	10	10	30
Understand	20	20	30
Apply	30	30	30
Analyse	0	0	10
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

			K.S.Ran	-	college of Tech		utonomous		R2	022
					ngineering Ph					
0.0					mmon to MEC	,		Massiss NA		
Sei	mester		Hours / We	Р	Total Hours	Credit	<u> </u>	Maximum Ma	1	
	1	 3	Т 0	Р 0	45	C 3	CA 40	ES 60	-	otal 00
*Crv	stal Phy	-	0	0	43	5	40	00		00
Lattic cubic Pack slow	ce - Unit c lattice king facto cooling)-	cell – crys - Calculati r for HCP · melt (Brid	on of numb structure - dgman and	er of aton Crystal gro	ais lattice - Crys ns per unit cel owth technique ki) - Imperfectio	I - Átomic r es – solutior	radius - Co n (Slow solv	ordination nur	nber -	[09]
<b>Opti</b> thin Theo - Ap	<b>cs:</b> Refle films: Ne ory of lase plications	wton's ring er - charac	action and d g and Air w teristics - Ei s in industry	edge expe nstein's co	of light waves - eriment - Overv pefficients - pop welding, cuttin	view of linea ulation inve	ar and nonl rsion - Nd-Y	linear optics. I ⁄AG laser, CO	Laser: 2 laser	[09]
Mag mate Resi	erials - Do stance(G	aterials: ( omaintheo MR). Diel	ry - Hysteres lectric Mate	agnetic m sis - soft a erials: Po	noment - Bohi nd hard magne plarization - E	tic materials	s - Applicati	ons - Giant Ma	agneto	[09]
Adva alloy Nano Phas Appli	anced Marks (SMA) o Techno se Depos lications o	aterials: M -character ology: Pro sition - Carl of carbon n	istics, prope operties- To bon Nano T ano tube:M	ses - prepa erties of Niī p-down pro ube (CNT) echanical r	aration, properti Fi alloy applicat ocess: Ball Mill : Properties, pr reinforcement &	ions. ling method eparation by	- Bottom-u	ip process: Va		[09]
Intro elect layer Cons	duction - trolyte an r capacito	Capacitor d separate or (EDLC), working, a	or in SC - T Pseudocap	mparison – ypes of So acitor and	Supercapacito C – Principle, o hybrid capacito ⁄brid (supercap	construction or- Advantag	and workir ges and dis	ng of Electric of advantages of	double f SC –	[09]
							Total Hours	s: 45 + 15 (Tu	torial)	60
<b>Text</b> 1.		vadhanulu			'S Arun Murthy	"A Text Bo	ok of Engin	eering Physic	s", S Cha	and
			Delhi, 2022.							
2					sics" McGraw				elhi.	
3			eering Physi	ics" McGra	w Hill Educatio	n Private Lir	mited, New	Delhi. 2010		
Refe	erence(s)									
1.	R. Puri, Gumber	L.R. Shai Market, C	rma, and S. Id Railway I	P. Madar Road, Jala		Physical C	hemistry: V	/ishal Publishi	ng Comp	pany
2.	Bahl, G.	D. Tuli, Ar	un Bahl. Ess	sentials of	ptics" New Ag Physical Chem	istry. S.Cha	nd and Con	npany, Ltd. Ne	w Delhi.	
3.	Superca				attil, M. Mohar les: Challenge					

\* SDG:4- Quality Education \*\* SDG:7 - Affordable, reliable, sustainable and modern energy for all

BoS Chairman

### Course Contents and Lecture Schedule

S. No.	Торіс	No.of Hours
1.0	CRYSTAL PHYSICS	
1.1	Introduction to Lattice, Unit cell	1
1.2	Crystal systems and Bravais lattice	2
1.3	Crystal planes and Miller indices	1
1.4	d spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Packing factor for HCP structure	2
1.5	Crystal growth techniques – solution (Slow solvent evaporation and slow cooling	1
1.6	Melt growth technique (Bridgman and Czochralski)	1
1.7	Imperfections in crystals	1
2.0	OPTICS AND LASER TECHNOLOGY	
2.1	Optics: Reflection, refraction and diffraction of light waves -	1
2.2	Interference -Application of interference in thin films:	1
2.3	Newton's ring and Air wedge experiment	1
2.4	Overview of linear and nonlinear optics.	1
2.5	Laser: Theory of laser - characteristics.	1
2.6	Einstein's coefficients- Population inversion	1
2.7	Nd-YAG laser, CO <sub>2</sub> laser	1
2.8	Applications of lasers in industry: Drilling, welding, cutting micro machining,	1
2.9	Measurement of long distances and IR Thermography.	1
3.0	MAGNETIC AND DIELECTRIC MATERIALS	•
3.1	Magnetic Materials: Origin of magnetic moment - Bohr magnetron	1
3.2	Classification of magnetic materials	1
3.3	Domaintheory - Hysteresis	1
3.4 3.5	Soft and hard magnetic materials - Applications Giant Magneto Resistance(GMR)	1
		1
3.6	<b>Dielectric Materials:</b> Polarization - Electronic, ionic, orientational and space charge	1
3.7	Frequency and Temperature dependence of polarization	1
3.8	Breakdown mechanisms	1
3.9	Applications of dielectrics in Capacitor and Transformer.	1
4.0	ADVANCED MATERIALS AND NANOTECHNOLOGY.	
4.1	Advanced Materials: Metallic glasses - preparation, properties and applications	2
4.2	Shape memory alloys (SMA) - characteristics, properties of NiTi alloy applications	2
4.3	Nano Technology: Properties- Top-down process: Ball Milling method	2
4.4	Bottom-up process: Vapour Phase Deposition	1
4.5	Carbon Nano Tube (CNT): Properties, preparation by electric arc method, Applications of carbon nano tube.	1
4.6	Mechanical reinforcement & Sensors	1
5.0	NEXT GENERATION ENERGY DEVICE	
5.1	Introduction - Capacitor-Battery-Comparison	1
5.2	Supercapacitor (SC)	1
5.3	Role of active materials, electrodes, electrolyte and separator in SC	1
5.4	Types of SC – Principle, construction and working of Electric double layer capacitor (EDLC)	1
5.5	Principle, construction and working of Pseudocapacitor	1
5.6	Principle, construction and working of hybrid capacitor	1
5.7	Advantages and disadvantages of SC	1
5.8	Construction, working, and performance of hybrid (supercapacitor/battery)device	1
5.9	Its application in electric vehicles	1

### **Course Designers**

Dr. V. Vasudevan

Dr. M. Malarvizhi

Mr.S. Vanchinathan

BoS Chairman

	Basic Electrical and Electronics	Category	L	Т	Р	Credit
60 EE 001	Engineering	ES	3	0	0	3

### Objective

This course aims to impart the knowledge of basics of electric circuits, working principles and applications of DC and AC electrical machines, various electrical installation, analyze the characteristics of various analog electronic devices and their applications, construction and working of various analog measuring Instrument.

### Prerequisite

NIL

### Course Outcomes

### On the successful completion of the course, students will be able to

CO1	Apply the basic laws of electric circuits to calculate the unknown quantities.	Apply							
CO2	Acquire knowledge on different electrical machines and select suitable machines for industrial applications.	Analyze							
CO3	Recognize the significance of various components of low voltage electrical installations and create awareness on electrical safety.	Understand							
CO4									
CO5	Understandthe operating principles of measuring instruments and choose suital instrument for measuring the parameters.	Understand							

M	Mapping with Programme Outcomes														
COs	P01	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	3	-	-	2	-	-	-	-	2	3	-	2	3	
CO2	3	3	1	1	-	-	2	-	2	-	2	1	2	3	
CO3	3	3	-	2	-	2	-	-	-	-	2	2	2	3	
CO4	2	2	3	-	2	-	2	1	-	2	1	3	2	3	
CO5	2	3	1	2	-	-	3	2	-	-	2	3	2	3	
3- Str	ong;2-l	Medium	n;1-Son	ne											

Assessment Patt	ern			
Bloom'sCategory	Contin	uous Assessme	ent Tests (Marks)	End Sem Examination (Marks)
	1	2	3	
Remember	10	20	20	30
Understand	20	30	30	30
Apply	30	10	10	30
Analyse	0	0	0	10
Evaluate	0	0	0	0
Create	0	0	0	0

BoS Chairman

					ny College of			us		
					trical and Ele			nches		
Common to CSE, IT, AIDS, AIML, MECH, MCT, BT, FT and CIVIL Branches           Hours/Week         Credit										
Ser	nester	L	T	P	Total Hrs.	C	CA	ES	T	Tota
	1/11	3	0	0	45	3	40	60		0.
DC ( prob Intro Wav serie	lems. duction to eform real es circuits-	ircuit Comp AC Circuit power, rea	s and Para	meters: Wa	aveforms, Aver aveforms, Aver rent power, pov three phase A	rage value a wer factor –	nd RMS Val	ue of Sinuso	idal [	[10
Cons and Cons moto	Applicationstruction, Normal Normal Struction, Normal Structure St	nd Working ons. Worki Working pri ee Phase Ir	ng Principl	le of DC Application	and Self excit motors, Torq s of Transform	ue Equation	n, Types ar	nd Application	ons. [	[10
Dom Circu UPS	estic wirir uit Breake ,Safety pre	r-Moulded ecautions a		uit Breaker	earthing,protect - Earth Leaka					[09
Intro Appl	duction to ications –		nction Tran	erials- PN	Junction Dio					[08
Intro Appl unit, <b>Mea</b> Func Coil	duction to ications – switched i surement ctional ele and Movir	<ul> <li>Semicone Bipolar Ju</li> <li>mode powe</li> <li>s And Inst</li> <li>ments of ang Iron me</li> </ul>	nction Tran er supply. rumentatio in instrume ters, Opera	erials– PN sistor-Biasi <b>n*</b> nt, Standar ting princip		uration (NP ation, Opera of Wattmet	N) - Regulate	ed power sup	ving	_
Intro Appl unit, <b>Mea</b> Func Coil Tran	duction to ications – switched i surement ctional elei and Movir isformers-(	<ul> <li>Semicone Bipolar Ju</li> <li>mode powe</li> <li>s And Inst</li> <li>ments of ang Iron me</li> </ul>	nction Tran er supply. rumentatio in instrume ters, Opera	erials– PN sistor-Biasi <b>n*</b> nt, Standar ting princip	ng and Config ds and calibra les and Types	uration (NP ation, Opera of Wattmet	N) - Regulate	ed power sup	ving ient	[08 [08 45
Intro Appl unit, <b>Mea</b> Func Coil Tran	duction to ications – switched i surement ctional ele and Movir sformers-( Book(s):	<ul> <li>Semicone Bipolar Ju mode powe</li> <li>s And Inst ments of a ng Iron me CT and PT,</li> </ul>	nction Tran er supply. rumentatio in instrume ters, Opera DSO- Bloc	erials– PN sistor-Biasi <b>n*</b> nt, Standar ting princip k diagram-	ng and Config ds and calibra les and Types Data acquisitio	ation, Opera of Wattmet	N) - Regulate ting Principle er, Energy M	ed power sup e, types -Mov leter, Instrum Total Hor	ving ient [ urs	[08 45
Intro Appl unit, <b>Mea</b> Func Coil Tran	duction to ications – switched i surement ctional ele and Movir sformers-( Book(s):	<ul> <li>Semicond Bipolar Ju mode powe</li> <li>s And Inst ments of a ng Iron me CT and PT,</li> <li>DP and I.J I</li> </ul>	nction Tran er supply. rumentatio in instrume ters, Opera DSO- Bloc	erials– PN sistor-Biasi <b>n*</b> nt, Standar ting princip k diagram-	ng and Config ds and calibra les and Types	ation, Opera of Wattmet	N) - Regulate ting Principle er, Energy M	ed power sup e, types -Mov leter, Instrum Total Hor	ving ient [ urs	[08 45
Intro Appl unit, Mea Func Coil Tran Text	duction to ications – switched i surement ctional ele and Movir sformers-( Book(s): Kothari I Educatio A.K. Sav	<ul> <li>Semicond Bipolar Ju mode powe</li> <li>s And Inst ments of a ng Iron me CT and PT,</li> <li>DP and I.J I on, 2020.</li> </ul>	nction Tran er supply. rumentatio in instrume ters, Opera DSO- Bloc Nagrath, "Ba neet Sawhne	erials– PN sistor-Biasi nt, Standar ting princip k diagram- asic Electri	ng and Config ds and calibra les and Types Data acquisitio	ation, Opera of Wattmet on.	N) - Regulate ting Principle er, Energy M ering", Secon	ed power sup e, types -Mov leter, Instrum <b>Total Ho</b> r d Edition, Mo	ving ient [ urs ]	[ <b>08</b> 45
Intro Appl unit, <b>Mea</b> Func Coil Tran <b>Text</b> 1. 2	duction to ications – switched i surement ctional ele and Movir sformers-( Book(s): Kothari I Educatio A.K. Sav	<ul> <li>Semicond Bipolar Ju mode powe</li> <li>s And Inst ments of a ng Iron me CT and PT,</li> <li>DP and I.J I on, 2020.</li> <li>whney, Pun</li> </ul>	nction Tran er supply. rumentatio in instrume ters, Opera DSO- Bloc Nagrath, "Ba neet Sawhne	erials– PN sistor-Biasi nt, Standar ting princip k diagram- asic Electri	rds and Config rds and calibra les and Types Data acquisitic cal and Electro	ation, Opera of Wattmet on.	N) - Regulate ting Principle er, Energy M ering", Secon	ed power sup e, types -Mov leter, Instrum <b>Total Ho</b> r d Edition, Mo	ving ient [ urs c Graw	[ <b>0</b> 8 45 / H
Intro Appl unit, <b>Mea</b> Func Coil Tran <b>Text</b> 1. 2	duction to ications – switched i switched i surement ctional ele and Movir sformers-( Book(s): Kothari I Educatio A.K. Sav Dhanpat rence(s):	<ul> <li>Semicond Bipolar Ju mode power</li> <li>s And Inst ments of a ng Iron mer CT and PT,</li> <li>DP and I.J I on, 2020.</li> <li>whney, Pun</li> <li>Rai and C</li> </ul>	nction Tran er supply. rumentatio in instrume ters, Opera DSO- Bloc Nagrath, "B Nagrath, "B neet Sawhne o, 2015.	erials– PN sistor-Biasi <b>n*</b> nt, Standar ting princip k diagram- asic Electri ey 'A Cours	rds and Config rds and calibra les and Types Data acquisitic cal and Electro	ation, Opera of Wattmet on. nics Engine & Electronic	N) - Regulate ting Principle er, Energy M ering", Secon Measureme	ed power sup e, types -Mov leter, Instrum <b>Total Ho</b> r d Edition, Mo nts & Instrum	ving lent [ urs c Graw	[ <b>08</b> 45 / H
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Intro Appl unit, Func Coil Tran <b>Text</b> 1. 2 <b>Refe</b> 1.	duction to ications – switched i switched i strement ctional ele and Movir sformers-( Book(s): Kothari I Educatio A.K. Sav Dhanpat rence(s): Kothari Albert M	<ul> <li>Semicond Bipolar Ju mode powe</li> <li>s And Inst ments of a ng Iron me CT and PT,</li> <li>DP and I.J I on, 2020.</li> <li>whney, Punt Rai and C</li> <li>DP and I</li> <li>alvino, Dav</li> </ul>	nction Tran er supply. rumentatio in instrume ters, Opera DSO- Bloc Nagrath, "B eet Sawhne o, 2015. J Nagrath, id Bates, 'E	erials– PN sistor-Biasi <b>n</b> * nt, Standar ting princip k diagram- asic Electri ey 'A Cours "Basic Elec "Basic Electronic P	ing and Config rds and calibra les and Types Data acquisitio cal and Electro se in Electrical ctrical Enginee	ation, Opera of Wattmet on. nics Engine & Electronic ering", Fourt aw Hill Educ	N) - Regulate ting Principle er, Energy M ering", Secon Measurement h Edition, Me cation; 7th ed	ed power sup e, types -Mov leter, Instrum <b>Total Ho</b> d Edition, Mo nts & Instrum cGraw Hill E ition, 2017.	ving ient urs Graw	[08 45 / H

SDG No.9 – Industry Innovation and Infrastructure

### **Course Contents and Lecture Schedule**

S.No	Topic	No.of Hours
1	ELECTRICAL CIRCUITS	
1.1	Circuit Components: Resistor, Inductor, Capacitor	1
1.2	Ohm's Law - Kirchhoff's Laws	1
1.3	Ohm's Law - Kirchhoff's Laws - Problems	2
1.4	Introduction to AC Circuits and Parameters: Waveforms, Average value and RMS Value of Sinusoidal Waveform	2
1.5	Real power, reactive power and apparent power, power factor	1
1.6	Steady state analysis of RLC series circuits	1
1.7	RLC series circuits - Problems	1
1.8	Introduction to three phase system	1
2	ELECTRICAL MACHINES	
2.1	Construction and Working principle of DC Generator	1
2.2	Types and Applications of Separately and Self excited DC Generators	1
2.3	EMF equation of DC Generator	1
2.4	Working Principle of DC motors	1
2.5	Torque Equation	1
2.6	Types and Applications	1
2.7	Construction, Working principle and Applications of Transformer	1
2.8	Construction, Working principle and Applications of Three phase Alternator	1
2.9	Construction, Working principle and Applications of Synchronous motor	1
2.10	Construction, Working principle and Applications of Three Phase Induction Motor	1
3	ELECTRICAL INSTALLATIONS	
3.1	Domestic wiring, types of wires and cables	1
3.2	Earthing, protective devices	2
3.3	Switch fuse unit- Miniature Circuit Breaker	1
3.4	Molded Case Circuit Breaker- Earth Leakage Circuit Breaker	1
3.5	Batteries and types	2
3.6	UPS	1
3.7	Safety precautions and First Aid	1
4	ANALOG ELECTRONICS	
4.1	Introduction to Semiconductor Materials	1
4.2	Characteristics and Applications of PN Junction Diodes	1
4.3	Characteristics and Applications of Zener Diode	1
4.4	Bipolar Junction Transistor	1
4.5	Biasing & Configuration (NPN)	2
4.6	Regulated power supply unit	1
4.7	Switched mode power supply	1
5	MEASUREMENTS AND INSTRUMENTATION	
5.1	Functional elements of an instrument	1
5.2	Standards and calibration	1
5.3	Moving Coil meters - Operating Principle, types	1
5.4	Moving Iron meters - Operating Principle, types	1
5.5	Operating principles and Types of Wattmeter	1
5.6	Energy Meter	1
5.7	Instrument Transformers – CT& PT	1
5.9	DSO- Block diagram- Data acquisition	1
	Total	45
C	ourse Designers	

### **Course Designers**

- 1. Mr.S.Srinivasan
- srinivasan@ksrct.ac.in
   radhamani@ksrct.ac.in
- Ms.R.Radhamani
   Ms.S.Jaividhya
- jaividhya@ksrct.ac.in
- 4. Dr.S.Gomathi
- gomathi@ksrct.ac.in
- 5. Mr.T.Prabhu
- prabhut@ksrct.ac.in

		Category	L	Т	Р	Credit
60 ME 004	Engineering Mechanics	ES	3	1	0	4

### Objective

- To learn a process for analysis of static objects, concepts of force, moment, and mechanical equilibrium in two and three dimensions.
- To learn the equilibrium of rigid bodies such as frames, trusses, beams.
- To identify the properties of surfaces and solids by using different theorem.
- To learn the principle of frictional forces at the contact surfaces and impart basic concept of dynamics of particles.
- To acquire the concept of elements of rigid body dynamics

### Prerequisite

NIL

### **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Use scalar and vector analytical techniques for analysing forces in statically	Understand &
	determinate structures.	Apply
CO2	Apply basic knowledge of scientific concepts to solve real-world problems.	Understand & Apply
CO3	Calculate the properties of surfaces and solids using various theorems.	Understand & Apply
CO4	Determine the effect of frictional forces and the dynamic forces exerted in the particle	Understand & Apply
CO5	Analysis of rigid body dynamics and calculation of member forces in the rigid body	Understand & Apply

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3								2	2	2
CO2	3	2	2	3								2	2	2
CO3	3	2	2	3								2	2	2
CO4	3	2	2	3								2	2	2
CO5	3	2	2	3								2	2	2
3- Str	- Strong;2-Medium;1-Some													

### Assessment Pattern

Bloom'sCategory	Continuous Assessme	End Sem Examination	
	1	2	(Marks)
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0

					Dilege of Techr Engineering					
					МЕСН & МСТ					
Hours/Week Total hrs Credit Maximum Marks										
Sem	ester	L	Т	Р	TOLATTIS	С	CA	ES	Tot	al
		3	1	0	60	4	40	60	10	0
Introdu	iction -U		Dimensions-I		/lechanics–Prin prs–Vectorial re				em, [	12
Additio Equilib		ction, dot p particle–F			Coplanar Force rium of a partic					12
Free b determ	ody diag iinacy, N	loments a	es of suppo nd Couples-	-Moment	eir reactions-r of a force abo ignon's theore	out a point	and about a	n axis-Vecto	orial   L	[12]
Determ using I Paralle thin rec <b>Frictio</b> Frictior <u>of tens</u>	nination c Integratio el axis the ctangular nal force- ion in bel	n Method; corem and section. -Laws of C	d Volumes- T section, perpendicula	I section, ar axis the	Noment of Inert Angle section, orem- Polar mo e contact frictio	Hollow sect oment of iner	tion using sta tia -Mass mo	ndard formu ment of inert	la) - <sup>ia of</sup> [	12]
Displac blane– Eleme Transla	Newton' nts of Ri ation and	/elocity, ac s law–Wor <b>gid Body</b> l	k Energy Eq <b>Dynamics</b> of Rigid Boo	uation – Im	ationship–Relat npulse and Mon city and accele	nentum.			[	[12]
and Da								Total Ho	urs	60
	Rajaseka		ankarasubrar Edition, 201		, Fundamentals	s of Enginee	ring Mechanic	s, Vikas Pub	lishing	J
			nson Jr. E.R dition, 2016.		Mechanics for E	Engineers", S	Statics and Dy	ynamics, Mc	Graw-	Hill
Refere	nce(s):									
	Jayakum	ar, V. and	Kumar, M, "E	Engineerin	g Mechanics", F	PHI Learning	Private Ltd, N	New Delhi, 20	)12	
1.		, R.C., "En	gineering Me	echanics",	Vol. 1 Statics, \	/ol. 2 Dynam	nics, Pearson	Education As	sia Pvt	
2	Hibbeller Ltd.,									
2.	Ltd.,	.K," Engine	eering Mecha	anics" Laxi	mi Publications	(P) Ltd, 201	1			
2. 3.	Ltd., Bansal R	Shames, E	-		mi Publications : Statics and Dy	· /		ion Asia Pvt.	Ltd, 4 <sup>1</sup>	th
2. 3. 4.	Ltd., Bansal R Irving H. Edition, 2	Shames, E 2003.	Engineering I	Mechanics		ynamics", Pe	arson Educati			

S.No	Course Contnts and Lecture Schedule Topic	No.of Hours
1	BASICS AND STATICS OF PARTICLES	
1.1	Introduction, Units and Dimensions, Laws of Mechanics	1
1.2	Principle of transmissibility, Lame's theorem,	1
1.3	Parallelogram and triangular Law of forces	1
1.4	Tutorial	2
1.5	Vectors, Vectorial representation of forces and moments	1
1.6	Vector operations, Coplanar Forces–Resolution and Composition of forces	2
1.7	Equilibrium of a particle, Forces in space	1
1.8	Equivalent systems of forces-Single equivalent force.	1
1.9	Tutorial	2
2	EQUILIBRIUM OF RIGID BODIES	
2.1	Free body diagram, Types of supports and their reactions	1
2.2	Requirements of stable equilibrium, Static determinacy	1
2.3	Moments and Couples–Moment of a force about a point and about an axis	2
2.4	Vectorial representation of moments and couples	1
2.5	Tutorial	2
2.6	Varignon's theorem	1
2.0	Equilibrium of Rigid bodies in two dimensions	2
2.7	Tutorial	2
3	PROPERTIES OF SURFACES AND SOLIDS	2
3.1 3.2	Determination of Areas and Volumes-Centroid Moment of Inertia of plane area (Rectangle, circle, triangle using Integration	1 2
5.2	Method)	2
3.3	Tutorial	2
3.4	Moment of Inertia of plane area(T section, I section, Angle section)	1
3.5	Moment of Inertia of plane area(Hollow section)	1
3.6	Parallel axis theorem and perpendicular axis theorem	1
3.7	Polar moment of inertia	1
3.8	Mass moment of inertia of thin rectangular section.	1
3.9 <b>4</b>	Tutorial FRICTION & DYNAMICS OF PARTICLES	2
4.1	Frictional force, Laws of Coloumb friction, Simple contact friction	1
4.2	Ladder friction	1
4.3	Rolling resistance–Ratio of tension in belt	1
4.4	Tutorial	2
4.4	Displacement, Velocity, acceleration and their relationship, Relative motion	1
4.5	Projectile motion in horizontal plane	1
4.0	Newton's law	1
4.7	Work Energy Equation	1
4.8	Impulse and Momentum	1
	Tutorial	2
4.10	IULUIIAI	2

ELEMENTS OF RIGID BODY DYNAMICS	
Translation and Rotation of Rigid Bodies	1
Translation and Rotation of Rigid Bodies - Velocity	2
Translation and Rotation of Rigid Bodies - acceleration	2
Tutorial	2
General Plane motion	1
General Plane motion - Crank and Connecting rod mechanism	2
Tutorial	2
Total	60
	Translation and Rotation of Rigid BodiesTranslation and Rotation of Rigid Bodies - VelocityTranslation and Rotation of Rigid Bodies - accelerationTutorialGeneral Plane motionGeneral Plane motion - Crank and Connecting rod mechanismTutorial

**Course Designers** 

1. Mr.S.KARTHICK

-skarthick@ksrct.ac.in

60 MY 001	Environmental Studies and Climate Change	Category	L	Т	Р	Credit
	(Common to all)	BS	2	0	0	0

### Objectives

- To understand the importance of ecosystem and biodiversity. •
- To analyze the impacts of pollution, control and legislation. •
- To enlighten awareness and recognize the social responsibility in environmental issues. •
- To enlighten the waste management •

Prerequisite

-Nil-

#### **Course Outcomes**

On the	On the successful completion of the course, students will be able to						
CO1	Understand the impacts of pollution on climate change	Understand					
CO2	Enhance the awareness the methods of waste management.	Apply					
CO3	Examine the value of sustainable future	Evaluate					
CO4	Evaluate the clean and green development for environmental problem	Evaluate					
CO5	Analyze the role of Geo-science in environmental management	Analyze					

### **Mapping with Programme Outcomes**

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	3	3	3	1	3	2	3		
CO2	3	3	3	3	2	3	3	3	3	2	2	3		
CO3	3	3	3	3	3	3	3	3	2	2	2	3		
CO4	2	2	3	3	-	1	3	3	2	2	1	2		
CO5	3	3	3	3	3	3	3	3	3	2	2	3		
3- Str	3- Strong;2-Medium;1-Some													

Assessment Pattern								
Dia amia Cata na mi	Conti	nuous Assessmen	Terminel Eveninetien					
Bloom'sCategory	1	2	3	Terminal Examination				
Remember	10	10	10	-				
Understand	20	20	20					
Apply	30	30	30					
Analyze	30	30	30	-				
Evaluate	-	-	-	-				
Create	-	-	-	-				

				nmental Studi	nology–Au			R2022
				Common to a		iate Change		
		Hours/We			Credit	1	Maximum Mark	S
Semester	L	Т	P	Total hrs	C	CA	ES	Tota
1/11	2	0	0	30	0	100	-	100
- ozone laye Agriculture, f	rces and in r depletion prestry and ge. IPCC, U	npacts of a - acid rai ecosyster NFCCC, K	ir pollution - n. Carbor n – climate yoto Protoco	- green house n Footprint - ( e change mitig ol, Montreal Pro or industry.	Climate cha gation and a	nge on vario adaptation. A	ous sectors – ction plan on	[06]
Abhiyan – Co nanagement ASP	s and class ommercial v Collection	ification. F vaste, plas , segregat	itic waste, d ion, treatme	waste manage omestic waste ent and dispos ment systems,	, e-waste a al methods.	nd biomedica Waste wat	al waste - risk er treatment-	[06]
riendly plast	levelopmen c – Alterna	t goals (SE ite energy:	DGs) <mark>–</mark> Gree : Hydrogen	n computing- ( – Bio-fuels –				[06]
Activity: Selee				t, ground water sustainable de	r recharge a			[00]
Environment vermi-compos agriculture. G	ct a topic an t <b>and Agri</b> sting, roof reen auditir	d analyze culture*: ( gardening g	the value of Organic farr g and irrig	t, ground water sustainable de ning – bio-pes ation. Waste	r recharge a evelopment. sticides- cor	nd rainwater	harvesting.	
Environment vermi-compo- agriculture. G <u>Activity</u> : Prep Geo-science Data base sc	et a topic an and Agric sting, roof reen auditir are a green in natural oftware in er e Sensing al informatio	d analyze culture*: ( gardening ag auditing re resource in nvironment and Geog n system (	the value of Organic farr g and irrig eport on ene management information graphical In ENVIS).	t, ground water sustainable de ning – bio-pes ation. Waste rgy, water etc.	r recharge a evelopment. sticides- cor land recla	nd rainwater nposting, bic mation. Clin applications i	harvesting.	[06]
Environment vermi-composi agriculture. G Activity: Prep Geo-science Data base so GPS, Remot Environmenta	et a topic an and Agric sting, roof reen auditir are a green in natural oftware in er e Sensing al informatio	d analyze culture*: ( gardening ag auditing re resource in nvironment and Geog n system (	the value of Organic farr g and irrig eport on ene management information graphical In ENVIS).	t, ground water sustainable de ning – bio-pes ation. Waste rgy, water etc. nt , Digital image	r recharge a evelopment. sticides- cor land recla	nd rainwater nposting, bic mation. Clin applications i	harvesting.	[06]
Environment vermi-composi agriculture. G Activity: Prep Geo-science Data base so GPS, Remot Environmenta	et a topic an and Agric sting, roof reen auditir are a green in natural oftware in er e Sensing al informatio	d analyze culture*: ( gardening ag auditing re resource in nvironment and Geog n system (	the value of Organic farr g and irrig eport on ene management information graphical In ENVIS).	t, ground water sustainable de ning – bio-pes ation. Waste rgy, water etc. nt , Digital image	r recharge a evelopment. sticides- cor land recla	nd rainwater nposting, bic mation. Clin applications i	harvesting.	[06]
Environment /ermi-compose agriculture. G Activity: Prep Geo-science Data base sc GPS, Remote Environmenta Activity: Prep ext Book(s):	ct a topic an and Agrie sting, roof reen auditir are a green in natural oftware in er e Sensing al informatio are the repo	d analyze culture*: ( gardening auditing re resource in nvironment and Geog n system ( ort using IT	the value of Organic farr g and irrig eport on ene management information graphical In ENVIS).	t, ground water sustainable de ning – bio-pes ation. Waste rgy, water etc. nt , Digital image formation Sys	r recharge a evelopment. sticides- cor land recla processing tem (GIS),	nd rainwater nposting, bic mation. Clin applications i World wide	harvesting.	[06]
Environment vermi-compose agriculture. G Activity: Prep Geo-science Data base so GPS, Remot Environmenta Activity: Prep ext Book(s): 1. Anubha publishe	et a topic an a <b>and Agri</b> sting, roof reen auditir are a green <b>in natural</b> oftware in er e Sensing al informatio are the repo Kaushik , C ers; Sixth ec	d analyze culture*: ( gardening auditing re resource in nvironment and Geog n system ( ort using IT	the value of Organic farr g and irrig eport on ene management information graphical In ENVIS). tool.	t, ground water sustainable de ning – bio-pes ation. Waste rgy, water etc. nt , Digital image formation Sys	r recharge a evelopment. sticides- cor land recla processing tem (GIS),	nd rainwater nposting, bic mation. Clin applications i World wide	harvesting. composting, nate resilient n forecasting. web (www), Total Hours	[06]
Environment vermi-compose agriculture. G Activity: Prep Geo-science Data base so GPS, Remot Environmenta Activity: Prep ext Book(s): 1. Anubha publish Reference(s) 1. G.Tyler	et a topic an a <b>and Agri</b> sting, roof reen auditir are a green <b>in natural</b> oftware in er e Sensing al informatio are the repo Kaushik , C ers; Sixth ec : Miller Envir	d analyze culture*: ( gardening auditing re resource in hvironment and Geog n system ( brt using IT Control 1 Ja conmental 3 and Wend	the value of Organic farr g and irrig eport on ene management information graphical In ENVIS). tool. hik. Perspent nuary 2018) Science 14th	t, ground water sustainable de ning – bio-pes ation. Waste rgy, water etc. nt , Digital image formation Sys	recharge a evelopment. sticides- cor land recla processing tem (GIS), vironmental age Publicat	nd rainwater nposting, bic mation. Clin applications i World wide Studies, N	harvesting. o composting, nate resilient in forecasting. web (www), Total Hours ew Age Inter	[06] [06] <u>30</u> nationa

\*SDG:3 – Climate Action

\*\*SDG:6 – Clean Water and Sanitation \*\*SDG:7 – Affordable and Clean Energy

S.No.	Contents and Lecture Schedule Topic	No.of
		Hours
1.0	Pollution and its impact on climate change	
1.1	Pollution: Sources and impacts of air pollution – green house effect- Global warming- climate change - ozone layer depletion - acid rain	2
1.2	Climate change on various sectors: Agriculture, forestry and ecosystem. – climate change mitigation and adaptation	1
1.3	Action plan on climate change - IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes	1
2.0	Integrated Waste Management	
2.1	Waste - Types and classification. Principles of waste management (5R approach) - Swachh Bharat Abhiyan	1
2.2	Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste	1
2.3	Risk management: Collection, segregation, treatment and disposal methods.	1
2.4	Waste water treatment- ASP	1
3.0	Sustainable development practices	
3.1	Sustainable development goals (SDGs) – Green computing- Carbon trading - Green building – Eco- friendly plastic	1
3.2	Alternate energy: Hydrogen – Bio-fuels – Solar energy – Wind – Hydroelectric power	2
3.3	Water scarcity- Watershed management, ground water recharge and rainwater harvesting	1
4.0	Environment and Agriculture	
4.1	Organic farming – bio-pesticides	1
4.2	Composting, bio composting, vermi-composting	1
4.3	Roof gardening and irrigation	1
4.4	Waste land reclamation. Climate resilient agriculture, Green auditing	1
5.0	Geo-science in natural resource management	
5.1	Data base software in environment information, Digital image processing applications in forecasting	2
5.2	GPS, Remote Sensing and Geographical Information System (GIS)	1
5.3	World wide web (www), Environmental information system (ENVIS)	1
	Total	30

CourseDesigners Dr.T.A.SUKANTHA Dr.B.SRIVIDHYA Dr.K.PRABHA Dr.S.MEENACHI Mr.K.TAMILARASU Ms.D.KIRTHIGA

60 ME 0P1	Fabrication and Reverse	Category	L	Т	P	Credit
	Engineering Laboratory (Common to All branches)	ES	0	0	4	2

### Objectives

- To acquire skills in operating hand tools and instruments.
- To provide hands-on training on Carpentry, Sheet metal, Fitting and Welding.
- To provide hands-on training on household wiring and electronic circuits.
- To offer real time activity on plumbing connections in domestic applications.
- To provide hands-on activities on dismantling, and assembling the Home Appliance, Center lathe operations, computer's internal components and peripherals.

### **Pre-requisite**

Nil

### **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Perform power tools operations.	Apply
CO2	Make a wooden model using carpentry Process	Apply
CO3	Make a model using sheet metal, filing and joining a MS Plate	Apply
CO4	Repair and Maintenances of water lines for home applications	Apply
CO5	Trouble shoots the electrical and electronic circuits, Electrical Machines and realizes the reputation of house wiring, home Appliance, computer internal components and peripherals.	Apply

#### Mapping with Programme outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3		2		3		3	2	3		2	3		
CO2	3	3	3		3	2		2	3	3		3		
CO3	3	3	3		3	2	2	2	3	3	2	3		
CO4	3	3	3	2	3	3	2	3	3			3		
CO5	3	3	3	3	3	2	2	2	3	2	2	3		
3- Str	3- Strong;2-Medium;1-Some													

				ollege of Tech				R2022			
	60 N	/IE 0P1 – F	abrication	and Reverse	Engineering	J Laboratory					
(Common to All branches)											
Somostor Hours/Week Total hrs Credit Maximum Marks											
Semester	L	Т	Р	TOLATTIS	С	CA	ES	Tota			
1/11	0	0	4	45	2	40	60	100			
Performs of Performs of Performs of Performs of Performance Perfor			Is Fitting of I	Hand shower n	nount, Shirt I	hanger, Towe	el hanger and	Pipe			
Carpentry Pro Design and De		of Wooden	Model usin	g the Carpentr	y Process T	/ Cross Joint	/ different joir	nts			
Sheet Metal and Design and De of Square joint	velopment	of Metal Mo			nents using	Sheet Metal	Process and	Mating			
Welding Proce Fabrication of N		MS Plate	using Arc W	/elding- Lap Jo	int, Butt Join	t, T Joint					
Plumbing Pro Repair and Ma pipes/ PVC and	intenances						assembly of (	G.I.			
<b>Residential hc</b> Design and Exe fabrication of d	cusion of R	esidential h					. Design and	I			
Electronic Circ PCB fabrication Connecting Vo filter board	n – Solderin										
Assembling an Iron box, Induc					g fan						
Study Exercis Demonstration dismantle of Va	of Centre L					its componer	nts. Assemble	e and			
Computer Har	dware Stu	dy Exercis	<u> </u>								

Computer Hardware Study Exercises Identify internal components of computer - Assemble and dismantle desktop computer systems

R1/w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

5.5. Quint ~~~~

### List of Experiments

### 1. Fitting of Wall mounting Parts using Power Tools

- a) Drilling in different Walls and Materials
- b) Fitting of Hand shower mount, Shirt hanger, Towel hanger and Pipe with Clamps.

### 2. Making of Wooden model using the Carpentry Process

- a) T / Cross Joint
- b) Mortise and Tenon Joint / different joints

### 3. Making of Metal Model

- a) Making of Components using Sheet Metal Process
- b) Mating of Components using the Filling Process

### 4. Fabrication of Welded model

### 5. Repair and Maintenance of Pipe Fitting for Home Applications

- a) Assembly of GI pipes/PVC and Pipe Fitting
- b) Cutting of Threads in GI pipes by thread Cutting Dies

### 6. Assembling and dismantling of

- a) Iron box
- b) Induction stove
- c) Water heater
- d) Mixer
- e) Table fan
- f) Ceiling fan

### 7. Design and Execution of Residential house wiring

- a) 1 BHK
- b) 2 BHK

### 8. Design and Execution of Residential house wiring with UPS.

- a) 1 BHK
- b) 2 BHK

### 9. Design and fabrication of domestic LED lamps

- a) Circuit designing (calculation of components)
- b) PCB fabrication
- c) Soldering

### **10. Assembling of Audio Amplifiers**

- a) Connecting USB/Bluetooth MP3 player board
- b) Connecting Volume controllers
- c) Connecting bass & treble filter boards
- d) Connecting Surround and sub-woofer filter board

### **Study Exercises**

- 1. Demonstration of Centre Lathe and its operations like Facing, Turning, and drilling.
- 2. Dismantle and Assemble of Vacuum Cleaner / Refrigerator.

3. Study of components of computer. Dismantle and assemble of desktop computer systems

### **Course Designers**

- 1. Mr.S Sakthivel <u>sakthivel\_s@ksrct.ac.in</u>
- 2. Dr. D Sri Vidya srividhya@ksrct.ac.in
- 3. Mr. K. Raguvaran raguvaran@ksrct.ac.in
|           | Basic Electrical and Electronics<br>Engineering Laboratory | Category | L | Т | Р | Credit |
|-----------|--|----------|---|---|---|--------|
| 60 EE 0P1 | (Common to Civil, Mech, MCT and<br>FT Branches)            | ES       | 0 | 0 | 4 | 2      |

- To acquire knowledge in conducting basic electrical laws
- To gain knowledge on three phase power measurement
- To train the students in conducting load tests on electrical machines
- To gain practical experience in characterizing electronic devices
- To gain practical experience in using measuring devices

# Course Outcomes

CO1	Practice experimental methods to verify the Ohm's and Kirchhoff's Laws.	Apply
CO2	Calculate the three-phase power measurement	Apply
CO3	Analyze experimentally the load characteristics of electrical machines.	Analyze
CO4	Analyze the characteristics of basic electronic devices.	Analyze
CO5	Calibrate the measuring devices	Analyze

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	2			2		3	3	2	
CO2	3	3	3	3	2	2		3			3	3	2	
CO3	3	3	3	3	2	2			2		3	3	2	
CO4	3	3	3	3	2	2	2	2		2	3	3	2	
CO5	3	3	3	3	2	2	2				3	3	2	
3- Str	ong;2-l	Medium	n;1-Son	ne										•

# List of Experiments

- 1. Verification of Ohm's and Kirchhoff's Laws.
- 2. Measurement of Three Phase Power.
- 3. Load test on DC Shunt Motor.
- 4. Load test on Self Excited DC Generator.
- 5. Load test on Single phase Transformer.
- 6. Load test on Induction Motor.
- 7. Characteristics of PN and Zener Diodes.
- 8. Characteristics of BJT (CE).
- 9. Calibration of Single-Phase Energy Meter.
- 10. Mini Project.

# SDG No.9 – Industry Innovation and Infrastructure

#### Course Designers

4.

- 1. Mr.S.Srinivasan
- <u>srinivasan@ksrct.ac.in</u>
   <u>radhamani@ksrct.ac.in</u>
- Ms.R.Radhamani
   Ms.S.Jaividhya
- jaividhya@ksrct.ac.in
- Dr.S.Gomathi gomathi@ksrct.ac.in
- 5. Mr.T.Prabhu
- prabhut@ksrct.ac.in

#### K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

(An Autonomous Institution affiliated to Anna University)

#### B.E. / B.Tech. Degree Programme SCHEME OF EXAMINATIONS (For the candidates admitted from 2022-2023 onwards)

# SECOND SEMESTER

S.	Course	Name of the Course	Duration of	Weighta	Minimum for Pass Semes Exar	in End ster					
No.	Code	Name of the Course	Internal Exam	Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total			
	THEORY										
1	60 EN 002	Professional English II	2	40	60	100	45	100			
2	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	2	40	60	100	45	100			
3	60 ME 001	Engineering Drawing	2	40	60	100	45	100			
4	60 CS 001	C Programming	2	40	60	100	45	100			
5	60 CH 001	Chemistry for Mechanical Sciences	2	40	60	100	45	100			
6	60 GE 001	Heritage of Tamils / தமிழர் மரபு	2	100	0	100	0	100			
			PRACI	<b>FICAL</b>							
8		Physics & Chemistry Laboratory	3	60	40	100	45	100			
9	60 CS 0P1	C Programming Laboratory	3	60	40	100	45	100			
10	60 CG 0P1	Career Skill Development-I	3	100	-	100	-	-			

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

s.s. Quint

BoS Chairman

60 EN 002	Professional English II	Category	L	т	Р	Credit
00 EN 002	Professional English II	HS	1	0	2	2

- 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

#### Pre-requisite

Basic knowledge of reading and writing in English and should have completed Professional English I.

#### Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								2	3	3	2	3	3	2
CO2								2	3	3	2	3	3	2
CO3								2	3	3	2	3	2	2
CO4								2	3	3	2	3	3	3
CO5								2	3	3	2	3	2	2
3- Str	3- Strong;2-Medium;1-Some													

Plaam'a Catagony	Continuous Asse	End Sem Examination	
Bloom's Category	1	2	(Marks)
Knowledge (Kn)	10	10	10
Apply (Ap)	20	20	40
Analyse (An)	30	30	50
Create (Cr)	0	0	0

BoS Chairman

	K.S.			e of Technolog		mous		R202	2		
				essional Englis							
			ommon to	All Branches							
Seme	ester Hours/Week			Total hrs	Credit		aximum M		- 1		
	L	T	P	45	C	CA	ES	Tot			
 		0	2	45	2	40	60	10	0		
	<pre>Comparisons ng: Evaluative Listening: A</pre>	duartiaam	onto Droc	duct Decoription		/ video: fill	ling o gran	nia			
LISICIII	organiser (choosing a pr				15, - Auulo /	viueo, ili	ing a grap				
Speakir	ng: Marketing a product, p							_	_		
	g: Reading advertisemen							[	09]		
	Professional emails, Er				st essay.						
Langua	ge Focus: mixed tenses	, prepositi	onal phra	ises, same wo	rds used in	different	contexts a	nd			
	discourse markers										
	sing Causal Relations in										
Listenir	ng: Listening to longer tec										
	information from podca	sts – List	ening to	process/event	description	s to iden	tify cause	&			
0	effects.	· · · · · · · ·							001		
	ng: Describing and discuss								09]		
	<ul> <li>g: longer technical texts-</li> <li>: Writing responses to compare to compare the technical texts-</li> </ul>		i ellect es	says, and letter	s / emails 0	r compiair	π,				
	ige Focus: Active Passiv		ansforma	tions Infinitive	and Gerur	nds – Wo	rd Format	on			
Langua	(Noun-Verb-Adj-Adv), Ad		ansionna								
Probler	m Solving										
	ng: Listening to / watching	ng movie :	scenes/ d	locumentaries	depicting a	technical	problem a	nd			
	suggesting solutions.	0					•				
	ng: Group Discussion (bas					es.		[0	09]		
	g: Case Studies, excerpts										
	: Letter to the Editor, Che						<b>.</b>				
	ge Focus: Error correction		onal sente	ences - Compo	und Words,	Sentence	Completio	n.			
	ing of Events and Resear			nort and doour	ontorioo						
	ng: Listening Comprehens ng: Interviewing, presentin					<u></u>					
	g: Newspaper articles.	y orai repo	113, Millin p		i select topi	63.		[			
		scodina. A	ccident Re	eport. Precis wr	iting and Su	Immorisin	a		09]		
-	ge Focus: Reported Spee	•	Writing: Recommendations, Transcoding, Accident Report, Precis writing and Summarising								
	ility to put Ideas or Inforr	- would	als - Conju	•	•		9		09]		
				•	•		9		09]		
	ng: Listening to TED Tal	nation Co	herently	inctions- use of	Preposition	S		ew	09]		
Listeniı perform	<b>ng:</b> Listening to TED Tal ance).	nation Col ks, Preser	herently ntations, F	inctions- use of Formal job inte	Preposition erviews, (an	s alysis of	the intervi	ew	09]		
Listenir perform Speakir	<b>ng:</b> Listening to TED Tal ance). <b>ng:</b> Participating in role pla	<b>nation Co</b> ks, Preser ys, virtual i	<b>herently</b> ntations, f	inctions- use of Formal job inte	Preposition erviews, (an	s alysis of	the intervi				
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# SDG 4 – Quality Education

# **Course Contents and Lecture Schedule**

S.No	Торіс	No.of Hours
1.	Making Comparisons	
1.1	Evaluative Listening	1
1.2	Product Descriptions and filling a graphic organiser	1
1.3	Marketing a product by using persuasive techniques	2
1.4	Reading advertisements, user manuals and brochures	1
1.5	Writing professional emails	1
1.6	Compare and contrast essay	1
1.7	Mixed tenses and prepositional phrases	1
1.8	Same words used in different contexts	1
2	Expressing Causal Relations in Speaking and Writing	
2.1	Listening to longer technical talks	1
2.2	Listening to process/event descriptions	1
2.3	Describing and discussing the reasons of accidents or disasters	1
2.4	Reading longer technical texts- cause and effect essays	1
2.5	Writing responses to complaints	1
2.6	Active Passive Voice transformations	2
2.7	Infinitive and Gerunds	1
2.8	Word Formation (Noun-Verb-Adj-Adv), Adverbs.	1
3	Problem Solving	
3.1	Listening to documentaries and suggesting solutions	1
3.2	Group Discussion (based on case studies)	2
3.3	Reading Case Studies, excerpts from literary texts and news reports	1
3.4	Letter to the Editor	1
3.5	Checklists	1
3.6	Problem solution and argumentative essays	1
3.7	Error correction and Sentence Completion	1
3.8	If conditional sentences	1
4	Reporting of Events and Research	
4.1	Listening Comprehension	1
4.2	Interviewing and presenting oral reports	1
4.3	Mini presentations on select topics	1
4.4	Reading newspaper articles	1
4.5	Recommendations	1
4.6	Transcoding	1
4.7	Precis writing and Summarising	1
4.8	Reported Speech, Modals	1
4.9	Conjunctions	
5	The Ability to put Ideas or Information Coherently	
5.1	Listening to Formal job interviews	1
5.2	Role plays	2
5.3	Virtual interviews	1
5.4	Reading Company profiles	1
5.5	Writing Statement of Purpose (SoPs)	1
5.6	Writing Résumé	1
5.7	Numerical Adjectives and Relative Clauses - Idioms	1
5.8	question types: Wh/ Yes or No/ and Tags	1
	Total	45

# Course Designers

Dr.A.Palaniappan - palaniappan@ksrct.ac.in

60 MA 003	Integrals, Partial Differential	Category	L	Т	Р	Credit
	Equations and Laplace Transform	BS	3	1	0	4

- To provide exposure in handling the situations involving multiple integrals
- To familiarize the basic concepts in Vector calculus.
- To get exposed to the fundamentals of analytic functions.
- To develop the mathematical skills in solving partial differential equations.
- To facilitate the concepts in Laplace transform techniques.

# Pre-requisite

-NIL-

#### **Course Outcomes**

# On the successful completion of the course, students will be able to

CO1	Evaluate double and triple integrals.	Remember, Apply,
COT		Evaluate
CO2	Analyze the basic concepts of vector calculus.	Remember, Analyze,
002		Evaluate
CO3	Construct the analytic functions and evaluate complex integrals.	Remember,
005		Understand, Apply
CO4	Compute the solution of partial differential equations using different methods.	Remember, Apply
CO5	Apply Laplace transform techniques for solving differential equations.	Remember, Apply

## Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3							2	3	2
CO2	3	3	2	2	3							2	3	2
CO3	3	3	3	2	2							2	3	2
CO4	3	3	3	3	2							2	3	2
CO5	3	3	2	3	3							2	3	2
3- Str	3- Strong;2-Medium;1-Some													

Please 'a Catagory	Continuous Asse	End Sem Examination	
Bloom'sCategory	1	2	(Marks)
Knowledge	10	10	10
Apply	0	10	10
Analyse	20	40	40
Create	10	0	20

		60 MA 003	5 – micqia						
					, EEE, CSE, N				
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		L	Т	Р	Total III's	С	CA	ES	Total
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# \*SDG 4 – Quality Education

# **Course Contents and Lecture Schedule**

S.No	Торіс	No. of Hours
1	Multiple Integrals	
1.1	Double integration	1
1.2	Cartesian and polar coordinates	1
1.3	Change of order of integration	1
1.4	Area as double integral	1
1.5	Tutorial	2
1.6	Triple integration in Cartesian coordinates	1
1.7	Change of variables	1
1.8	Cartesian to polar coordinates	1
1.9	Cartesian to Cylindrical coordinates	1
1.10	Tutorial	2
2	Vector Calculus	
2.1	Introduction: Gradient of a scalar point function	1
2.2	Directional derivative	1
2.3	Angle of intersection of two surfaces	1
2.4	Divergence and curl (excluding vector identities)	1
2.5	Tutorial	2
2.6	Solenoidal and irrotational vectors	1
2.7	Application: Green's theorem in the plane	1
2.8	Gauss divergence theorem	1
2.9	Stokes' theorem (statement only)	1
2.10	Tutorial	2
3	Analytic Functions And Integrals	
3.1	Analytic function	1
3.2	Necessary and Sufficient conditions (statement only)	1
3.3	Properties	1
3.4	Harmonic function	1
3.5	Tutorial	2
3.6	Construction of an analytic function	1
3.7	Cauchy's Integral theorem (statement only), Cauchy's integral formula	1
3.8	Classification of singularities	1
3.9	Applications : Cauchy's residue theorem.	1
3.10	Tutorial	2
4	Partial Differential Equations	
4.1	Formation of partial differential equations by eliminating arbitrary constants	1
4.2	Formation of partial differential equations by eliminating arbitrary functions	2
4.3	Tutorial	2
4.4	Non- linear partial differential equations of first order	2
4.5	Lagrange's linear equations	1
4.6	Application : Homogeneous Linear partial differential equations with constant coefficients.	2
4.7	Tutorial	2

5	Laplace Transform	
5.1	Conditions for existence	1
5.2	Transforms of elementary functions	1
5.3	Basic properties	1
5.5	Derivatives and integrals of transforms, Initial and final value theorem	1
5.6	Tutorial	1
5.7	Transform of periodic functions	2
5.8	Inverse Laplace transform	1
5.9	Convolution theorem (excluding proof)	1
5.10	Application: Solution of second order ordinary differential equation with constant co-efficient.	1
5.11	Tutorial	2
	Total	60

#### **Course Designers**

- 1. Dr. C. Chandran cchandran@ksrct.ac.in
- 2. Dr. K. Prabakaran prabakaran@ksrct.ac.in

## List of MATLAB Programmes:

- 1. Evaluating double and triple integrals.
- 2. Area as double integral.
- 3. Volume as triple integral.
- 4. Plotting and visualizing single variable functions.
- 5. Plotting and visualizing functions of two and three variables.
- 6. Evaluating Gradient, divergence and curl.
- 7. Evaluating Laplace & Inverse Laplace transforms.
- 8. Applying Laplace transform techniques to solve differential equations

60 ME 001	Engineering Drowing	Category	L	Т	Р	Credit
	Engineering Drawing	ES	2	0	4	4

- To convey to acquire various concepts of dimensioning, conventions and standards.
- To impart the graphic skills for converting pictorial views of solids in to orthographic views.
- To learn the concept in projection of solids.
- To draws the section of solids and to know development of different types of surfaces.
- To learn the concept in isometric projection.

#### Prerequisite

Basic knowledge of Higher Secondary Mathematics, Binary Operations & Mathematical Logic.

#### Course Outcomes

## On the successful completion of the course, students will be able to,

CO1	Use the drafting instruments for construct the conic sections	Remember/ Understand/Apply
CO2	Convert the pictorial views of solids in to orthographic views	Remember/ Understand/Apply
CO3	Draw the projections of regular solids	Remember/ Understand/Apply
CO4	Draw the true shape of sections and develop the lateral surfaces of right solids.	Remember/ Understand/Apply
CO5	Sketch the three-dimensional view of solids for given orthographic views	Remember/ Understand/Apply

# Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3										3	3
CO2	3	3	3										3	3
CO3	3	3	3		3			3					3	3
CO4	3	3	3		3			3					3	3
CO5	3	3	3										3	3
3- Str		Medium	1-1-Son	00										

3- Strong;2-Medium;1-Some

Assessment i attern	Assessment ratem								
Plaam'aCatagany	ContinuousAsse	End SemExamination							
Bloom'sCategory	1	2	(Marks)						
Remember	10	10	20						
Understand	20	20	30						
Apply	30	30	50						
Analyse	0	0	0						
Evaluate	0	0	0						
Create	0	0	0						

			K.S.Ra	ngasamy Co	ollege of Techr	nology–Auto	nomous	R	2022
				60 ME 00 <sup>2</sup>	1- Engineering	Drawing			
Som	ester	ŀ	lours/Weel	k	Total hrs	Credit	Max	imum Marks	
Sem	ester	L	Т	Р	Total fils	С	CA	ES	Total
		2	0	4	90	4	40	60	100
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								[6+12]	
Orthographic Projection*								[6+12]	
Projection of Solids* Projections of simple solids: prism, pyramid, cylinder and cone (Axis of solid inclined to both HP and [9 VP).							[6+12]		
Section views of	ns of sol of geom	lids :Prism,	Cylinder, F ls, objects		<b>es</b> * ne – Auxiliary V ry - Developme				[6+12]
Princip pyrami	les of i d, cylind	sometric pr	ojection – e - Isometr	ic projection	CAD* cale – Isometri s of frustum and				[6+12]
				Т	otal Hours(Leo	cture=30 Hoເ	Irs + Practice	=60 Hours)	90
	Book(s)								
		_	-	-	tar Publishing F			-	)19
2. E	Basant A	garwal and	C.M.Agarv	wal., "Engine	ering Drawing",	McGraw Hill	Education, 20	)13.	
Referer	nce(s):								
1. s	Shah M.I	B., Rana B.	C., and V.K	K.Jadon., —E	Engineering Dra	wingll, Pears	on Education,	2011.	
2. N	Vataraja	n K.V., —A	Text Book	of Engineeri	ng GraphicsII, D	hanalakshm	i Publishers, C	Chennai, 2014	1.
3. <sub>V</sub>									
	Dhawan, Delhi, 20		ext Book of	Engineering	Drawing" 3 rd I	Revised Editi	on, S. Chand	Publishing, N	ew

# \*SDG 4 – Quality Education

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

C	Course Contents and Lecture Schedule						
S.No	Торіс	No.of Hours					
1	Introduction to Engineering Drawing and Plane Curves						
1.1	Use of drawing instruments	1					
1.2	BIS conventions and specifications – Size, layout and folding of drawing sheets	1					
1.3	Lettering and dimensioning -Drawing sheet layouts - Title block - Line types	2					
1.4	Scales: plain, diagonal and vernier scales	2					
1.5	Construction of ellipse	1					
1.6	Construction of parabola	2					
1.7	Construction hyperbola by eccentricity method	1					
1.8	Practice class for ellipse, parabola and hyberbola	2					
1.9	Construction of rectangular hyperbola	2					
1.10	Construction of cycloids	1					
1.11	Construction of epicycloids and hypocycloids	2					
1.12	Practice class for cycloids and hypocycloids	1					
2	Orthographic Projection						
2.1	Introduction to orthographic projections	2					
2.2	Planes of projection	2					
2.3	Projection of points	1					
2.4	Projection of lines inclined to both planes	2					
2.5	Projection of planes	2					
2.6	Projection of planes Inclined to both planes	2					
2.7	Conversions of pictorial views to orthographic views	3					
2.8	Practice class for pictorial views to orthographic views	2					
2.9	Practice class for pictorial views to orthographic views	2					
3	Projection of Solids						
3.1	Projections of simple solids: prism	2					
3.2	Projections of simple solids: cylinder	3					
3.3	Projections of simple solids: pyramid	3					
3.4	Projections of simple solids: Cone	2					
3.5	Practice class for Projection of Solids	3					
3.6	Axis of solid inclined to both HP and VP	5					
4	Sections of solids and Development of surfaces						
4.1	Section of solids for Prism	2					
4.2	Section of solids for Cylinder	2					
4.3	Section of solids for Pyramid	2					
4.4	Section of solids for Cone	2					
4.7	Auxiliary Views - Draw the sectional orthographic views of geometrical solids	2					
4.8	Draw the sectional orthographic views of objects from industry	2					
4.9	Development of surfaces of Right solids Prism	2					
4.10	Development of surfaces of Right solids Pyramid	2					
4.11	Development of surfaces of Right solids Cylinder and Cone	2					

BoS Chairman

5	Isometric Projection and Introduction to AutoCAD	
5.1	Principles of isometric projection	2
5.2	Isometric scale	2
5.3	Isometric projections of simple solids: Prism	2
5.4	Isometric projections of simple solids: Pyramid	2
5.5	Isometric projections of simple solids: Cylinder	2
5.6	Isometric projections of simple solids: Cone	2
5.7	Isometric projections of frustum	2
5.8	Isometric projections of truncated solids	2
5.9	Combination of two solid objects in simple vertical positions	2
	Total Hours	90
	Course Designers	

1. Dr.G.Venkatachalam-venkatachalam@ksrct.ac.in

BoS Chairman

CO CC 001	C PROGRAMMING	Category	L	т	Р	Credit
60 CS 001	CFROGRAMMING	ES	3	0	0	3

- To learn most fundamental element of the C language and to examine the execution of branching, looping statements,
- To examine the concepts of arrays, its characteristics and types 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 handling functions for storage and retrieval of data

# Prerequisite

NIL

#### **Course Outcomes**

On the	On the successful completion of the course, students will be able to							
CO1	Construct the fundamental building blocks of structured Programming in C	Apply						
CO2	Implement the different operations on arrays and strings	Apply						
CO3	Develop simple real world applications utilizing functions, recursion and pointers.	Apply						
CO4	Demonstrate the concepts of structures ,unions ,user defined data types and preprocessor	Apply						
CO5	Interpret the file concepts using proper standard library functions for a given application	Apply						

# Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3				2	2		2	3	3
CO2	3	3	3		3				2	2		2	3	3
CO3	3	3	3		3				2	2		2	3	3
CO4	3	3	3		3				2	2		2	3	3
CO5	3	3	3		3				2	2		2	3	3
2 Ctr		Madium	1 Son	~~										

3- Strong;2-Medium;1-Some

Cognitive Levels	Continuous	Assessment Tests	End Semester Examination (Marks)		
201010	1	2	(inanc)		
Remember	10	10	20		
Understand	10	10	20		
Apply	40	40	60		
Analyse	-	-	-		
Evaluate	-	-	-		
Create	-	-	-		

BoS Chairman

K.S.Rangasamy College of Technology–Autonomous R202								R2022		
					)1 – Č Progra					
Common to all Branches										
Sem	ester	Ho	ours / Wee		Total hrs	Credit		Maximum Marks		
		L	T	Р		С	CA	ES	Total	
								100		
<b>Basics of C, I/O, Branching and Loops*</b> Structure of a C Program – Data types – Keywords - Variables – Type Qualifiers - Constants – Operators–expressions and precedence- Console I/O– Unformatted and Formatted Console I/O - Conditional Branching and Loops-Writing and evaluation of conditionals and consequent branching										
Array array	/s: One /s – Strir		Manipulati		mensional Arra			on - Chara	icter <b>[07]</b>	
Proto Call Recu Introo Array	otypes – by value irsion an duction	e and Call d applicatio to Pointer herating a I	by refere on - Passir Variables	ence – Fur ng Arrays to - The Poir	Functions an action Categor Functions–S ater Operators Indexing Poin	ization- Arg torage class ; - Pointer	guments to n s Specifiers. Expressions	nain functio - Pointers	on— and	
Struc Struc	ctures - ctures, N	Introductio	on to Str ctures - Pa	uctures an assing Strue	ef and Preproced d Initialization ctures to Func cessor and con	<ul> <li>Arrays</li> <li>tions - Struct</li> </ul>				
File:	Handlin Streams Manipu	-Reading	and Writin uential acc	ng Characte cess - Rand	rs - Reading a om Access Fil	nd Writing S es – Comm	Strings - File S and Line argu	System fund uments.	ctions [09]	
								Total Ho	ours 45	
Text	Book(s									
1.			•		ice C", Fourth				010.	
2.	Byron (	Gottfried, "F	Programmi	ing with C",	Third Edition,	McGraw Hil	I Education, 2	2014.		
Refe	rence(s	):								
1.	E.Balaç 2016.	gurusamy, ʻ	"Programn	ning in ANS	I C", Seventh	Edition, Tata	a McGraw Hil	I Edition, N	ew Delhi,	
2.	Brian V	V. Kernigha	Deine MUKennishen and Dennis M. Ditable "O Dennemening Language" Dennis Lat							
ReemaThareja, "Computer Fundamentals and Programming in C", Second Edition, Oxford Higher										
3.		Thareja, "C ion, 2016.							l Higher	

\*SDG:4- Quality Education

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

# **Course Contents and Lecture Schedule**

Module No.	Торіс	No. of Hours
1	Basics of C, I/O, Branching and Loops	•
1.1	Structure of a C Program, Keywords	1
1.2	Data types, Type Qualifiers	1
1.3	Variables and Constants	1
1.4	Operators-expressions and precedence	1
1.5	Console I/O– Unformatted and Formatted Console I/O	1
1.6	Conditional Branching	1
1.7	Iteration and loops	2
1.8	Writing and evaluation of conditionals and consequent branching	1
2	Arrays and Strings	
2.1	One Dimensional Array	1
2.2	Two-Dimensional Array and Matrix Manipulation	1
2.3	Character arrays and Strings Basics	1
2.4	String Manipulation without String Handling Functions	2
2.5	String Manipulation with String Handling Functions	2
3	Functions and Pointers	
3.1	Scope of a Function – Library Functions, User defined functions and Function Prototypes	1
3.2	Function Call by value and Function Call by reference, Function Categorization	2
3.3	Arguments to main function	1
3.4	Recursion and application	1
3.5	Passing Arrays to Functions	1
3.6	Storage class Specifiers	1
3.7	Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions	1
3.8	Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers	1
3.9	Function and pointers	1
3.10	Dynamic memory allocation	1
4	Structures, Unions, Enumerations, Typedef and Preprocessors	-
4.1	Introduction to Structures and Initialization	1
4.2	Arrays and Structures, Arrays of Structures	1
4.3	Structures within Structures, Passing Structures to Functions	2
4.4	Structure Pointers	1
4.5	Unions and Bit Fields.	1
4.6	Enumerations - typedef	1
4.7	Preprocessor commands	2
5	File Handling	
5.1	File Streams – Reading and Writing Characters - Reading and Writing Strings	2
5.2	File System functions and File Manipulation	2
5.3	Sequential access	2
5.4	Random Access Files	2
5.5	Command Line arguments and files	1
	Total Hours	45

# **Course Designers**

1. Dr.P.Kaladevi - kaladevi@ksrct.ac.in

BoS Chairman

60 CH 001	CHEMISTRY FOR MECHANICAL SCIENCES	Category	L	Т	Р	Credit	
	(Common to Mechanical and Mechatronics)	BS	3	0	0	3	

# Objective(s)

- To help the learners, analyze the hardness of water and its removal.
- To endow an overview corrosion and its control.
- To rationalize the types of engineering materials.
- To analyze the concepts of advanced materials and its applications.
- To recall the basics of fuel and combustion technique.

# Prerequisite

Nil

# Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the types of hardness of water and its removal.	Understand, Apply & Analyse
CO2	Understand the concept of electrochemistry, corrosion and its control	Understand & Apply
CO3	Deduce the application of protective coatings	Apply
CO4	Interpret the principles of sensors in various applications.	Apply & Analyse
CO5	Recognize the types of batteries and fuel calls.	Understand

# Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	3	3	2	3	3	3	3		2
CO2	3	3	3	3	-	3	3	3	2	2	3	3	3	3
CO3	3	3	3	3	1	3	3	3	3	2	3	3		1
CO4	2	2	2	2	-	2	3	2	2	1	2	2	2	3
CO5	3	3	3	3	3	3	3	3	3	2	3	3	2	2
2_ Str		Modium		00										

3- Strong;2-Medium;1-Some

Plaam'a Catagany	Continuous As	sessment Tests	Terminal Examination			
Bloom's Category	1	2				
Remember	10	10	20			
Understand	20	20	40			
Apply	20	20	20			
Analyze	10	10	20			
Evaluate	-	-	-			
Create	-	-	-			

BoS Chairman

# **Course Level Assessment Questions**

# Course Outcome 1 (CO1):

- 1. Distinguish Soft and Hard water.
- 2. 1 gm of CaCO<sub>3</sub> was dissolved in HCl and the solution was made up to one liter with distilled water. 20 ml of the above solution required 18 ml of EDTA solution on titration. 20 ml of hard water sample required 10 ml of same EDTA solution on titration. 20 ml boiled off water, cooling and filtering required 6 ml of EDTA solution on titration. Calculate the total, temporary and permanent hardness of water in ppm.
- 3. Analyze the disadvantages of hard water in various industries.

# Course Outcome 2 (CO2):

- 1. Derive the Nernst equation for single electrode potential.
- 2. List out the advantages of potentiometric titration.
- 3. Interpret the role of cathodic protection mechanism in corrosion control.

# Course Outcome 3 (CO3):

- 1. Differentiate paint and varnish and analyze the applications.
- 2. Discuss Enamels and lacquers.
- 3. Explain electrochemical etching for conductors and semiconductors

# Course Outcome 4 (CO4)

- 1. Discuss the characteristics of chemical sensors.
- 2. Illustrate the role of chemical sensors in detectors & indicators.
- 3. Discuss the mechanism of enzyme sensors

# Course Outcome 5 (CO5)

- 1. Discuss the applications of microbial fuel cell.
- 2. Explain the fabrication and Working of Lithium Ion Batteries.
- 3. Summarize the working principle and applications of solar cell in electronic Industries.

-1------ Q\_\_\_\_

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

				llege of Techr			<u> </u>	2022
				chanical and				
	Ц	ours / Wee			Credit	, ,	imum Marks	
Semester			P	Total hrs	Cledit	CA	ES	Total
11	3	0	0	45	3	40	60	100
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EDTA method external cond Osmosis and	d- Internal co ditioning ( Electro dialy	onditioning (Zeolite pro ysis). Flash	(colloidal, p ocess, demi evaporation	of water - hard hosphate, calg neralization p	jon and carbo	onate condition	ning methods	s) – (roz
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		Aluminum	1.			Ū		
CHEMICAL S Sensors – Ch · Amperome Optical Biose Detectors and	ENSORS** emical Sens tric Sensors nsors : En d Indicators:	* sors – Chai – Sensors izyme Sen:	racteristics – Based on E sors – Bio a	- Elements and Electrochemica affinity Sensor n Processes –	al Methods – s - DNA Se	ation - Potentio Electrochemic ensors. Chem	ometric Sens al Biosensor ical Sensors	ors 's - as [10
CHEMICAL S Sensors – Ch - Amperome Optical Biose Detectors and chemical sens ENERGY ST Reversible ar Battery - Lea microbial fue	ENSORS*** emical Sens tric Sensors nsors : En d Indicators: sors. DRAGE DE DRAGE DE ad-Acid Bat I cell (MFC)	* – Sensors izyme Sens izyme Sens indicators <b>VICES</b> ** ** ole Cells – itery-Ni-Cd- ). Organic	racteristics – Based on E sors – Bio for Titration Titration Batteries - Lithium Ion Solar Cells	Electrochemica affinity Sensor Processes – Types of Batter Batteries – -working princ	al Methods – s - DNA Se Separation eries. Fabrica Fuel Cells: ciple and app	ation - Potentie Electrochemic ensors. Chem Methods. Nan ation and Wor Hydrogen-Oxy	ometric Sens al Biosensor ical Sensors o technology king of Alka gen fuel ce	iors is – as / in line -II - [09
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\*\*SDG 7 Affordable and clean energy \*\*\*SDG 9 Industry, innovation and infrastructure \*\*\*\*SDG 12 Responsible consumption and production

BoS Chairman

Course	Course Contents and Lecture Schedule									
S. No.	Торіс	No. of hours								
1.0	Water Technology									
1.1	Introduction – Commercial and Industrial uses of water	1								
1.2	Hardness - types	1								
1.3	Estimation of Hardness of ater by EDTA method	1								
1.4	Internal conditioning (Colloidal, Phosphate, Calgon and Carbonate)	1								
1.5	External conditioning (Zoelite process & Demineralization process)	1								
1.6	Desalination methods (Reverse Osmosis and Electrodialysis)	1								
1.7	Flash Evaporation	1								
2.0	Electrochemistry And Corrosion									
2.1	Electrode potential - Nernst Equation - derivation and problems	1								
2.2	Reversible and irreversible cells	1								
2.3	Types of Electrodes and its applications	2								
2.4	Reference electrodes - pH	1								
2.5	Conductometric and Potentiometric titrations	1								
2.6	Electrochemical corrosion, Corrosion due to dissimilar metal cells (galvanic cells),	1								
2.7	Corrosion due to differential aeration - Factors influencing corrosion	2								
2.8	Corrosion control: cathodic protection (sacrificial anodic protection, impressed	1								
	current cathodic protection).									
3.0	Protective Coatings	ł								
3.1	Protective coatings: Classification	1								
3.2	Metallic coating: Electroplating – electroless plating - diffusion coating.	1								
3.3	Paint: types and Characteristics of paints - Constituents - Drying process.	1								
3.4	Varnishes: characteristics - Constituents. Enamels and lacquers (natural resins).	1								
3.5	Electro polishing of mild steel- electrochemical machining – electro phoretic painting in automotive industry,	2								
3.6	technology of electro priming – Electrochemical etching for conductors and semiconductors	2								
3.7	Electroforming – Electro winning of Aluminium – Anodizing of Aluminium.	1								
4.0	Chemical Sensors									
4.0	Sensors – Chemical Sensors - Characteristics	1								
		-								
4.2	Elements and Characterization	1								
4.3	Potentiometric Sensors, Amperometric Sensors	1								
4.4	Sensors Based on Electrochemical Methods	1								
4.5	Electrochemical Biosensors	1								
4.6	Optical Biosensors : Enzyme Sensors – Bio affinity Sensors	1								
4.7	DNA Sensors. Chemical Sensors as Detectors and Indicators	1								
4.8	Indicators for Titration Processes	1								
4.9	Separation Methods. Nano technology in chemical sensors.	2								
5.0	Energy Storage Devices									
5.1	Reversible and Irreversible Cells – Batteries - Types of Batteries.	2								
5.2	Fabrication and Working of Alkaline Battery	1								
5.3	Lead-Acid Battery	1								
5.4	Ni-Cd-Lithium Ion Batteries	1								
5.5	Fuel Cells: Hydrogen-Oxygen fuel cell	1								
5.6	Microbial fuel cell (MFC).	1								
5.7	Organic Solar Cells-working principle and applications organic transistors	1								
5.8	Construction-working principle and applications in electronic Industries.	1								

Course Designers Dr.T.A.SUKANTHA Dr.K.PRABHA Dr.S.MEENACHI Ms.D.KIRTHIGA

BoS Chairman

60 GE 001	Heritage of Tamils	Category	L	Т	Ρ	Credit
00 GE 001	(Common to all Branches)	GE	1	0	0	1

#### **Objectives:**

- To learn the extensive literature of classical Tamil.
- To review the fine arts heritage of Tamil culture.
- To realize the contribution of Tamils in Indian freedom struggle.

#### Prerequisite:

Nil

## Course Outcomes:

On the successful completion of the course, students will be able to

CO1	Recognize the extensive literature of Tamil and its classical nature.	Understand
CO2	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.	Understand
CO3	Review on folk and martial arts of Tamil people.	Understand
CO4	Insight thinai concepts, trade and victory of Chozha dynasty.	Understand
	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	Understand

## Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3	3		2		3		
CO2							3	3		2		3		
CO3							3	3		2		3		
CO4							3	3		2		3		
CO5							3	3		2		3		
3- Strong;2-Medium;1-Some														

BoS Chairman

Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Janism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern Interature in Tamil - Contribution of Bharathiyar and Bharathidhasan.       [03]         Heritage - Rock Art Paintings to Modern Art – Sculpture*       Forms of minor Poetry - Development of Modern Art – Sculpture*       [03]         Heritage - Rock Art Paintings to Modern Art – Sculpture*       Forms of minor Poetry - Development of Modern Art – Sculpture*       [03]         Heritage - Rock Art Paintings to Modern Art – Sculpture*       Forma of the Modern Rock Art Paintings to Modern Art – Sculpture*       [03]         Heritage - Rock Art Paintings to Modern Art – Sculpture*       Forma of Tamils - Aran Concomcic Life of Tamils.       [03]         Folk and Martial Arts*       Formaon Arts Arts*       [03]         Forma of Tamils to Indian Self Sangam Age - Sports and Games of Tamils.       [03]         Floria and Founa of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cites and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest for Cholas.       [03]         Contribution of Tamils to Indian National Movement and Indian Culture*       [03]         Contribution of Tamils to Indian Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – grafatic (grawafulag): g	K.S.Rangasamy College of Technology–Autonomous												
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Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mirihangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.         [03]           Folk and Martial Arts*         [03]           For And Statuments - Miridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Therukothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.         [03]           Frinai Concept of Tamils*         [03]         [03]           For and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Chices and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.         [03]           Contribution of Tamils to Indian National Movement and Indian Culture* Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India - Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine - Inscriptions & Manuscripts - Print History of Tamil Books.         [03]           1         gubge argong u wissegib using basis again.         [03]           1.         gubge argong gan dage i sangbub again again again again again again agai	Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.												
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<ol> <li>Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB &amp; ESC and RMRL – (in print).</li> <li>Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.</li> <li>Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).</li> <li>The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)</li> <li>Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)</li> <li>Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).</li> <li>Porunai Civilization (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu Text Book and</li> </ol>	3. கீழ	நடி – வைகை	நதிக்கரையில்	சங்ககால ந	நகர நாகரீகம்	் (தொல்லி	ியல் துறை ெ	வளியீடு).					
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<ul> <li>Institute of Tamil Studies.</li> <li>Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).</li> <li>The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)</li> <li>Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)</li> <li>Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).</li> <li>Porunai Civilization (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).</li> </ul>	5. So	cial Life of T	amils (Dr.K.	K.Pillay) A	joint public	cation of	INTB & ESC	c and RMRL – (in print)	).				
<ul> <li>7. Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).</li> <li>8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)</li> <li>9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)</li> <li>10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).</li> <li>11. Porunai Civilization (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).</li> </ul>	h l			he Classic	cal Period (	Dr.S.Sing	garavelu) (P	ublished by: Internatior	nal				
<ul> <li>8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)</li> <li>9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)</li> <li>10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).</li> <li>11. Porunai Civilization (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).</li> </ul>	- His	storical Herit	tage of the Ta			manian, I	Dr.K.D. Thiru	unavukkarasu) (Publish	ned by:				
9.Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)10.Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).11.Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).	<sub>8</sub> Th	e Contributi	ons of the Ta			e (Dr.M.V	alarmathi) (F	Published by: Internation	onal				
<ul> <li>Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).</li> <li>Porunai Civilization (Jointly Published by: Department of Archaeology &amp; Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).</li> </ul>	o Ke	eladi - 'San	gam City Civ						tment of				
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).	10 Stu	udies in the							ed by:				
	11 Po	orunai Civiliz				tment of <i>i</i>	Archaeology	& Tamil Nadu Text Bo	ook and				
						ishnan) (I	Published by	RMRI) - Reference	Book				

# \*SDG:4- Quality Education

BoS Chairman

60 GE 001	தமிழர் மரபு	Category	L	Т	Ρ	Credit
60 GE 001	(அனைத்து துறைகளுக்கும் பொதுவானது)	GE	1	0	0	1

பாடத்தின் நோக்கங்கள்:

- தமிழ் மொழியின் இலக்கணச் செறிவைக் கற்றுணர்தல்.
- தமிழர் பண்பாட்டின் நுண்கலைகள் பற்றிய ஒரு மீள்பார்வை.
- இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பை உணருதல்.

# முன்கூட்டிய துறைசார் அறிவு:

தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்:

#### பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

CO1	தமிழ் மொழியின் செந்தண்மை மற்றும் இலக்கியம் குறித்த தெரிதல்.	புரிதல்
CO2	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்த தெளிவு.	புரிதல்
CO3	தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு.	புரிதல்
CO4	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	புரிதல்
CO5	இந்திய தேசிய இயக்கம், சுயமரியாதையை இயக்கம் மற்றும் சித்த மருத்துவம் பற்றிய புரிதல்.	புரிதல்

# Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3	3		2		3		
CO2							3	3		2		3		
CO3							3	3		2		3		
CO4							3	3		2		3		
CO5							3	3		2		3		
3- Str	3- Strong;2-Medium;1-Some													

BoS Chairman

K.S.Rangasamy College of Technology–Autonomous R 60 GE 001 – தமிழர் மரபு												
60 GE 001 – தமிழர் மரபு Hours/Week Total hrs Credit Maximum Marks												
		ŀ	Hours/Wee		Total hrs	Credit		Maximum Marks				
Ser	nester	L	Т	Р		С	CA	ES	Total			
	II	1	0	0	15	1	100	-	100			
இந் சங்க மேஎ இல	நிய மொழ இலக்கி லாண்மை க்கியம், அ	ியத்தின் க க் கருத்துக் ஆழ்வார்கள	பங்கள் — த சமயச் சார் கள் - தமிழ் ர் மற்றும் ந	பற்ற தன் க் காப்பிய எயன்மார்ச	மை – சங்க பங்கள் - தமிழ	இலக்கிய கத்தில் சம கியங்கள் -	பத்தில் பகிர் ண பௌத்த தமிழில் நவ	- தமிழ் செவ்விலக்கியங்கள் - iதல் அறம் – திருக்குறளில் சமயங்களின் தாக்கம் – பக்தி ீன இலக்கியத்தின் வளர்ச்சி – ப்பு.	[03]			
<b>மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை–சிற்பக் கலை:</b> நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.												
தெரு	ரக்கூத்து,	கரகாட்டப்	ற <b>ற்றும் வீர எ</b> ந், வில்லுப்ப பெழர்களின் எ	பாட்டு, கவ	னியான் கூத்து	, ஒயிலாட்ட	_ம், தோல்ப	ராவைக் கூத்து, சிலம்பாட்டம்,	[03]			
<b>தமிழர்களின் திணைக் கோட்பாடுகள்:</b> தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.												
இந் - சு	நிய விடுத யமரியா	லைப்போ தை இயக்	ாரில் தமிழர் கம் – இ	களின் பங் இந்திய ம		வின் பிறப் சித்த ம	ப்பகுதிகளில்	: தமிழ்ப் பண்பாட்டின் தாக்கம் எபங்கு – கல்வெட்டுகள்,	[03]			
<b>F</b> 1								Total Hours	15			
1.	• •		மக்களும் ப	பண்பாடும்	் கே. கே . பில	ர்ளை ( வெ	வியீடு: தமிழ	ழ்நாடு பாடநூல் மற்றும் கல்வி -	பியல்			
2.	கணினித	<u>ந்</u> தமிழ் – மு	ழனைவர் இ	ல. சுந்தரட	ம். (விகடன் பி	ரசுரம்).						
3.					் நகர நாகரீகம்		யல் துறை ெ	வளியீடு).				
4.					ல்லியல் துறை							
5.		. 0			÷ ,	-	,	C and RMRL – (in print).				
6.					<u> </u>			ublished by: International Ir	stitute of			
7.	Historic	al Herita		amils (Dr	.S.V.Subara	-	<i>/ \</i>	unavukkarasu) (Published b				
8.	The Co					e (Dr.M.Va	alarmathi) (I	Published by: International I	nstitute c			
9.	Keelad	i - 'Sanga						tly Published by: Departmer poration, Tamil Nadu)	nt of			
10.								(Dr.K.K.Pillay) (Published by				
							anni Nauu (	(DI.N.N.Fillay) (Fublished b	y: The			
11.				/ Publishe	ed by: Depar			/ & Tamil Nadu Text Book a				
11. 12.	Educat	ional Serv	vices Corp	/ Publishe oration, T	ed by: Depar Tamil Nadu).	tment of A	vrchaeology		ind			

\*SDG:4- Quality Education

BoS Chairman

60 CP 0P1	PHYSICS AND CHEMISTRY LABORATORY	Category	L	Т	Ρ	Credit
	(CIVIL, MECH & MCT))	BS	0	0	4	2

## Objective(s)

- 1. To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.
- 2. To demonstrate an ability to make physical measurements and understand the limits of precision in measurements
- 3. To analyze the behavior and characteristics of various materials for its optimum utilization
- 4. Test the knowledge of theoretical concepts and develop the experimental skills of the learners.
- 5. To facilitate data interpretation and expose the learners to various industrial and environmental applications

# Prerequisite

Nil

# **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Apply the concept of stress, strain and elastic limit for a given sample to find their properties	Apply
CO2	Recognize the concept of quantum Physics & magnetic properties by experimental verification	Apply
CO3	Recall the knowledge of properties of light and fiber optic cable	Apply
CO4	Apply the concepts of chemistry and develop analytical skills for applications in engineering to determine the rate of corrosion	Apply
CO5	Analyze the pH, electrode potential, conductance sample solutions	Analyze

# Mapping with Programme Outcomes

			. • <del>g</del> . a.														
COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2			
CO1	3	3	3	3	3	2	2	3	2	2	2	3					
CO2	3	3	3	2	2	2	2	2	1	3	2	2	2				
CO3	3	2	3	3	3	2	3	1	2	2	1	2	2				
CO4	3	3	3	3	3	3	3	3	2	2	3	3	3	2			
CO5	3	3	3	3	2	2	3	2	2	-	2	3	1	2			
2 Ctr	000.0	Modium	1 Con				2 Strong:2 Modium:1 Some										

3- Strong;2-Medium;1-Some

# PHYSICS LABORATORY

# (B.E CIVIL, MECH & MCT)

#### List of Experiments

- 1. Determination of Young's modulus of a given material Uniform bending
- 2. Determination of rigidity modulus of a wire Torsional pendulum.
- 3. Determination of Planck's constant.
- 4. Magnetic field along the axis of current carrying coil Stewart and Gee.
- 5. (a) Laser- Determination of the wave length of the laser using grating.
  - (b) Optical fibre -Determination of Numerical Aperture and acceptance angle.

#### Course Designers

Dr. V.Vasudevan Mr.S. Vanchinathan Dr. M.Malarvizhi

BoS Chairman

# CHEMISTRY LABORATORY (B.E CIVIL, MECH & MCT)

#### List of Experiments

- 1. Estimation of hardness of water sample by complexometric method.
- 2. Determination of Dissolved Oxygen in water sample by Winkler's method
- 3. Determination of corrosion by weight loss method
- 4. Estimation of HCl by pH meter.
- 5. Estimation of mixture of acids by conductivity meter.

#### Case studies/Activity report

- 1. Case study on Dissolved Oxygen in various water samples.
- 2. Activity report for determination of HCI using conductometric titration

\*SDG 6: Improve Clean Water and Sanitation \*SDG 9: Industry, Innovation, and Infrastructure \*SDG 8: Decent Work and Economic Growth

#### **Course Designers**

Dr.T.A.SUKANTHA Dr.B.SRIVIDHYA Dr.K.PRABHA Dr.S.MEENACHI

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

60 CS 0P1 C PROGRAMM	C PROGRAMMING LABORATORY	Category	L	Т	Р	Credit
00 C3 0F1	C PROGRAMMING LABORATORT	ES	0	0	4	2

- 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

Prerequisite

NIL

# Course Outcomes

On th	ne successful completion of the course, students will be able to	
CO1	Read, display basic information and use selection and iterative statements.	Apply
CO2	Demonstrate C program to manage collection of related data.	Apply
CO3	Design and Implement different ways of passing arguments to functions, Recursion and implement pointers concepts.	Apply
CO4	Develop a C program to manage collection of different data using structures, Union, user-defined data types and preprocessor directives.	Apply
CO5	Demonstrate C program to store and retrieve data using file concepts.	Apply

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3				2	2		2	3	3
CO2	3	3	3		3				2	2		2	3	3
CO3	3	3	3		3				2	2		2	3	3
CO4	3	3	3		3				2	2		2	3	3
CO5	3	3	3		3				2	2		2	3	3
3- Str	3- Strong;2-Medium;1-Some													

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.

#### SDG:4- Quality Education Course Designers

1. Dr.P.Kaladevi - kaladevi@ksrct.ac.in

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BoS Chairman

60 CG 0P1	CAREER SKILL DEVELOPMENT I	Category	L	Т	Ρ	Credit
00 CG 0F 1	CAREER SKILL DEVELOFMENT I	CG	0	0	2	1*

- To help learners improve their vocabulary and to 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 effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

#### Prerequisite

Basic knowledge of reading and writing in English.

#### **Course Outcomes**

On the	successful completion of the course, students will be able to	
CO1	Listen and comprehend complex academic texts	Understand
CO2	Read and infer the denotative and connotative meanings of technical texts	Analyze
CO3	Write definitions, descriptions, narrations, and essays on various topics	Apply
CO4	Speak fluently and accurately in formal and informal communicative contexts	Apply
CO5	Appraise the verbal ability skills in the career development and professional contexts	Analyze

#### Mapping with Programme Outcomes

_														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								2	3	3	2	3		
CO2								2	3	3	2	3		2
CO3								2	3	3	2	3	2	2
CO4								2	3	3	2	3		
CO5								2	3	3	2	3	2	2
3- Str	3- Strong;2-Medium;1-Some													

BoS Chairman

		K.8			ge of Technolo		mous		R2022	
					er Skill Develo					
				Common	to All Branche					
Semes	ster	Hours	Week	_	Total Hrs.	Credit		laximum Ma		
		L	T	P		C	CA	ES	Total	
		0	1	0	25	0	100	00	100	
Listening Listening for general information-specific details - audio / video (formal & informal) - Listen to podcasts/ TED talks/ anecdotes / stories / event narration / documentaries and interviews with celebrities - Listen to a product and process descriptions, advertisements about products or services.										
experi podca Small	ntroduc iences ists/ inf Talk; N	ction; Introducing a / events; Intervie terviews - Picture d Mini presentations -	wing a ce escription;	elebrity; re giving ins	eporting / and truction to use	summarizin the product;	g of doc	umentaries	/ [05]	
<b>Reading</b> Loud reading vs Silent reading, Skimming & Scanning of passages, reading brochures (technical context), social media messages relevant to technical contexts and emails - Biographies, travelogues, newspaper reports and travel & technical blogs - Advertisements, gadget reviews and user manuals - Newspaper articles and Journal reports - Editorials; and opinion blogs										
Writing Writing on an Note-t	ng g lette event taking;	rs – informal and fo (field trip etc.) - De recommendations; ay texting	ormal – ba: finitions; in	sics and f	ormat orientatic ; and product /p	on - paragra process desc	cription - N	lote-making	/ [05]	
Verba Readi	al Abili ing Co							marizing an	d <b>[05]</b>	
					•			Total Hou	r <b>s</b> 25	
Refere	ence(s	s):								
1. 'English for Engineers & Technologists' Orient Blackswan Private Ltd. Department of English, Anna University, 2020										
E	Book', I	n Lewis, 'Word Pov Penguin Random H	ouse India	, 2020			Ŭ	•		
3. Michael McCarthy and Felicity O Dell, 'English Vocabulary in Use: Upper Intermediate', Cambridge University Press, N.York, 2012										
4. L	_akshn	ni Narayanan, 'A Co	ourse Book	on Techn	ical English' Sc	itech Publica	ations (Ind	lia) Pvt. Ltd.	2020	

SDG-04-Quality Education

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BoS Chairman

# Course Contents and Lecture Schedule

S.No	Торіс	No.of Hours
1		
1.1	Listening for general information and Specific details	1
1.2	Listening to podcasts, documentaries and interviews with celebrities	1
1.3	Narrating personal experiences	1
1.4	Readingrelevant to technical contexts and emails	1
1.5	Listen to a product and process descriptions	1
2	Speaking	
2.1	Self-introduction	1
2.2	Summarizing of documentaries& Picture Narration	1
2.3	Small Talk; Mini presentations	1
2.4	Group discussions, debates & role plays.	1
2.5	Group discussions	1
3	Reading	
3.1	Loud reading vs Silent reading, Skimming & Scanning of passages	1
3.2	Reading social media messages relevant to technical contexts	1
3.3	Reading newspaper reports and travel & technical blogs	1
3.4	Reading advertisements, gadget reviews and user manuals	1
3.5	Reading newspaper articles and journal reports	1
4	Writing	
4.1	Writing letters – informal and formal	1
4.2	Paragraph Texting	1
4.3	Definitions and instructions	1
4.4	Note-making / Note-taking	1
4.5	Essay texting	1
5	Verbal Ability	
5.1	Reading Comprehension (MCQs) and Cloze Test	1
5.2	Sequencing of sentences	1
5.3	Paraphrasing and Summarizing	1
5.4	Error Detection and Spelling Test	1
5.5	Prepositions	1
	Total	25

# **Course Designers**

1. Dr.A.Palaniappan - palaniappan@ksrct.ac.in

BoS Chairman

# K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

(An Autonomous Institution affiliated to Anna University)

# B.E. / B.Tech. Degree Programme SCHEME OF EXAMINATIONS

(For the candidates admitted from 2022-2023 onwards)

#### THIRD SEMESTER

S.	Course		Duration of	Weighta	ge of Marks	6	Minimum for Pass Semester	in End
No.	Code	Name of the Course	Internal Exam	Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
1	60 MA 007	Statistics and Numerical Methods	2	40	60	100	45	100
2	60 MC 301	Analog Devices and Digital Circuits	2	40	60	100	45	100
3	60 MC 302	Sensors and Instrumentation	2	50	50	100	45	100
4	60 MC 303	Manufacturing Technology	2	40	60	100	45	100
5	60 MC 304	Mechanics of Solids	2	40	60	100	45	100
6	60 MY 002	Universal Human Values	2	100	0	100	0	100
7	60 GE 002	Tamils and Technology / தமிழரும் தொழில்நுட்பமும்	2	100	0	100	0	100
			PRACT	ICAL				
8	60 MC 3P1	Analog Devices and Digital Circuits Laboratory	3	60	40	100	45	100
9	60 MC 3P2	Manufacturing Technology Laboratory	3	60	40	100	45	100
10	60 CG 0P2	Career Skill Development-II	3	100	-	100	-	-
11	60 CG 0P6	Internship	-	-	-	-	-	-

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

R1/w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

60 MA 007	Statistics and Numerical Methods	Category	L	Т	Ρ	Credit
00 MA 007		BS	3	1	0	4

- To familiarize the basic concepts of probability and random variables.
- To familiarize various distributions and testing of hypothesis.
- To learn basics of descriptive statistics.
- To get exposed to various techniques to solve equations numerically.
- To know the concepts of interpolation and numerical integration.

# Prerequisite

NIL

# CourseOutcomes

Attheendofthe course, the students will be able to

С	01	Understand the basic concepts of probability and random variables.	Remember, Understand, Apply
С	02	Apply Student's t test, F test and Chi-square test for testing the statistical	
Ŭ		hypothesis.	Understand, Apply
C	O3	Compute measures of central tendency, measures of dispersion and	Remember,
	03	correlation coefficient.	Understand, Analyze
C	04	Employvarious iteration techniques for solving algebraic,	Remember,
	04	transcendental and system of linear equations.	Understand, Apply
C	O5	Apply different techniques to find the intermediate values and to	Remember,
	05	evaluate single definite integrals.	Understand, Apply

# Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2							2		3
CO2	3	3	3	3	3							2		3
CO3	3	3	3	3	2							2		3
CO4	3	3	3	2	3							2		3
CO5	3	3	3	2	3							2		3
3 - Str	- Strong;2 - Medium;1 – Some													

Plaam's Cotogony	ContinuousAssessn	End Sem Examination	
Bloom'sCategory	1	2	(Marks)
Remember(Re)	10	10	10
Understand (Un)	10	10	20
Apply (Ap)	30	30	60
Analyse (An)	10	10	10
Evaluate (Ev)	0	0	0
Create (Cr)	0	0	0

BoS Chairman

				of Technolog tics and Num				1\2	022	
				IVIL, MECH &		as				
	Ноц	urs/Week			Credit	N	laximum M	arke		
Semester	1	T	Р	Total hrs	C	CA	ES	Total		
	3	1	0	60	4	40	60		100ar	
	and Random Varia	, hles	Ŭ	00	•	10		10	[9	
	robability - Condit		ability - I	Bave's theorer	n - Random	variable	- Expecta	ation -	10	
	ass function - Proba									
	stributions and Te	-	-	-					[9	
	stribution - Poisso				Il errors - Te	est of sigr	nificance of	small	•	
	udent's 't' test - Sing									
- Independer	ice of attributes.									
Empirical St	atistics								[9	
	f central tendenc	<b>y*</b> : Mean,	, Median,	Mode - Meas	sures of dis	persion: F	Range - Q	uartile	-	
deviation - S	tandard deviation -	Measures	of skewne	ess: Bowley's c	o-efficient of	skewnes	s - Pearsor	ı's co-		
efficient of sk	ewness- Correlatio	on.								
Solutions of	Equations and Ei	igen Value	Problem						[9	
Algebraic an	d Transcendental	equations	- Nowto	n Ranhson me	othod - Rec	ula Falsi	method -(	Gauss		
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elimination n method - Eig Interpolation	nethod - Gauss Jo en value of a matrix	ordan meth x by Power ntegration	od - Itera method.	tive methods:	Gauss Jaco	bi methoc	I - Gauss S		[9	
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\*\*SDG:9 Industry, Innovation, and Infrastructure

# List of MATLAB Programs:

- Calculate the standard parameters by using Binomial distribution.
   Determine the Measures of central tendency.
   Compute the measures of dispersion.
   Solve the Equation by using Gauss Seidel method.

- 5. Numerical integration using Trapezoidal and Simpson's rules.
- 6. Compute eigen values and eigen vectors by using power method

# **Course Contents and Lecture Schedule**

S.No	Торіс	No.of Hours
1	Probability and Random Variables	
1.1	Axioms of probability	1
1.2	Conditional probability	1
1.3	Baye's theorem	1
1.4	Tutorial	2
1.5	Random variable	1
1.6	Expectation	1
1.7	Probability mass function	1
1.8	Probability density function	1
1.9	Momentgenerating function	1
1.10	Tutorial	2
2	STANDARD DISTRIBUTIONS AND TESTING OF HYPOTHESIS	
2.1	BinomialDistribution	1
2.2	Poisson Distribution	1
2.3	Fit a Binomial and Poisson Distribution	1
2.4	t test	1
2.5	Tutorial	2
2.6	F test	1
2.7	Chi- squaretest	1
2.8	TestforIndependency	1
2.9	Goodness offit.	1
2.10	Tutorial	2
3	EMPIRICAL STATISTICS	2
3.1	Mean, Median and Mode	1
3.2	Range, Quartile deviation	1
3.3	Standard deviation	1
3.4	Tutorial	2
3.5	Pearson's co-efficient ofskewness	1
3.6	Bowley's co-efficient ofskewness	1
3.7	Measures of skewness	1
3.8	correlation	2
<u>3.9</u>	Tutorial	2
	SYSTEM OF EQUATIONS AND EIGEN VALUE PROBLEM	2
<b>4</b> 4.1	Newton Raphson method	1
4.1	Gauss elimination method	1
4.2 4.3	Gauss Jordan method	1
4.3 4.4	Gauss Jacobimethod	1
4.4 4.5	Tutorial	2
4.5	Gauss Seidelmethod	2
4.0	Matrix inversion by Gauss Jordan method	1
4.7	Eigen values of a matrix by powermethod	1
4.0	Tutorial	2
4.9 5	INTERPOLATIONANDNUMERICALINTEGRATION	<u> </u>
5.1	Lagrange's interpolations	1
5.1 5.2	Newton's divided difference interpolations	2
5.2 5.3	Tutorial	2
<u>5.3</u> 5.4	Newton's forward and backward difference interpolations	2
5.4 5.5		2
5.5 5.6	Two and three point Gaussian quadratures	2
5.0 5.7	Single integration using Trapezoidal and Simpson's 1/3 and 3/8 rules Tutorial	2
J.I	Tutorial Total	
	וטנמו	60

Dr.C.Chandran - <u>cchandran@ksrct.ac.in</u>

60 MC 301	Analog Devices and Digital Circuits	Category	L	Т	Ρ	Credit
		PC	3	0	0	3

- To procure the fundamental knowledge in semiconductor diodes and applications
- To impart the fundamental knowledge in the areas of transistors and amplifiers.
- To equip learners with Boolean algebra and design of combinational logic circuits.
- To acquaint learners with fundamentals and design of sequential circuits
- To educate learners with the basics of memory devices and implement combinational circuits

#### Prerequisite

#### **Basic Electrical and Electronics Engineering**

#### **Course Outcomes**

#### On the successful completion of the course, students will be able to

CO1	Describe the concepts and characteristics of Semiconductor Diodes	Understand
CO2	Describe the characteristics of transistor and amplifiers	Understand
CO3	Practice the Boolean techniques and design combinational circuits.	Apply
CO4	Design Synchronous sequential circuit using flipflops.	Analyze
CO5	Construct combinational logic functions using programmable logic devices	Analyze

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	2	1					1	1	2	3	3
CO2	3	2	2	1	1					1		2	3	3
CO3	3	2	2	2	1				1	1		2	3	3
CO4	3	2	1	1	1				1	1		2	3	3
CO5	3	1	1	2	1				1	1	1	2	3	3
3- Str	ong;2-l	Vedium	n;1-Son	ne										

Bloom's		ssessment Tests (Marks)	End Sem
Category	1	2	Examination(Marks)
Remember	30	20	30
Understand	30	25	30
Apply	0	10	30
Analyse	0	5	10
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

		Circuits	and Digital	alog Devices	C 301 – An	60 M		
				МСТ				
s	aximum Mar	ľ	Credit	Total hrs	ek	lours/We	ŀ	Semester
Tota	ES	CA	С		Р	Т	L	
100	60	40	3	45	0	0	3	
	e – Light em	- Photo dioc	ner diode -	resistance. Ze	tors - drift d dynamic	miconduc Static ar	Extrinsic se of diode –	Semiconducto Intrinsic and E characteristics diode – Laser o
:s –	characterist	deal Op-Am	cteristics - I ing amplifie	「 – FET chara ng & non-in∨er	- Transist nd MOSFE ons- Invertir	n of BJT of JFET a configurat	operation operation osed loop o	Transistor and         Construction &         Construction &         Open loop , Cla         amplifier- Completee
on - [	ap minimizat	Karnaugh m	ressions -		nimization c	aws - Mi	lates and	<b>Boolean Algel</b> Boolean postu Quine-McClusk
's –					edure – Hal iplexer – ei	esign proc – Demul	Multiplexer Combinatior	Combinational BCD adder – I Simulation of C
s – evel	triggering – L	checker – p ation – Edge	der– parity teristic equa	ncoder – deco Slave – Charao	edure – Hal iplexer – er nd Master-S lop using of	esign proc – Demul nal Circuit: JK, D, T a f one flip	Multiplexer Combination Couits ops – SR, ealization o	BCD adder –
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rs – evel pwn ead ogic ) –	triggering – L triggering – L pronous Up/C operation – F grammable L	checker – p ation – Edge s and Async AM – Write Devices – Pr able Gate	der– parity teristic equa Synchronou PROM – Ra able Logic E Programm	Slave – Charac Slave – Charac her flip flops – EPROM – EE II –Programm PAL) – Field	edure – Hal iplexer – er i. nd Master-S lop using of ters. <b>Devices</b> - PROM – mic RAM ce ay Logic (	esign proc – Demul hal Circuit: JK, D, T a f one flip hter-Regis ble Logi s: ROM ell - Dyna mable Ar	Multiplexer combination rcuits ops – SR, ealization o dulo–n cour programma of memorie atic RAM C - Programma	BCD adder – I Simulation of C Sequential Cir Latches, Flip-fl Triggering – Re counters – Moo Memory and P Classification of Operation – Sta Array (PLA) –
evel bwn ead ogic ) –	triggering – L bronous Up/D operation – F grammable L strays (FPG)	checker – p ation – Edge s and Async AM – Write Devices – Pr able Gate	der– parity teristic equa Synchronou PROM – R/ able Logic D Programm LA and PAL	Slave – Charac her flip flops – EPROM – EE ell –Programm PAL) – Field sing PROM, P	edure – Hal iplexer – er  nd Master-S lop using of ters. • <b>Devices</b> • <b>PROM</b> – mic RAM ce ay Logic ( gic circuits u	esign proc – Demul hal Circuit: JK, D, T a f one flip hter-Regis <b>able Logi</b> s: ROM - ell - Dyna mable Ar ational lo	Multiplexer Combination Couits ops – SR, ealization o dulo–n cour Programma of memorie atic RAM C - Programma of combin	CD adder – 1 Simulation of C Sequential Cir Latches, Flip-fli Triggering – Re counters – Moo Memory and P Classification of Operation – Sta Array (PLA) – mplementation
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evel bwn bgic ) – uurs d., New	triggering – L tronous Up/D operation – F grammable L trrays (FPG) <u>Total H</u> ication Pvt. L	checker – p ation – Edge s and Async AM – Write Devices – Pr able Gate Pearson Ec	der– parity teristic equa Synchronou PROM – R. able Logic E Programm LA and PAL	Slave – Charac Aler flip flops – EPROM – EE II –Programm PAL) – Field sing PROM, P	edure – Hal iplexer – er  nd Master-S lop using of ters. <b>Devices</b> PROM – mic RAM ce ay Logic ( jic circuits u	esign proc – Demul hal Circuit: JK, D, T a f one flip hter-Regis hele Logio s: ROM ell - Dyna mable Ar ational lo ctronic De 17.	Multiplexer Combination Couits ops – SR, - ealization o dulo–n cour Programma of memorie atic RAM C - Programma n of combin : Floyd, "Ele Edition, 20	CD adder – Simulation of C Sequential Cir _atches, Flip-fli Triggering – Re counters – Moo Memory and P Classification of Deperation – Sta Array (PLA) – mplementation Coperation – Sta Array (PLA) – mplementation
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rs – [ evel bwn ead bgic ) – [ uurs d., New 17	triggering – L triggering – L nronous Up/D operation – F grammable L grammable L trrays (FPG) Total H ication Pvt. L nd Edition, 20 5 <sup>th</sup> Edition 2	checker – p ation – Edge s and Async AM – Write Devices – Pr able Gate Pearson Ec New Delhi, 2 s, New Delhi	der– parity teristic equa Synchronou PROM – Ra able Logic E Programm LA and PAL ia Pvt. Ltd.,/ se Pvt. Ltd, versity Press	Slave – Charac Aler flip flops – EPROM – EE II –Programm PAL) – Field sing PROM, P	edure – Hal iplexer – er i. nd Master-S lop using of ters. <b>Devices</b> PROM – mic RAM ce ay Logic ( jic circuits u vices", Prer ics", Vikas I s and Circui	esign proc – Demul hal Circuit: JK, D, T a f one flip hter-Regis <b>able Logi</b> s: ROM - ell - Dyna mable Ar ational lo ctronic De 17. al Electron hic Device ivazhaga	Multiplexer Combination Couits ops – SR, ealization o dulo–n cour Programma of memorie atic RAM C - Programma of combin Floyd, "Ele Edition, 20 arna, "Digit ell, "Electron an S and Ar	BCD adder –         Simulation of C         Simulation of C         Sequential Cir         _atches, Flip-flic         Triggering – Recounters – Moor         Memory and P         Classification coperation – Station         Array (PLA) –         mplementation         Classification coperation – Station         Array (PLA) –         mplementation         2         Satish K Ka         Seference(s) :         1         David A.Be         2         Salivahana
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SDG No.9

BoS Chairman
## **Course Contents and Lecture Schedule**

S.No	Торіс	No.of Hours
1	Semiconductor Diodes and Applications	
1.1	Intrinsic and Extrinsic semiconductors	1
1.2	drift and diffusion current	1
1.3	formation of PN junction	1
1.4	VI characteristics of diode	1
1.5	static and dynamic resistance	1
1.6	Zener diode – photo diode – light emitting diode	2
1.7	laser diode – optocoupler-	2
1.8	Clipperand Clamper - voltage regulator and multipliers	2
2	Transistor and Operational Amplifiers	
2.1	Construction & operation of BJT	1
2.2	Transistor characteristics -	1
2.3	CE, CB and CC configuration	1
2.4	Construction & operation of JFET and MOSFET – FET characteristics -	1
2.5	Ideal Op-Amp characteristics - Open loop, Closed loop configurations	1
2.6	Inverting & non-inverting amplifier –	1
2.7	voltage follower	1
2.8	Summing amplifier.	1
2.9	Comparators -Schmitt Trigger.	1
2.10	Instrumentation Amplifier.	1
	Boolean Algebra and Combinational Circuits	
3	Boolean postulates and laws	
3.1	Minimization of Boolean expressions - Karnaugh map minimization	1
3.2	Quine-McCluskeymethod of minimization	2
3.3	Combinational circuits: Design procedure – Half adder – Full Adder	1
3.4	Half subtractor – Full subtractor	1
3.5	–BCD adder	2
3.6	Multiplexer – Demultiplexer	1
3.7	encoder – decoder	1
3.8	Code Converters	1
4	Synchronous devices	
4.1	Latches, Flip-flops –	1
4.2	SR, JK	1
4.3	D, T	1
4.4	Master-Slave –	1
4.5	Characteristic equation – Edge triggering – Level Triggering –	2
4.6	Realization of one flip flop using other flip flops –	1
4.7	Synchronous and Asynchronous Up/Down counters - Modulo-n counter	1
4.8	Registers	
5	Memory and Programmable Logic Devices	
	Classification of memories: ROM – PROM – EPROM – EEPROM – RAM – Write	
5.1	operation – Read operation	1
5.2	Static RAM Cell - Dynamic RAM cell	1
5.3	Programmable Logic Devices	1
5.4	Programmable Logic Array (PLA)	1
5.5	Programmable Array Logic (PAL)	1
5.6	Field Programmable Gate Arrays	1
5.7	Implementation of combinational logic circuits using PROM, PLA and PAL	1
	Total	45
	Course Designers	

# Mrs V Indumathi- indumathi@ksrct.ac.in

BoS Chairman

60 MC 302	Sensors and Instrumentation	Category	L	Т	Ρ	Credit
		PC	3	0	2	4

- To create a conceptual understanding of the basic principles of sensors, actuators, and their operations
- To analyze the real-world problems and provide solutions using sensors and actuators
- To promote awareness regarding recent developments in the fields of sensors and actuators
- To introduce about advancements in sensor technology.
- To educate the advance trends and application of sensors.

#### Preequisite

Basics of Electrical and Electronics Engineering, Analog Devices and Digital Circuits **Course Outcomes** 

On the successful completion of the course, students will be able to

CO1	Classify different Sensors & Actuators based on various physical phenomena and differentiate their performance characteristics	Remember and Understand
CO2	Interpret the working principles of thermal and optical sensor	Understand
CO3	Infer the functional principles of Electromagnetic and Mechanical Sensors	Understand
CO4	Illustrate the working and characteristics of Acoustic and Chemical Sensors	Understand
CO5	Select the relevant sensors to design real-time data acquisition from ambience via case studies	Apply

### Mapping with Programme Outcomes

COs	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3		1	2	1	1	1	1	3	2
CO2	3	3	3	1	1	1		2	2	1		1	3	2
CO3	3	2	3	3	3			3	1	1	1	1	3	3
CO4	3	1	3	3	3	1	1	1	1		1	1	3	2
CO5	3	2	3	2	3			1	1	1	1	1	3	2
3- Str	ong;2-l	Medium	n;1-Son	ne										

#### Assessment Pattern

Bloom's Category	Continuous As	sessment Tests (Marks)	End Sem Examination
Bloom's Category	1	2	(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

		K.S.Ra	ngasamy	College of Tec	hnology – Autono	omous		R2022
				2 -Sensors and	Instrumentation			
				МСТ	1			
Semester	H	lours / Wee		Total hrs	Credit		ximum Marks	
	L	Т	Р		С	CA	ES	Total
	3	0	2	60	4	50	50	100
of Sensor cla	es: visior	ns – Perforn	nance cha	aracteristics of Se	efinitions: Sensors ensors : Transfer F e - Calibration & R	unction, Rai		[09]
Thermoelectr Optical sens Optical sens Indicator usin	ive senso ic senso ors – Ph ors – Ac og Optical	ors: Therm rs -Principle otoelectric s tive infrared Sensor <b>s</b>	iistors, R es of Op sensors - d (AFIR)	tics: Optical un - Charge couple sensors – Optic	erature, and silic its – Quantum ef ed device (CCD) l cal Actuators – C	fects – Qua based – Th	antum-based ermal-based	[09]
Magnetic ser Force Senso Capacitive A Sensors: Med	Electric sors – M rs: Strain ccelerom chanical,	and Magne lagnetoresis Gauges, S leters, Strai Piezoresisti	etic fields stance – N Semicond n Gauge ve, Capa	: Basic units – Magnetostrictive uctor Strain Gau Accelerometers	The Electric field: – Magnetometers uges & Tactile Ser & Magnetic Acc – Velocity sensing	nsors – Acc elerometers	elerometers:	[09]
Microphones Headphones Chemical uni Sensors – P	es and t – Piezo and Buzz ts and Do otentiome	heir proper belectric eff zers - Magno efinitions – l etric smart s	ties – N ect – Pi etic and F Electroch sensors:	ezoelectric Sen Piezoelectric – Ul emical sensors: Glass Membran	arbon, Magnetic, sors – Acoustic s trasonic sensors a Metal Oxide Sensi es, Soluble Inorga hermochemical, Op	sensors: Lo nd actuators ors and Soli inic Salt Me	udspeakers, d Electrolyte mbrane and	[09]
sensing and	lyzer usii odomete	ng tempera er in a car	using sm	art sensors-Tire	el Indicator using -pressure monitor ng –Agriculture bas	ing system	using smart	[09]
Lab Experim Simulation I 1. Design a 2. Liquid Le	<b>nents Jsing La</b> nd impler vel Indica	<b>bVIEW</b> mentation of ator using op	Breath a btical Sen	nalyzer using ter	nperature sensors			15
							Total	60
<sup>1.</sup> IET, Un	Ída, "Ser ited King	dom.			A Multidisciplinary			
		, "Transduce	er Engine	ering", Allied Put	olishers (P) Ltd., 20	)15		
Reference(s1.Murthy, 2010.		ransducers	and Instr	umentation, 2nd	Edition, Prentice H	Hall of India	P∨t. Ltd., New	/Delhi,
2. Jacob F Springe	r, Switzer	land.			cs, Designs, and			
3. Swain, Switzerl	"Sensors and.				ostolache, Krisha d Food Engineerii			
SDG No	.8,9							

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BoS Chairman

## **Course Contents and Lecture Schedule**

S.No	Торіс	No.of Hours
	Basics of Sensors	
1.1	The five senses: vision, hearing, smell, taste, and touch	2
1.2	Definitions: Sensors & Actuators	2
1.3	Overview of Sensor classifications	2
1.4	Performance characteristics of Sensors : Transfer Function, Range, Span, Input and Output Full Scale	2
1.5		1
1.5	Resolution, and Dynamic Range - Calibration & Reliability Temperature and optical Sensors	I
2.1	Thermoresistive sensors: Thermistors, Resistance temperature ,silicon resistive sensors – Thermoelectric sensors	2
2.2		1
2.2	Principles of Optics: Optical units	1
2.3	Quantum effects – Quantum-based Optical sensors Photoelectric sensors	2
2.4	Photoelectric sensors – Charge coupled device (CCD) based – Thermal-based Optical sensors	2
2.5	Active infrared (AFIR) sensors – Optical Actuators – Case study: Liquid Level Indicator using Optical Sensors.	2
	Electromagnetic and Mechanical Sensors	•
3.1	Principles of Electric and Magnetic fields	1
3.2	Basic units – The Electric field	1
3.3	Capacitive Sensors	1
3.4	Magnetic sensors, Magnetostrictive, Magnetometers	1
3.5	Force Sensors: Strain Gauges	1
3.6	Semiconductor Strain Gauges & Tactile Sensors	1
3.7	Magnetic Accelerometers	1
3.8	Pressure Sensors: Mechanical, Piezoresistive	1
3.9	Capacitive & Magnetic – Velocity sensing	1
0.0	Acoustic and Chemical Sensors	
4.1	Elastic waves and their properties	1
4.2	Microphones: Carbon, Magnetic, Ribbon and Capacitive Microphones	1
4.3	Piezoelectric effect , Piezoelectric Sensors	1
4.4	Acoustic sensors: Loudspeakers, Headphones and Buzzers	1
4.5	Magnetic and Piezoelectric – Ultrasonic sensors and actuators	1
4.6	Chemical units and Definitions – Electrochemical sensors	1
4.7	Potentiometric smart sensors: Glass Membranes, Soluble Inorganic	1
4.8	Immobilized Ionophore Membranes sensors	1
4.9	Thermochemical, Optical, Mass humidity gas sensors.	1
5	Recent sensor Applications	
5.1	Breathe analyzer using temperature	1
5.2	Liquid Level Indicator using Optical Sensors	1
5.3	Speed sensing and odometer in a car using smart sensors	2
5.4	Tire-pressure monitoring system using smart sensors	1
5.5	Ultrasonic parking system -Water quality monitoring	1
5.6	Water quality monitoring	1
5.7	Agriculture based moisture sensors	2
5.7	Lab Experiments Simulation Using LabVIEW	
1		- -
1	Design and implementation of Breath analyzer using temperature sensors	5
2	Liquid Level Indicator using optical Sensors	5
3	Demonstrate a simple parking system using ultrasonic sensors	5 60

## **Course Designers**

Dr.M.Ravi - ravi@ksrct.ac.in

BoS Chairman

60 MC 303	Manufacturing Technology	Category	L	Т	Р	Credit
		PC	3	0	0	3

- To enlighten the learners about the concepts of casting and powder metallurgy techniques. •
- To impart the fundamental knowledge in the area of metal joining. •
- To endow with an overview of metal forming processes. •
- To understand the working of conventional machine tools and CNC Machines •
- To gain adequate knowledge in the metal finishing processes •

## Prerequisite

Nil

#### **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Recognize the concepts of casting and powder metallurgy process.(REMEMBER)	Remember
CO2	Understand the working of welding processes.	Remember
CO3	Describe the various types of forming processes.	Understand
CO4	Demonstrate and simulate the working principle of machine tools.	Apply
CO5	Understand the different finishing processes.	Understand

#### Mapping with Programme Outcomes

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COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				2		3				2	3	3	2
CO2	2 3				2		3				2	3	2	2
CO3	3				2		3				2	3	3	3
CO4	3				3		3				2	3	2	3
CO5	5 3				2		3				2	3	2	3
3- St	rong;2-	Medium	n;1-Son	ne										

#### **Assessment Pattern**

Bloom's Catagory	Continuous A	ssessment Tests (Marks)	End Sem Examination
Bloom's Category	1	2	(Marks)
Remember (Re)	30	10	10
Understand (Un)	30	20	40
Apply (Ap)	0	30	50
Analyze(An)	0	0	0
Evaluate (Ev)	0	0	0
Create(Cr)	0	0	0

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BoS Chairman

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					nufacturing Te tronics Engine				
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Seme	ester –	Hours	Total hrs	Credit	<u> </u>	Maximum Ma			
		L 3	T 0	P 0	45	C 3	CA 40	ES 60	Tota 100
		owder metallurg	-	0	40	3	40	00	100
Pattern propert Castin of meta	i: mater ies - Co ng defec al powde	ials, types, allow res: types and ma ts: causes and re rs	vances - aking - Cas	sting: san	d mould castin	ng, die casti	ng and co	ontinuous casting	[09]
Princip velding Electro	g - Resis on beam	and gas welding stance welding, u welding and Lase	ltrasonic w	velding, g	as tungsten ar	c welding ar		efects - Safety in etal arc welding -	[09]
Hot an		esses orking of metals - - Sheet metal wor							[09]
Introdu Simple operati	iction to drilling ions- Int	ocesses conventional Lat operations, Rea roduction to CN0 rations: Turning, I	aming and C Machine	d tapping es- G-Co	I – Gear milli de and M-Coo	ing operation	on – Sha Trainer S	aper and Planer Simulation Tool –	[09]
<b>Finish</b> Types specific	ing Proc of grind cations ne: type		drical grin grinding	ding, surf wheel –	ace grinding, d Lapping – Ho	centreless g ning – Sup	prinding, i ber finishi	nternal grinding, ing – Broaching	[09]
Joanne	<i>j</i> 0.							Total Hours	45
ext B	ook(s):								
1. J. Ec	P. Kaus dition,20	19.	•			-		imited, New Delhi lew Delhi, Third E	
	ence(s):								
1 Ha		udhury S.K, "Eler	nents of w	orkshop 7	Fechnology, Vo	ol I and II", N	ledia Pro	motors, Bombay I	Editio
2. P. De	. N. Rao, elhi, 201	8.	0.				U	Company Limited	-
	anufactu	Kumar Choudhar Iring" Walnut Put			, "Computer Inf	tegrated Ma	nufacturii	ng & Computer Ai	ded
								tion, John Wiley 8	

SDG No. 9

BoS Chairman

Cours	e Contents and Lecture Schedule	
S.No	Торіс	No. of Hours
1	Casting and powder metallurgy	1
1.1	Pattern: materials, types, allowances	1
1.2	Moulding: green sand moulding ,	1
1.3	Moulding sand and its properties	1
1.4	Cores: types and making, Casting types	1
1.5	Sand mould casting, die casting and continuous casting	2
1.6	Casting defects: causes and remedies.	1
1.7	Powder metallurgy processes - steps involved-	1
1.8	Characteristics of metal powders	1
2	Joining Processes	
2.1	Principle of arc and gas welding	1
2.2	Filler and flux materials, Flame types	1
2.3	Welding defects, Safety in welding	1
2.4	Resistance welding,	1
2.5	Ultrasonic welding, gas tungsten arc welding	1
2.6	Gas metal arc welding	1
2.7	Electron beam welding and Laser beam welding -	2
2.8	Brazing and soldering	1
3	Forming Processes	
3.1	Hot and cold working of metals	1
3.2	Die forging,Rolling: high roll mills	1
3.3	Extrusion: forward and backward	2
3.4	Tube extrusion	1
3.5	Sheet metal work: Shearing,	1
3.6	Bending and drawing operations	2
3.7	Stretch forming	1
4	Machining Processes	
4.1	Basics of Additive and Subtractive Processes	1
4.2	Introduction to conventional Lathe and simple operations –	1
4.3	single point and multipoint cutting tools	1
4.4	Simple drilling operations, Reaming and tapping	1
4.5	Gear milling operation – Shaper and Planer operations	1
4.6	Introduction to CNC Machines- G-Code and M-Code -	2
4.7	CNC Trainer Simulation Tool Machining operations: Turning, Drilling and Boring	2
5	Finishing Processes	
5.1	Types of grinding process, cylindrical grinding	1
5.2	Surface grinding, centreless grinding	1
5.3	Internal grinding, specifications and selection of grinding wheel	2
5.4	Lapping, Honing	1
5.5	Super finishing,Broaching machine:	1
5.6	Types and operations	1
5.7	Introduction to advanced coating processes	1
	Total	45

# **Course Designers**

1. Dr.M.Baskaran

- baskaranm@ksrct.ac.in

BoS Chairman

60 MC 304	Mechanics of Solids	Category	L	Т	Р	Credit
00 MC 304	Mechanics of Solids	PC	3	1	0	4

- To understand the nature of stresses and strains induced in materials under different loads.
- To analyze biaxial stress under given loading conditions for various materials and to analyze cylindrical shells under circumferential and radial loading.
- To plot shear force and bending moment diagrams of beams under different types of loads.
- To understand the deflection of determinate beams using various methods.
- To analyze the stresses and deformations occurring in circular shafts and helical springs caused by torsional forces.

### Prerequisite

Engineering Mechanics

#### Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concepts of stresses and strains in simple and composite bars	Remember / Understand / Apply
CO2	Determine the stresses and deformations of objects under external loadings	Remember / Understand / Apply
CO3	Develop shear force and bending moment diagrams for various types of beams with given loading conditions	Remember / Understand / Apply
CO4	Find the slope and deflection of beams using Macaulay's method and double integration method	Remember / Understand / Apply
CO5	Estimate torsional rigidity of given materials numerically using torsion equation, buckling effect of columns	Remember / Understand / Apply

## **Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	3	2				2		2	3	2
CO2	3	3	3	2	3	2				2		2	3	2
CO3	3	3	3	2	3	2				2		2	3	3
CO4	3	3	3	2	3	2				2		2	2	3
CO5	3	3	3	2	3	2				2		2	2	3
3- Str	3- Strong 2-Medium 1-Some													

3- Strong;2-Medium;1-Some

#### **Assessment Pattern**

Bloom's Catagony	Continuous Asses	End Semester Examination	
Bloom's Category	1	2	(Marks)
Remember	10	10	15
Understand	10	10	15
Apply	40	40	70
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0
Total	60	60	100

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

K.S.Rangasamy College of Technology–Autonomous R2022										
-		Ŭ		4 - Mechanic						
-				МСТ						
Comostor	Ho	ours / Wee	ek	Tatal hra	Credit	Μ	laximum Marks			
Semester	L	Т	Р	Total hrs C CA ES						
	3	1	0	60	4	40	60	100		
Stress -Strai strains - Con	properties of n Diagram - He nposite sectior	ooke's lav s - Therm	v, elastic con nal stresses a	stants and th and strain			hear stresses - linear and shear	[9+3]		
Stresses on spherical sh Cylinders - L	ells subjected ame's theory	to interi	al stresses a nal pressure	nd principal s			n cylindrical and tresses - Thick	[9+3]		
Types of be distributed lo stress distrib	oad and unifor ution – Simula	ds - She mly varyi	ar force and ng load - Th	neory of simp	ole bending -	- Bending st	load, uniformly tress and shear	[9+3]		
beam - Cant	- computatio	Double int					imply supported Cantilever beam	[9+3]		
	olid and hollo closed coil h						nafts - Stresses derness ratio –	[9+3]		
							Total Hours	60		
Text Book(s										
	R.K., "Strength									
	R.K. "Strength									
		of Materia	als", Tata Mc	Graw Hill Edi	ucation (P).Lt	d., New Delh	ni, Third Edition, 2	016		
Reference(s	/		a ala anciena - 6.6	Dalida" Darret						
2. Ferdinar publishir	ng co. Ltd., Ne	ssell Johr w Delhi., :	nson, J.r. and 2019.	I John J. Dew	vole, "Mechan	ics of Materi	als", Tata McGra			
Edition,	2016.	0		-		•	cation Series, Th	ird		
4. Hibbeler	, R. C. Mecha	nics of Ma	aterials. 6th e	d. East Ruth	erford, NJ: Pe	earson Prenti	ice Hall, 2013			

SDG No. 9

BoS Chairman

Course	Contents and Lecture Schedule	
S.No	Торіс	No. of Hours
1	Stresses and Strains	
1.1	Mechanical properties of materials - Stress and strain	1
1.2	Tensile, compressive and shear stresses	1
1.3	Stress-Strain Diagram - Hooke's law	1
1.4	Elastic constants and their relations	1
1.5	Tutorial	2
1.6	Linear and shear strains	1
1.7	Volumetric strain	1
1.8	Composite sections	1
1.9	Thermal stresses and strain	1
1.10	Tutorial	2
2	Principal Stresses, Thin Cylindrical and Spherical Shells	
2.1	Stresses on inclined planes	1
2.2	Principal stresses and principal strains	1
2.3	Mohr's circle	1
2.4	Thin cylindrical shells subjected to internal pressure	1
2.5	Tutorial	2
2.6	Thin spherical shells subjected to internal pressure	1
2.7	Circumferential and longitudinal stresses	1
2.8	Thick Cylinders	1
2.9	Lame's theory	1
2.10	Tutorial	2
3	Shear Force and Bending Moment of Beams	
3.1	Types of beams and loads	1
3.2	Shear force and bending moment diagrams - Point load	1
3.3	Shear force and bending moment diagrams - Uniformly distributed load	1
3.4	Shear force and bending moment diagrams - Uniformly varying load	1
3.5	Tutorial	2
3.6	Theory of simple bending	1
3.7	Bending stress distribution	1
3.8	Shear stress distribution	1
3.9	Simulation of shear force and bending movement diagram	1
3.10	Tutorial	2
4	Deflection of Beams	
4.1	Elastic curve	1
4.2	Computation of slopes and deflection applying Macaulay's method	1
4.3	Simply supported beam	1
4.4	Cantilever beam	1
4.5	Tutorial	2
4.6	Double integration method - Simply supported beam	1
4.7	Double integration method - Cantilever beam	1
4.8	Simulation of beam deflection - Cantilever beam	1
4.9	Simulation of beam deflection - Simply supported beam	1

BoS Chairman

4.10	0 Tutorial						
5	5 Torsion and Columns						
5.1	Torsion in solid and hollow circular shafts	1					
5.2	Stresses and deformations in circular shafts						
5.3	Stresses in open coil helical springs						
5.4	Stresses in closed coil helical springs						
5.5	Tutorial						
5.6	6 Theory of columns						
5.7	Euler's theory	1					
5.8	Slenderness ratio	1					
5.9	Rankine's formula	1					
5.10	Tutorial	2					

# **Course Designer**

Dr. A. Ramesh Kumar - rameshkumar@ksrct.ac.in

BoS Chairman

Category	L	Т	Ρ	Credit
MY	2	1	0	3*

- To identify the essential complementarily between 'values' and 'skills'
- To ensure core aspirations of all human beings.
- To acquire ethical human conduct, trustful and mutually fulfilling human behaviour
- To enrich interaction with Nature
- To achieve holistic perspective towards life and profession

# Prerequisite

NIL

## Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Understand the significance of value inputs in formal education and start applying them in their life and profession	Understand
CO2	Evaluate coexistence of the "I" with the body.	Analyze
CO3	Identify and evaluate the role of harmony in family, society and universal order.	Analyze
CO4	Classify and associate the holistic perception of harmony at all levels of existence and Nature	Analyze
	Develop appropriate human conduct and management patterns to create harmony in professional and personal lives.	Create

## Mapping with Programme Outcomes

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

#### **Assessment Pattern**

Bloom's Category	Continuou	is Assessmen	End Semester	
	1	2	Model	Examination(Marks)
Remember	10	10	20	
Understand	10	10 20		No End Semester Examination
Apply	20	20	30	Examination
Analyse	20	20	30	
Evaluate	0	0	0	
Create	0	0	0	

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		K.S	6. Rangasa	amy Colleg	e of Technolo	gy–Autono	mous		R2022
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					ommon to all				
Seme	ster		Hours / We			Credit	Ν	/laximum Mar	
		L	Т	Р	Total hrs	С	CA	ES	Total
	/IV	2	1	0	45	3*	100	0	100
		alue Educat alue Educat		ploration as	s the process f	or value edu	cation-Contin	uous Happine	ess
and pro	osperity-th	ie basic h	iuman asp	oirations-rig	ht understand hod to fulfill th	ing-relations	ship and ph	ysical facility	
Understaneeds o	anding Hu	and the boo	g as the C dy-the body	y as an inst	e of the self a rument of the s e to ensure sel	self- <mark>underst</mark>	anding harm		
Harmon 'Trust' th society -	y in the F ne foundat -vision for	tion value in the univers	basic unit relationsh sal human	nip –'Respe	interaction-val ct'- as the right				
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					l Professional   2019. ISBN 978			ana, G P Baga	ria, 2 <sup>nd</sup>
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Referer	,								
1.	Jeevan Vi	dya: EkPar	ichaya, A I	Nagaraj, Jee	evan Vidya Pra	kashan, Am	arkantak, 199	9.	
					ernational. Pub				
	- Good H						, <b>_</b>		

\*SDG 3 – Good Health and Well – Being \*\* SDG 5 – Quality Education

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

	urse Contents and Lecture Schedule	
S.No.	Торіс	No. of Hours
1	INTRODUCTION TO VALUE EDUCATION	
1.1	Discussion on Present Education System and Skill Based Education	1
1.2	Understanding Value Education	1
1.3	Self exploration as the process for value education	1
1.4	Basic Human Aspirations - Continuous Happiness and Prosperity	1
1.5	Basic requirements to fulfill Human Aspirations - Right understanding, Relationship and Physical facility	1
1.6	Transformation from Animal Consciousness to Human Consciousness	1
1.7	Sources of Happiness and Prosperity – Harmony and Disharmony	1
1.8	Current Scenario and Role of Education	1
1.9	Outcome of Human Education and Method to fulfill the basic human aspirations	1
2	HARMONY IN THE HUMAN BEING	
2.1	Understanding Human being - As Co-Existence of the self and the Body - The	1
2.2	Needs of the Self and the Body Understanding Human being - As Co-Existence of the self and the Body - The Activities and Response of the Self and the Body	2
2.3	The body as an instrument of the self	1
2.4	Understanding harmony in the self	1
2.5	Harmony of the self with the body	2
2.6	Programme to ensure self-regulation and health	1
2.7	My Participation (Value) regarding Self and my Body - Correct Appraisal of our Physical needs	-
3	HARMONY IN THE FAMILY AND SOCIETY	1
3.1	Harmony in the Family - Understanding Values in Human Relationships	1
		1
3.2	Family as the basic Unit of Human Interaction	-
3.3	Values in human Relationships	1
3.4	Trust - the foundation value in relationship	1
3.5	Respect as the right evaluation, the Basis for Respect, Assumed Bases for Respect today	1
3.6	Harmony from Family to World Family: Undivided Society	1
3.7	Extending Relationship from family to society, Identification of the Comprehensive Human Goal	1
3.8	Programs needed to achieve the Comprehensive Human Goal: The Five Dimensions of Human Endeavour	1
3.9	Harmony from Family Order to World Family Order – Universal Human Order	1
4	HARMONY IN THE NATURE / EXISTENCE	
4.1	The Four Orders in Nature	1
4.2	Participation of Human Being in Entire Nature	1
4.3	Natural Characteristics - Tendency of Human Living with Animal Consciousness / The Holistic Perception of Harmony in Existence	
4.4	Present day Problems	1
4.5	Recyclability and self-regulation in Nature	1
4.6	Relationship of Mutual Fulfillment	1
4.7	An Introduction to space, Co-existence of Units in Space	1
4.8	Harmony in Existence – Understanding Existence as Co- Existence	1
4.9	Natural Characteristic of Human Living with Human Consciousness	1
5	IMPLICATIONS OF THE HOLISTIC UNDERSTANDING	1
5.1	Natural Acceptance of human values	1
5.2	Definitiveness of Ethical Human Conduct - Development of Human Consciousness	1
5.2	Identification of Comprehensive Human Goal	1
5.4	Basis for Humanistic Education and Humanistic Constitution	1
5.5	Ensuring Competence in professional Ethics	1
5.6	Issues in Professional Ethics-The Current Scenario	1
		2
5.7	Holistic Technologies and Production Systems and management models -Typical Case Studies	
5.8	Strategies for transition towards value based life and profession	1
	Total se Designers	45

# **Course Designers**

- 1. Dr.G.Vennila 2. Dr.K.Raja
- vennila@ksrct.ac.in
  rajak@ksrct.ac.in

3.3. Q.....

BoS Chairman

60 GE 002	Tamils and Technology	Category	L	Т	Ρ	Credit
	(Common to all Branches )	GE	1	0	0	1

#### **Objectives:**

- To learn weaving, ceramic and construction technology of Tamils.
- To understand the agriculture, irrigation and manufacturing technology of Tamils.
- To realize the development of scientific Tamil and Tamil computing.

### Pre requisite:

Nil

#### **Course Outcomes:**

On the successful completion of the course, students will be able to

CO1	Understand the weaving and ceramic technology of ancient Tamil people nature.	Understand
CO2	Comprehend the construction technology, building materials in sangam period and case studies.	Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence.	Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving.	Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing.	Apply

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3	3		2		3		
CO2							3	3		2		3		
CO3							3	3		2		3		
CO4							3	3		2		3		
CO5							3	3		2		3		
3- Str	3- Strong;2-Medium;1-Some													

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BoS Chairman

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Semest	er L		P	TULAITIIS	Creat	CA	ES	Total
	1	0	0	15	1	100	-	100
WEAVING	AND CERAMIC	TECHNO	OLOGY*					
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	ND CONSTRUC			₹Y*				
Designing a Building ma Sculptures Temples of	and Structural c aterials and Herc and Temples c	onstructio stones of of Mamalla d - Type \$	n House a f Sangam apuram <i>–</i> Study (Ma	& Designs age – Deta Great Tei idurai Mee	ails of Sta mples of nakshi Te	ge Construc Cholas and emple)- Thi	als during Sangam Ag tions in Silappathikara d other worship place rumalai Nayakar Maha riod.	n – 3 s – 3
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SCIENTIFI	C TAMIL & TAN	IIL COMP	UTING*					
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Tamil Softv								ivai <sup>3</sup>
Tamil Softv Project.	vare – Tamil Vi						il Dictionaries - Sorku	ivai <sup>3</sup>
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Tamil Softv Project. Text Book(: 1. 2. a	vare – Tamil Vi <b>s):</b> நமிழக வரலாறு - பணிகள் கழகம்).	rtual Acac மக்களும் ப மனைவர் இ	demy- Tan பண்பாடும் ல. சுந்தரம்	nil Digital L கே. கே . பி . (விகடன் ப	_ibrary — வன்ளை ( ெ சிரசுரம்).	Online Tam வளியீடு: தமி	il Dictionaries – Sorku Total Ho ழநாடு பாடநூல் மற்றும்	vai <sup>3</sup> Irs 15
Tamil Softv Project. Text Book(9 1. 2. 3.	vare – Tamil Vi s): நமிழக வரலாறு - பணிகள் கழகம்). கணினித்தமிழ் – டு	rtual Acac மக்களும் ப மனைவர் இ திக்கரையில்	demy- Tan பண்பாடும் )ல. சுந்தரம் ல் சங்ககால	nil Digital L கே. கே . பி . (விகடன் ப நகர நாகரீகட	_ibrary — ிள்ளை ( ெ ிரசுரம்). ம் (தொல்லி	Online Tam வளியீடு: தமி பெயல் துறை ெ	il Dictionaries – Sorku Total Ho ழநாடு பாடநூல் மற்றும்	vai <sup>3</sup> Irs 15
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BoS Chairman

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#### பாடத்தின் நோக்கங்கள்:

- தமிழர்களின் சங்ககால நெசவு, பனை வனைதல் மற்றும் கட்டிட தொழில் நுட்பம் குறித்து அறிதல்.
- தமிழர்களின் சங்ககால வேளாண்மை, நீர்ப்பாசனம் மற்றும் உற்பத்தி முறைகள் குறித்த கற்றல்.
- நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிதல்.

# முன்கூட்டிய துறைசார் அறிவு:

தேவை இல்லை

#### பாடம் கற்றதின் விளைவுகள்:

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

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CO1	சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானை வனைதல் தொழில்நுட்பம் குறித்த கற்றுணர்தல்	புரிதல்
CO2	சங்ககாலத் தமிழர்களின் கட்டிட தொழில்நுட்பம் கட்டுமானப் பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்த அறிவு.	புரிதல்
CO3	சங்ககாலத் தமிழர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு.	புரிதல்
CO4	சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு.	புரிதல்
CO5	நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிந்துகொள்ளலும் மற்றும் பயன்படுத்துதலும்.	பகுப்பாய்வு

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							3	3		2		3		
CO2							3	3		2		3		
CO3							3	3		2		3		
CO4							3	3		2		3		
CO5							3	3		2		3		
3- Str	3- Strong;2-Medium;1-Some													

عده هسته د. د

BoS Chairman

K. S. Rangasamy College of Technology – Autonomous									
				<b>002</b> – தமிழ		ில்நுட்பமும்			
		Hours/Wee		Total hrs	Credit		Maximum Marks		
Semeste		Т	Р		С	CA	ES	Total	
	1	0	0	15	1	100	-	100	
	றம் பானைத் 🤅	-							
-		தொழில் -	பானைத் ெ	தாழில்நுட்ப	ம் - கருப்பு	µ சிவப்பு பா <i>வ</i>	ன்டங்கள் - பாண்டங்களில்	3	
கீறல் குறிய	டுகள்.								
சங்க காலத சங்க காலத – மாமல்ல தலங்கல் - ஆலயம் ம - சாரோசெ	தில் கட்டுமாக புரச் சிற்பங்க நாயக்கர் கால ற்றும் திருமனை விக் கட்டிடக்	மப்பு மற்றும் னப் பொருட் ளும், கோவி லக் கோயில ல நாயக்கர் ட கலை.	் கட்டுமான களும் நடுக லகளும் - ல்கள் – ம	5ல்லும் - சில சோழர் காவ 1திரி கட்டனை	ப்பதிகாரத் த்துப் பெ மப்புகள் ப	தில் மேடை ச நங்கோயில்கள பற்றி அறிதல்,	பாருட்களில் வடிவமைப்பு - அமைப்பு பற்றிய விவரங்கள் ர் மற்றும் பிற வழிபாட்டுத் மதுரை மீனாட்சி அம்மன் த்தில் சென்னையில் இந்தோ	3	
	தொழில் நுட்ப								
							க்குதல், எஃகு - வரலாற்றுச் -		
							வாக்கும் தொழிற்சாலைகள் -	3	
					ங்கு மணிச	ள் - எலும்புத	<u></u> த் துண்டுகள் - தொல்லியல்		
-	- சிலப்பதிகார • • • •								
அணை, ஏ கால்நடைச - கடல்சார் அறிவுசார் க	ளுக்கான வடி அறிவு - மீ மூகம்.	மதகு - ே வமைக்கப்ப ர்வளம் - பு	சாழர்காலச ட்ட கிணறு	்குமுழித் த கள் – வேள	ாண்மை ம	ற்றும் வேளான	- கால்நடை பராமரிப்பு - ங்மை சார்ந்த செயல்பாடுகள் குறித்த பண்டைய அறிவு -	3	
அறிவியல் மென்பொ		ளர்ச்சி - க ாக்கம் - தமி					ாபதிப்பு செய்தல் - தமிழ் லகம் - இணையத்தில் தமிழ்	3	
Total Hou		99,						15	
Text Boo									
1 <sup>தமிழ</sup>	க வரலாறு - கள் கழகம்).	மக்களும்	பண்பாடும்	கே. கே . ப	ிள்ளை (ெ	வளியீடு: தமி	ிழ்நாடு பாடநூல் மற்றும் கவ	ல்வியியல்	
2. கணி	னித்தமிழ் – மு	ைனவர் இவ	ல. சுந்தரம்.	(விகடன் பிரக	சுரம்).				
3. கீழடி	– வைகை ந§	டுக்கரையில்	சங்ககால ந	கர நாகரீகம் (	தொல்லிய	ல் துறை வெஎ	ரியீடு).		
4. பொ	ரநை - ஆற்ற <u>ா</u>	ப்கரை நாகரீச	5ம் (தொல்	லியல் துறை (	வெளியீடு).				
							nd RMRL – (in print).		
<sup>6.</sup> Tam	il Studies.			,	0	, (	lished by: International Ins		
	orical Herita national Inst				aramaniar	n, Dr.K.D. T	hirunavukkarasu) (Publis	hed by:	
×	Contribution: il Studies.)	s of the Tar	nils to Indi	an Culture (	Dr.M.Vala	armathi) (Pub	blished by: International Ins	stitute of	
<sub>a</sub> Kee	adi - 'Sangai					• • •	Published by: Department ation, Tamil Nadu)	of	
	ies in the His						K.K.Pillay) (Published by:	The	
11 Poru	/				rtment of	Archaeolog	y & Tamil Nadu Text Bo	ook and	
				,	nnan) (Pu	blished by: R	MRL) – Reference Book.		
SDG:4-Q	ality Educa	tion							

BoS Chairman

	Analog Devices and Digital Circuits	Category	L	Т	Ρ	Credit
60 MC 3P1	Laboratory	PC	0	0	4	2

- 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.

## Pre-requisite

**Basic Electrical and Electronics Engineering** 

## **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Analyze the characteristics of semiconductor devices and determine the input and output parameters.	Remember, Understand and Apply
CO2	Identify the various operating regions and analyze the characteristics of BJT and MOSFET	Analyze
CO3	Understand the fundamentals of digital electronic circuit and their application in practice	Understand
CO4	Construct basic combinational circuits and verify their functionalities	Understand/Analyze
CO5	Design and implement synchronous and asynchronous sequential circuits.	Remember

COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2				3				1	1	1	1	3	3
CO2	2	3	2		1			1	3	2		1	3	3
CO3	2	2	1		2			1	2	2	1	1	3	3
CO4	2	3	2	2	2			2		2	1	1	3	3
CO5	2	3		2	2						1	1	3	3
3- Str	ona:2-	Medium	n:1-Son	ne										

Assessment Patte	ern		
Bloom's Category	Continuous	Assessment Tests (Marks)	End Sem Examination
	1	2	(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

## List of Experiments

- 1. Study the VI Characteristics of PN junction diode and Zener diode
- 2. Study the ripple and regulation characteristics of full wave rectifier with and without capacitor filter.
- 3. Construct the clipper and clamper circuit using PN junction diode
- 4. Combinational Logic and Circuit Simulation in LabVIEW
- 5. Determination of Input and Output Characteristics of MOSFET
- 6. Design and verify the summing amplifier using IC 741 in LabVIEW.
- 7. Design and implementation of 4 bit binary Adder/ Subtractor using IC 7483
- 8. Design and implementation of Multiplexer and De-multiplexer using IC 741XX
- 9. Construction and verification of 4 bit ripple counter and Mod-10 Ripple counters
- 10. Design and study the operation inverting and non inverting amplifier using IC741

#### SDG No.9

		Category	L	Т	Ρ	Credit
60 MC 3P2	Manufacturing Technology Laboratory	PC	0	0	4	2

- To enhance the working knowledge on Lathe.
- To conversant the drilling and shaping machine operations.
- Demonstration and study of the milling and grinding machine.
- To gain the knowledge on green sand moulding process.
- To enhance the working skill in CNC turning machine.

#### Prerequisite

#### **Manufacturing Technology**

## Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Perform the various operations using conventional lathe.	Understand
CO2	Make the operations using drilling and shaping machine.	Understand
CO3	Develop a component using milling and grinding machine.	Understand
CO4	Prepare a model using green sand moulding process.	Apply
CO5	Perform the operation of given work piece using CNC turning machine.	Apply

#### Mapping with Programme Outcomes

mapp														
COs	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	2	2						2		2	2	3	3
CO2	3	2	2						2		2	2	3	3
CO3	3	2	2						2		2	2	3	3
CO4	3	2	2						2		2	2	3	3
CO5	3	2	2						2		2	2	3	3
3- Str	ona.5-	Medium	1.1-Son	ne										

3- Strong;2-Medium;1-Some

## List of Experiments

- 1. Machining a work piece by facing, plain turning and taper turning operations using a lathe.
- 2. Machining a work piece by knurling and external thread cutting operations using a lathe.
- 3. Performing a work piece by drilling reaming and tapping operations using a drilling machine.
- 4. Machining a work piece by hexagonal component using appropriate machine.
- 5. Machining a work piece by spur gear using milling machine.
- 6. Grinding a work piece by flat and cylindrical surfaces using grinding machine.
- 7. Preparation of stepped pulley mould using green sand moulding process.
- 8. Preparation of hollow cylindrical pipe mould using green sand moulding process.
- 9. Machining a work piece by facing and turning using CNC turning machine.
- 10. Machining a work piece by plain turning and step turning using CNC turning machine.
- 11. Demonstration on additive manufacturing process (3D Printing Machine)

#### SDG No.9

60 CG 0P2	CAREER SKILL DEVELOPMENT II	Category	L	Т	Ρ	Credit
		CG	0	0	2	1*

- 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

#### Prerequisite

#### Basic knowledge of reading and writing in English.

### Course Outcomes

## On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Analyze
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyze
CO3	Analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyze
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								2	3	3	2	3		
CO2								2	3	3	2	3	2	
CO3								2	3	3	2	3		2
CO4								2	3	3	2	3		
CO5								2	3	3	2	3	2	2
3- Str	3- Strong;2-Medium;1-Some													

BoS Chairman

		K.S.			ge of Technol		omous	F	R2022
					r Skill Develo				
				ommon t	o All Branche		-		-
Seme	ester	Hours	Week		Total Hrs	Credit		/laximum Ma	rks
		L	Т	Р		С	CA	ES	Total
II	I	0	0	2	25	1*	100	0	100
organ comp proce	ative liser (c leting- ss/eve	Listening: Advertis hoosing a product gap filling exercis ent descriptions to d suggesting solution	or service ses. Lister identify	by comp hing techr cause &	arison) - Lister nical informatio effects, docu	ning to long on from poo	er technic dcasts -	cal talks and Listening to	[5]
Speak Marke accide prese	<b>king</b> eting a ents o enting (	product, persuasi r disasters based pral reports, Mini p l interviews	ve speech on news	techniqu reports,	es - Describin Group Discus	ssion (base	ed on ca	se studies),	[5]
essay	ing ad <sup>.</sup> /s, and	vertisements, user l letters / emails of any profiles, Stater	complaint ·	- Case St	udies, excerpts				[5]
	ssional aints F	emails, Email et Precis writing, Sum							[5]
<b>Verba</b> Readi	a <b>l Abili</b> ng Co	<b>ty II</b> omprehension (Infe Change of Voice –					Analogie	s – Theme	[5]
								Total Hours	25
	rence	(s):							
Refe									
1.	Unive	sh for Engineers & rsity, 2020					•	_	
1. 2.	Unive Norma Vocat	rsity, 2020 an Lewis, 'Word oulary Book', Pengu	Power Ma uin Randor	ide Easy n House	- The Comp India, 2020	lete Handb	ook for	Building a S	Superio
1.       2.       3.	Unive Norma Vocat Rama 2019	rsity, 2020 an Lewis, 'Word	Power Ma uin Randor Irma. Sang	de Easy n House jeeta, 'Pro	- The Comp India, 2020 ofessional Eng	lete Handb lish'. Oxforc	ook for I Universi	Building a s	Superioi w Delhi.

SDG 4 – Quality Education

BoS Chairman

# Course Contents and Lecture Schedule

S.No	Торіс	No.of Hours	Mode of content Delivery
1	Listening		
1.1	Evaluative Listening: Advertisements, Product Descriptions	1	Activity Based
1.2	Listening to longer technical talks and completing– gap filling exercises.	1	Activity Based
1.3	Listening technical information from podcasts	1	Activity Based
1.4	Listening to process/event descriptions to identify cause & effects and documentaries depicting a technical problem and suggesting solutions	1	Activity Based
1.5	Listening to TED Talks	1	Activity Based
2	Speaking		
2.1	Marketing a product, persuasive speech techniques	1	Activity Based
2.2	Describing and discussing the reasons of accidents or disasters based on news reports,	1	Activity Based
2.3	Group Discussion (based on case studies)	1	Activity Based
2.4	Presenting oral reports, Mini presentations on select topics with visual aids	1	Activity Based
2.5	participating in role plays and virtual interviews	1	Activity Based
3	Reading		
3.1	Reading advertisements, user manuals and brochures	1	Activity Based
3.2	Reading - longer technical texts– cause and effect essays, and letters / emails of complaint	1	Activity Based
3.3	Case Studies, excerpts from literary texts, news reports etc.	1	Activity Based
3.4	Company profiles	1	Activity Based
3.5	Statement of Purpose (SoPs)	1	Activity Based
4	Writing		
4.1	Professional emails, Email etiquette	1	Activity Based
4.2	Compare and contrast essay	1	Activity Based
4.3	Writing responses to complaints	1	Activity Based
4.4	Precis writing, Summarizing and Plagiarism	1	Activity Based
4.5	Job / Internship application – Cover letter & Résumé	1	Activity Based
5	Verbal Ability II		
5.1	Reading Comprehension (Inferential fillups) and Theme Detection	1	Activity Based
5.2	Spotting Errors	1	Activity Based
5.3	Verbal Analogies	1	Activity Based
5.4	Change of Voice and Change of Speech	1	Activity Based
5.5	One word substitution	1	Activity Based
	Total	25	
ourse	Designer		

1. Dr.A.Palaniappan

- palaniappan@ksrct.ac.in

BoS Chairman

## K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

#### (An Autonomous Institution affiliated to Anna University) B.E. / B.Tech. Degree Programme SCHEME OF EXAMINATIONS (For the candidates admitted from 2022-2023 onwards) FOURTH SEMESTER

S.	Course		Duration of	Weighta	ge of Marks	6	Minimum Marks for Pass in End Semester Exam		
S. No.	Code	Name of the Course	Internal Exam	Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total	
			THEC	DRY					
1	60 MC 401	Industrial Drives and Control	2	40	60	100	45	100	
2	60 MC 402	Fluid Mechanics and Thermodynamics	2	40	60	100	45	100	
3	60 MC 403	Metrology and Statistical Quality control	2	40	60	100	45	100	
4	60 MC 404	Hydraulic and Pneumatic control	2	50	50	100	45	100	
5	60 MC 405	Virtual Instrumentation and Applications	2	50	50	100	45	100	
6	60 MC L0*	Open Elective-I	2	40	60	100	45	100	
			PRACT	ICAL					
8	60 MC 4P1	Industrial Drives and Control Laboratory	3	60	40	100	45	100	
9	60 MC 4P2	Applied Mechanics Laboratory	3	60	40	100	45	100	
10	60 CG 0P3	Career Skill Development-III	3	100	-	100	-	-	
11	60 CG 0P6	Internship	-	-	-	-	-	-	

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

60 MC 401	Industrial Drives and Control	Category	L	Т	Ρ	Credit
		PC	3	0	0	3

- To learn the structure of Electric Drive systems and their role in various loads
- To impart the knowledge on starting methods of DC and AC motors
- To understand the operation of D.C motor speed control using converters and choppers.
- To introduce the concept of control circuit for industrial drives.
- To provide the knowledge on construction, working and control strategies of special drives.

## Prerequisite

Basic Electrical and Electronics Engineering

#### Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the need of electrical drives and their applications in various loads.	Remember, Understand, Apply
CO2	Describe the starting methods of AC and DC Drives	Remember, Understand, Apply, Analyse
CO3	Apply the solid state speed control techniques in DC & AC Drives	Remember, Understand, Apply
CO4	Develop motor control circuit basics in industrial standard	Remember, Understand, Apply
CO5	Understand the principle of operation of special drives and their applications	Remember, Understand, Apply, Analyse

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3			2	1	1	1	1	3	3
CO2	3	3	3	2	2			2	2	1		1	3	3
CO3	3	2	3	3	3			3	1	1	1	1	3	3
CO4	3	3	3	3	3			1	1		1	1	3	3
CO5	3	2	3	2	3			1	1	1	1	1	3	3
3- Str	ong;2-l	Medium	n;1-Son	ne										

#### Assessment Pattern

Bloom's Category	Continuous As	End Sem Examination	
BIOOIII'S Category	1	2	(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

			K.S. Ra	angasam	y College of Teo	hnology-Autono	nous		R2022	
60 MC 401 - Industrial Drives and Control										
					МСТ					
Semes	ster	F	Hours / Wee	k	Total hrs	Credit	Ma	ximum Marks	5	
		L	Т	Р		С	CA	ES	Total	
IV	/	3	0	0	45	3	40	60	100	
heating drive m	Element g and co notors w	oling cu /ith rega	urves — Loa and to therma	ading con al overloa	ditions and classe ding and Load va	ncing the choice of es of duty — Selec riation factors			[09]	
Speed- control cage a	Torque- circuits nd slip i	charac for shu ring indu	unt and ser uction motor	raking of ies motoi s	Electrical motors s — Types of A	-Types of D.C Mo .C Motor starters-			[09]	
Speed system Speed	control n — Usii control	of DC ng contr of thre	series and s olled rectifie e phase inc	shunt mo ers and Do duction m	C choppers.	and field control, control, voltage / t egulators.			[09]	
Develo Forwar	p ladd rd and	er diagr reverse	e motoring,	ntrol from Automat	ic star delta sta	note control, inter irter, Automatic P and Induction mo	lugging, Jo		[09]	
Steppe	er moto		rmanent ma			e, Single and mult motors – Brushles			[09]	
							Т	otal Hours	45	
	Book(s									
						arosa Publishing H				
2 N	lew Del	hi, 2005		al Techno	ology–Volume II (	AC & DC Machine	s)"S.Chand	& Company I	_td.,	
	ence(s):									
'. C	Compan	y Ltd., N	lew Delhi, 2	001.		and Applications"			_	
2. L	.td.,New	, Delhi, 2	2008.			onics", Tata Mc G		Ū	mpany	
						ntrol", Cambridge l				
4 P	Partab. I	H., "Art a	and Science	and Utilis	sation of Electrica	al Energy", Dhanpa	t Rai and So	ons, 2017		

SDG No.8, 9

BoS Chairman

## Course Contents and Lecture Schedule

S.No	Торіс	No.of Hours
1.1	Basic Elements of electrical drives	2
1.2	Types of Electric Drives, factors influencing the choice of electrical drives	1
1.3	heating and cooling curves	2
1.4	Selection of power rating for drive motors with regard to thermal overloading Load variation factors	2
1.5	Loading condition & class of duty	1
1.6	Load variation factors of electrical drive	1
	Drive motor characteristics and Starting Methods	
2.1	Speed-Torque characteristics	1
2.2	Braking of Electrical motors	1
2.3	Types of D.C Motor starters, single phase three phase	1
2.4	Typical control circuits for shunt motors	2
2.5	Typical control circuits for series motors	1
2.6	Starters for Three phase squirrel cage.	2
2.7	Starting methods of slip ring induction motors ,	1
2.1	Solid State Speed Control of DC Drives & AC Drives	•
3.1	Speed control of DC series and shunt motors	1
3.2	Armature and field control	1
3.3	Ward-Leonard control system	1
3.4	Using controlled rectifiers and DC choppers	1
3.6	Speed control of three phase induction motor	1
3.7	Voltage control, voltage / frequency control	1
3.8	slip power recovery scheme	2
3.9	Using inverters and AC voltage regulators .	1
0.0	Development Of Control Circuit	•
4.1	Develop ladder diagram for control from one place, remote control, interlocking	1
4.2	DOL starter, Forward and reverse motoring	1
4.3	Automatic star delta starter	1
4.5	Automatic Plugging, Jogging	1
4.6	sequence speed control	1
4.8	sequence functions and applications	1
4.9	Thyristor controlled DC Motor Drive	1
4.10	Thyristor controlled Induction motor drive	1
5	Special motor Drives	1
5.1	Stepper motors	1
5.2	Permanent magnet, Variable reluctance	1
5.3	Single and multi-stack configurations	2
5.4	Hybrid motor .	1
5.5	Switched reluctance motors	1
5.6	AC & DC Servo motors	1
5.7	Brushless DC motors	1
	Total	45

# **Course Designer**

1. Dr.M.Ravi

- ravi@ksrct.ac.in

BoS Chairman

60 MC 402	Fluid Mechanics and Thermodynamics	Category PC	L	Т	Ρ	Credit
00 WIC 402	Fluid Mechanics and Thermodynamics	PC	3	1	0	4

- To understand the properties of fluids, manometry and buoyancy
- To recognize mass and momentum conservation laws for fluid flows.
- To know the pressure and velocity variation in flow of fluids through pipes
- To know the basics of thermodynamics and evaluate the properties of changes in open and closed systems.
- To apply the concept of thermodynamics laws to various applications such as heat engine, heat pump and refrigeration systems.

### Prerequisite

Nil

## Course Outcomes

#### On the successful completion of the course, students will be able to

• • • • • •		
CO1	Estimate the properties of fluids, manometry and buoyancy	Remember
CO2	Identify the type of flow and apply the fluid dynamics concepts.	Understand
CO3	Evaluate the velocity and pressure variation in flow through pipes.	Understand
CO4	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.	Apply
CO5	Relate the concept of second laws of thermodynamics to heat engine, heat pump and refrigerator and discuss the concept of entropy.	Apply

## Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2					1			1	3	3
CO2	3	3	2	2					1			1	3	3
CO3	3	3	2	2					1			1	3	3
CO4	3	3	2	2					1			1	3	3
CO5	3	3	2	2					1			1	3	3
3- Str	ona:2-l	Medium	n:1-Son	ne										

Bloom's	Continuous	Assessment Tests (Marks)	End Sem
Category	1	2	Examination(Marks)
Remember	20	10	20
Understand	40	20	40
Apply	0	30	40
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0

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			л.э.капуа	asamy Coll	ege of Techno	ology–Auton	omous		R2022
			60 MC 4	402 – Fluid	Mechanics ar	nd Thermody	namics		
					МСТ				
		ł	Hours/Wee	ek		Credit		Maximum Mai	'ks
	ester	L	Т	Р	Total hrs	С	CA	ES	Total
	IV	3	1	0	60	4	40	60	100
Fluid D Specific statics:	Definition c Gravity : Concep	v, Viscosity ot of fluid	ification – , Compre static pr	ssibility, Bu essure –	of fluids: Den: ılk Modulus, C Pascal's law ıd Pressure me	Capillary and -Absolute a	Surface Tel and Gauge	nsion – Fluid pressures –	[9+3]
Fluid k and Ac Euler's	Kinematic cceleratic	on of fluid p n along a s	of fluid flov	v – Continu √elocity pot	ity equation in ential function s equation and	and Stream	function. Flu	id dynamics:	[9+3]
_amina Equatio	on-Major	Furbulent f and Minor	losses - a	oplication of	le equation, I f Moody's char el – Power trar	t — Hydraulic	gradient and		[9+3]
		• • •		-			ngn pipes.		[9+3]
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SDG No.9

-.... BoS Chairman

## Course Contents and Lecture Schedule

S. No	Торіс	No. of Hours
1	Fluid Properties and Fluid Statics	
1.1	Fluid Definition and Classification	1
1.2	Properties of fluids: Density, Specific Weight, Specific Volume,	1
1.3	Specific Gravity, Viscosity, Compressibility, Bulk Modulus, Capillary and Surface Tension	1
	Fluid statics: Concept of fluid static pressure	
1.4	Pascal's law ,Absolute and Gauge pressures	2
1.5	Manometers: piezometer, U-tube Manometer and Pressure measurement	2
1.6	Concept of Buoyancy and Floatation.	1
1.7	Fluid Properties and Fluid Statics	1
2	Fluid kinematics and fluid dynamics	
2.1	Fluid Kinematics: Types of fluid flow	1
2.2	Continuity equation in two and three dimensions	1
2.3	Velocity and Acceleration of fluid particle Velocity potential function and Stream function.	1
2.4	Fluid dynamics: Euler's equation along a streamline	2
2.5 2.6	Bernoulli's equation and applications	2
2.0	Venturi meter, Orifice meter and Pitot tube.	1
3	Flow through pipes	1
3.1	Laminar and Turbulent flow	1
3.2	Hagen-Poiseuille equation, Darcy friction factor,	1
3.3	Darcy-Weisbach Equation	2
3.4	Major and Minor losses, Application of Moody's chart	2
3.5	Hydraulic gradient and Total energy lines	1
3.6	Flow through pipes in series and in parallel	1
3.7	Power transmission through pipes.	1
4	Basics of Thermodynamics and First Law of Thermodynamics	
4.1	Thermodynamics, Microscopic and macroscopic point of view	1
4.2	Systems, properties, process, path, cycle,	1
4.3	Thermodynamic equilibrium	1
4.4	Zeroth law of Thermodynamics,internal energy, enthalpy,	1
4.5	specific heat capacities CV and CP, Relationship between CV and CP.	1
4.6	First law of Thermodynamics	1
4.7	Application to closed and open systems	1
4.8	Steady Flow Energy Equation (SFEE)	1
4.9	Simple problems.	1
5	Second Law of Thermodynamics and Entropy:	
5.1	Second Law of thermodynamics	1
5.2	Kelvin Planck and Clausius Statements	1
5.3	Reversibility, Irreversibility, reversible cycle	1
5.4	Heat engine, heat pump and refrigerator.	1
5.5	Carnot cycle and Clausius theorem.	1
5.6	Entropy principle, General expression for entropy	1
5.7	Property of entropy, P-V and T-S diagrams	1
5.8	Simple problems in entropy	1
	Tota	45

# **Course Designers**

Dr.R.Senthil murugan- <u>senthilmurugan@ksrct.ac.in</u> Dr.S.Sathish - <u>sathishs@ksrct.ac.in</u> Dr.M.Baskaran- <u>baskaranm@ksrct.ac.in</u>

BoS Chairman

60 MC 403	Metrology and Statistical Quality Control	Category	L	Т	T         P         Credit           0         0         3	
00 WIC 403	Metrology and Statistical Quality Control	PC	3	0	0	3

- To give insights on the basics of metrology and measurements.
- To facilitate the knowledge on the various measurement techniques.
- To provide exposure on the fundamental working of optical measuring techniques
- To deliver insights on the basics of different forms of measurements
- To familiarize the statistical tools in the quality analysis.

## Prerequisite

#### **Engineering physics**

## Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Describe the fundamental concepts of measurement.	Understand
CO2	Recognise the linear and angular measurement techniques to inspect the products.	Understand
CO3	Understand the optical measurement techniques to inspect the products.	Understand
CO4	Demonstrate and simulate the different forms of measurements.	Understand
CO5	Apply the statistical tools and control charts in measurements.	Apply

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	3	2	2					1			1	3	3	
CO2	3	3	2	2					1			1	3	3	
CO3	3	3	2	2					1			1	3	3	
CO4	3	3	2	2					1			1	3	3	
CO5	3	3	2	2					1			1	3	3	
3- Str	ong;2-l	Medium	n;1-Son	3- Strong;2-Medium;1-Some											

#### Assessment Pattern

Bloom's	Continuous A	ssessment Tests (Marks)	End Sem								
Category	1	2	Examination(Marks)								
Remember	10	10	30								
Understand	20	20	30								
Apply	20	20	25								
Analyse	5	5	05								
Evaluate	5	5	10								
Create	0	0	0								

		6	60 MC 403	<ul> <li>Metrology</li> </ul>	and Statistica	al Quality C	ontrol		
		-			МСТ	-	-		
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SDG No.9

# Course Contents and Lecture Schedule

S. No	Торіс	No. of Hours
1	Fundamentals of Metrology	
1.1	Introduction to Metrology and Measurement,	1
1.2	Classifications and its characteristics	1
1.3	Evolution of Standards	1
1.4	Sources of errors	2
1.5	Calibration	1
1.6	Concepts of interchangeability and selective assembly	1
1.7	Limits, fits and tolerances	1
1.8	Limit gauges	
2	Linear And Angular Measurements	
2.1	Introduction to measurements, Vernier instruments	1
2.2	Micrometers	1
2.3	Surface plates, V-Blocks	1
2.4	Feeler gauges, Thread gauges, Scribers	1
2.5	Slip gauges	1
2.6	Angular measurements - sine bar	1
2.7	Bevel protractor, clinometers, angle gauges	1
2.8	Comparators- Mechanical	1
2.9	Comparators- optical and pneumatic	1
3	Advancements in metrology	
3.1	Basics – Interference of two rays	1
3.2	Light source, Interference in testing	1
3.3	Interferometers - Michelson Interferometer, Twyman-Green Specialisation of Michelson	2
	Interferometer, N.P.L. Flatness Interferometer, Laser Interferometers	
3.4	Coordinate measuring machines -Types	2
3.5	Coordinate measuring machines - Probes, applications	1
3.6	Machine vision system – Introduction	1
3.7	Machine vision system – Principle, and Applications	1
4	Form Measurement	
4.1	Principles and Methods of straightness	1
4.2	Flatness measurement	1
4.3	Thread measurement	2
4.4	Gear measurement	1
4.5	surface finish measurement, Surface finish measurements with Gwyddion and LAB	2
	View software	
4.6	Roundness measurement	1
4.7	Applications of measurement	1
5	Statistical Process Control	
5.1	Introduction to quality control and quality assurance	1
5.2	Statistical process control, Statistical tools of quality control	1
5.3	Control charts for variable, objective, relation between $\vec{X}$ ,s, $\vec{R}$ , control limits	2
5.4	Control charts for variable, control limits	1
5.5	Control charts for attributes, p chart and np chart, Creation of Control charts using minitab	2
5.6	Process capability studies	1
5.7	Acceptance sampling	1
	Total	45

Dr.S.Sathish - <u>sathishs@ksrct.ac.in</u>

		Category	L	Т	Р	Credit
60 MC 404	HYDRAULIC AND PNEUMATIC CONTROL	PC	3	0	2	4

- To familiarize about the basics fundamentals of hydraulic and pneumatic transmission power using pressurized fluids.
- To understand working principles, operation of hydraulic and pneumatic components.
- To expose to various techniques for choosing pumps, valves and pneumatics components for suitable application.
- Have exposure to diagnose / troubleshoot hydraulic, pneumatic, electro pneumatic circuits.
- To design the circuits using pneumatic / hydraulic components for a small scale industrial application.

## Prerequisite

NIL

## **Course Outcomes**

## On the successful completion of the course, students will be able to

CO1	Explain the fundamental properties of fluids and understand the applications, advantages of fluid power system.	Remember, Understand, Apply
CO2	Identify the various pumps, valves, actuators and its working principles in hydraulic circuit.	Remember, Understand, Apply
CO3	Describe and illustrate the construction and working principles of various compressors, pneumatic valves and FRL unit importance in pneumatic circuit.	Remember, Understand, Apply
CO4	Design and develop the hydraulic and pneumatic circuit for various applications.	Remember, Understand, Apply
CO5	Know the significance of failures and troubleshooting, fluid power circuit for machine tool applications and software used in fluid power automation	Remember, Understand, Apply

## Mapping with Programme Outcomes

Cos	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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
CO3	2	2	1	2	2	1	2	1	2	1	2	2	3	2
CO4	2	3	3	2	3	2	1	1	2	2	2	2	2	3
CO5	2	2	2	2	3	1	1	1	2	1	3	2	2	3
3 - Str	3 - Strong; 2 - Medium; 1 - Some													

#### Assessment Pattern

Bloom's Category	Continuous Asse (Mark		Model Exam (Marks)	End Sem Examination (Marks)
	1	2	(IVIALKS)	(iviai KS)
Remember (Re)	10	10	10	20
Understand (Un)	20	20	30	30
Apply (Ap)	30	30	60	50
Analyze (An)	0	0	0	0
Evaluate (Ev)	0	0	0	0
Create (Cr)	0	0	0	0
Total	60	60	100	100

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		60 MC		aulic and Pr		ontrol		
				atronics En				
Seme	ster H	lours / Week		Total	Credit		Maximum Ma	
	L	Т	P	hrs	С	CA	ES	Total
IV	3 Power System	0	2	75	4	50	50	100
Introduc prevent power - - Analys Pressue <b>Hydrau</b> Pumps Hydrau acting of Valve ty <b>Pneum</b> Propert Single a Two wa AND ty <b>Design</b> Constru Accume pneuma <b>Industr</b> Fluid po automa <b>Hands</b>	ction to fluid power tion, Pour point, Fla Applications of flu sis of simple hydrau re Booster <b>Ilic Pumps, Actua</b> Pumping theory - F lic Actuators: Hydra cylinders, Special ty ypes, Direction con <b>atic System</b> ties of air-Compres and Multi-Stage Co ay, Three way, Fou pe valve - Quick ex of Hydraulic and uction of Hydraulic ulator circuits. Cons atic circuit – IoT bas <b>rial Automation</b> ower circuit for hydr titon for Industry 4.0 <b>on Session:</b> 1. Assembling of p 3. Assembling of p 5. IoT based pneur	ash point and id power – F ulic jack - Ap tor and Valv Pump classif aulic motors /pe cylinders trol valve typ sors: Rotary mpressor - F r way valves chaust valve. Pneumatic circuits - Fail struction of F sed solenoid raulic braking D-Hydraulic som neumatic con neumatic con neumatic con	I Fire point, <sup>-</sup> luid power co plications of <b>res</b> ication - wor - gear and w : rodless, tai bes, Flow con compressor Filter, Regula - Pneumatic <b>Circuits</b> safe circuit neumatic cir valve. g system-Flu system for In ponents for mponents for	Types of hyd omponents a Pascal's law king principle vane motors, ndem and te ntrol valve ty - Screw con ator and Lubic check valve - Regenerati rcuits: Casca did power circ dustry 4.0- T basic Hydra r basic Pneu r Meter in &	raulic fluids and symbols v: Hand oper Hydraulic c lescopic - H pes, Counte npressor, va ricator Unit - es - Flow cor ive circuit - p ade method cuit for robot rouble shoo ulic circuit. imatic circuit Meter out ci	- Advantag - Pascal's la rated hydra mp, Vane p ylinders: sir ydraulic val r balance v ne compres Valves: Dir htrol valve, l pressure inte - sequence arm for pic ting of Fluid	es and drawk aw: Multiplica ulic jack, Air oump, Screw ngle acting ar ves: Pressur alve. ssor - Piston rection contro Pneumatic sl ensifier circui circuit. Elect k and placeF power syste	packs of fluid ation of Force to Hydraulic [09] pump - nd double e Control [09] Compressor ol valves, nuttle valve - [09] its - ro - [09] Pneumatic
ext bo								
	Anthony Esposito, "							
	Srinivasan R ,"Hydr	aulic and Pn	eumatic Cor	ntrols",2 <sup>nd</sup> Ed	lition', Vijay I	Nicole Impri	nt (P) Ltd., C	hennai, 2016
	nce(s) :							
	S. R. Majumdar, "O						. New Delhi,	2014.
2 3	S. R. Majumdar, "P				,	Tata		
r		ing Compan						
1 3 /	Andrew Parr, Hydra James L. Johnson,	ulics and Pr	eumatics, Ja	aico Publishi	ng House, 2			

SDG No.9

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman
S. No.	Торіс	No.of Hours
1.0	Fluid Power System	
1.1	Introduction to fluid power	1
1.2	Properties of fluids: Viscosity index, Oxidation index, Demulsibility, Lubricity, Rust prevention, Pour point, Flash point and Fire point, Types of hydraulic fluids	2
1.3	Advantages and drawbacks of fluid power - Applications of fluid power	1
1.4	Fluid power components and symbols	2
1.5	Pascal's law: Multiplication of Force	1
1.6	Analysis of simple hydraulic jack	1
1.7	Applications of Pascal's law: Hand operated hydraulic jack, Air to Hydraulic Pressure Booster	1
2.0	Hydraulic Pumps, Actuator and Valves	
2.1	Pumps Pumping theory	1
2.2	Pump classification - working principle of Gear pump, Vane pump, Screw pump	1
2.3	Hydraulic Actuators: Hydraulic motors	1
2.4	Gear and vane motors, Hydraulic cylinders: single acting and double acting cylinders	1
2.5	Special type cylinders: rodless, tandem and telescopic	1
2.6	Hydraulic valves: Pressure Control Valve types	1
2.7	Direction control valve types	1
2.8	Flow control valve types	1
2.9	Counter balance valve	1
3.0	Pneumatic System	
3.1	Properties of air-Compressors: Rotary compressor	1
3.2	Screw compressor, vane compressor	1
3.3	Piston Compressor: Single and Multi-Stage Compressor	1
3.4	Filter, Regulator and Lubricator Unit	1
3.5	Valves: Direction control valves, Two way, Three way, Four way valves	1
3.6	Pneumatic check valves.	1
3.7	Flow control valve	1
3.8	Pneumatic shuttle valve - AND type valve	1
3.9	Quick exhaust valve	1
4.0	Design of Hydraulic and Pneumatic Circuits	
4.1	Construction of Hydraulic circuits	2
4.2	Fail safe circuit - Regenerative circuit	2
4.3	Pressure intensifier circuits - Accumulator circuits	2
4.4	Construction of Pneumatic circuits: Cascade method	1
4.5	Sequence circuit. Electro	1
4.6	Pneumatic circuit – IoT based solenoid valve.	1
5.0	Industrial Automation	
5.1	Fluid power circuit for hydraulic braking system	1
5.2	Fluid power circuit for robot arm for pick and place	2
5.3	Pneumatic automation for Industry 4.0	2
5.4	Hydraulic system for Industry 4.0	2
5.5 <b>Design</b>	Trouble shooting of Fluid power system	2

Course Designers

Dr.R.Senthilmurugan

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

60 MC 405	Virtual Instrumentation and Applications	Category	L	Т	Ρ	Credit
		PC	2	0	2	3

- To understand the fundamentals of virtual instrumentation and basic concept of graphical programming with their functions in LabVIEW.
- To impart the fundamental knowledge on the software tools in virtual instrumentation.
- To develop programming through LabVIEW graphical programming environment.
- To know about the data acquisition and various types Interfaces used in VI.
- To familiarize students with various applications of VI.

#### Prerequisite

#### Sensors and Instrumentation

Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Understand the basic concepts about virtual instrumentation.	Remember, Understan and Apply
CO2	Interpret the software tools in virtual instrumentation	Analyze
CO3	Develop programming through LabVIEW graphical programming environment.	Understand
CO4	Describe the functions and the interface requirements in Data acquisition system.	Analyze
CO5	Understand the different applications and advanced concept of VI.	Remember

#### Mapping with Programme Outcomes

		<u> </u>												
COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	3			2					3	3
CO2	3	3	2	2	3	2			2				3	3
CO3	3	3	2	2	3	2				3			3	3
CO4	3	3	2	2	3		2				3	3	3	3
CO5	3	3	1	3	3						3	2	3	3
3- Str	3- Strong;2-Medium;1-Some													

#### **Assessment Pattern**

Bloom's Category	Continuous As	End Sem	
Bloom's Category	1	2	Examination(Marks)
Remember	10	20	30
Understand	10	15	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	10	10	0
Create	0	0	0

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

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BoS Chairman

					f Technology – umentation and				R2022
					MCT				
Sei	mester	н	lours/Week		Total Hrs.	Credit		Maxim	um
00	mester		T	Р	rotarris.	C	CA	ES	Total
	IV	2	0	2	60	3	50	50	100
Histor instrui Hardv	ment – Blo vare and	ective and Tr ock diagram Software-A	of a Virtua Advantages	al Instrument of Virtual	ments–General f – Physical qua Instruments ov he operating sys	ntities and	nalog in	terfaces -	[09]
Graph progra and t	amming–Eo tools–Func	Interfaces–( diting, Debug tion and Lik	gging and Riboraries–VI a	unning a Virtu and sub-VI,	-Modular progra ual Instrument–G Structures: FOF structures, Time	Graphical prog R Loops, WH	iramming HILE loc	g palettes	[09]
Arrays data:	s and Clus	d charts – St	operation -		ndle and Bundle evel and Low lev			-	[09]
Introd termir Analo Curre	uction to o nology –Ins g I/O funct nt loop – R	talling Hardw ion –Real tin S 232C – R	ion on PC, vare and driv ne Data Acc	Sampling fur /ers – Configi	ndamentals. Cor uring and addres B based DAQ. ( 3.	sing the hard	ware – C	Digital and	[09]
Advar acquis desigr Hand 1. Del 2. Pro 3. Col	sition – Mo n and simu <b>s on Sess</b> bugging a ' ogramming ntrol of tem	d Application tion Control lation. ions: VI, sub VI's u structure, ar uperature usin	– Signal pro using LabVIE rays, cluster ng data acqu	cessing – Sig EW.	-TCP / IP– P> gnal analysis: Po Dusing LabVIEW	wer spectral a			[09]
4. 1010							Тс	otal Hours	60
<b>Text I</b> 1.	Book(s): Jeffrey Ti	avis, Jim Kri	ng, "LabVIE	W for Everyo	ne: Graphical Pro	ogramming Ma	ade Eas	y and Fun"	(3rd
2	Sanjay G			tion using Lal	bVIEW : principle	es and practice	es of gra	aphical	
	ence(s):	ning",TMH,20					•		
Refer	lovitho l	ning",TMH,20							
Refer 1.	JUVILIA J		017.	ntation using I	_abView", PHI Le	earning Pvt. Lt		Delhi, 2010	
	Gary W.	erome, "Virtu Johnson, Ric	017. Ial Instrumer	•	_abView", PHI Le	U U	td, New		
1.	Gary W Publishin	erome, "Virtu Johnson, Ric g, 2011.	017. Ial Instrumer chard Jennin	•	Graphical Progr	U U	td, New		

SDG No.7, 8, 9

BoS Chairman

S.No	Торіс	No.of
1	Introduction to VI	Hours
1.1	Historical perspective and traditional bench	<b>09</b> 1
1.1	Top instruments	1
1.2	General functional description of a digital instrument	2
1.3	Block diagram of a Virtual Instrument	1
1.4	Physical quantities and analog interfaces	1
1.6	Hardware and Software	1
1.7	Advantages of Virtual Instruments over conventional instrument	1
1.7	ArchitectureofaVirtualInstrumentanditsrelationtotheoperatingsystem	1
<u> </u>	VI Software Tools	09
2.1	Graphical user interfaces	1
2.1	Controls and Indicators	1
2.2		1
	Modular programming, Data types	
<u>2.4</u> 2.5	Data flow programming ,Editing Debugging and Running a Virtual Instrument	1
2.5	Graphical programming palettes and tools	1
2.6	Function and Libraries–VI and sub VI	1
2.7	Structures: FOR Loops ,WHILE loops ,Shift Registers	1
2.0	CASE structure , Formula nodes , Sequence structures, Timed looped structures.	1
<u>2.9</u> 3	VI Programming Techniques	-
	Arrays and Clusters: Array operation	09
<u>3.1</u> 3.2	Bundle/Unbundle and Bundle/Unbundle by name	1
		2
3.3	Plotting data: graphs and charts String and File I/O: High level and Low level file I/O's	1
<u>3.4</u> 3.5	Local and global variables.	1 2
	v v	
3.6	Debugging a VI, sub VI's using LabVIEW- HANDS ON Programming structure, arrays, clusters, and File I/O using LabVIEW- HANDS ON	1
3.7	Data Acquisition and Interface System	1
4		09
4.1	Introduction to data acquisition on PC, Sampling fundamentals	1
4.2	Concepts of Data Acquisition and terminology	1
4.3	Installing Hardware and drivers	1
4.4	Configuring and addressing the hardware	1
4.5	Digital and Analog I/O function	1
4.6	Real time Data Acquisition USB based DAQ.	1
4.7		1
4.8	Common Instrument Interfaces: Current loop, RS 232C- RS485andBusInterfaces. Control of temperature using Data Acquisition Card HANDS ON	1
<u>4.9</u> 5	VI Applications	1
<b>5</b> .1	Advantages and Applications	<b>09</b> 1
5.2	Advanced concepts	1
<u> </u>	TCP/IP, PXI	1
<u> </u>	Instrument Control	1
<u>5.4</u> 5.5	Image acquisition	1
5.6	Motion Control, Signal processing	1
5.7	Signal analysis, Power spectral analysis	1
5.8	Control design and simulation	1
	Model and simulate a LED interface unit using DAQ- HANDS ON	
5.9		1
	Total	45

#### **Course Designers**

Mrs.V.Indumathi - indumathi@ksrct.ac.in

BoS Chairman

60 MC 4P1	Industrial Drives and Control Laboratory	Category	L	Т	Ρ	Credit
		PC	0	0	4	2

- To acquire knowledge about speed control of DC drives.
- To determine the performance characteristics of the given DC drives.
- To provide the knowledge about speed control of AC drives.
- To determine the performance characteristics of the given AC drives.
- To acquire the knowledge of solid state speed control of AC & DC drives.

#### Prerequisite

#### **Basic Electrical and Electronics Engineering**

#### Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Test the performance of DC motors under different load condition	Remember, Understand
CO2	Test the performance of induction motors under different load conditions.	Remember, Understand
CO3	Understand the performance of conventional speed control systems for DC motors	Understand
CO4	Design power electronics based speed control systems for DC drives.	Apply
CO5	Design power electronics based speed control systems for Induction motor drives	Apply

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2				3				1	1	1	1	3	3
CO2	2	3	2		1			1	3	2		1	3	3
CO3	2	2	1		2			1	2	2	1	1	3	3
CO4	2	3	2	2	2			2		2	1	1	3	3
CO5	2	3		2	2						1	1	3	3
3- Str	3- Strong;2-Medium;1-Some													

Assessment Patte	ern
Bloom's Category	Con

Bloom's Category	Continuous As	ssessment Tests (Marks)	End Sem Examination		
	1	2	(Marks)		
Remember	30	10	30		
Understand	30	20	40		
Apply	20	30	30		
Analyse	0	0	0		
Evaluate	0	0	0		
Create	0	0	0		

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BoS Chairman

#### List of Experiments

- 1. Load characteristics of DC shunt motor and compound motor.
- 2. Load characteristics of DC series motor.
- 3. Load test on three-phase squirrel cage induction motor.
- 4. Load test on three-phase slip ring induction motor.
- 5. Load test on single phase induction motor.
- 6. Speed control of DC shunt motor.
- 7. Speed control of DC shunt motor using controlled rectifier.
- 8. Speed control of DC shunt motor using chopper.
- 9. Speed control of three–phase induction motor by V/F method.
- 10. Speed control of three phase induction motor (Voltage control)

SDG No. 8, 9

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BoS Chairman

60 MC 4P2	Applied Mechanics Laboratory	Category	L	Т	Ρ	Credit
		PC	0	0	4	2

- To study the mechanical properties of metals under tension, hardness, torsion, and impact by testing in laboratory.
- To study on the deflection of open and closed coil springs.
- To facilitate the experimental knowledge about coefficient of discharge using orifice meter.
- To emphasize the concept of fluid mechanics and machinery theory to determine friction factor.
- To analyse the performance characteristics of pumps and turbines.

#### Prerequisite

#### Strength of Materials, Fluid Mechanics

#### Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Determine the tensile, hardness, torsion and impact properties of metals.	Apply
CO2	Determine the stiffness of open and closed springs.	Apply
CO3	Estimate the coefficient of discharge using orifice meter	Analyse
CO4	Apply the fluid mechanics and machinery theory to determine the friction factor for various pipes.	Analyse
CO5	Determine the performance characteristics of pumps and turbines.	Analyse

#### Mapping with Programme Outcomes

	<b>J</b>	- J												
COs	P01	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				2	3		2	2		2	3	3
CO2	3	2				2	3		2	2		2	3	3
CO3	3	2				2	3		2	2		2	3	3
CO4	3	2				2	3		2	2		2	3	3
CO5	3	2				2	3		2	2		2	3	3
3- Str	3- Strong;2-Medium;1-Some													

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BoS Chairman

	K	.S.Rangas	amy Colle	ge of Technolo	ogy – Auton	omous		R202	2	
		60 I	MC 4P2 - A	pplied Mecha	nics Laborat	tory				
				МСТ						
Semester Hours/Week Total hrs Credit Maximum Marks										
	L	Т	Р		С	CA	ES	Total		
IV	0	0	4	60	2	40	60	100		
List of Experim	nents									
1. Determination	on of tensile	e behavior o	of metals.							
2. Determination	on of Hardr	ness of mate	erial (Rock	well and Brinell	Hardness)					
3. Determination	on of impac	t strength c	of metals us	sing Charpy and	d Izod testers	6.				
4. Determination	on of torsio	nal strength	n on given r	material.						
5. Determination	on of tensic	on and com	pressive be	havior of helica	al springs.					
6. Determination	on of coeffi	cient of disc	charge of o	rifice meter.						
7. Determination	on of friction	n factor for	a set of pip	es.						
8. Determination	on of Peltor	n wheel per	formance u	Inder various in	terval loads.					
9. Determination	on of Kapla	n turbine pe	erformance	under various	interval loads	S.				
10. Determinat	tion of cent	rifugal pum	p performa	nce under vario	ous interval lo	oads.				
							Total H	lours	60	

### SDG No.9

#### **Course Designers**

Mr.R. Vivek- <u>vivek@ksrct.ac.in</u> Dr.S.Sathish- <u>sathishs@ksrct.ac.in</u>

BoS Chairman

60 CG 0P3	CAREER SKILL DEVELOPMENT III	Category	L	Т	Ρ	Credit
		CG	0	0	2	1*

- To help learners improve their logical reasoning skills at different academic and professional contexts.
- To help learners relate basic quantitative problems and solve them.
- To help learners Infer critically the statements with optimal conclusions and assumptions.
- To Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively
- To compute quantitative problems related to time and work, speed and distance, and simple and compound interest

#### Prerequisite

#### Basic knowledge of Arithmetic and Logical Reasoning

#### Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Deduce the topics in logical reasoning at the preliminary and intermediate level.	Analyze
CO2	Relate basic quantitative problems and solve them effectively at the preliminary level	Apply
CO3	Infer critically the statements with optimal conclusions and assumptions with the data and information given.	Analyze
CO4	Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively at the pre-intermediate level.	Apply
CO5	Compute quantitative problems related to time and work, speed and distance, and simple and compound interest at intermediate level.	Apply

## Mapping with Programme OutcomesCOsPO1PO2PO3PO4PO5PO6PO7

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	3		3				2	3	3	1	
CO2	3	3	3	3		2				2	3	3	2	2
CO3	2	2	2	2		3				2	3	3		1
CO4	3	3	3	3		2				2	3	3	2	2
CO5	3	3	3	3		2				2	3	3	3	3
3- Str	3- Strong;2-Medium;1-Some													

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BoS Chairman

		K.S.I				ogy – Autono	mous		R2022
					Developme				
Common to All Branches									
Semes	ster	Hours	Week		Total Hrs	Credit	N	laximum Mark	S
		L	Т	Р		С	CA	ES	Total
IV	'	0	0	2	25	1*	100	00	100
Analog	gies - /	<b>soning</b> Alpha and numeric ons - Order and Ra					ing - Blood	d Relations -	[5]
Numbe	er syst	Aptitude – Part 1 em - Squares & cu nd Arithmetic progre				emainder Th	eorem - H	CF & LCM -	[5]
Syllogi		oning Statements and Con nents and Weak Arc					ssumptions	s - identifying	[5]
Averag		Aptitude – Part 2 tio and proportion -	- Ages – P	artnership	- Percentage	e - Profit & lo	ss – Disco	unt - Mixture	[5]
<b>Quant</b> Time &	i <b>tative</b> & Work	Aptitude – Part 3 - Pipes and cister Compound interest	rn – Time,	Speed & o	distance - T	rains - Boats	s and Strea	ams - Simple	[5]
								<b>Total Hours</b>	25
Refer	ence(s	s):							
2	2009, \$	val, R.S. 'A Modern S.Chand & Co Ltd.,	New Delhi.					Edition 2008	Reprin
2. Abhijit Guha, 'Quantitative Aptitude', McGraw Hill Education, 6 <sup>th</sup> edition, 2016									
3. I	Dinesh	Khattar, 'Quantitati	ve Aptitude	For Com	petitive Exam	ninations', Pea	arson Educ	ation 2020	
4. Anne Thomson, 'Critical Reasoning: A Practical Introduction' Lexicon Books, 3 <sup>rd</sup> edition, 2022. Warszaw									

SDG 4 – Quality Education SDG 8 – Decent work and Economic growth SDG 9 – Industry, innovation and Infrastructure



S.No	Торіс	No. of Hours	Mode of content Delivery
1	Logical Reasoning		
1.1	Analogies - Alpha and numeric series	1	Chalk & Board
1.2	Number Series - Coding and Decoding	1	Chalk & Board
1.3	Blood Relations - Coded Relations	1	Chalk & Board
1.4	Order and Ranking – odd man out	1	Chalk & Board
1.5	Direction and distance	1	Chalk & Board
2	Quantitative Aptitude – Part 1		
2.1	Number system	1	Chalk & Board
2.2	Squares & cubes - Divisibility	1	Chalk & Board
2.3	Unit digits - Remainder Theorem	1	Chalk & Board
2.4	HCF & LCM- Geometric and Arithmetic progression	1	Chalk & Board
2.5	Surds & indices	1	Chalk & Board
3	Critical Reasoning		
3.1	Syllogism	1	Chalk & Board
3.2	Statements and Conclusions, Cause and Effect	1	Chalk & Board
3.3	Statements and Assumptions	1	Chalk & Board
3.4	identifying Strong Arguments and Weak Arguments	1	Chalk & Board
3.5	Cause and Action -Data sufficiency	1	Chalk & Board
4	Quantitative Aptitude – Part 2		
4.1	Average - Ratio and proportion	1	Chalk & Board
4.2	Ages – Partnership	1	Chalk & Board
4.3	Percentage	1	Chalk & Board
4.4	Profit & loss	1	Chalk & Board
4.5	Discount - Mixture and Allegation	1	Chalk & Board
5	Quantitative Aptitude – Part 3		
5.1	Time & Work	1	Chalk & Board
5.2	Pipes and cistern	1	Chalk & Board
5.3	Time, Speed & distance - Trains	1	Chalk & Board
5.4	Boats and Streams	1	Chalk & Board
5.5	Simple interest and Compound interest	1	Chalk & Board
	Total	25	

#### **Course Designer**

R. Poovarasan

- poovarasan@ksrct.ac.in



#### K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted from 2022 -2023 onwards)

FIFTH SEMESTER

S.	Course		Duration of	Weighta	5	Minimum for Pass Semester	in End	
No.	Code	Name of the Course	Internal Exam	Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
1	60 MC 501	Microprocessors and Microcontrollers	2	40	60	100	45	100
2	60 MC 502	System Design and Control	2	40	60	100	45	100
3	60 MC 503	Kinematics and Dynamics of Machines	2	40	60	100	45	100
4	60 HS 003	Total Quality Management	2	40	60	100	45	100
5	60 MY 003	Start-ups and Entrepreneurship	2	100	0	100	0	100
6	60 MC E1*	Elective-I	2	40	60	100	45	100
7	60 MC L0*	Open Elective-II	2	40	60	100	45	100
			PRACT	ICAL				
8	60 MC 5P1	Microprocessors and Microcontrollers Laboratory	3	60	40	100	45	100
9	60 MC 5P2	Metrology and Dynamics Laboratory	3	60	40	100	45	100
10	60 CG 0P4	Career Skill Development-IV	3	100	-	100	-	-
11	60 CG 0P6	Internship	-	-	-	-	-	-

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks



		Category	L	Т	Ρ	Credit
60 MC 501	Microprocessor and Microcontrollers	PC	3	0	0	3

- To understand the concept of 8086 Microprocessor.
- To study about the8086-instruction set and addressing mode.
- To understand the concept of I/O Interfacing
- To understand the concept of 8051 microcontroller.
- To study about interfacing microcontroller

#### Prerequisite

NIL

#### Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Learn the architecture and pin configuration of 8086 Microprocessor	Remember, Understand and Apply			
CO2	Write assembly language programs using 8086 microprocessor	Remember, Understand and Apply			
CO3	Interface 8086 Microprocessors with peripheral devices	Remember, Understand and Analys			
CO4	Learn the architecture and pin configuration of 8051 Microcontroller.	Understand and Apply			
CO5	Interface 8051 Microcontroller with peripheral devices	Understand and Analyse			

#### Mapping with Programme Outcomes

COs	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3								2	2	2	2
CO2								3			2	2	2	2
CO3	3	3	2	3		2			3	3	2	2	3	2
CO4	2	2		2	3		2	2			2	3	3	2
CO5	2	2	2	3	2						3	3	3	3
3- Stro	3- Strong;2-Medium;1-Some													

#### Assessment Pattern

Bloom's Category	Continuous A	Assessment Tests(Marks)	End Sem
	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0



			K.S.Ranga	asamy Colle	ege of Techno	ology – Auto	onomous		R2022
					processor and				
					МСТ				
			Hours/We	ek		Credit	Ν	Aaximum Mark	S
_		L	Т	Р		С	CA	ES	Total
	V	3	0	0	45	3	40	60	100
levice	s-The 80	85 MPU- a	rchitecture	, Pins and s	ecture and its ignals-Timing I interfacing inpu	Diagrams- L	ogic devices	for interfacing-	[09]
low perat dexii	chart syi ion- Writ ng- Additi	mbols-Data ing assemb ional data t	Transfer bly langua transfer ar	operations ge program nd 16-bit ari	Addressing m - Arithmetic ( s- Programming thmetic instruct Programming	Dperations-L ng techniqu tion-Logic c	ogic Operati	ons- Branch counting and	[09]
nemo rogra	ry orgai immable	nization-Ad	dressing interface	modes- P	eripheral Dev	/ices- 8237	7 DMA Co	segmentation ntroller- 8255 programmable	
nd C	ircuits – ıpts, Prog	Instruction gramming	set – Add External I	lressing mo	Special Functi des – 8051 Re nterrupts, Prog ers	eal Time Co	ontrol: Program	mming Timer	[09]
and C nterru nterru Progr Interf Wave	ircuits – pts, Prog pts, Prog <b>bheral Int</b> ramming acing – pform ge	Instruction gramming ramming 8 erfacing an Timers – ADC, DAC	set – Add External I 051 Timers nd Applic Serial Por & Senso	Iressing mod Hardware Ir s and Count ations: t Programm r Interfacing	des – 8051 Re nterrupts, Prog	eal Time Co gramming th ots Program Jemory Inte	ming – LCD	mming Timer ommunication & Keyboard er Motor and	[09]
and C nterru nterru Progr Interf Wave	ircuits – pts, Prog pts, Prog <b>bheral Int</b> ramming acing – pform ge	Instruction gramming ramming 80 erfacing an Timers – ADC, DAC neration.	set – Add External I 051 Timers nd Applic Serial Por & Senso	Iressing mod Hardware Ir s and Count ations: t Programm r Interfacing	des – 8051 Re nterrupts, Prog ers ning – Interrup g – External M	eal Time Co gramming th ots Program Jemory Inte	ming – LCD	mming Timer ommunication & Keyboard er Motor and	
And C nterru nterru Progi Interf Wave Appli Text 1.	ircuits – upts, Prog upts, Prog <b>bheral Int</b> ramming acing – acing – acing – acing – A.P.Gods Publication	Instruction gramming 80 erfacing at Timers – ADC, DAC neration. d control.	set – Add External 1 051 Timers <b>nd Applic</b> Serial Por & Senso Assembly	Iressing mod Hardware Ir s and Count ations: t Programm r Interfacing r language	des – 8051 Re nterrupts, Prog ers ning – Interrup g – External M program usin	eal Time Co gramming th ots Program Aemory Inte g 8051 and sors and Mic	ming – LCD rface- Stepped 8085 for	mming Timer ommunication & Keyboard er Motor and Mechatronics Total Hours	<b>[09]</b>
nd C nterru nterru Progi Interf Wave Appli Text	ircuits – ipts, Prog pheral Int ramming acing – , acing – , acion an eform ge cation an Book(s): A.P.Gods Publication Yu-Cher	Instruction gramming 8 erfacing an Timers – ADC, DAC neration. d control. se, Jairaj So ons, 2023 ng Liu, Gler	set – Add External 1 051 Timers <b>nd Applic</b> Serial Por & Senso Assembly olankeand	Iressing mod Hardware Ir s and Count ations: t Programm r Interfacing r language D.A.Godse, on, "Microco	des – 8051 Re nterrupts, Prog ers ning – Interrup g – External M program usin	eal Time Co gramming the ots Program Aemory Inte g 8051 and sors and Mic	ming – LCD rface- Stepped 8085 for crocontrollers"	mming Timer ommunication & Keyboard er Motor and Mechatronics Total Hours	<b>[09]</b> 45
nd C nterru Perip Progi Interf Wave Appli Text 1. 2	ircuits – ipts, Prog pheral Int ramming acing – , acing – , acion an eform ge cation an Book(s): A.P.Gods Publication Yu-Cher	Instruction gramming ramming 80 erfacing at Timers – ADC, DAC neration. d control. se, Jairaj So ons, 2023 ng Liu, Gler ming and E	set – Add External 1 051 Timers <b>nd Applic</b> Serial Por & Senso Assembly olankeand	Iressing mod Hardware Ir s and Count ations: t Programm r Interfacing r language D.A.Godse, on, "Microco	des – 8051 Re nterrupts, Prog ers ning – Interrup g – External M program usin , "Microprocess mputer System	eal Time Co gramming the ots Program Aemory Inte g 8051 and sors and Mic	ming – LCD rface- Stepped 8085 for crocontrollers"	mming Timer ommunication & Keyboard er Motor and Mechatronics Total Hours	<b>[09]</b> 45
nd C nterru Perip Progr Interf Wave Appli Text 1. 2 Refe 1.	ircuits – ipts, Prog pheral Int ramming acing – acing – acin	Instruction gramming ramming 80 erfacing an Timers – ADC, DAC neration. d control. d control. se, Jairaj St ons, 2023 ng Liu, Gler ming and I ed Ali Mazie s: Using As	set – Add External 1 051 Timers <b>nd Applic</b> Serial Por & Senso Assembly olankeand nn A. Gibse Design", Se di, Janice (	Iressing mod Hardware Ir s and Count ations: t Programm r Interfacing banguage D.A.Godse, D.A.Godse, on, "Microco econd Editio Gillispie Maz	des – 8051 Re nterrupts, Prog ers ning – Interrup g – External M program usin , "Microprocess mputer System n, Prentice Ha zidi, Rolin Mc K d Edition, Pear	eal Time Co gramming the ots Program Aemory Inte g 8051 and sors and Mic sors and Mic sors and Mic finlay, "The 8 from educati	ming – LCD rface- Stepped 8085 for rrocontrollers" 6 / 8088 Fami 019 8051 Microco on, 2019.	mming Timer ommunication & Keyboard er Motor and Mechatronics Total Hours , Technical ly – Architectur	<b>[09]</b> 45 e,
nd C nterru Perip Progr Interf Wave Appli Text 1. 2 Refe 1. 2.	ircuits – ipts, Prog pheral Int ramming acing – acing – acin	Instruction gramming ramming 80 erfacing at Timers – ADC, DAC neration. d control. d control. d control. se, Jairaj So ons, 2023 ng Liu, Gler ming and I ed Ali Mazio s: Using As as V.Hall, –	set – Add External 1 051 Timers <b>nd Applic</b> Serial Por & Senso Assembly olankeand on A. Gibso Design", So di, Janice of sembly an -Microproo	Iressing mod Hardware Ir s and Count ations: t Programm r Interfacing b language D.A.Godse, D.A.Godse, D.A.Godse, D.A.Godse, Con, "Microco econd Editio Gillispie Maz d C", Secon cessors and	des – 8051 Re hterrupts, Prog ers hing – Interrup g – External M program usin , "Microprocess mputer System n, Prentice Ha zidi, Rolin Mc K <u>id Edition, Pear</u> Interfacing, Pr	eal Time Co gramming the ots Program demory Inte g 8051 and sors and Mic sors and Mic ns: The 8086 Il of India, 20 (inlay, "The 8 rson education ogramming and the source of the source	ming – LCD rface- Stepped 8085 for crocontrollers" 6 / 8088 Fami 019 8051 Microco on. 2019. and Hardware	mming Timer ommunication & Keyboard er Motor and Mechatronics Total Hours , Technical ly – Architectur ntroller and Em	[ <b>09</b> ] 45 e, bedded
Perip Progr Interf Wave Appli Text 1. 2 Refe	ircuits – ipts, Prog pheral Int ramming acing – acing – acin	Instruction gramming 80 erfacing an Timers – ADC, DAC neration. d control. se, Jairaj So ons, 2023 ng Liu, Gler ming and I ed Ali Mazio s: Using As as V.Hall, – 7, K.M.Bhur	set – Add External 1 051 Timers <b>nd Applic</b> Serial Por & Senso Assembly olankeand nn A. Gibse Design", Se di, Janice <u>sembly an</u> -Microproc chandi, "A	Iressing mod Hardware Ir s and Counts ations: t Programm r Interfacing r language D.A.Godse, D.A.Godse, D.A.Godse, con, "Microco econd Editio Gillispie Maz d C". Secon cessors and dvanced Mid	des – 8051 Re hterrupts, Prog ers hing – Interrup g – External M program usin , "Microprocess mputer System n, Prentice Hal id Edition. Pear Interfacing, Pro- croprocessors	eal Time Co gramming the ots Program Aemory Inte g 8051 and sors and Mice and Periphe	ming – LCD rface- Stepped 8085 for crocontrollers" 6 / 8088 Fami 019 8051 Microco on, 2019. and Hardware rals" 3rd editi	mming Timer ommunication & Keyboard er Motor and Mechatronics Total Hours , Technical ly – Architectur	e, bedded awHill,

SDG No. 9



S.No	Торіс	No. of Hours
1	8086 MICROPROCESSOR	
1.1	Introduction to 8086	1
1.2	Architecture	1
1.3	Pin Description	1
1.4	External memory interfacing	1
1.5	Bus cycle, some important companion chips	1
1.6	Maximum mode bus cycle, memory interfacing	1
1.7	Minimum mode System configuration	1
1.8	Maximum mode system configuration	1
1.9	Interrupts processing,8086 Numeric data processor	1
2	8086INSTRUCTION SET AND ADDRESSING MODE	
2.1	Addressing modes, Instruction set and assembler directives	1
2.2	Assembly language programming using MASM	1
2.3	Modular Programming, Linking and Relocation	1
2.4	Stacks, Procedures, Macros, Byte and String Manipulation	1
2.5	Assembly language program using 8086 MASM software and 8086 microprocessor kit Addition	1
2.6	Subtraction, multiplication, division	1
2.7	Sorting, searching, string manipulation	1
2.8	Code conversion, matrix operation	2
3	I/O INTERFACING	2
3.1	I/O interfacing, Parallel communication interface	1
3.2	Keyboard /display controller	2
3.3	Timer, D/A and A/D Interface, Serial communication interface	1
3.4	Interrupt controller, DMA controller	1
3.5	Programming and applications Case studies, Traffic Light control, LED display	2
	Keyboard display interface and Alarm Controller, Assembly language program using	1
3.6	8086 kit	
3.7	For interfacing with 8255, 8253, ADC and DAC,8251.	1
4	8051 MICROCONTROLLER	
4.1	Architecture of 8051	1
4.2	Special Function Registers(SFRs)	1
4.3	I/O Pins Ports and Circuits	1
4.4	Instruction set	1
4.5	Addressing modes	2
4.6	Assembly language programming	1
4.7	Assembly language program using 8051 kit addition	1
4.8	Subtraction, Multiplication and Division operations.	1
5	INTERFACING MICROCONTROLLER	
5.1	Programming 8051 Timers	1
5.2	Serial Port Programming	1
5.3	Interrupts Programming	1
5.4	LCD & Keyboard Interfacing, ADC, DAC & Sensor Interfacing	1
5.5	External Memory Interface	1
5.6	Stepper Motor and Waveform generation	2
5.7	Assembly language program using 8051 for Robotic Arm control	2
	Total	45

#### **NPTEL Course Material**

S.No.	Link
1.	MPMC:https://onlinecourses.nptel.ac.in/noc24_ee46/preview
C	Course Designers

Mrs.V.Indumathi -indumathi@ksrct.ac.in

BoS Chairman ~~~

		Category	L	Т	Ρ	Credit
60 MC 502	SYSTEM DESIGN AND CONTROL	PC	3	1	0	4

- To describe feedback control and basic components of control systems
- To understand the various time domain and frequency domain tools for analysis and designof linear control systems.
- To study the methods to analyze the stability of systems from transfer function forms.
- To describe the methods of designing compensators
- To understand the concept of state space analysis

#### **Course Outcomes**

#### On the successful completion of the course, students will be able to

CO1	Understand the open loop and closed loop control system and able to design developmathematical model, Translations and Rotational systems transfer function	Remember, Understan and Apply
CO2	Learn about time domain specifications and about various types of test input.	Remember, Understan and Apply
CO3	Learn about frequency domain specifications and design and develop different frequency response plots	Remember, Understan and Apply
CO4	Understand the concept of stability and knowledge about Root locus, Routh Hurwitz Criterion	Remember, Understan and Apply
CO5	Design Lag, Lead, Lag-lead network and knowledge about State space Analysis.	Understand and Apply

#### Mapping with Programme Outcomes

		-												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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
CO3	3	3	3	2	1	1	1	2	1	2	1	2	3	2
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
3- Stroi	3- Strong;2-Medium;1-Some													

#### Assessment Pattern

Bloom's Category	Continuous A	Assessment Tests (Marks)	End Sem Examination
Bloom 3 Category	1	2	(Marks)
Remember	15	15	30
Understand	20	20	40
Apply	15	15	30
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0



		K.S.Rar	ngasamy	College of	Fechnology	- Autonom	ous	R2022
			60 MC	502 - Syster	n Design and	d Control		
				Ν	ICT			
Semester	Н	ours / Wee	k	Total Hrs	Credit		Maximum Marks	
	L	Т	Р		С	CA	ES	Tota
V	3	1	0	60	4	40	60	100
Automobile [ Mechanical ]	o Control Drive Syst Model- Tr	System: Optem, and Translational	oen and emperate & Rota	ure Control S tional System	System. Trar ns, Electrica	nsfer functio I Model, Blo	idential Heating System, n: Mathematical Model- ock Diagram Reduction	[09
Techniques-S Fime Respo			ng Manso	on's Gain Rule	e –Related p	roblems.		[09
Introduction Overshoot, S Response-St Parabolic, Ir	<ul> <li>The P</li> <li>ettling time</li> <li>eady State</li> <li>mpulse -</li> </ul>	Performance ne, Measure e Error Cor First and	e of perfo istants a Second	ormance of th nd System Ty	e Standard S /pe Numbers tem Respoi	Second Orde s. Types of T nse. Feed	ime, Peak time, Peak er System -Steady State est Inputs: Step, Ramp, Back Control System	
Frequency R			Sgrai, DC				101.	[09]
			pecification	ons in Freque	ency Domain	- The Bode	Plots – The Polar Plots–	L
				response froi				
Bounded inp construction: Gain Margin	Characteriout Bound Root loce and Phase	istic Equat led output us Concept e Margin. N	Stability , Guideli yquist St	, Zero input nes for Sket tability Criterio	Stability, R ching Root L	outh Hurwit	ility. Stability Criterion: z Criterion. Root locus d illustrative Root Loci-	[09]
	criteria	- Lag, Lea	ad and				sign using Bode Plot,	[09
							Total Hours	60
Text Book(				, <u> </u>				
<sup>1.</sup> Delhi,2	020		-		-	-	nal publisher, New	
		, "Modern C	ontrol Er	ngineering", 5	<sup>th</sup> Edition, P	earson Educ	ation, New Delhi, 2019	
Reference(s								
							e Hall of India, 2018.	
							dent Edition, 2016	
							Control Systems"	
4. Gopa	I M. "Cont	rol System	Principle	s and Design	", 5 <sup>th</sup> Edition	, Tata McGra	aw-Hill, New Delhi,2020	

SDG No. 9

S. No	Systems and Their Representation	No. of Hours
1	Introduction to Control System: Open and Closed loop Systems Examples	2
1.1	Residential Heating System, Automobile Drive System, and Temperature Control System	1
1.2	Transfer function: Mathematical Model, Mechanical Model	2
1.3	Translational & Rotational Systems, Electrical Model, Block Diagram Reduction Techniques Signal flowGraph using Manson's Gain Rule	2
1.4	Signal flowGraph using Manson's Gain Rule	1
1.5	Simple problems.	1
	Time Response Analysis	•
2.1	Introduction, The Performance Specifications: Transient Response, Rise time, Peak time, Peak Overshoot, Settling time, Measure of performance of the Standard Second Order System	2
2.2	Steady State Response	1
2.3	Steady State Error Constants and System Type Numbers.	2
2.4	Types of Test Inputs: Step, Ramp, Parabolic, Impulse -First and Second Order System Response.	1
2.5	Feed Back Control System Characteristics: - Proportional, Integral, Derivative, PID Modes of Feedback Control.	
	Frequency Response Analysis	•
3.1	Introduction	2
3.2	The Performance Specifications in Frequency Domain	1
3.3	The Bode Plot	2
3.4	The Polar Plot	1
3.5	NicholsChart	2
3.6	Determination of closed loop response from open loop response	1
	Stability of Control Systems	
4.1	Introduction-Characteristic Equation, Location of Roots in S-plane for Stability.	2
4.2	Stability Criterion: Bounded inputBounded output Stability, Zero input Stability, Routh Hurwitz Criterion.	2
4.3	Root locus construction: Root locus Concept	1
4.4	Guidelines for Sketching Root Loci, Selected illustrative Root Loci-Gain Margin and Phase Margin.	2
4.5	Nyquist Stability Criterion	2
	Compensator Design and State space Analysis	. –
5.1	Performance criteria - Lag, Lead and Lag-Lead	1
5.2	Compensator design using Bode Plot- Lag and Lead Network	2
5.3	Compensator design using Bode Plot-Lag-Lead Network	1
5.4	Introduction to state space analysis	2
5.5	Simulation of First order system	2
	Total	45

# S.No. Link 1. https://archive.nptel.ac.in/courses/107/106/107106081/ Course Designers

Dr.M.Ravii@ksrct.ac.in

		Category	L	Т	Ρ	Credit
60 MC 503	Kinematics & Dynamics of Machines	PC	3	1	0	4

- To learn various mechanisms and find their velocity and acceleration.
- To compute the velocity and acceleration for simple mechanisms and able to construct cam profile.
- To determine gear ratio for simple, compound, reverted and epi cyclic gear train.
- To understand the function of flywheel and to determine basic parameters of flywheel
- To perform vibration analysis and balancing of engines.

#### Pre-requisite

**Engineering Mechanics** 

#### Course Outcomes

On the successful completion of the course, students will be able to

CO1	Create simple mechanisms based on the degrees of freedom	Remember, Understand
CO2	Design and analyze the velocity and acceleration of different mechanisms. the cam profile	Analyze
CO3	Solve and evaluate the kinematic aspects of gears and gear trains	Apply
CO4	Plot the turning moment diagram of crank rotation at various strokes and the process of providing continuous energy to the system	Analyze
CO5	analyze different types of vibrations and understanding of balancing of single and several masses in same or different planes	Analyze

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3								2	2	3
CO2	3	3	3	3	3							2	3	2
CO3	3	3	3	3								2	2	2
CO4	3	3	3	3								2	2	3
CO5	3	3	3	3								2	2	2
3- Stro	- Strong;2-Medium;1-Some													

#### **Assessment Pattern**

Bloom's Catagory	Continuous /	Assessment Tests (Marks)	End Sem
Bloom's Category	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

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		ŀ	Hours/We	ek		Credit	Ν	Maximum Mark	s	
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V		3	1	0	60	4	40	60	100	
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SDG No. 9

BoS Chairman

S.No	Торіс	No.of Hours
1	Simple Mechanism	
1.2	Introduction- Kinematic links, structure- comparison between machine and structure,	1
1.2	joints	I
1.3	Kinematic pairs- classification	1
1.4	Types of constrained motion. Kinematic chain-classification	2
1.5	Degrees of freedom – Kutzbach criterion,	2
1.6	Gruebler's criterion – Grashof's law	1
1.7	Mechanism - Inversions of four bar and slider crank chain – Mechanical advantage	2
1.8	Description of common mechanisms	1
1.9	Quick return mechanisms, Straight line generators, Universal Joint – rocker	2
	mechanisms	2
2	Kinematic Analysis of Linkages and CAM	
2.1	Displacement, velocity and acceleration analysis of simple mechanisms	1
2.2	Graphical method of velocity and acceleration diagram for four bar and slider crank	2
2.2	chain.	2
2.3	CAM – Classification of cams and follower	1
2.4	Radial cam nomenclature – analysis of follower motion	1
2.5	Uniform velocity, simple harmonic motion	2
2.6	Uniform acceleration & retardation	2
2.7	Cycloidal motion	1
2.8	Construction of cam profile for a radial cam	2
2.9	Introduction to kinematic analysis software packages	1
3	Gears and Gear Trains	
3.1	Gear tooth profiles	1
3.2	Gear tooth action	2
3.3	Interference and undercutting	2
3.4	Requirement of minimum number of teeth in gears	2
3.5	Gear trains	1
3.6	Simple and compound gear trains	2
3.7	Determination of speed and torque in epicyclic gear trains	2
4	Turning Moments and Flywheels	
4.1	Introduction	1
4.2	Turning moment diagram for a single cylinder double acting steam engine	1
4.3	Turning moment diagram for a four stroke internal combustion engine	2
4.4	Fluctuation of energy- determination of maximum fluctuation energy	1
4.5	Co-efficient of fluctuation of energy-	1
4.6	Flywheel: co-efficient of fluctuation of speed	2
4.7	Energy stored in a flywheel- Dimensions of the flywheel rim	2
4.8	Introduction to governors and gyroscope	2
5	Vibration and Balancing	
5.1	Free, forced and damped vibrations of single degree of freedom systems	2
5.2	Critical speed of shaft	1
5.3	Logarithmic decrement Force transmitted to supports	1
5.4	Static and dynamic balancing	2
5.5	Balancing of revolving masses masses	2
5.6	single and multi-cylinder engines.	2
5.7	Reciprocating masses - single cylinder engines	2
	Total	60
NPTE	EL Course Material	
S.No.	Link	

 1.
 https://www.youtube.com/watch?v=I8L6JQ GKQc&list=PL5KGb23FFL8eDGFRT7wK4cm6uwYwA7d04

 2.
 https://www.youtube.com/watch?v=TPlqvCg5xJ4&list=PLf-VAO7xqD8f1PdfkWG2tL56rAdBn2-\_1

#### **Course Designer**

Dr.P.Mohanram - mohanram@ksrct.ac.in

		Category	L	Т	Ρ	Credit
60 HS 003	TOTAL QUALITY MANAGEMENT	HS	3	0	0	3

- 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 • and their impact on the final product

#### **Course Outcomes**

#### On the successful completion of the course, students will be able to

CO1	Recognize the need for quality concepts and its application in organizations	Remember
CO2	Apply the TQM principles for survival and growth in world class competition	Understand
CO3	Apply the traditional tools and new tools for quality improvement.	Understand
CO4	Apply the tools and techniques like quality circle, QFD, TPM and FMEA for qualityimprovement.	Apply
CO5	Apply QMS and EMS in organizations	Apply

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			2	3	3	3	3	3		3		
CO2	3	2			2	3	3	3	3	3		3		
CO3		3				2	2			3				
CO4		3			3	2	2	3	2			3		
CO5	3				3	3		3	2	2				
3- Str	ona.5-	Medium	1.1-Son	ne										

3- Strong;2-Medium;1-Some

#### Assessment Pattern

Bloom's Category	Continuous Asse	End Sem								
Bioom s oategory	1	2	Examination(Marks)							
Remember (Re)	10	10	20							
Understand (Un)	20	20	40							
Apply (Ap)	30	30	40							
Create (Cr)	0	0	0							

		К.	S.Rangas	amy Coll	ege of Tecl	hnology –	Autonomous		R202
			60 HS	6 003- Tot	tal Quality	Manageme	nt		
_			Hours / W	eek		Credit		aximum Mark	1
Se	emester	L	Т	Р	Total hrs	С	CA	ES	Total
	V	3	0	0	45	3	40	60	100
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TQN mot app	ivation; Empo	leadershi werment; uous proc	ip, strateg Team and ess impro	jic qualit I Teamwo vement;	ork; Quality	circles, rec	councils- emp ognition and r 5S & 7S ; S	eward, perforr	mance
TQI The sect	M Manageme e seven traditi tor, Statistical	nt Tools a onal tools Fundamer ontrol char	and Techn of quality; ntals, Meas rts, proces	<b>iques</b> New ma sures of c	entral Tend	lency and D	lications to ma Pispersion, Pop Ima, Bench ma	ulation and Sa	ample,
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								Total	Hours 45
Тех	t Book(s):								
1.	Dale H.Beste 2020). ISBN			Quality Ma	anagement"	, Pearson E	ducation, Inc.2	2003. (Indian r	eprint
2	Janakiramar Ltd. 2016.	n, B and G	opal, R.K,	"Total Qu	ality Manag	ement – Te	ext and Cases"	, Prentice Hall	(India) Pvt.
Ref	erence(s):								
1.	James R. Ev 8th Edition, S	,		,	illiam M. Lin	idsay , "The	Management	and Control o	f Quality",
2.	Joel.E. Ross	s, <sup>«</sup> Total Qu	uality Mana	agement -	- Text and (	Cases", 3rd	Edition, Routle	edge, 2021.	
3.							ers", Wood He		s, 2019
4.				-			cepts and Task		



S.No	Торіс	No. of Hours
1	Introduction to Fundamentals of Total Quality Management	
1.1	Introduction and Definition of Quality	1
1.2	Need and evolution of quality	1
1.3	Different Dimensions of Quality	1
1.4	Basic concepts of TQM and TQM framework	1
1.5	Deming, Juran and Crosby Philosophy of quality Management	1
1.6	Barriers to TQM Implementation	1
1.7	Quality Statements, Strategic Planning	1
1.8	Customer focus, customer satisfaction customer retention Techniques	1
1.9	Techniques for Quality Costs	1
2	Total Quality Management Principles	
2.1	Total Quality Management Principles	1
2.2	Strategic of quality planning and Quality councils	1
2.3	Motivation, Empowerment, Teams, Recognition and Reward	1
2.4	Performance Appraisal, Benefits, Continuous Process Improvement	1
2.5	Juran Trilogy, PDSA Cycle Continuous Process Improvement	1
2.6	5S, Kaizen, Continuous Process and Supplier Partnership	1
2.7	Partnering, sourcing, Supplier Selection	1
2.8	Supplier Rating, Relationship Development,	1
2.9	Basic Concepts, Strategy, Performance Measure.	1
3	TQM Management Tools and Techniques	
3.1	The seven traditional management tools of quality	1
3.2	The New management tools	1
3.3	Management tools applications to manufacturing	1
3.4	Management tools applications to service sector	1
3.5	Statistical Fundamentals in management tools	1
3.6	Normal Curve, Control Charts for variables and attributes	1
3.7	Concepts of six sigma principles	1
3.8	Benchmarking tools and Reasons to benchmark	1
3.9	Benchmarking process tools	1
4	TQM Process based Tools and Techniques	
4.1	Quality circles	1
4.2	Quality Function Deployment (QFD	1
4.3	house of Quality, QFD Process	1
4.4	Benefits, Taguchi Quality Loss Function	1
4.5	Total Productive Maintenance (TPM	1
4.6	Concept, Improvement Needs	1
4.7	Performance measuring tools	1
4.8	stages, types of FMEA	1
4.9	Process implementation of FMEA	1

5	Quality Management System (QMS)	
5.1	Need for ISO 9000 and Other Quality Systems	1
5.2	Benefits of ISO Registration	1
5.3	Sector-Specific Standards in ISO 9001	1
5.4	AS 9100, TS16949 and TL 9000 - ISO 9001	1
5.5	Documentation and Internal Audits Requirements	1
5.6	Environmental Management System	1
5.7	ISO 14000 Series Standards	1
5.8	Concepts of ISO 14001Requirements	1
5.9	ISO 14001-Benefits of EMS	1
	Total	45

#### **Course Designers**

1. Dr.G.Mylsami

- mylsamig@ksrct.ac.in



		Categor	y L	Т	Ρ	Credit
60 MY 003	STARTUPS AND ENTREPRENEURSHIP	MY	2	0	0	-

- To provides practical proven tools for transforming an idea into a product or service that creates ٠ value for others.
- To build a winning strategy, how to shape a unique value proposition, prepare a business plan ٠
- To impart practical knowledge on business opportunities ٠
- To inculcate the habit of becoming entrepreneur
- To know the financing, growth and new venture & its problems ٠

#### Prerequisite

Basic knowledge of reading and writing in English.

#### **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Listen and comprehend Meaning and concept of Entrepreneurship	Understand
CO2	Identify the business opportunities and able prepare business plan	Analyze
CO3	Comprehend the process of innovation, incubation, prototyping and marketing	Understand
CO4	Executing a new venture through various financial resources	Apply
CO5	Grasp the managing growth and rewards in new venture	Understand

#### **Mapping with Programme Outcomes**

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	3	1	2	1		2	2		
CO2	2	3	3	2	2		2	2	2		2	2		
CO3	3	2	3	1	2				1	3	1	3		
CO4	3	3	3	3	3	2	2	1		1	3	3		
CO5	3	2	3	3	3			2			3	2		
3- Str	3- Strong 2-Medium 1-Some													

3- Strong;2-Medium;1-Some

#### Assessment Pattern

Dia amia Catanama	Continuous Asses	Case Study Report	
Bloom's Category	1 (25 Marks)	2 (25 Marks)	
Remember (Re)	10	10	
Apply (Ap)	20	20	50 Marks
Analyse (An)	30	30	
Create (Cr)	0	0	

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\*SDG 12 – Responsible Consumption and Production SDG 9 – Industry, Innovation and Infrastructure

S.No	Торіс	No. of Periods
1	Introduction to Entrepreneurship & Entrepreneur	
1.1	Meaning and concept of Entrepreneurship, the history of Entrepreneurship development,	1
1.2	Myths of Entrepreneurship, role of Entrepreneurship in Economic Development,	1
1.3	Agencies in Entrepreneurship Management and Future of Entrepreneurship.	1
1.4	The Entrepreneur: Meaning, the skills required to be an entrepreneur,	1
1.5	The entrepreneurial decision process	1
1.6	Role models	1
1.7	Mentors and Support system.	1
2	Business Opportunity Identification and Preparing a Business Plan	
2.1	Business ideas, methods of generating ideas	1
2.2	Opportunity recognition	1
2.3	Idea Generation Process	1
2.4	Feasibility study	1
2.5	Preparing a Business Plan	1
2.6	Meaning and significance of a business plan	1
2.7	Components of a business plan	1
3	Innovations	
3.1	Innovation and Creativity - Introduction, Innovation in Current. Environment	1
3.2	Types of Innovation, School of Innovation, Analyzing the Current Business Scenario	1
3.3	Challenges of Innovation, Steps of Innovation Management	1
3.4	Experimentationin Innovation Management, Participation for Innovation,	1
3.5	Co-creation for Innovation, Proto typing to Incubation.	1
3.6	Blue Ocean Strategy-I, Blue Ocean Strategy-II.	1
3.7	Marketing of Innovation, Technology Innovation Process	1
4	Financing and Launching the New Venture	
4.1	Importance of new venture financing, types of ownership,	1
4.2	Venture capital, types of debt securities	1
4.3	Determining idealdebt-equity mix, and financial institutions and banks.	1
4.4	Launching the New Venture	1
4.5	Choosing the legal form of new venture,	1
4.6	Protection of intellectual property	1
4.7	Formationof the new venture	1
5	Managing Growth and Rewards in New Venture	
5.1	Characteristics of high growth new ventures	1
5.2	Strategies for growth	1
5.3	Building the new ventures	1
5.4	Managing Rewards	1
5.5	Exit strategies for Entrepreneurs,	1
5.6	Mergers and Acquisition, Succession and exit strategy	1
5.7	Managing failures-bankruptcy.	1
	Total Hours	30

1. Dr.N.Tiruvenkadam - tiruvenkadam@ksrct.ac.in

BoS Chairman

60 MC 5P1	Microprocessors and	Category	L	Т	Ρ	Credit
	Microcontrollers Laboratory	PC	0	0	4	2

- To familiarize the architecture of 8085, 8086 Microprocessor and 8051 microcontrollers.
- To explore a basic knowledge of microprocessors and microcontrollers.
- To learn programming of microprocessors and microcontrollers.
- To design and develop interfacing concepts of microprocessors and microcontrollers.
- Ability to develop microprocessor and microcontroller based small applications.

#### Prerequisite

Theory of Machines

#### Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Perform the basic arithmetic operations using 8085 microprocessors by	Remember,
001	developing assembly language programs	Understand
CO2	Develop an assembly language program to convert hexadecimal to decimal and decimal to hexadecimal and also perform sorting using 8085.	Understand
CO3	Perform the basic programming operations using 8086 microprocessors.	Analyse
CO4	Perform the basic arithmetic operations using 8051 microcontrollers by developing assembly language programs	Apply
CO5	Demonstrate the interfacing of stepper motor and traffic light controller using 8051.	Apply

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3			3		3			3		2	3	2	2
CO2	3			3		3			3		2	3	2	2
CO3	3			3		3			3		2	3	2	2
CO4	3			3		3			3		2	3	3	2
CO5	3			3		3			3		2	3	3	2
3- Stron	ig;2-Me	dium;1	-Some											

				of Technology				R2022
	60 MC 5P	1 – Microp	processor	s and Microcor	ntrollers Lab	oratory		
				МСТ				
		Hours/Wee		Total hrs	Credit		Maximum Mar	ks
	L 0	T	P	<u> </u>	C	CA	ES 40	100
List of Exper	•	0	4	60	2	60	40	100
Programmin		5 Micropro	cessors					
•	-	•		, multiplication, o	division) usin	a 8085		
	•			, multiplication, t		y 0000		
2. Logical op	•	0	0		-			
3. Sorting nui	mbers in as	scending an	d descend	ling order of 808	35			
4. 8-bit decim	al to hexad	decimal con	version of	8085				
5. Hexadecim	nal number	to decimal	number co	onversion of 808	5			
Programmin	g with 808	6 Micropro	cessors					
6. Basic Prog	ramming w	/ith 8086 As	sembler					
Programmin	g with 805	1 Microco	ntrollers					
7. Arithmetic	operations	(addition, s	ubtraction,	, multiplication, o	division) usin	g 8051		
8. Stepper m	otor interfa	ce using 80	51					
9. Interface T	raffic light of	controller us	sing 8051					
10.ADC and D	DAC Interfa	се						
							Total Hours	60

SDG No. 8, 9

60 MC 5P2	Metrology and Dynamics	Category	L	т	Р	Credit
	laboratory	PC	0	0	4	2

- To be familiar with different measurement equipment's and quality inspection for industrial applications.
- Identify and use reference materials to ensure good quality, accurate, traceable measurement results.
- To study the principles of gyroscope, Cam and measurement of surface finish.
- To calculate the moment of inertia of connecting rod.
- To analyze the natural frequency of different types of vibrations.

#### Prerequisite

Theory of Machines

#### Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Describe the basic concepts of Metrology and Understand the measuring concepts of microscope.	Remember, Understand
CO2	Discriminate between various screws by measuring their taper angle and pitch.	Understand
CO3	Measure the surface finish by using autocollimeter	Analyse
CO4	Verify the laws of gyroscope and plot the profile of cam.	Apply
CO5	Evaluate the natural frequency of spring mass system and moment of inertia connectingrod.	Apply

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3			3		3			3		2	3	2	2
CO2	3			3		3			3		2	3	2	2
CO3	3			3		3			3		2	3	2	2
CO4	3			3		3			3		2	3	3	2
CO5	3			3		3			3		2	3	3	2
3- Stron	ig;2-Me	dium;1	-Some											

		K. S			e of Technolo				R2022
			60 MC	5P2- Metro	logy and Dyna MCT	amics labora	atory		
			Hours/Wee	k	Total hrs	Credit	ľ	Maximum Mark	s
-		L	T	P	101011113	C	CA	ES	Tota
	V	0	0	4	60	2	60	40	100
Introc	luction t	o metrolog	y and me	asurement					
1.	Calibrat	tion of micro	ometer usir	ng slip gaug	es.				
2.	a) Study	y of Tool M	akers Micro	oscope.					
	b) Meas	surement of	taper ang	e and pitch	by using tool r	naker's micro	oscope.		
3.	a) Study	y of Gear T	erminology	' <b>.</b>					
	b) Meas	surement of	various di	mensions o	f the given con	nponent using	g profile proje	ector.	
4.	Measur	ement of ta	per angle u	using sine b	ar.				
5.	a) Study	y of Screw	hread term	ninology.					
	b) Meas	surement of	major and	effective di	ameter of scre	w thread usir	ng 2 wire me	thods.	
6.	a) Stud	y of various	surface fir	nish measur	ement techniq	ues.			
	b) Mea	surement o	of surface f	atness by u	sing autocollin	nator.			
7.	Determ	ination of g	yroscopic c	ouple using	Motorized Gy	roscope.			
8.	Plot the	profile of c	am and stu	idy of jump	phenomenon.				
9.	Determ	ination of n	atural frequ	iency and c	ritical speed of	given shaft.			
10.	Determ	ination of n	atural frequ	iency of giv	en spring mass	s system.			
11.	Determ	ination of to	orsional free	quency of a	single rotor sy	stem.			
12.	Calcula	te the mom	ent of inert	ia of conne	cting rod by os	cillation meth	od.		
								Total Hours	60

SDG No. 9

#### K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE - 637215

#### (An Autonomous Institution affiliated to Anna University) B.E. / B.Tech. Degree Programme SCHEME OF EXAMINATIONS (For the candidates admitted from 2022 –2023 onwards) SIXTH SEMESTER

S.	Course		Duration of	Weighta	6	Minimum Marks for Pass in End Semester Exam		
No.	Code	Name of the Course	Internal Exam	Continuous Assessment*	End Semester Exam **	Max. Marks	End Semester Exam	Total
			THEC	DRY				
1	60 MC 601	Industrial Automation Controllers	2	40	60	100	45	100
2	60 MC 602	Machine Design	2	40	60	100	45	100
3	60 MC 603	Computer Aided Design and Manufacturing	2	40	60	100	45	100
4	60 MC E2*	Elective-II	2	40	60	100	45	100
5	60 MC E3*	Elective-III	2	40	60	100	45	100
6	60 MC L0*	Open Elective-III	2	40	60	100	45	100
			PRACT	ICAL				
8	60 MC 6P1	Computer Aided Manufacturing Laboratory	3	60	40	100	45	100
9	60 MC 6P2	Design Thinking and Industrial Automation Laboratory	3	60	40	100	45	100
10		Mini Project	3	100	-	100	-	-
11	60 CG 0P5							
	60 CG 0P6	Internship	-	-	-	-	-	-

\* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

\*\* End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60marks for the award of terminal examination marks



60 MC 601	Industrial Automation Controllers	Category	L	Т	Ρ	Credit
		PC	3	1	0	4

- 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.
- To familiarize the learners in data handling of PLC.
- To impart the knowledge of Supervisory Control and Data Acquisition (SCADA) System.
- To enable the students to troubleshoot and maintain the controller operation in industries.

#### Prerequisite

Sensors and Instrumentation, Industrial Drives and Control, Digital electronics and Microprocessors

#### **Course Outcomes**

#### On the successful completion of the course, students will be able to

CO1	Describe the main functional units in a PLC and its elements.	Remember, Understand and Apply
CO2	Develop ladder logic programming for industrial applications.	Analyze
CO3	Apply PLC data handling instructions for industrial automation	Understand, Apply
CO4	Implement the Supervisory Control and Data Acquisition systems for particular applications.	Analyze
CO5	Outline different industrial automation applications and troubleshooti procedure.	Remember, Apply

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	3	2	3	2				3	3	2	2	3	3
CO2	3	3	3	2	3								3	3
CO3	3	3	3	2	3	2					3	3	3	3
CO4	3	3	2	2	2			3					2	2
CO5	3	2	2	2	2		3				2	2	2	2
3- Stro	3- Strong;2-Medium;1-Some													

#### Assessment Pattern

Plaam'a Catagony	Continuous As	End Sem	
Bloom's Category	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyze	10	5	10
Evaluate	0	0	0
Create	0	0	0



		K	<u>. S. R</u> anga	samy Colle	ge of Technol	ogy – Autor	nomous		R2022
					strial Automati				
					МСТ				
Seme	ster						laximum Marl	s	
		L	Т	Р	Total Hrs	С	CA	ES	Tota
V		3	1	0	60	4	40	60	100
Introduc Principle Program	e operat nming de	equiremen ion – PL(	C Input &	Output mod	rial Automation dules –Selectic ler diagram, S	on criteria -	PLCs versu	s computers	-
PLC Pro – Bit log function	gic instru s – PLC	ng Symbol uctions – I C Timer &	adder diagi Counter fu	ram exampl nctions: ON	oolean logic & es, interlocking I-delay timer, C i counter, indu	, latching, i DFF-delay ti	nter depender mers, retentiv	ncy and logic e timers, puls	al se
Data me manipul	ove instr ation &c	onversion	functions -		IS, CLR, SWE ontrol and inte rograms				
Element mode F System	ts of SC Functions (DCS)	ADA-Func s-Tools: T - Introduc	tionalities o ag Databa tion, Flow	se-Recipe sheet symb	em rchitecture: Hai database- Alai ools, Architectu ial Ethernet, Pro	rm Logging- ire- HMI, [	Trends- Dist	ributed Contr ming- Differe	ol
PLC ma	aintenano – Diagno	ce – intern stic Circui	ts- troubles	al PLC fault nooting. Cas	s – programmo se Studies: Rob – Automatic co	ot controller	- FMS - Fac	tory automatio	
						То	tal Hours:45-	45/Tutorial)	
Text bo	ook(s):							FIS(TULONAL)	= 60 Hrs
								FIS(TULOHAI)	= 60 Hrs
1.   F	rank D.F	Petruzella "	Programma	Ible Logic C	ontroller", Tata				
2 N F	/I. P. Gro Pearson I		mation, Pro	-	ontroller", Tata stems and Corr	McGraw-Hill	Publication, 6	6 <sup>th</sup> Edition, 202	23.
2 N F Referen	/l. P. Gro Pearson I nce(s):	over, Auto Education,	omation, Pro UK, 2016.	oduction Sys	stems and Com	McGraw-Hill	Publication, 6	5 <sup>th</sup> Edition, 202 turing, Fourth	23. Edition,
2 N F Referen	/l. P. Gro Pearson I nce(s):	oover, Auto Education, advanovsk	omation, Pro UK, 2016.	oduction Sys		McGraw-Hill	Publication, 6	5 <sup>th</sup> Edition, 202 turing, Fourth	23. Edition,
2 N F Referen 1. F	A. P. Gro Pearson I I <b>ce(s):</b> Robert Ra Press, 20	oover, Auto Education, advanovsk 16.	umation, Pro UK, 2016. y, Jacob Bro	oduction Sys	stems and Com	McGraw-Hill oputer Integra	Publication, 6 ated Manufac ystems Securi	S <sup>th</sup> Edition, 202 turing, Fourth ty", 2 <sup>nd</sup> Editior	23. Edition, n, CRC
2 M Feferer 1. F 2. E	A. P. Gro Pearson I nce(s): Robert Ra Press, 20 E.A. Parr	oover, Auto Education, advanovsk 16. "Programr	mation, Pro UK, 2016. y, Jacob Bro nable Contr	oduction Sys odsky, "Han ollers An Er	stems and Com	McGraw-Hill puter Integra A/Control S , Elsevier P	Publication, 6 ated Manufac ystems Securi ublication, 3 <sup>rd</sup>	S <sup>th</sup> Edition, 202 turing, Fourth ty", 2 <sup>nd</sup> Editior Edition, 2017.	23. Edition, n, CRC

SDG No.4, 9



S.No	Торіс	No. of Hours
1	Fundamentals of PLC	
1.1	Introduction	1
1.2	Requirement	1
1.3	Architecture of Industrial Automation system	1
1.4	History & Architecture of PLC	1
1.5	Principle operation	1
1.6	PLC Input & Output modules	1
1.7	Selection criteria	1
1.8 1.9	PLCs versus computers, Programming devices PLC programming: Ladder diagram, STL, Functional block diagram, Sequential flow	1
•	chart, Instruction List	
2	PLC Programming	1
2.1 2.2	PLC Programming Symbols in ladder diagram	1
	Boolean logic & relay logic	-
2.3	Input and output field devices	1
2.4	Bit logic instructions, ladder diagram examples	1
2.5	Interlocking, latching, inter dependency and logical functions PLC Timer & Counter functions	1
2.6 2.7	ON-delay timer, OFF-delay timers, retentive timers, pulse timers, up-counter	
2.7	Down-counter and up/down counter,	1
2.0	Sequential flow chart, Instruction List	1
<u> </u>	Data Handling Functions	1
3.1	Data move instructions	1
3.2	FIFO & LIFO, FAL, ONS	2
3.3	CLR, SWEEP functions, Math instructions	1
3.4	Data manipulation & conversion functions	1
3.5	Program control and interrupts, SKIP and MCR functions	2
3.6	Jumps, subroutine, and sequence control relay	1
3.7	Simple programs	1
4	Supervisory Control and Data Acquisition System	-
4.1	Elements of SCADA	1
4.2	Functionalities of SCADA, Architecture	1
4.3	Hardware, Software, Development, Runtime mode Functions,	1
4.4	Tools, Tag Database	1
4.5	Recipe database, Alarm Logging, Trends	2
4.6	Distributed Control System (DCS) - Introduction	1
4.7	Flow sheet symbols, Architecture, HMI, DCS programming, Different Network protocols	1
4.8	ASI, CAN, Device net, Industrial Ethernet, Profibus – PA -DP -FMS, Fieldbus, HART	1
5	PLC Maintenance and Case Studies	
5.1	PLC maintenance	1
5.2	Internal & external PLC faults, programmed error	1
5.3	Watch dogs, Hardware safety circuits	1
5.4	Troubleshooting. Case Studies	1
5.5	Robot controller, FMS, Factory automation	1
5.6	Process control, Materials handling applications	2
5.7	Automatic control of power plant using SCADA	2
	Total	45
NPTE	- Course Material	
S.No.	Link	

S.No. Link

1. https://onlinecourses.nptel.ac.in/noc24\_ee56/preview
Course Designers

Mrs.V.Indumathi -indumathi@ksrct.ac.in


		Category	L	Т	Ρ	Credit
60 MC 602	Machine Design	PC	3	1	0	4

- To familiarize the various steps involved in the Design Process.
- 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 learn to use catalogues and standard machine components.
- To design the various machine components as per standards.

# Pre-requisite

Strength of Materials

# Course Outcomes

# On the successful completion of the course, students will be able to

CO1	Analyze stresses and dimensions in machine elements at various loa	Remember, Understand, Understand and Apply
CO2	Understand the design of shaft, couplings, keys and knuckle joint for different applications.	Analyze, Understand and Apply
CO3	Design and analyze the springs and gears	Remember, Understand, Analyze and Apply
CO4	Exhibit the design of bearings and connecting rod	Analyze, Understand and Apply
CO5	Understand the threaded fasteners and ability to design of welded joints.	Remember, Understand, Analyze and Apply

# Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	1	1	1	2		2		2	3	2	2	3
CO2	2	2	2	3	3		2		3		2		2	2
CO3	2	3	1	3	2	1		1		1		3	2	2
CO4	1	3	3	2	1		2	3		2	1	2	2	2
CO5	2	1	1	1	2	2	3				1	2	2	3
3- Stro	ng;2-M	ledium;	1-Some	Э										

Bloom's Cotogony	Continuous As	sessment Tests (Marks)	End Sem Examination
Bloom's Category	1	2	(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0



			K. S. Rang	jasamy Col	lege of Techn	ology – Aut	onomous		R2022
				60 MC	602 – Machin	e Design			
					МСТ				
			Hours/Wee		Total hrs	Credit		Maximum Ma	
Sen	nester	L	Т	Р		С	CA	ES	Total
	VI	3	1	0	60	4	40	60	100
Introd mech curve	luction to anical pro d beams	the design operties – I – crane ho	process - Direct, Ben ok and 'C'	iding and to frame - Fac	RS uencing machin prsional stress ctor of safety - an and Gerber	equations - theories of t	eccentric loa	ading – Desig	gn of
Desig	n of shaft		strength, ri	gidity and c n of knuckle	ritical speed – i joints.	Design of ke	eys – Types -	keyways - De	esign [09]
SPRI Spring – Cor	NGS AND gs –Type: ncentric to	D GEARS s of Springs prsion spring	, Design o js – Gears	f helical, lea , types, tern	if under consta ninologies-Des				[09]
Study Desig dimer	of bearin of journ of journ nsions – E	nal bearings Design of co	of bearin - Mckee -	gs – sliding s equation od. <b>`S</b>	contact and r – Lubrication i	n journal be	arings – calo	culation of be	aring [09]
	ided faste ided joint		gn of bolte	ed joints incl	uding eccentric	c loading – [	-	-	neory
Toyt	Book(s):						Total Ho	ours:45+15(T	utorial) = 6
1.	Juvinall	R.C, and M Edition,202		.M, "Funda	mentals of Ma	ichine Comp	oonent Desig	n", John Wild	ey & Sons,
2.	J. K Gup	ota and R.S	Khurmi, "	A Textbook	of Machine De	sign",Eurasi	a Publishing	House, 2019.	
Refer	ence(s):								
1.	Bhandar	i V.B, "Desi	gn of Mac	hine Elemer	nts", Tata McGi	raw-Hill Bool	k Co, 2008		
2.	Norton F	R.L, "Design	of Machir	iery", Tata N	/IcGraw-Hill Bo	ok Co, 2004			
3.	Orthweir	n W, "Machi	ne Compo	nent Desigr	n", Jaico Publis	hing Co, 200	)3.		
4.	Spotts M	1.F., Shoup	T.E, "Desi	gn and Mac	hine Elements	" Pearson Ec	ducation, 200	4	
5.	Design [	Data Book (	Of Enginee	rs By "PSG	College Kalaik	athir Achcha	agam", 2020.		

SDG No.4, 9



S.No	Торіс	No. of Hours
1	VARIABLE STRESSES IN MACHINE MEMBERS	
1.1	Introduction to the design process - factors influencing machine design, selection of	1
1.1	materials based on mechanical properties.	1
1.2	mechanical properties – Direct, Bending and torsional stress equations.	2
1.3	eccentric loading	1
1.4	Tutorial 1	2
1.5	Design of curved beams – crane hook and 'C' frame	1
1.6	Factor of safety - theories of failure	1
1.7	stress concentration, design for variable loading – Soderberg	1
1.8	Design for variable loading – Goodman relations.	2
1.9	Design for variable loading – Gerber relations.	1
1.10	Tutorial 2	2
2	SHAFTS AND COUPLINGS	
2.1	Design of solid shaft based on strength	1
2.2	Design of solid shaft based on rigidity	2
2.3	Design of solid shaft based on critical speed	1
2.4	Tutorial 3	2
2.5	Design of keys – Types - keyways	1
2.6	Design of rigid and flexible couplings	2
2.7	Design of knuckle joints.	2
2.8	Design of knuckle joints.	1
2.10	Tutorial 4	2
3	ELECTRICAL INSTALLATIONS	
3.1	Springs –Types of Springs, Design of helical	1
3.2	Design of helical spring	2
3.3	Design of leaf spring	1
3.4	Design of leaf spring	2
3.5	Tutorial 5	2
3.7	Concentric torsion springs	1
3.8	Gears, types, terminologies-Design of spur and helical gears	1
3.9	Gears, types, terminologies-Design of spur and helical gears	2
4	BEARINGS AND CONNECTING ROD	
4.1	Study of bearings, Design of bearings – sliding contact	2
4.2	Study of bearings, Design of bearings – sliding contact	1
4.3	Tutorial 6	2
4.4	Design of rolling contact types	1
4.5	Design of rolling contact types. Cubic mean load	2
4.6	Design of journal bearings, Mckees equation	1
4.7	Design of journal bearings, Mckees equation	2
4.8	Lubrication in journal bearings – calculation of bearing dimensions	1
4.9	Design of connecting rod	2
4.10	Tutorial 7	
5	FASTENERS AND WELDED JOINTS	
5.1	Threaded fasteners	1
5.2	Design of bolted joints including eccentric loading	2
5.3	Design of welded joints for pressure vessels and structures	1
5.4	theory of bonded joints	1
5.5	Tutorial 8	2
	Total	60

# **NPTEL Course Material**

SI.No	Link
1.	https://www.nptelvideos.com/lecture.php?id=15521
2.	https://www.nptelvideos.com/lecture.php?id=15552
3.	https://www.nptelvideos.com/lecture.php?id=15545
4.	https://nptel.ac.in/courses/112105125
5.	https://www.nptelvideos.com/lecture.php?id=15541
Cou	

#### Course Designers

Mr.R.Vivek - vivekr@ksrct.ac.in



60 MC 603	Computer Aided Design	Category	L	Т	Р	Credit
00 MC 003	and Manufacturing	PC	3	0	0	3

- To offer a sight into the utilization of computers in component design.
- To gain insight into the role of computer-aided design and analysis in the design process.
- To comprehend the fundamentals of pioneering manufacturing methodologies.
- To know the impressions of Part programming with computer assistance.
- To understand the Group Technology and Flexible Manufacturing System concepts.

#### Pre -requisites

Manufacturing Technology

#### **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Obtain an understanding of the stages within the product life cycle, as well as the principles of 2D and 3D transformations and the basics of CAD/CAM	Remember, Understand , Apply
CO2	Acquire knowledge regarding I/O devices, Boolean operations, and	Remember,
-	the concepts of Finite Element Analysis (FEA).	Understand, Apply
CO3	Comprehend and elucidate the principles governing the latest	Remember,
003	advancements in manufacturing machinery.	Understand, Apply
004	Utilize NC programming concepts to create part programs for both	Remember,
CO4	Lathe and Milling Machines	Understand, Apply
CO5	Enumerate the functions of computers in the context of Group	Remember,
005	Technology (GT) and Flexible Manufacturing Systems (FMS).	Understand, Apply

N	lapping	g with F	Program	mme O	utcome	es								
COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	3	2				2		3	3	2
CO2	2	3	3	2	2	2				3		3	2	2
CO3	2	2	2	2	3	2				2		2	3	2
CO4	2	3	2	3	3	2				3		3	2	2
CO5	2	3	3	2	3	2				2		2	2	3
3- Stro	ng;2-M	edium;	1-Some	Э										

Assessment Pa	ttern		
Pleam's Category	Continuous A	ssessment Tests (Marks)	End Sem Examination
Bloom's Category	1	2	(Marks)
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0
Total	60	60	100

		K							
		6	0 MC 603 - C	omputer	Aided Design	and Manufa	cturing		
0			Hours / Week		Tradition	Credit	Ma	ximum Marks	
Sem	ester -	L	Т	Р	Total Hrs	С	CA	ES	Total
١	/I	3	0	0	45	3	40	60	100
listo ts ap otatio	rical dev plication	ns in vario concatena	of CAD techn ous industries ation. Geometri	- Transfor ic modelli	roduct cycle, Do mations: 2D & ng: Wire frame es - advantages	3D transform modelling. S	ations - trans urface modell	lation, scaling,	[09]
ntrod pera Defini	ations - E ition - Ne	o Comput Boundary	representation S - OpenGL - I	n - Constr	d Output device uctive Solid Ge KF. Finite Elem	eometry- Com	parison. Grap	hics standard:	[09]
Defini Ipplic CAP IGV	ition of cations c P) - Typ - working	automatic of numeric oes of CA g principle	al control. Pro PP - Variant t	cess Plan ype, Gen efits. Conc	n, Definition of ning: Introducti erative type - a surrent Enginee	on - Compute advantages of	r Assisted Pro CAPP. AGV:	cess Planning Introduction -	[09]
ngin	eering -	need of C		01					
NC Nanu efere	Part Pro al part part po oolation -	ogrammir programm ints - NC - CNC pro	<b>ng</b> ning - coordina C dimensionin	ate systen g - G co	n - Datum poir odes and M c rogram - canne	codes - linea	r interpolatior	and circular	[09]
CNC Manu eferent nirron Group Group Syste	Part Pro ial part   ence po polation - ring - dri <b>p Techn</b> p Techn em, MICL poes - Fle	ogrammir programm ints - NC · CNC pro lling cycle nology an ology: Pa _ASS Sys exibility in	ng hing - coordina C dimensioning gram procedur - pocketing d Flexible Ma art families - F tem and CODI	ate system g - G co re - sub-p nufacturi Parts class E System	odes and M c rogram - canne	codes - linea ed cycles - sto coding - Codir facturing Syst	r interpolatior ck removal - t ng structure - em - FMS Co	n and circular hread cutting - Optiz Coding mponents and	
Anu efere nterp nirror Grou Grou Syste	Part Pro ial part   ence po polation - ring - dri <b>p Techn</b> p Techn em, MICL poes - Fle	ogrammir programm ints - NC · CNC pro lling cycle nology an ology: Pa _ASS Sys exibility in	ng hing - coordina c dimensioning gram procedue - pocketing d Flexible Ma art families - F tem and CODI FMS - FMS C	ate system g - G co re - sub-p nufacturi Parts class E System	odes and M c rogram - canne ng Systems sification and c . Flexible Manu	codes - linea ed cycles - sto coding - Codir facturing Syst	r interpolatior ck removal - t ng structure - em - FMS Co	n and circular hread cutting - Optiz Coding mponents and	
SINC Manuelerere hterphirron Groug Syste s typ tole	Part Pro ial part   ence po polation - ring - dri <b>p Techn</b> p Techn em, MICL poes - Fle	ogrammir programm ints - NC - CNC pro lling cycle nology an ology: Pa _ASS Sys exibility in CAM in In	ng hing - coordina c dimensioning gram procedue - pocketing d Flexible Ma art families - F tem and CODI FMS - FMS C	ate system g - G co re - sub-p nufacturi Parts class E System	odes and M c rogram - canne ng Systems sification and c . Flexible Manu	codes - linea ed cycles - sto coding - Codir facturing Syst	r interpolatior ck removal - t ng structure - em - FMS Co	n and circular hread cutting - Optiz Coding mponents and and Benefits -	[09]
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CNC Manu eferenterp nirrou Group Group Syste Sole Text 1.	Part Pro ial part   ence po polation - ring - dril p Techn p Techn em, MICL bes - Fle of CAD/0 Book(s P. N. Ra Mikell F	programmir programm orts - NC - CNC pro lling cycle nology an ology: Pa _ASS Sys exibility in CAM in In CAM in In ): ao - 'CAD	ng hing - coordina C dimensionin- gram procedur - pocketing d Flexible Ma art families - F tem and CODI FMS - FMS C dustry 4.0 D/CAM, Princip r and Emory V	ate system g - G co re - sub-p <b>nufacturi</b> Parts class E System ontrol - Fl oles and A	odes and M c rogram - canne ng Systems sification and c . Flexible Manu MS layout confi	codes - linea ed cycles - sto coding - Codin facturing Syst iguration - FM	r interpolatior ck removal - t ng structure - em - FMS Co S Application Hill Publishe shers - 2014	n and circular hread cutting - Optiz Coding mponents and and Benefits - <b>Total Hours</b> rs - 2017	[09]
CNC Manua eferenterp hirrou Group Gyste Syste Syste Syste Sole 1.	Part Pro ial part   ence po polation - ring - dril p Techn p Techn em, MICL bes - Fle of CAD/0 Book(s P. N. Ra Mikell F	pgrammir programm ints - NC - CNC pro lling cycle nology an ology: Pa _ASS Sys exibility in CAM in In CAM in In ): ao - 'CAD 2. Groove Koren - 'C	ng hing - coordina C dimensionin- gram procedur - pocketing d Flexible Ma art families - F tem and CODI FMS - FMS C dustry 4.0 D/CAM, Princip r and Emory V	ate system g - G co re - sub-p <b>nufacturi</b> Parts class E System ontrol - Fl oles and A	Applications' - <sup>-</sup>	codes - linea ed cycles - sto coding - Codin facturing Syst iguration - FM	r interpolatior ck removal - t ng structure - em - FMS Co S Application Hill Publishe shers - 2014	n and circular hread cutting - Optiz Coding mponents and and Benefits - <b>Total Hours</b> rs - 2017	[09]
CNC Manua efere interp interp inirrou Group Cyste s typ cole	Part Pro lal part   ence po polation - ring - dril p Techn p Techn em, MICL Des - Fle of CAD/0 Book(s P. N. Ra Mikell P Yoram I rence(s	pgrammir programm ints - NC - CNC pro lling cycle nology an ology: Pa _ASS Sys exibility in CAM in In CAM in In ): ao - 'CAD - Groove Koren - 'C	ng ning - coordina C dimensionin- gram procedur - pocketing d Flexible Ma art families - F tem and CODI FMS - FMS C dustry 4.0 D/CAM, Princip r and Emory V Computer Con	ate system g - G co re - sub-p <b>nufacturi</b> Parts class E System ontrol - Fl oles and A V. Zimme trol of Ma	Applications' - <sup>-</sup> anufacturing Systems	codes - linea ed cycles - sto coding - Codir facturing Syst iguration - FM Tata McGraw I' - PHI Publis ystems' - McG	r interpolatior ck removal - t ng structure - em - FMS Co S Application Hill Publisher shers - 2014 Graw Hill Publ	n and circular hread cutting - Optiz Coding mponents and and Benefits - <b>Total Hours</b> rs - 2017	[09]
CNC Manueferenterphirron Broug Broug Byste Syste Sole o Cext 1. 2 3. Referenter 3.	Part Pro lal part   ence po polation - ring - drii <b>p Techn</b> em, MICL Des - Fle of CAD/0 <b>Book(s</b> P. N. Ra Mikell P Yoram I rence(s	ogrammir programm ints - NC - CNC pro lling cycle nology an ology: Pa _ASS Sys exibility in CAM in In CAM in In ): ao - 'CAD P. Groove Koren - 'C ):	ng ning - coordina C dimensionin- gram procedur - pocketing d Flexible Ma art families - F tem and CODI FMS - FMS C dustry 4.0 D/CAM, Princip r and Emory V Computer Con an, S. Subrama	ate system g - G cc re - sub-p nufacturi Parts class E System ontrol - Fl oles and A V. Zimme trol of Ma	Applications' - <sup>-</sup> anufacturing Systems	codes - linea ed cycles - sto coding - Codir facturing Syst iguration - FM Tata McGraw I' - PHI Publis rstems' - McG	r interpolatior ck removal - t ng structure - em - FMS Co S Application Hill Publishe shers - 2014 Graw Hill Publ	n and circular hread cutting - Optiz Coding mponents and and Benefits - <b>Total Hours</b> rs - 2017 ishers - 2007.	[09] 45
CNC Manueferenterphirron Aroug Broug	Part Pro lal part   ence po polation - ring - dril p Techn em, MICL bes - Fle of CAD/0 Book(s P. N. Ra Mikell P Yoram I rence(s R. Radh Ibrahim 2009.	ogrammir programmi ints - NC - CNC pro lling cycle nology: Pa _ASS Sys exibility in CAM in In CAM in In ): ao - 'CAD 2. Groove Koren - 'C ): nakrishna Zeid and	ng ning - coordina C dimensionin- gram procedure - pocketing d Flexible Ma art families - F tem and CODI FMS - FMS C dustry 4.0 D/CAM, Princip r and Emory V Computer Con an, S. Subrama I R Sivasubrar	ate systen g - G co re - sub-p Parts class E System ontrol - Fl oles and A V. Zimme trol of Ma anian 'CA manian, "(	Applications' - <sup>-</sup> Applications' - <sup>-</sup> anufacturing Sy D/CAM/CIM', I	codes - linea ed cycles - sto coding - Codir facturing Syst iguration - FM Tata McGraw 1' - PHI Publis /stems' - McG New Age Inte eory and Prace	r interpolation ck removal - t og structure - em - FMS Co S Application Hill Publishe shers - 2014 Graw Hill Publ rnational Pvt.	n and circular hread cutting - Optiz Coding mponents and and Benefits - <b>Total Hours</b> rs - 2017 ishers - 2007. Ltd., 3 <sup>rd</sup> Editior	[09] 45

BoS Chairman

Cour	se Contents and Lecture Schedule	
S. No	Торіс	No. of Hours
1	Computer Aided Drawing	1
1.1	Historical development of CAD technology	1
1.2	Product cycle, Design process (Shigley model)	1
1.3	CAD and its applications in various industries	1
1.4	Transformations: 2D & 3D transformations – translation and scaling	1
1.5	Transformations: 2D & 3D transformations - rotation and concatenation	1
1.6	Geometric modelling: Wire frame modelling	1
1.7	Surface modelling - types of surfaces - applications	1
1.8	Solid modelling - Entities	1
1.9	Solid modelling - advantages and disadvantages	1
2	Computer Graphics	1
2.1	Introduction to Computer Graphics	1
2.2	Input and Output devices	1
2.3	Graphical input techniques	1
2.4	Boolean operations - Boundary representation	1
2.5	Constructive Solid Geometry	1
2.6	Graphics standard: Definition - Need - GKS	1
2.7	OpenGL - IGES - DXF	1
2.8	Finite Element Analysis: Introduction	1
2.9	Finite Element Analysis: Development - basic steps - advantages	1
3	Computer Aided Manufacturing	1
3.1	Definition of automation, types of automation	1
3.2	Definition of NC, basic components of NC system, applications of numerical control	1
3.3	Process Planning : Introduction - Computer Assisted Process Planning (CAPP)	1
3.4	Types of CAPP - Variant type,	1
3.5	Generative type - advantages of CAPP	1
3.6	AGV : Introduction - AGV - working principle - types - benefits	1
3.7	Concurrent Engineering : Definition	1
3.8	Sequential vs Concurrent engineering	1
3.9	Need of CE - benefits of CE	1
4	CNC Part Programming	1
4.1	Manual part programming - coordinate system	1
4.2	Datum points: machine zero, work zero, tool zero - reference points	1
4.3	NC dimensioning - G codes and M codes	1
4.4	Linear interpolation and circular interpolation	1
4.5	CNC program procedure - sub-program - canned cycles - stock removal	1
4.6	Thread Cutting	1
4.7	Mirroring	1
4.8	Drilling Cycle	1
4.9	Pocketing	1
5	Group Technology and Flexible Manufacturing Systems	1
5.1	Group Technology: Part families - Parts classification and coding	1
5.2	Coding structure - Optiz Coding System	1
5.3 5.4	MICLASS System and CODE System	1
5.4 5.5	Flexible Manufacturing System	<u> </u>
5.5 5.6	FMS Components and its types Flexibility in FMS - FMS Control	
5.6 5.7		1
	FMS layout configuration	1
5.8 5.9	FMS Application and Benefits Role of CAD/CAM in Industry 4.0	<u>1</u>
5.9	Total Hours	45
		40

# NPTEL Course Link

ĺ	S. No	Link
ĺ	1	https://archive.nptel.ac.in/courses/112/102/112102101/
ĺ	2	https://archive.nptel.ac.in/courses/112/102/112102102/
ĺ	3	https://archive.nptel.ac.in/courses/112/102/112102103/
ĺ	4	https://www.nptelvideos.com/course.php?id=782

Course Designers Dr. A.Ramesh Kumar - <u>rameshkumar@ksrct.ac.in</u>



	Computer Aided Manufacturing	Category	L	т	Р	Credit
60 MC 6P1	Laboratory	PC	0	0	4	2

- Imparting an understanding of the construction and operation of Computer Numerical Control (CNC) Machines.
- Familiarizing individuals with the interfacing, communication, and control of CNC machine tools.
- Providing foundational knowledge in CNC manual part programming.
- Equipping individuals with the skills needed to program CNC turning centers and CNC machining centers
- Facilitating hands-on experience in computer-assisted part programming.

#### Prerequisite

Manufacturing Technology Laboratory

#### **Course Outcomes**

On the successful completion of the course, students will be able to

CO1	Elaborate on the structure and functionality of CNC machine tools	Remember / Understand / Apply
CO2	Comprehend diverse aspects of CNC programming.	Remember / Understand / Apply
CO3	Create programs for producing components on CNC turning centers.	Remember / Understand / Apply
CO4	Develop programs for fabricating geometric components with CNC machining centers.	Remember / Understand / Apply
CO5	Grasp the generation of NC code from CAD models within CAM software.	Remember / Understand / Apply

#### Mapping with Programme Outcomes

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

Assessment Patt	ern		
Pleam's Category	Continuous As	ssessment Tests (Marks)	End Sem Examination
Bloom's Category	1	2	(Marks)
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0
Total	60	60	100

# List of Experiments

# **Exploration of CNC Machinery and Programming**

1. Study on CNC Lathe, CNC Milling operations and G-Codes and M-Codes

# **CNC Turning Operations**

- 2. Implementing Linear and Circular interpolation for step turning
- 3. Applying Contour Turning cycles to achieve taper turning
- 4. Utilizing Stock removal cycles for drilling and boring processes
- 5. Crafting a part program for grooving and thread cutting using canned cycles

#### **CNC Milling Techniques**

6. Developing a part program for drilling, tapping, and counter sinking with canned cycles

- 7. Generating a part program for contour milling using canned cycles
- 8. Creating part programs for drilling and peck drilling with the aid of canned cycles
- 9. Employing subprograms to achieve mirror imaging

# **Computer-Aided Part Programming**

10. Generating CL Data for a given component using CAM Software

# SDG No. 9

#### Virtual Lab Links

S. No	Link
1	http://vlabs.iitkgp.ac.in/cim/
2	http://vlabs.iitkgp.ernet.in/vlabs/rtvlab1/cadprg.html

#### **Course Designers**

#### Dr. A.Ramesh Kumar - rameshkumar@ksrct.ac.in



		Category	L	Т	Ρ	Credit
60 MC 6P2	Design Thinking and Industrial Automation Laboratory	PC	0	0	4	2

- To train the students to be familiar with the software and hardware of PLC using ladder logic codes.
- To familiarize the student to develop PLC programs for different applications.
- To facilitate knowledge on PLC Control Principles and Applications with Field Devices.
- To train the students to create ladder diagrams for process control descriptions.
- To impart knowledge on Configure communication between the PLC and PC.

#### Pre-requisite

Sensors and Instrumentation, Industrial Drives and Control, Digital Electronics and Microprocessors

# Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Write a PLC program for various industrial applications.	Remember, Understand and Apply
CO2	Control the speed of AC motors using VFD.	Analyze
CO3	Interface the sensors for flow, pressure and level monitoring and control in process industries	Understand, Apply
CO4	Design the of closed loop temperature controller	Analyze
CO5	Explore the concept of real-time monitoring and control using HMI	Remember, Apply

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	3				3	3	2	2	3	2
CO2	3	3	3	2	3								3	3
CO3	3	3	3	2	3	2	3				3	3	3	2
CO4	3	3	2	2	3			3					3	2
CO5	3	2	2	2	3						2	2	2	2
3- Stro	ong;2-N	ledium	;1-Son	ne										

Bloom's Category	Мс	del lab (Marks)	End Sem Practical
Bloom's Category	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyze	10	5	10
Evaluate	0	0	0
Create	0	0	0



					ege of Techn				R202
		60 MC	6P2- De	sign i nink	ing and Indus MCT	trial Automa	ation Labora	tory	
			Hours/Wee	ek	Total Hrs	Credit	Λ	/laximum Mar	ks
		L	T	P	101011113	C	CA	ES	Total
	VI	0	0	4	60	2	60	40	100
2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13	Demonstr Demonstr Simulation PLC contr Simulation Controllin Implement Demonstr Measuren	ation of cou ation of Ma n of Automa rol of electro n of Lift Elev g of a convo g and speed tation of wa ration of bat nent by mul	nt up and ster and Ju ting car pa p-pneumat vator syste eyor belt co d control of ter level co ch process ti touch po	count down ump control arking syste ic and elect m using PL ontrol using f AC motors ontrol syste s reactor co sition tracki		PLC. logic networ stems. rough PLC.			
								otal Hours	60
Text	book(s):								
1.	Frank D.	Petruzella '	Programm	hable Logic	Controller", Ta	ta McGraw-F	Hill Publication	n, 6 th Edition	, 2023.
2	Mrs.V.In	dumathi, " I	Design Thi	nking and li	ndustrial Auton	nation Labora	atory", KSRC	CT Lab manua	al ,2023
Refe	rence(s):								
1.		Radvanovsk ess, 2016.	y, Jacob B	rodsky, "Ha	andbook of SC/	ADA/Control	Systems Sec	urity", 2nd Ed	lition,
2.	E.A.Parr	"Programn	able Cont	rollers An E	ingineer's Guid	le", Elsevier l	Publication, 3	rd Edition, 20	017.
3.	Stuart A	Boyer, "SC	ADA Supe	ervisory Con	itrol and Data A	Acquisition",	ISA, 4 th Rev	ised Edition, 2	2018.
4.	Krishnak	ant, "Comp	uter based	Industrial	Control", PHI, N	New Delhi,5tl	hEdition, 2017	7.	
00	G No.9								

SDG No.9

		Category	L	Т	Ρ	Credit
60 MC E11	Mobile Robotics	PC	3	0	0	3

- To broaden the importance of Robot Locomotion
- To learn the knowledge of mobile Robot kinematics and dynamics
- To broaden the importance of GPS and sensors
- To enhance the knowledge about Localization, Planning and Navigation
- To make the student design, fabricate, motion planning, and control of intelligent mobile robotic systems

#### Prerequisite

#### **Robotics Engineering**

# Course Outcomes

# On the successful completion of the course, students will be able to

CO1	Discuss about the Robot Locomotion.	Remember, Understand and Apply
CO2	Differentiate the Kinematics and the Dynamics of Mobile Robots	Analyze
CO3	Illustrate the Sensors and GPS.	Understand
CO4	Describe about the Localization and Planning of Robots	Understand/Analyze
CO5	Summarize the knowledge on Navigation	Remember

# Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2										
CO1	3	3	2	2	2	1	1	1	2	2	1	1	2	3										
CO2	3	3	2	3	1	2	1	1	2	3	3	1	2	2										
CO3	3	3	3	3	1	1	1	1	2	1	1	1	2	2										
CO4	CO4         2         2         3         3         1         2         1         2         3         1         2         1         2         2         2													2										
CO5         3         3         2         1         1         2         1         1         1         1         2         1         2         3																								
3- Stro	ng;2-N	/ledium	;1-Son	ne										3- Strong;2-Medium;1-Some										

	Continuous As	End Sem Examination	
Bloom's Category	1	2	(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyze	10	5	10
Evaluate	0	0	0
Create	0	0	0

		K.S.Ran	gasamy	College of Tech	nology – Autonoi	mous		R2022
			60 I	MC E11 - Mobile	Robotics			
				МСТ				
Semester	н	lours / Wee	k	Total hrs	Credit	Max	imum Marks	5
	L	Т	Р	i otai ili s	С	CA	ES	Total
V	3	0	0	45	3	40	60	100
Robot locomo Types of loco controllability.	omotion,	hopping ro	bots, le	gged robots, w	heeled robots, st	tability, man	euverability,	[09]
Mobile robot Forward and ir	<b>kinematio</b> nverse kin	ematics, ho	lonomic a	and non-holonom of mobile robots.	ic constraints, kine	matic models	s of simple	[09]
	ots like glo	bal position	ing syste		formance measure r effect-based sen			[09]
				ntation, probabilis	stic mapping, Mark systems.	ov localizatio	n,	[09]
	algorithms	s based on /	Ā-star, Di		agrams, probabilis sses (MDP), stoch			[09]
- 0 0						То	tal Hours	45
Poter Co	art,I.R.No				NobileRobots',The	•		
<sup>2</sup> Advance	ed Robotic						<u>, , , , , , , , , , , , , , , , , , , </u>	
Reference(s):								
1. http://pla	nning.cs.u	uiuc.edu/)		<b>C</b>	ress,2016.(Availal			
					ITPress,Cambridg			
⊿ H.Chose	t,K.M.Lyn	ch,S.Hutchi	nson,G.K		n,Build,BlowTheirN ,L.E.Kavraki,andS .,2017		ciples of	Robot

SDG No.4, 9



S.No	Торіс	No.of Hours
1	Types of locomotion	2
1.1	hopping robots	1
1.2	legged robots	2
1.3	wheeled robots	2
1.4	stability, maneuverability	1
1.5	controllability.	1
2	Mobile robot kinematics and dynamics	
2.1	Forward and inverse kinematics	2
2.2	holonomic and nonholonomic constraints	1
2.3	kinematic models of simple car and legged robots	2
2.4	dynamics simulation of mobile robots	1
3	Perception	
3.1	Proprioceptive/ Exteroceptive and passive/active sensors	2
3.2	performance measures of sensors	1
3.3	sensors for mobile robots like global positioning system (GPS)	2
3.4	Doppler effect-based sensors	1
3.5	Doppler effect-based sensors, vision-based sensors	2
3.6	uncertainty in sensing, filtering	1
4	Localization	
4.1	Odometric position estimation	2
4.2	belief representation	2
4.3	probabilistic mapping	1
4.4	Markov localization, Bayesian localization	2
4.5	Kalman localization, positioning beacon systems.	2
5	Introduction to planning and navigation	
5.1	path planning algorithms based on A-star	1
5.2	Dijkstra, Voronoi diagrams	2
5.3	probabilistic roadmaps (PRM)	1
5.4	rapidly exploring random trees (RRT), Markov Decision Processes (MDP)	2
5.5	stochastic dynamic programming (SDP).	2
	Total	45

#### **NPTEL Course Material**

S.No.	Link
1.	https://archive.nptel.ac.in/courses/112/106/112106298/
Course I	Designers

Dr.M.Ravi - ravi@ksrct.ac.in



		Category	L	Т	Ρ	Credit
60 MC E12	Electric Vehicle	PE	3	0	0	3

- To understand the concept of electric vehicles.
- To study about the motors & drives for electric vehicles.
- To understand the concept of BMS.
- To understand the concept of hybrid vehicles.
- To study about fuel cell for electric vehicles.

#### Prerequisite

Industrial Drives and Control, Sensors and Instrumentation

#### Course Outcomes

# On the successful completion of the course, students will be able to

CO1	Understand about working principle of electric vehicles.	Understand
CO2	Understand the construction and working principle of various motors used in electric vehicles.	Understand
CO3	Understand about working principle of BMS	Understand
CO4	Analyze the different types and working principle of hybrid vehicles.	Analyze
CO5	Understand the various types and working principle of fuel cells.	Understand

# Mapping with Programme Outcomes

ap	ping m			-										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	2		2					2	1	2	
CO2	3	3	3	2				3			2	2	2	2
CO3	3	3	2	3		2				3	1	2	2	3
CO4	2	2		2	3			2			2	3		2
CO5	2	2	2	3	2	2					3	3	2	2
3- Stro	3- Strong;2-Medium;1-Some						•	•	•					

Bloom's Category	Continuous Asse	End Sem Examination (Marks)	
	1	2	
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0



		K	. S. Rang	jasamy Col	lege of Techn	ology – Aut	tonomous		R202
				60 MC	E12 - Electri	c Vehicle			
					МСТ				
		ŀ	lours/Wee	ek		Credit	Ν	/laximum Mar	(S
Sen	nester	L	Т	Р	Total hrs	С	CA	ES	Total
	V	3	0	0	45	3	40	60	100
Electi Contr	ric Vehic ols. Batte	eries – overv	d Emissio view and it	ts types. Bat	ric Vehicle Te ttery plug-in an ireless & Solar.	d life. Ultra-			
Elect Motor Serie	<b>ric Vehic</b> rs (DC, li s HEDT hanical C	<b>le Motors</b> nduction, BL (Electrical C	_DC) – Ty Coupling) ·	/pes, Princij – Power Ra	ple, Constructio ating Design, P Speed Coupli	on, Control. Peak Power	Source (PPS	5); Parallel HE	DT
Batte Need Charç	of BMS, ge (SoC)		ogy-BMS lealth (So	Controller a oH), Rule b	and BMS Com ased control a				
Hybri Serie	s, Paralle omy, Vib	c vehicles - el and Series	s-Parallel	Hybrid, Prop	cro, Mild, Full, pulsion system rid Electric Ve	s and comp	onents. Rege	nerative Braki	ng,
Fuel o Fuel Facto	cell – Intr and Oxions affect	dation Cons	echnologie sumption, design of	Fuel cell ( f fuel Cell )	Obstacles. Op Characteristics Vehicle and fr	- Efficienc	y, Durability,	Specific pov	/er,
								Total Ho	<b>JINS</b> 45
Text	Book(s)								
2	Electric	and Hybrid	Vehicles	Power Sc	, Taylor & Fran ources, Models /, Elsevier Publ	s, Sustainat		ucture and th	e Market
Refere	ence(s):								
	• • •	lectric Vehic	les – Tere	esa Donateo	, Published by	ExLi4EvA, 2	2017.		
	•	lectric Vehi	do Sveto	m Modelina	and Control	Weiliu (	General Moto		
	<u>30115, 111</u>	c., 2017.						15, USA, JUI	
3.	Jack Erja Cengage	c., 2017. avec and Je Learning P	eff Arias, vt. Ltd., N	"Alternative ew Delhi, 20	Fuel Technol	ogy – Elect	tric, Hybrid a	nd Fuel Cell	

SDG No.7, 9

BoS Chairman

S.No	Торіс		No.of Hours
1 I	INTRODUCTION to ELECTRIC VEHICLES		
1.1 E	Electric Vehicle		1
	Cost and Emissions		1
	Electric Vehicle Technology		1
	ayouts, cables, components, Controls		1
	Batteries		1
	overview and its types		1
	Battery plug-in and life		1
	Ultra-capacitor, Charging		1
	Methods and Standards.		1
	Alternate charging sources – Wireless & Solar.		1
	ELECTRIC VEHICLE MOTORS		
	Motors (DC, Induction, BLDC)		1
2.2	Types, Principle, Construction, Control		1
	Electric Drive Trains (EDT)		1
2.4 \$	Series HEDT (Electrical Coupling)		1
	Power Rating Design, Peak Power Source (PPS)		1
2.6 F	Parallel HEDT (Mechanical Coupling)		1
2.7	Torque Coupling and Speed Coupling.		1
2.8 \$	Switched Reluctance Motors (SRM) Drives		1
3 E	Battery Management System		
3.1	Need of BMS, BMS Topology		1
3.2 E	BMS Controller and BMS Communication system		2
3.3 (	Cell balancing		1
3.4 \$	State of Charge (SoC), State of Health (SoH)		1
3.5 F	Rule based control and optimization-based control		2
3.6 \$	Software-based high-level supervisory control.		1
4 H	HYBRID VEHICLES		
4.1 I	Hybrid Electric vehicles		1
4.2 (	Classification – Micro, Mild, Full, Plug-in, EV		1
4.3 L	Layout and Architecture		1
4.4 \$	Series, Parallel and Series-Parallel Hybrid		1
4.5 F	Propulsion systems and components		2
4.6 F	Regenerative Braking, Economy, Vibration and Noise reduction		1
4.7 H	Hybrid Electric Vehicles System		1
4.8 A	Analysis and its Types, Controls.		1
	FUEL CELLS FOR ELECTRIC VEHICLES		
5.1 F	Fuel cell		1
5.2 I	Introduction, Technologies & Types		1
	Fuel and Oxidation Consumption, Fuel cell Characteristics		1
	Efficiency, Durability, Specific power		1
	Factors affecting, Power design of fuel Cell Vehicle and freeze capacity		1
	Lifetime cost of Fuel cell Vehicle		1
	System, Components, maintenance.		1
		Total	45

Link

# S.No.

- https://onlinecourses.nptel.ac.in/noc22\_ee53

# **Course Designers**

1.

Mr.S.Hari Prasadh -hariprasadh@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC E13	Aircraft Mechatronics	PE	3	0	0	3

- To familiarize the basic concept on Aircraft Aerodynamics
- To facilitate the various types of aircraft propulsion and their uses
- To gain knowledge on navigation and guidance system of aircraft
- To provide exposure on the functions of various primary flight controls
- To familiarize the use of various applications of mechatronics in aviation

# Prerequisite

NIL

# Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recognize the Basics in aerodynamics, aircraft propulsion, materials and controls	Remember, Understand
CO2	Understand the various concepts used in aerodynamics	Understand
CO3	Apply the techniques to develop the aero system	Apply
CO4	Design the aircraft with the use of concepts in aerodynamics, aircraft propulsion, materials and controls	Analyze
CO5	Apply this aircraft system in various applications	Apply

# Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		2	2						2	1	3	2
CO2	3	3	3		3						2	2	2	2
CO3	3	3	2	3	2	2					1	2	3	2
CO4	2	2			3						2	3	2	2
CO5	2	2	2	3	2						3	3	2	2
3- Stro	3- Strong;2-Medium;1-Some													

Plaam'a Catagony	Continuous As	sessment Tests (Marks)	End Sem Examination
Bloom's Category	1	2	(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

K. S. Rangasamy College of Technology – Autonomous R2										
				60 MC E1	3 - Aircraft M	echatronics	;			
	МСТ									
Sen	nester		Hours/Wee	ek		Credit		Maximum Marks		
		L	Т	Р	Total hrs	С	CA	ES	Total	
	V	3	0	0	45	3	40	60	100	
<b>AIRCRAFT AERODYNAMICS</b> Types of wing plan forms, Aerodynamic features Aerofoil pressure distribution- Aerodynamic forces and moments Lift and Drag- Drag polar, L/D ratio, high lift devices, Airplane performance, Thrust/Power available, climb and glide – maximum range and endurance, take off and landings.									r	
								I		
NAVIGATION AND GUIDANCE SYSTEM OF AIRCRAFT         [I]           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.         –									; <b>[09]</b>	
Ailerc	ons – Aile		l System o	of a Comme der Control		Elevators -	- Elevator co	ontrol system of a	<b>[09]</b>	
Flaps contro	and Act	uator drive	unit-Pilot S avigation s	ystem-Unde	m-Fly by wire o			per-Primary fligh -Measurement o		
								Total Hour	<b>s</b> 45	
<b>Text</b> 1.	Book(s): Middleto Englanc	on, D.H., E	d., "Avionio	cs systems,	Longman Sci	entific and T	Fechnical", L	ongman Group	JK Ltd.,	
2	Pallet. E	.H.J., "Airc	raft Instrum	nents and Ir	tegrated Syste	ms", Pearsc	ons, Indian e	dition 2020.		
Refe	rence(s):									
1.	Spitzer,	C.R. "Digita	al Avionics	Systems",	Prentice-Hall, E	Englewood C	Cliffs, N.J.,U.	S.A. 2019.		
2.	2. Spitzer. C.R. "The Avionics Hand Book", CRC Press, 2019									
3.		/ Adamski, ublishers, 2		ts and powe	er supply syste	ms in UAV",	New Edition	n, Taylor and Fra	ncis	
4.					Logbook for D Edition, 2019.	rone Pilots &	& Operators"	, Create Space		

# SDG No.4, 9

BoS Chairman

S.No	Торіс	No.of Hours
1	AIRCRAFT AERODYNAMICS	
1.1	Nomenclature used in Aerodynamics	1
1.2	different parts of airplane	1
1.3	Wing as lifting surface	1
1.4	Aerodynamic features	1
1.5	Aerofoil pressure distribution	1
1.6	Aerodynamic forces and moments Lift and Drag	1
1.7	Drag polar, L/D ratio, high lift devices	1
1.8	Airplane performance, Thrust/Power available	1
1.9	climb and glide	1
1.10	maximum range and endurance, take off and landings	2
2	AIRCRAFT PROPULSION	
2.1	Requirement of power	1
2.2	various means of producing power	1
2.3	Brief description of thermo dynamics of engines	1
2.4	Piston engines, Jet engines	1
2.5	Airplane Structure, Materials and Production	1
2.6	Structural arrangement of earlier airplane	1
2.7	developments leading to all metal aircraft	1
2.8	Strength to weight ratio choice of aircraft materials for different parts.	2
3	NAVIGATION AND GUIDANCE SYSTEM OF AIRCRAFT	2
3.1	Flight Control System	1
3.2	Path planning- Way point Navigation system	2
3.3	Obstacle's avoidance Techniques	1
3.4	functional block of lateral and longitudinal guidance	1
3.5	GPS,GCS	2
3.6	Telementry	1
3.7	Transmitter & Receiver	1
<u> </u>	PRIMARY FLIGHT CONTROLS	- 1
	Ailerons	1
4.1		1
4.2	Aileron Control System of a Commercial Aircraft Elevators	1
4.3		1
4.4	Elevator control system of a commercial aircraft	1
4.5 <b>5</b>	Rudders- Rudder Control System	2
-	APPLICATIONS OF MECHATRONICS IN AVIATION	4
5.1	Flaps and Actuator drive unit	1
5.2	Pilot Static system	1
5.3	Fly by wire control system	1
5.4	Yaw damper	1
5.5	Primary flight control system	1
5.6	Internal navigation system	1
5.7	Under carriage-Measurement of motor rpm	1
5.9	Measurement of air flow velocity	1
5.10	Altitude measurement sensor-Air speed	2
	Total	45

S.No.	Link
1.	https://onlinecourses.nptel.ac.in/noc22_ae14/preview
Course	Designers

Mr.S.Hari Prasadh -hariprasadh@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC E14	Applied Materials Technology	PE	3	0	0	3

- To impart knowledge on the structure and properties of alloys.
- To understand heat treatment processes and hardening techniques.
- To acquire knowledge in ferrous and non-ferrous materials.
- To impart knowledge on Powder metallurgy processes and applications.
- To identity and select suitable characterization techniques for material testing.

#### Pre-requisite

NIL

# Course Outcomes

# On the successful completion of the course, students will be able to

CO1	Understand the various types of alloy structures using iron carbide equilibrium diagram andphase changes of various structures.	Remember
CO2	Identify heat treatment process for engineering applications and case hardening process -carburizing, nitriding and cyaniding.	Apply
CO3	Predict the effect of alloying additions on ferrous and non- ferrous metals.	Apply
CO4	Comply the properties of ceramic materials and powder metallurgy for engineeringapplications and production of different metal powders.	Apply
CO5	Utilize the mechanism of plastic deformation process, testing of mechanical properti andmetallographic procedures.	Apply

# Mapping with Programme Outcomes

COs	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3			2		2						3	2	2
CO2	3			2		2						3	2	3
CO3	3			2		2						3	2	2
CO4	3			2		2						3	2	3
CO5	3			2		2						3	2	2
3- Stro	3- Strong;2-Medium;1-Some													

Bloom's Category	Continuous As	sessment Tests (Marks)	End Sem
Bloom's Category	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

			K. S. Rang	asamy Co	llege of Techn	nology – Aut	onomous		R	R2022
					Applied Materia					
					МСТ					
Ser	nester		Hours/Wee	k		Credit		Maximum Mark	(S	
		L	Т	Р	Total hrs	С	CA	ES	Т	otal
	V	3	0	0	45	3	40	60	1(	00
Cons const	titution o	f alloys – <sup>i</sup> phase diag		tions, subs				grams, types a ctic, eutectoid a		[09]
Defin steel,	austem	ll annealing pering, ma	rtempering	- TTT dia		nability, jim		and tempering ench test – ca		[09]
Ferro Class stainl	bus and N sification of less and t	<b>Ion Ferrou</b> of steel and tool steels -	<b>s Metals</b> d cast iron- – HSLA - g	effect of a ray, white,	alloying additio	ns on steel oy cast irons	- copper a	Mo, V, Ti & W nd copper alloy ys.		[09]
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# SDG No.9

# NPTEL Course Material

S.No.	Link
1.	https://archive.nptel.ac.in/courses/113/106/113106032/
2.	https://nptel.ac.in/courses/113105024
Course	Designers

#### Course Designers

Dr.M.Baskaran -baskaranm@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC E15	DESIGN OF EXPERIMENTS	PC	3	0	0	3

- To impart knowledge on various types of experimental designs conduct of experiments
- To understand the different data analysis techniques
- To Understand the importance of Design of Experiments
- Be able to allocate observations using Single Factor Experiments
- To Learn the factorial design of experiments

#### Prerequisite

**Operations Research** 

# Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply experimental techniques to practical problems to improve quality of processes	Understand	
CO2	Analyze the variance and apply the single factor variance	Analyze	
CO3	Learn the factorial design of experiments	Apply	
CO4	Design and learn Special Experimental Design	Analyze	
CO5	Focuses on design efficient, reliable products using Taguchi method.	Analyze	

# Mapping with Programme Outcomes

COs	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3								2	3	3
CO2	3	3	3	3	3							2	3	3
CO3	3	3	3	3								2	3	3
CO4	3	3	3	3								2	3	3
CO5	3	3	3	3								2	3	3
3- Str	ong;2-l	Vedium	n;1-Son	ne										

Bloom's Cotogony	Continuous As	End Sem	
Bloom's Category	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

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				60 MC E1	5-Design of Ex	periments			
					МСТ				
50	maatar	Н	lours/Wee	k	Total bra	Credit	Ν	/laximum Marks	
	mester	L	Т	Р	Total hrs	С	CA	ES	Total
	V	3	0	0	45	3	40	60	100
Hypoth Experir principl	nesis test mentatior les of des l and half	n – need, C sign, steps i	e mean, t Conventior n experime	wo means, nal test stra entation. m	ategies, Analys arket-standard	is of varian design ana	ce, F-test, te lysis – choice	fidence intervals erminology, basic e of sample size - ng using Analysis	; (09)
Comple of mod Newma	etely Rar lel param an-Keuel	eters, residu 's test, Fishe	esign- effe uals analys er's LSD te	sis- treatme st, Tukey's	nt comparison r	methods-Du	ncan's multip	cking- estimation le range test, d Block Design –	(09)
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# SDG No.9

BoS Chairman

S.No	Торіс	No.of Hours
1	FUNDAMENTALS OF EXPERIMENTAL DESIGNS	
1.1	Hypothesis testing – single mean, two means, dependant/ correlated samples	1
1.2	Confidence Intervals	1
1.3	Experimentation – need, Conventional test strategies	1
1.4	Analysis of variance, F-test, terminology	1
1.5	Basic principles of design, steps in experimentation	1
1.6	Market-standard design analysis	1
1.7	Coice of sample size	1
1.8	Normal and half normal probability	1
1.9	Simple linear and multiple linear regression testing using Analysis of variance	1
2	SINGLE FACTOR EXPERIMENTS	
2.1	Completely Randomized Design- effect of coding the observations-	1
2.2	model adequacy checking- estimation of model parameters	1
2.3	Residuals analysis- treatment comparison methods	1
2.4	Duncan's multiple range test,	1
2.5	Newman-Keuel's test	1
2.6	Fisher's LSD test, Tukey's test-testing using contrasts-	1
2.7	Randomized Block Design	1
2.8	Latin Square Design	1
2.9	Graeco Latin Square Design – Applications.	1
3	FACTORIAL DESIGNS	
3.1	Main and Interaction effects	1
3.2	Two and three factor full factorial designs	1
3.3	Fixed effects and random effects model	1
3.4	Rule for sum of squares and Expected Mean Squares	1
3.5	2K Design with two and three factors	1
3.6	Yate's Algorithm	1
3.7	Fitting regression model	1
3.8	Randomized Block Factorial Design - Practical applications	2
4	SPECIAL EXPERIMENTAL DESIGN	
4.1	Blocking and Confounding in 2K Designs	1
4.2	Blocking in replicated design- 2K Factorial Design in two blocks	1
4.3	Complete and partial confounding	1
4.4	Confounding 2K Design in four blocks	1
4.5	Two level Fractional Factorial Designs	1
4.6	One-half fraction of 2K Design	1
4.7	Design resolution,	1
4.8	Construction of one-half fraction with highest design resolution	1
4.9	One-quarter fraction of 2K Design	1
5	TAGUCHI METHODS	
5.1	Design of experiments using Orthogonal Arrays	2
5.2	Data analysis from Orthogonal experiments-Response Graph Method	2
5.3	ANOVA- attribute data analysis	1
5.4	Robust design	1
5.5	noise factors, Signal to noise ratios,	1
5.6	Inner/outer OA design	2
	Total	45

S.No.	Link
1.	https://www.youtube.com/watch?v=KhjM8YI3agk
2.	https://www.youtube.com/watch?v=p0iUVADJwHk

# **Course Designers**

Dr.P.Mohanram - mohanram@ksrct.ac.in

		Category	L	Т	Ρ	Credit
60 MC E16	Automation in Process Industries	PE	3	0	0	3

- To introduce the importance of automation techniques manufacturing and process industries.
- To impart the role of PLC in industry automation. •
- To expose to various sensors employed in process automation. •
- To develop safety and control strategies in automation system. •
- To expose to various control techniques employed in process automation using PLC •

#### Prerequisite

NIL

# **Course Outcomes**

On the	On the successful completion of the course, students will be able to								
CO1	Understand automation techniques manufacturing and process	Remember, Understa							
COI	industries.	and Apply							
CO2	Understand the automated material handling equipment	Analyze							
CO3	Apply various control sensors employed in process automation.	Understand							
CO4	Develop the safety and control strategies in industrial standard	Understand/Analyze							
CO5	Understand various control techniques employed in process automati	Understand/Apply							
005	using IOT.	Understand/Apply							

# Mapping with Programme Outcomes

	•													
COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	1	1	2	2	1	1	3	2
CO2	3	3	2	3	1	2	1	1	2	3	3	1	2	2
CO3	3	3	3	3	1	1	1	1	2	1	1	1	3	2
CO4	2	2	3	3	1	2	1	2	3	1	2	1	2	2
CO5	3	3	2	1	1	2	1	1	1	1	2	1	2	2
3- Stro	ng;2-N	ledium	;1-Som	ie										

Bloom's Category	Continuous A	End Sem Examination			
	1	2	(Marks)		
Remember	10	20	30		
Understand	20	25	30		
Apply	20	10	30		
Analyse	10	5	10		
Evaluate	0	0	0		
Create	0	0	0		

		K. S. Ra	ngasam	y College of Teo	hnology – Autor	nomous		R2022
		60	MC E16	- Automation in	Process Industrie	es		
				MCT				
Semester	Н	lours / Wee	k	Total hrs	Credit	Ма	ximum Mark	s
	L	Т	Р		С	CA	ES	Total
V	3	0	0	45	3	40	60	100
Automation in	n Manufac	turing Indus	tries					
					d strategies of aut			[00]
					els of automations			[09]
transfer med buffers.	nanisms,	Analysis of	transfel	r lines without s	storage, Automat	ed flow line	s with stora	
Material han	dlina							
		identificatio	n techno	logies -Overview	of material hand	dling systems	s, Types of	
					eyor system, Au			[09]
		storage an	d retriev	/el systems, li	nterfacing handli	ng and sto	orage with	
manufacturin								
Sensors and				-			( )	[00]
					Selection and (			[09]
Safety and c					s and Actuators in	T CONITOT Sys	sterns	
					Safety Standards	s-Cvbersecur	rity in Industr	
					Systems (ICS)- A			[09]
					d Control-Batch			
Control-Optin	nization Te	echniques ir						
Industrial Au		-						
					mbling, Feeding,	Metalworking	g, materials	[09]
handling and	plastics w	orking appli	cation wi	th IoT.		Τ.		45
Text Book(	<u></u>					10	otal Hours	45
MPCr		tomation Pr	oduction	Systems and Co	omputer Integrate	d Manufactu	rina" 5 th Edi	ition
	n Educatio		ouucion	Systems and Co				luon,
John M	. Webb ar	nd Ronald A	Reis. "F	Programmable Lo	ogic Controllers: F	Principles and	Applications	s". 5th
		Hall Inc., Ne			- <u>-</u>			,
Reference(s		,						
			ess Con	trol Instrumenta	tion Technology	", 8th Editi	ion, Pearsor	ר New
Internat	ional, 201							
<sup>2.</sup> Edition,	2009.				eling of Automate		0,	1s″, 1st
					of Things", Apres			
4. Lucas M	/I.P, Distrik	outed Contro	ol System	ns, Van Nostrand	Reinhold Compa	any, Newyork	k, 2007.	

SDG No.4, 9

BoS Chairman

S.No	Торіс	No.of Hours
1	Automation in production system	2
1.1	Principles and strategies of automation	1
1.2	Basic elements of an automated system	2
1.3	Advanced automation functions, Levels of automations	2
1.4	Automated flow lines and transfer mechanisms	1
1.5	Analysis of transfer lines without storage, Automated flow lines with storage buffers.	1
	Material handling	
2.1	Material handling and identification technologies	2
2.2	Overview of material handling systems	1
2.3	Types of material handling equipment, Design of the system	2
2.4	Conveyor system, Automated guided vehicle system, Automated storage systems	2
2.5	Interfacing handling and storage with manufacturing ,Overview of Automatic Identification Methods	2
	Sensors and Actuators in Process Automation	
3.1	Types of Sensors	1
3.2	Temperature, Pressure, Flow, Level sensors	2
3.3	Selection and Calibration of Sensors	2
3.4	Actuators: Motors, Valves, and Drives	2
3.5	Integration of Sensors	1
3.6	Actuators in Control Systems	1
	Safety and control Strategies in Automation	
4.1	Safety Instrumented Systems (SIS)	2
4.2	Risk Assessment and Safety Standards, Cybersecurity in Industrial Automation	2
4.3	Best Practices for Securing Industrial Control Systems (ICS).	1
4.4	Advanced Control Strategies (PID, Model Predictive Control), Cascade and Feedforward Control	2
4.5	Batch Processing and Sequential Control, Optimization Techniques in Industrial Processes	2
	Industrial Automation in IoT	
5.1	Press and Fork lift control using IoT	1
5.2	Fluid powered Assembling	2
5.3	Feeding, Metalworking	2
5.4	materials handling	2
5.5	Plastics working application with IoT	2
	Total	45

# **NPTEL Course Material**

S.No.	Link	
1.	https://nptel.ac.in/courses/108105063	

# **Course Designers**

Dr.M.Ravi - ravi@ksrct.ac.in

BoS Chairman

		Category	L	Т	Р	Credit
60 MC E21	AGRICULTURAL ROBOTICS AND AUTOMATION	PE	3	0	0	3

- Recognize the areas in agricultural process where robotics can be applied.
- Integrate sensor and system for a required specific process in agricultural applications.
- Apply Mechanics to the design various robot parameters
- Convert various mechanisms into robot by providing actuation at specific links and joints of the mechanism.
- Develop suitable robotic system for specific agricultural tasks.

#### Course Outcomes

# On the successful completion of the course, students will be able to

CO1	Know the basics of automation in agriculture.	Remember,
COT	Know the basics of automation in agriculture.	Understand
CO2	Recognize the concepts of Precision agricultural systems and trends	Understand
CO3	understand importance of automation in Irrigation systems	Understand
CO4	Realize the various Automation Practices in agriculture through case studies	Understand
CO5	Apply concepts in material handling and packaging industries	Apply

# Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	<b>PO</b> 8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	1	1	2	2	1	1	3	2
CO2	3	3	2	3	1	2	1	1	2	3	3	1	2	2
CO3	3	3	3	3	1	1	1	1	2	1	1	1	3	2
CO4	2	2	3	3	1	2	1	2	3	1	2	1	2	3
CO5	3	3	2	1	1	2	1	1	1	1	2	1	3	3
3- Stro	3- Strong;2-Medium;1-Some													

Plaam'a Catagony	Continuous As	End Sem Examination	
Bloom's Category	1	2	(Marks)
Remember	30	20	30
Understand	30	20	50
Apply	0	20	20
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

		K.S.Ran	gasamy	College of Tech	nology – Autono	mous		R2022	
		60 MC	E21 - A	gricultural Robo	tics and Automat	tion			
				МСТ					
Semester	н	lours / Wee	k	Total hrs	Credit	Maximum Marks			
	L	Т	Р	Total III's	С	CA	ES	Total	
VI	3	0	0	45	3	40	60	100	
Introduction									
					nd Related Mach		ge- Planting	[09]	
		ing-Agricultu	ral Auton	nation – Agricultu	ral Vehicle Robot.				
Precision Ag									
					ning System (GPS			[09]	
					PS- Military GPS-	Geographic	Information	[00]	
		Applications	and Con	troller Area Netwo	orks.				
Traction and									
Hitching- Prin	ciples of h	itching- Typ	es of hitc	hes- Hitching an	d weight transfer-	Control of hi	itches- Tires	[09]	
				id sheet- Soil Cor	mpaction- Traction	Aids- I racto	or Lesting.		
Soil Tillage a				· · · · · · · · · · · · · · · · · · ·	la Deufeureau e	• <b>f T</b> :			
					ols – Performance			[09	
Rotation- Mec			eu mana	agement – Conv	entional Cropping	Systems-	Tools- Crop		
Robotics and			ation						
				n sorting and ha	cking-Climate con	tral evetame	-Automation		
					of greenhouse ei			[09	
practices in co					or greenhouse ei	IVII OF ITTE ITTS	Sustainable		
		minorinente	•			т	otal Hours	45	
Text Book(s	):					•		10	
	/	Carroll E. C	oerina. F	Roger P. Rohrbac	h, Dennis R. Buck	master, "En	aineerina Prin	ciples	
				ication, 2019.	,		g	0.0.00	
					undamentals and	Practices", C	CRC Press, 20	016.	
Reference(s)		,	0			,	,		
		of John Billi ral Science,		obotics and Auto	mation for Improv	ving Agricultu	ure, Burleigh	Dodds	
Stenhen				'Automation: The	Future of Weed	Control in (	Cropping Svs	tems"	
<sup>2</sup> . Springer	, Dordreck	ht Heidelber	g New Yo	ork London, 2014					
		Bainer, E.L	. Barger,	"Principles of Fa	arm Machinery", 3	<sup>rd</sup> Edition, Cl	BS Publishers	s, New	
<sup>0.</sup> Delhi, 20	)15.								

SDG No. 9 & 12

BoS Chairman

S.No	Торіс	No. of Hours
1	History of Mechanized Agriculture	2
1.1	Farming Operations and Related Machines	1
1.2	Tillage	2
1.3	Planting Cultivation and Harvesting	2
1.4	Agricultural Automation	1
1.5	Agricultural Vehicle Robot.	
	Precision Agriculture	
2.1	Sensors, types and agricultural applications	2
2.2	Global Positioning System (GPS)	1
2.3	GPS for civilian use- Differential GPS, Carrier, phase GPS, Real-time kinematic GPS, Military GPS	2
2.4	Geographic Information System	1
2.5	Variable Rate Applications and Controller Area Networks	
	Traction and Testing	
3.1	Hitching, Principles of hitching, Types of hitches	2
3.2	Hitching and weight transfer	1
3.3	Control of hitches, Tires and Traction models	2
3.4	Traction predictor spread sheet	1
3.5	Soil Compaction, Traction Aids	2
3.6	Tractor Testing	1
	Soil Tillage and Weed Management	
4.1	Tillage Methods and Equipment	2
4.2	Mechanics of Tillage Tools ,Performance of Tillage Implements ,Hitching of Tillage Implements	2
4.3	Weed Management	1
4.4	Conventional Cropping Systems, Tools	2
4.5	Crop Rotation ,Mechanical Cultivation.	2
	Robotics and Greenhouse Automation	•
5.1	Robotic applications in tasks such as pruning, sorting, and packing	2
5.2	Climate control systems	1
5.3	Automation of irrigation and nutrient delivery.	1
5.4	Monitoring and control of greenhouse environments	2
5.5	Sustainable practices in controlled environments	2
	Total	45

# NPTEL Course Material

S.No	Link
1.	https://www.youtube.com/watch?v=-
	NINgz6KQTA&list=PLOSWwFV98rfLAVnU2DJq8xO1LuFw6SXEa

# **Course Designers**

Dr.M.Ravi - ravi@ksrct.ac.in

BoS Chairman

		Category	L	Т	Р	Credit
60 MC E22	DESIGN OF TRANSMISSION SYSTEMS	PE	3	0	0	3

- To learn about the and design process for mechanical power transmission components.
- To understand the standard procedure available for Design of Transmission of Mechanical elements
- To learn to use standard data and catalogues.
- To select and design drive systems for a wide variety of driven loads to a
- given performance specification.
- To design a power transmission component with quality assurance.

# Prerequisite

#### NIL

# Course Outcomes

# On the successful completion of the course, students will be able to

CO1	Understand and apply the concepts of design to belts, chains and rope	Understand and
	drives.	apply
CO2	Understand and apply the concepts of design to spur, helical gears.	Understand and
		apply
CO3	Understand and apply the concepts of design to worm and bevel gears.	Understand and
		apply
CO4	Understand and apply the concepts of design to gear boxes.	Understand and
		apply
CO5	Understand and apply the concepts of design to cams, brakes and clutch	Understand and
		apply

# Mapping with Programme Outcomes

COs	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3										3	3
CO2	2	2	3										3	3
CO3	2	2	3			2							3	3
CO4	2	2	3										3	3
CO5	2	2	3										3	3
3- Str	ong;2-l	Medium	n;1-Son	ne										

Bloom's Category	Continuous	Assessment Tests (Marks)	End Sem Examinatio		
	1	2	(Marks)		
Remember	10	10	10		
Understand	20	20	20		
Apply	30	30	60		
Analyse	-	-	10		
Evaluate	-	-	-		
Create	-	-	-		

BoS Chairman

		K	.S. Rang	asamy C <mark>olle</mark>	ege of Techno	logy – Auto	onomous		<u>R2</u> (	022
			60 I	MC E22 - De	sign of Transr	mission Sy	stems			
					МСТ					
Se	mester		Hours/We	ek		Credit		Maximum Mar	ks	
		L	Т	Р	Total hrs	С	CA	ES	Tota	
		3	0	0	45	3	40	60	100	
Desig	gn of Flat		ulleys - So		belts and pulle rockets.	eys – Select	tion of hoistin	g wire ropes a		09]
Spee Facto wear	d ratios a or of safet	nd number y - Gear ma ations – Pre	of teeth-F aterials –	Design of st	L GEARS s -Tooth stress raight tooth sp rmal and trans	ur & helical	gears based	l on strength a	th -	09]
<b>BEV</b> Straig the d	EL, WORI ght bevel ( imensions demerits t	<b>W AND CRO</b> gear: Tooth s of pair of s terminology	terminolo traight be Therma	evel gears. H I capacity, n	ces and stresse lerringbone gea naterials-forces	ars and Hyp and stress	oid gears. W ses, efficienc	orm Gear: Me y, estimating	ing rits the	09]
cross	s helical ge	ears. ball &			minology-helix	angles-Estil	mating the s	ize of the pair		
cross GEA Geor gear Spee	helical ge <b>R BOXES</b> netric prog box - Des d reducer	ears. ball & gression - S sign of mul	Screw me Standard s ti speed g ariable sp	echanisms step ratio - I gear box for eed gear bo	Ray diagram, k machine tool ox, Fluid Coup	kinematics la applications	ayout -Design - Constant	n of sliding me mesh gear bo	esh ix -	09]
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SDG No.9

BoS Chairman -----

S.No	Торіс	No.of Hours
1	DESIGN OF FLEXIBLE ELEMENTS	
1.1	Design of Flat belts	1
1.2	Design of pulleys	1
1.3	Selection of V belts and pulleys	1
1.4	Selection of pulleys	1
1.5	Selection of hoisting wire ropes	2
1.6	Design of Transmission chains	2
1.7	Design of Sprockets.	1
2	SPUR GEARS AND PARALLEL AXIS HELICAL GEARS	
2.1	Speed ratios and number of teeth-Force analysis	2
2.2	Tooth stresses - Dynamic effects	1
2.3	Fatigue strength - Factor of safety	1
2.4	Design of straight tooth spur & helical gears based on strength and wear considerations	2
2.5	Pressure angle in the normal and transverse plane	1
2.6	Equivalent number of teeth-forces for helical gears.	2
3	BEVEL, WORM AND CROSS HELICAL GEARS	
3.1	Straight bevel gear: Tooth terminology, tooth forces and stresses	2
3.2	Estimating the dimensions of pair of straight bevel gears.	1
3.3	Herringbone gears and Hypoid gears	1
3.4	Worm Gear: Merits and demerits terminology, materials-forces and stresses	2
3.5	Cross helical: Terminology-helix angles	1
3.6	Estimating the size of the pair of cross helical gears	1
3.7	ball & screw mechanisms	1
4	GEAR BOXES	
4.1	Geometric progression - Standard step ratio	1
4.2	Ray diagram, kinematics layout	1
4.3	Design of sliding mesh gear box	1
4.4	Design of multi speed gear box for machine tool applications	2
4.5	Constant mesh gear box - Speed reducer unit.	1
4.6	Variable speed gear box, Fluid Couplings	1
4.7	Torque Converters for automotive applications	1
4.8	gearboxes in vehicles	1
5	CAMS, CLUTCHES AND BRAKES	
	Cam Design: Types-pressure angle and under cutting base circle determination	2
5.2	forces and surface stresses	1
5.3	Design of plate clutches –axial clutches-cone clutches	1
5.4	Internal expanding rim clutches- Electromagnetic clutches.	2
5.5	Braking methods - advantages & disadvantages	1
5.6	Band and Block brakes	1
5.7	external shoe brakes – Internal expanding shoe brake	1
	Total	45

# **NPTEL Course Material**

S.No.	Link
1.	onlinecourses.nptel.ac.in/noc24_me71/preview

# **Course Designers**

Dr.R.Senthilmurugan-senthilmurugan@ksrct.ac.in

BoS Chairman ÷

		Category	L	Т	Ρ	Credit
60 MC E23	Navigation and Communication System	PE	3	0	0	3

- To familiarize the basic concept on inertial navigation systems
- To facilitate the various types of radio navigation & satellite navigation and their uses
- To gain knowledge on navigation system and guidance system of aircraft
- To provide exposure on the functions of various aircraft communication systems
- To familiarize the use of various principles of weather radar system and DME

# Prerequisite

NIL

# Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the advanced concepts of Aircraft Navigation	Understand
CO2	Understand the necessary mathematical knowledge those are needed in modeling the navigation process and methods.	Understand
CO3	Apply exposure on various Navigation systems such as Inertial Measurement systems, Radio Navigation Systems, Satellite Navigation and GPS	Apply
CO4	Design Landing aids and will be able to deploy these skills effectively in the analysis and understanding of navigation systems in an aircraft.	Analyze
CO5	Apply the principles of Radar and its related components.	Apply

# Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		2			2				2	1	2	3
CO2	3	3					3				2	2	2	2
CO3	3	3	2	3		2					1	2	2	2
CO4	2	2									2	3	2	3
CO5	2	2	2	3							3	3	2	2
3- Stro	3- Strong;2-Medium;1-Some													

Bloom's Category	Continuous As	End Sem	
	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0



					llege of Techr				R2022
			60 MC E2	23 - Navig	ation and Cor	nmunicatio	n System		
					МСТ				
			Hours/Wee	k		Credit		Maximum Marks	
Ser	nester	L	Т	Р	Total hrs	С	CA	ES	Total
	VI	3	0	0	45	3	40	60	100
Intro	duction to		– Types IN		ents- transfer fu and Strap dowr			n in inertial space	[09]
Diffe	rent types	of radio r	navigation-					gations -LORAN	[09]
NAV Fund conc	IGATION amentals epts of Na	<b>CONCEPT</b> of navigat avigation –	<b>S</b> ion system The Earth	ns and Pos n in inertial	sition Fixing – I space – Diff	Categories erent Coorc	s of navigat linate Syster	ion – Geometric ns – Coordinate on – quaternior	
Basic Desc comr	cs of aird ription, Pr nunication	craft comr inciple, Op system.		system-typ VHF Comn				nication system High Frequency	
TCAS	S, ATC tra	nsponders,	Weather F	Radar Syste	em, Radio Altim	eter, Arinc (	Communicati	on & reporting.	
								Total Hour	<b>s</b> 45
<b>Text</b> 1.			ommunicati Iland, 2022		"Aircraft Com	munications	s and Naviga	tion systems",Lo	ongman
2	Paul. D. House, 2		inciples of	GNSS, Iner	tial, and Multi	sensor Integ	rated Naviga	tion Systems Ar	
		.020.		,	,	0		mon Systems, Ai	tech
Refe	rence(s):	.020.							tech
Refe	( )				d guidance, Sp			• · ·	tech
1. 2.	Maxwell Albert D.	Noton, Spa	acecraft nav	vigation and	l guidance, Sp pnics, Second I	ringer (Lond Edition, Prer	on, New Yor ntice Hall Ca	k), 2015 reer & Technolog	y, 2016
1.	Maxwell Albert D. Albert He	Noton, Spa . Helfrick, N elfrick, Prac	acecraft nav Iodern Avia ctical Aircra	vigation and ation Electro ft Electronic	d guidance, Sp onics, Second I c Systems, Pre	ringer (Lond Edition, Prer ntice Hall E	on, New Yor ntice Hall Ca ducation, Ca	k), 2015	y, 2016

SDG No.9

S.No	Торіс	No.of Hours
1	AIRCRAFT AERODYNAMICS	
1.1	Introduction to navigation	1
1.2	Types INS components	1
1.3	transfer function and errors	1
1.4	Earth in inertial space	2
1.5	Coriolis Effect	1
1.6	INS Mechanization. Platform and Strap down	2
1.7	Navigation algorithms	1
2	AIRCRAFT PROPULSION	
2.1	Different types of radio navigation	1
2.2	ADF, VOR, DME& Doppler	1
2.3	Hyperbolic Navigations	2
2.4	LORAN, DECCA and Omega	1
2.5	Introduction to GPS, system description	2
2.6	,Basic principles	1
3	NAVIGATION AND GUIDANCE SYSTEM OF AIRCRAFT	
3.1	Fundamentals of navigation systems and Position Fixing	1
3.2	Categories of navigation	2
3.3	Geometric concepts of Navigation	1
3.4	The Earth in inertial space	2
3.5	Different Coordinate Systems	2
3.6	Telementry Coordinate Transformation & Euler angle formulations	1
3.7	direction cosine matrices formulation & quaternion formulation	2
4	AIRCRAFT COMMUNICATION SYSTEMS	
4.1	Basics of aircraft communication system	2
4.2	Types Very High Frequency Communication system	1
4.3	Description, Principle, Operation of VHF Communication system	2
4.4	layout on aircraft.	1
4.5	High Frequency communication system	2
5	WEATHER RADAR SYSTEM AND DME	
5.1	TCAS	1
5.2	ATC transponders	1
5.3	Weather Radar System	2
5.4	Radio Altimeter	1
5.5	Arinc Communication & reporting,	2
	Total	45

Mr.S.Hari Prasadh -hariprasadh@ksrct.ac.in

# NPTEL Course Material

S.No.	Link
1.	https://nptel.ac.in/courses/101104330
2.	https://archive.nptel.ac.in/courses/117/105/117105131/

BoS Chairman
	Category	<b>-</b>	1	P	Credit
60 MC E24 Non-Destructive Testing	PE	3	0	0	3

- To learn the fundamentals of NDT Techniques
- To understand the basic principles of various NDT methods
- To be aware of applications and limitations of the NDT techniques
- To know the different type of service and process defects.
- To learn the NDT method(s) best suited to evaluate the manufactured products.

#### Pre-requisite

NIL

## Course Outcomes

### On the successful completion of the course, students will be able to

CO1	Understand the fundamentals of NDT techniques and testing equipment.	Remember
CO2	Understand the eddy current testing procedures for non-destructive testing	Apply
CO3	Apply principles of magnetism to investigate the service and processing defects	Apply
CO4	Select appropriate radiographic techniques and X-Rays for evaluation	Apply
CO5	Utilize ultrasonic testing as an NDT technique to investigate defects.	Apply

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3					2	2	2				3	2	2
CO2	3					2	2	2				3	2	2
CO3	3					2	2	2				3	2	2
CO4	3					2	2	2				3	2	2
CO5	3					2	2	2				3	2	2
- Strong	g;2-Me	dium;1·	Some											

Bloom's Cotonom	Continuous As	Continuous Assessment Tests (Marks)					
Bloom's Category	1	2	Examination(Marks)				
Remember	10	20	30				
Understand	20	25	30				
Apply	20	10	30				
Analyse	10	5	10				
Evaluate	0	0	0				
Create	0	0	0				

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					Non Destruc						
					МСТ						
Sen	nester		Hours/Wee	ek	Total hrs	Credit	Ν	Aaximum Mark	S		
		L	Т	P C CA				C CA ES I			
	VI	3	0	0	45	3	40	60	100 [ <b>09]</b>		
Visual Inspection and Liquid Penetrant Testing Introduction to Non Destructive Testing (NDT), scope and advantages of NDT, Comparison of NDT and Destructive testing (DT), classifications of NDT. Equipment used for visual inspection -Magnifying Glass, Magnifying Mirror, Microscope, Borescope and Endoscope. Liquid Penetration Testing: Introduction, Principle, Procedures, Hazards Precautions, Advantages, Limitations and Applications											
Princi Resp	onse-Mate	ddy Curre	ctivity, Pei		ges, Disadvan Frequency, Ge				's		
Princi Testir	iple of Ma ng Equipr	nent and Te	icle Testin sting Proc		methods to ge ethods of De-N andards.						
Radio radio	graphic in	rinciple-Ele	ection star		n Sources- X-r echniques – N				[09]		
Princi Ultras	sonic Tes	eration, Typ ting Technic	ques. Met	hod for Eva	pagation- Ultra aluating Disco bes, rails and d	ntinuities -	Applications i	in inspection			
_								Total Hou	<b>rs</b> 45		
Text	Book(s):			<b>D</b>							
1.		d, C G K N on Private L			Testing and	Evaluation (	of Materials",	Tata McGraw	Hill		
2	Prakash Edition,2		destructive	e Testing T	echniques", N	ew Age Inte	ernational pu	blishers, 1 <sup>st</sup> R	evised		
Refe	rence(s):										
1.		Raj, Jayaku New Delhi,3	,		M, "Practical N	on Destructi	ve Testing", N	larosa Publish	ing		
2.		n Society fo dition, Meta			ctive Evaluatio	on and Quali	ity Control" : N	Metals Hand B	ook, Vol.		
3.	Paul E M 2005.	1ix, Wiley, ʻ	Introductio	on to Nonde	structive Testir	ng: A Trainin	ig Guide", 2 <sup>nd</sup>	Edition New Jo	ersey,		
4.	Y. Kong, investiga	C.J. Benne ation of frett	ett, C.J. Hy ing fatigue	/de, "A Revi e cracks ", N	ew of Non-Des Materials and D	structive Tes Design, Vol.	ting Techniqu 196, Elsevier,	es for the in-si 2020.	tu		

SDG No.9, 12

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

S.No	Торіс	No. of Hours
1	Visual Inspection and Liquid Penetrant Testing	
1.1	Introduction to Non Destructive Testing (NDT), scope and advantages of NDT	1
1.2	Comparison of NDT and Destructive testing (DT)	1
1.3	Classifications of NDT, Equipment used for visual inspection	2
1.4	Magnifying Glass, Magnifying Mirror,	1
1.5	Microscope, Borescope and Endoscope.	1
1.6	Liquid Penetration Testing:	1
1.7	Introduction, Principle, Procedures, Hazards Precautions, Advantages, Limitations	2
1.7	and Applications.	2
2	Eddy Current Testing	
2.1	Principle of Eddy Current Testing	1
2.2	Advantages, Disadvantages	1
2.3	Factors affecting Eddy Current Response	2
2.4	Material Conductivity, Permeability	1
2.5	Frequency, Geometry and Proximity (Lift off)	2
2.6	Faraday's Law - Lenz's law	1
2.7	Types of Probes	1
3	Magnetic Particle Testing	
3.1	Principle of Magnetic Particle Testing	1
3.2	Different methods to generate magnetic fields	1
3.3	Magnetic Particle Testing Equipment and Testing Procedures	2
3.4	Methods of De-Magnetization	1
3.5	Magnetic Particle Medium	1
3.6	Evaluation of test indications and Acceptance Standards.	2
4	Radiographic Testing	
4.1	Radiography Principle	1
4.2	Electromagnetic Radiation Sources	1
4.3	X-ray films, exposure	1
4.4	Penetrometer radiographic imaging	2
4.5	inspection standards and techniques	1
4.6	Neutron radiography	1
4.7	Radiography applications	1
4.8	limitations and safety.	1
5	Ultrasonic Testing	
5.1	Principle of operation	1
5.2	Types of Ultrasonic Propagation	1
5.3	Ultrasonic probes - Ultrasonic Transducers	1
5.4	Ultrasonic Testing Techniques	2
5.5	Method for Evaluating Discontinuities	1
5.6	Applications in inspection of castings, forgings, Extruded steel parts	2
5.7	Bars, pipes, rails and dimensions measurements	1
0.1	Total	45

## Course Designers

Dr.M.Baskaran -baskaram@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC E25	Optimization Techniques	PE	3	0	0	3

- To impart knowledge about Operations Research techniques and enable students to take effective engineering and managerial decisions
- To equip students to find the optimum solution for transportation problems and assignment problems
- To train students to apply simulation techniques to solve Inventory and queuing problems
- To train students to apply Operations Research techniques for the effective utilization of available resources in engineering and business
- To impart knowledge about network models and train students to apply these concepts to solve the real world problems

### Pre-requisite

## **Statistics and Numerical method**

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Form the Linear Programming models and solve them.	Remember, Understan and Apply
CO2	Apply transportation models and Assignment models to solve real world problems.	Apply
CO3	Apply Inventory models to solve inventory problems	Understand
CO4	Apply Queuing models to solve problems and analyze them using simulation techniques	Apply
CO5	Construct Networks and find optimum solution	Apply

## Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		2							3	2	3	
CO2	3	2	3	2							3	2	2	
CO3	3	3	3	3							2	3		3
CO4	2	3	3	3								3		2
CO5	2	2		2							3	2	3	
3- Stro	ng;2-M	edium;1	1-Some											

Plaam'a Catanami	Continuous As	End Sem	
Bloom's Category	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	45
Apply	20	10	30
Analyse	10	5	15
Evaluate	0	0	0
Create	0	0	0

		K	K. S. Rang	asamy Coll	ege of Techno	ology – Auto	onomous		R202
			5	50 MC E25 -	<b>Optimization</b>	Technique	S		
					МСТ				
			Hours/Wee	ek	Tatal Una	Credit		Maximum Ma	arks
5	Semester	L	Т	Р	Total Hrs	С	CA	ES	Total
	VI	3	0	0	45	3	40	60	100
Optin	nization te		definition, F	Phases & M	odels, Mathem hod - Introducti			ar programmi	ng – <b>[09]</b>
Tran: Prod	uction pro	problems-	signment p		balanced TP- Hungarian me				
Type (EOC	ג) - Purcha	tory models ase and Pro	duction m	odels withou	terministic Inve ut shortages - [	Determinatio	on of buffer s		
				inventory -	Introduction to	Stochastic I	nventory.		
<b>Que</b> u Queu distri	u <b>ing Theo</b> uing syste bution and	<b>ry and Sim</b> m - termii d exponen	nulation nologies c tial distrib	of queuing ution –Sing	Introduction to problem - ap gle server que oplications of si	plications o euing mode	f queuing r ls – Simula	ation - Need	for
Queu distrii simu Netw Short cons	uing Theo uing syste bution and lation – Ac vork Mode test route truction – I	ry and Sim m - termin d exponen dvantages, ls and Pro model- M Network log	nologies c tial distrib disadvanta <b>ject Mana</b> /inimal sp gic - Fulker	of queuing ution –Sing ages and ap <b>gement</b> anning tree rson's rule -	problem - ap gle server que	plications o euing mode imulation - F aximum flow Aethod (CPN	f queuing r ls – Simula Random num w model – /) and Projec	ation - Need ber generation Project net	sson I for on – [09] work
Queu Queu distrii simu Netw Shor cons Revie	uing Theo uing syste bution and lation – Ac vork Mode test route truction – I ew Technic	ry and Sim m - termin d exponen dvantages, ls and Pro model- M Network log	nologies c tial distrib disadvanta <b>ject Mana</b> /inimal sp gic - Fulker	of queuing ution –Sing ages and ap <b>gement</b> anning tree rson's rule -	problem - ap gle server que oplications of si e model - Ma Critical Path M	plications o euing mode imulation - F aximum flow Aethod (CPN	f queuing r ls – Simula Random num w model – /) and Projec	ation - Need ber generation Project net	sson   for on – <b>[09]</b> work and
Queu distril simu Netw Shor cons Revie	uing Theo uing syste bution and lation – Ac vork Mode test route truction – I ew Technic Book(s): Hamdy A	ry and Sim m - termin d exponen dvantages, ls and Pro model- M Network log que (PERT)	nologies c tial distrib disadvanta <b>ject Mana</b> linimal sp gic - Fulker ) – Probabi	of queuing ution –Sing ages and ap <b>gement</b> anning tree rson's rule - ility of comp	problem - ap gle server que oplications of si e model - Ma Critical Path M	plications o euing mode imulation - F aximum flow Aethod (CPN in a schedu	f queuing r ls – Simula Random num w model – /) and Project led date	ation - Need aber generation Project net ct Evaluation <b>Total H</b> e	sson l for on – [09] work and ours 45
Queu distril simu Netw Short cons Revie	uing Theo uing syste bution and lation – Ac vork Mode test route truction – I ew Technic Book(s): Hamdy A Pvt. Ltd.	ry and Sim m - termin d exponen dvantages, ils and Pro model- M Network log que (PERT) A. Taha, "O , New Delhi	initian initia	of queuing ution –Sing ages and ap gement banning tree rson's rule - ility of comp esearch - A	problem - ap gle server que oplications of si e model - Ma Critical Path M leting a project	plications o euing mode imulation - F aximum flow Aethod (CPN in a schedu	f queuing r ls – Simula Random num w model – /) and Project led date Pearson Ind	ation - Need ber generation Project network ct Evaluation <b>Total He</b> ia Education	sson     for   on –   work   and   ours   45 Services
Queu distril simu Netw Short cons Revie Text 1.	uing Theo uing syste bution and lation – Ac <b>vork Mode</b> test route truction – I ew Technic Book(s): Hamdy A Pvt. Ltd. Panneer	ry and Sim m - termin d exponen dvantages, ils and Pro model- M Network log que (PERT) A. Taha, "O , New Delhi	initian initia	of queuing ution –Sing ages and ap gement banning tree rson's rule - ility of comp esearch - A	problem - ap gle server que oplications of si e model - Ma Critical Path M leting a project n Introduction",	plications o euing mode imulation - F aximum flow Aethod (CPN in a schedu	f queuing r ls – Simula Random num w model – /) and Project led date Pearson Ind	ation - Need ber generation Project network ct Evaluation <b>Total He</b> ia Education	sson     for   on –   work   and   ours   45 Services
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Queu distrii simu Netw Short cons Revie Text 1. 2 Refe	uing Theo uing syste bution and lation – Ac vork Mode test route truction – I ew Technic Book(s): Hamdy A Pvt. Ltd. Panneer 2016. erence(s): Wayne I 2003 Inc	ry and Sim m - termin d exponen dvantages, ils and Pro model- M Network log que (PERT) A. Taha, "O , New Delhi selvam, R., L. Winston, dia Private I	individual distribution disadvanta ject Mana finimal sp gic - Fulker ) – Probabi peration R i, 2019. , "Operation Limited, Ne	of queuing ution –Sing ages and ap gement vanning tree rson's rule - ility of comp esearch - A ns Research ns Research ew Delhi, 20	problem - ap gle server que oplications of si e model - Ma Critical Path M leting a project n Introduction", h" 2 <sup>nd</sup> Edition, F	plications o euing mode imulation - F aximum flow Aethod (CPN in a schedu 9 <sup>th</sup> Edition, Prentice Hall s and Algorit	f queuing r ls – Simula Random num w model – /) and Project led date Pearson Ind of India Priv hms", 4 <sup>th</sup> Edi	ation - Need ber generation Project network ct Evaluation <b>Total He</b> ia Education rate Ltd, New tion, Cengag	sson for for for for and for an and for an and for an and for an
Queu distrii simu Netw Short cons Revie 1. 2 <b>Refe</b> 1.	uing Theo uing syste bution and lation – Ac vork Mode test route truction – I ew Technic Book(s): Book(s): Hamdy A Pvt. Ltd. Panneer 2016. erence(s): Wayne I 2003 Inc Perm Ku	ry and Sim m - termin d exponen dvantages, is and Pro model- M Network log que (PERT) A. Taha, "O , New Delhi selvam, R., L. Winston, dia Private imar Gupta	indiation nologies c tial distrib disadvanta ject Mana finimal sp gic - Fulker ) – Probabi peration R i, 2019. , "Operation Limited, Ne , D.S. Hira	of queuing ution –Sing ages and ap gement banning tree rson's rule - ility of comp esearch - A ns Research ns Research ms Research w Delhi, 20 , "Operation	problem - ap gle server que oplications of si e model - Ma Critical Path M leting a project n Introduction", h" 2 <sup>nd</sup> Edition, F	plications o euing mode imulation - F aximum flow Aethod (CPN in a schedu 9 <sup>th</sup> Edition, Prentice Hall s and Algorit 5. Chand and	f queuing r ls – Simula Random num w model – A) and Project led date Pearson Ind of India Priv hms", 4 <sup>th</sup> Edi d Company L	ation - Need ber generation Project network ct Evaluation <b>Total Ho</b> ia Education vate Ltd, New tion, Cengage	sson for for for for and for an and for an and for an and for an

SDG No.9

BoS Chairman

S.No	Торіс	No. of Hours
1	Formulation of Linear Programming	
1.1	Optimization techniques- definition, Phases & Models	1
1.2	Mathematical formulation of linear programming	1
1.3	Graphical solution	2
1.4	Simplex method	2
1.5	Big M method	2
1.7	Introduction to duality theory	1
2	Transportation Model	
2.1	Transportation	1
2.2	Balanced and Unbalanced TP	2
2.3	Basic feasible solution	1
2.4	Degeneracy, Production problems	2
2.5	Assignment problems - Hungarian method - Balanced assignment problems	2
2.6	Travelling salesman problem	1
3	Inventory Models	
3.1	Types of inventory models - Inventory cost	1
3.2	Deterministic Inventory models	2
3.3	Economic Order Quantity (EOQ)	1
3.4	Purchase and Production models without shortages	2
3.5	Determination of buffer stock and re-order levels	1
3.6	ABC, VED & SDE analysis in inventory - Introduction to Stochastic inventory	2
4	Queuing Theory and Simulation	
4.1	Queuing system - terminologies of queuing problem	1
4.2	applications of queuing model	1
4.3	Poisson distribution and exponential distribution	2
4.4	Single server queuing models	1
4.5	Simulation - Need for simulation, Advantages, disadvantages and applications of simulation	2
4.6	Random number generation – Monte Carlo technique	2
5	Network Models and Project Management	
5.1	Shortest route model	1
5.2	Minimal spanning tree model	1
5.3	Maximum flow model	1
5.4	Project network construction – Network logic	2
5.5	Fulkerson's rule	1
5.6	Critical Path Method (CPM)	2
5.7	Project Evaluation and Review Technique (PERT)	1
-	Total	45

## **Course Designer**

Dr.P.Mohanram - mohanram@ksrct.ac.in

## **NPTEL Course Material**

S.No.	Link
1.	https://www.youtube.com/watch?v=WwMz2fJwUCg
2.	https://www.youtube.com/watch?v=66aKgySf9vo&list=PLLy_2iUCG87Bq8RGMTdeFZiB-
	87V4i9p1

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC E26	SUPPLY CHAIN MANAGEMENT	PE	3	0	0	3

- To provide an insight on the fundamentals of supply chain networks, tools and techniques.
- To describe the increasing significance of logistics and its impact on both costs and
- service in business and commerce.
- To incorporate and learn the critical elements of logistics and supply-chain management processes based on the most relevant application in forward-thinking companies.
- To develop a sound understanding of the important role of supply chain management in today's business environment
- To incorporate a meaningful focus on the rate of change occurring in business today, and more specifically, in business logistics.

## Pre-requisite

NIL

#### Course Outcomes

## On the successful completion of the course, students will be able to

CO1	Understand fundamental supply chain management concepts.	Understand
CO2	Understand the foundational role of logistics in transportation system.	Understand
CO3	Integrating and optimizing the total logistics and supply-chain design.	Understand and apply
CO4	Co-ordinate the efficient handling and movement of goods, services, materials and related information within and between supply chains	Understand and apply
CO5	Learn and apply computer-based supply chain management	Understand and apply

## Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		3								2		2	1
CO2	2		3								2		2	1
CO3	2		3								2		3	1
CO4	2		3								2		3	1
CO5	2		3								2		2	1
3- Str	3- Strong;2-Medium;1-Some													

Plaam'a Catagony	Continuous Asses	End Sem Examination	
Bloom's Category	1	2	(Marks)
Remember	10	10	10
Understand	50	30	60
Apply	0	20	30
Analyse	-	-	
Evaluate	-	-	-
Create	-	-	-

BoS Chairman

		ł	-	-	ege of Techno				R2022
			6	0 MC E26 -	Supply Chain	Manageme	ent		
					МСТ				
			Hours/We	ek		Credit		Maximum Marks	
Ser	nester	L	Т	Р	Total hrs	С	CA	ES	Total
	VI	3	0	0	45	3	40	60	100
Role and	Importanc	cs and Su e- Evolutic	on of Supp	oly Chain -		ses in Supp	oly Chain -	agement -Scope Competitive and	[09]
LOG Role trans	<b>ISTICS IN</b> of transpo portation r	SUPPLY	CHAIN supply cha failored tra	ain – factors	s affecting tran third-party log	sportations	decision – D	Design option for	[09]
Gene	eral frame	work - des	ign for logi	istics – Rev	AIN DESIGN erse logistics- d services-diffe			the new product pricing	[09]
Role sourc Prode	of sourci cing plann uction Pla ation in s	ng supply ing and an Inning & C	chain sup alysis - Pla Control-sup	anning Dem ply chain c	on assessmer and and Supp co-ordination -	bly- Planning Bull whip e	and Manag	n collaboration - ing Inventories - t of lack of co- within a supply	[09]
The	role IT in	supply cha	ain- The s				Relationship	Management -	[09]
					·			Total Hours	45
<b>Text</b> 1.			r Meindl an n Educatio		ipply Chain Ma	inagement, S	Strategy, Pla	nning, and	
2					th Simchi-Levi McGraw Hill, Ir			ging the Supply	Chain:
Refe	rence(s):								
1.	Srinivasa	an G.S, "Q	uantitative	models in O	perations and	Supply Chai	n Manageme	ent, PHI, 2010.	
2.	David J.	Bloomberg	, Stephen	Lemay and	Joe B.Hanna,	"Logistics", F	PHI 2002		
3.		-		-	Chain", Thomso				
4.	-		•		ain Manageme				
	Surred E			Cappi, On		, 01.20010	p. 500, 2000.		

SDG No.9, 12

BoS Chairman

S.No	Торіс	No. of Hours
1	INTRODUCTION	
1.1	Role of Logistics and Supply chain Management:	1
1.2	5 basic steps of supply chain management	1
1.3	Scope and Importance of supply chain management	1
1.4	Evolution of Supply Chain	1
1.5	Decision Phases in Supply Chain	1
1.6	Competitive and Supply chain Strategies	2
1.7	Drivers of Supply Chain Performance and Obstacles	2
2	LOGISTICS IN SUPPLY CHAIN	
2.1	Role of transportation in supply chain	1
2.2	factors affecting transportations decision	1
2.3	Design option for transportation network	1
2.4	Tailored transportation	2
2.5	third-party logistics	2
2.6	Logistics Intelligence	2
3	COORDINATED PRODUCT AND SUPPLY CHAIN DESIGN	
3.1	General framework - design for logistics	2
3.2	Reverse logistics	1
3.3	Supplier integration into the new product development	2
3.4	mass customization	1
3.5	value-added services	1
3.6	differential pricing- dynamic pricing	2
4	SOURCING AND COORDINATION IN SUPPLY CHAIN	
4.1	Role of sourcing supply chain supplier selection assessment and contracts	2
4.2	Design collaboration - sourcing planning and analysis	1
4.3	Planning Demand and Supply- Planning and Managing Inventories	2
4.4	Production Planning & Control - supply chain co-ordination	1
4.5	Bull whip effect –Effect of lack of co-ordination in supply chain and obstacles	1
4.6	Building strategic partnerships and trust within a supply chain.	2
5	SUPPLY CHAIN AND INFORMATION TECHNOLOGY	<u> </u>
5.1	The role IT in supply chain	1
5.2	The supply chain IT frame work	2
5.3	Customer Relationship Management	2
5.4	Internal supply chain management	2
5.5	supplier relationship management.	2
	Total	45

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC E31	Robots and Systems in Smart Manufacturing	PE	3	0	0	3

- To acquire the basic concepts of Industrial Robot.
- To selection of robots based on various applications.
- To familiar with a material handling system
- To impart the knowledge on robotic welding
- To obtain the knowledge on various type of robot welding operation

## Course Outcomes

## On the successful completion of the course, students will be able to

CO1	Recognize various concepts of Industrial Robot.	Remember, Understand
CO2	Select the appropriate manufacturing procedure for Robots	Understand
CO3	Apply various manufacturing process in Robot manufacturing.	Understand
CO4	Learn about the Welding operation and also related to Programming	Understand
CO5	Produce a manufacturing plan for developing a robot	Apply

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	1	1	2	2	1	2	3	3
CO2	3	3	2	3	1	2	1	1	2	3	3	2	3	3
CO3	3	3	3	3	1	1	1	1	2	1	1	2	3	3
CO4	2	2	3	3	1	2	1	2	3	1	2	2	3	3
CO5	3	3	2	1	1	2	1	1	1	1	2	2	3	3
3- Str	ong;2-l	Vedium	n;1-Son	ne										

Dia amia Catanamy	Continuous As	End Sem Examination		
Bloom's Category	1	2	(Marks)	
Remember	30	20	30	
Understand	30	40	40	
Apply	0	0	30	
Analyse	0	0	0	
Evaluate	0	0	0	
Create	0	0	0	

BoS Chairman

		K. S. Ran	gasamy	College of Tech	nology – Autonor	nous		R2022	
		60 MCE31	- Robots	s and Systems i	n Smart Manufact	turing			
				MCT					
Semester	H	lours / Wee	k	Total hrs	Credit	Ма	ximum Mark	S	
	L	Т	Р		С	CA	ES	Total	
VI	3	0	0	45	3	40	60	100	
Introduction Types of industrial robots – Load handling capacity – general considerations in Robotic material handling-material transfer – machine loading and unloading – CNC machine tool loading – Robot centered cell									
SELECTION OF ROBOTS AND OTHER APPLICATIONS Factors influencing the choice of a robot – robot performance testing – economics of robotisation – Impact of robot on industry and society. Application of Robots in continuous arc welding – Spot welding – Spray painting -assembly operation – cleaning – robot for underwater applications.									
and Traction m	iples of h	action predic			d weight transfer- npaction- Traction			[09]	
conventional n systems -crane automated sto	naterial hand naterial hand es and ho rage and	andling - pr andling syst ists - advan retrieval sy	ems - inc ced mate stems(AS	dustrial trucks - n rial handling syst	ns in material har nonorails - rail gui ems - automated g technology - radio	ded vehicles guided vehic	s - conveyor ele systems -	[09]	
Application of car body's we	robot in m elding, ro	nanufacturin bots for bo	g: Explora x fabrica	tion, robots for	ROCESSES application of robo microelectronic w dies for simple and	elding and discomplex a	soldering – pplications	[09]	
						Т	otal Hours	45	
<sup>1.</sup> of Agrice 2 Pires J I	rivastava, ultural Ma	chines", AS o A, Bolmsjo	ABE Pub	lication, 2012.	h, Dennis R. Buck			nciples	
Reference(s):		, 2010.							
		Iding Proce	sses and	Technology". Kh	anna Publishers, N	lew Delhi, 2	<sup>nd</sup> Edition, 20 <sup>2</sup>	13.	
John A.	piotrowsk	ki, William T.	Randolp	h, "Robotic weld	ing: A Guide to Se evelopment Dept.,	lection and	Application, W	/elding	
3 Mikell P	Groover,	Mitchel We	iss, Roge	r N Nagel, N.G.C	drey, AshishDutta on, McGraw Hill Ed	, "Industrial	Robotics (SIE	Ξ):	
4. YoramK	oren, "Ro	obotics for E	ngineers	, McGraw-Hill, 19	987.				

SDG No.4, 9

BoS Chairman

S.No	Торіс	No. of Hours
1	Introduction	
1.1	Types of industrial robots	2
1.2	Load handling capacity	1
1.3	General considerations in Robotic material handling	2
1.4	Material transfer, machine loading and unloading	2
1.5	CNC machine tool loading , Robot centered cell	2
2	Selection of Robots and other Applications	
2.1	Factors influencing the choice of a robot	2
2.2	Robot performance testing	1
2.3	Economics of robotisation, Impact of robot on industry and society	2
2.4	Application of Robots in continuous arc welding ,Spot welding, Spray painting	2
2.5	Assembly operation, cleaning, robot for underwater applications.	2
3	Traction and Testing	
3.1	Hitching, Principles of hitching, Types of hitches	2
3.2	Hitching and weight transfer	1
3.3	Control of hitches, Tires and Traction models	2
3.4	Traction predictor spread sheet	1
3.5	Soil Compaction, Traction Aids	2
3.6	Tractor Testing	1
4	Material Handling	
4.1	Concepts of material handling ,principles and considerations in material handling systems design	2
4.2	Conventional material handling systems ,industrial trucks	2
4.3	Monorails, rail guided vehicles ,conveyor systems	1
4.4	Cranes and hoists, advanced material handling systems, automated guided vehicle systems, automated storage and retrieval systems(ASRS)	2
4.5	Bar code technology, radio frequency identification technology, Introduction to Automation Plant design software	2
5	Applications of Robots in Welding and Allied Processes	
5.1	Application of robot in manufacturing: Exploration of practical application of robots in welding	2
5.2	Robots for car body's welding, robots for box fabrication	1
5.3	Robots for microelectronic welding and soldering	2
5.4	Applications in nuclear, aerospace and ship building	2
5.5	Case studies for simple and complex applications	2
	Total	45

## **NPTEL Course Material**

S.No.	Link
1.	https://archive.nptel.ac.in/courses/110/105/110105155/

## **Course Designers**

Dr.M.Ravi - ravi@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MCE32	Automotive Electronics	PE	3	0	0	3

- To study the basics of electronics and Various Vehicle Sensors.
- To study the Ignition and Injection system in Automobiles
- To expose students about the automotive engine management and its construction details.
- To understand the principles of comfort, safety systems
- To understand the concept of advanced vehicle technologies of automobiles

#### Course Outcomes

## On the successful completion of the course, students will be able to

CO1	Know the working of Various Vehicle Sensors	Remember, Understand
CO2	Understand the electronic fuel injection/ignition components and their function.	Remember, Understand
CO3	Study the construction details of new developments in engine management	Remember, Understand
CO4	Exposure of different automotive safety systems	Understand
CO5	Acquire knowledge about advanced vehicle technology and navigation systems	Understand

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	1	1	2	2	1	1	3	3
CO2	3	3	2	3	1	2	1	1	2	3	3	1	3	3
CO3	3	3	3	3	1	1	1	1	2	1	1	1	3	3
CO4	2	2	3	3	1	2	1	2	3	1	2	1	3	3
CO5	3	3	2	1	1	2	1	1	1	1	2	1	3	3
2 C+r	3- Strong:2-Medium:1-Some													

3- Strong;2-Medium;1-Some

Dia amia Catanami	Continuous As	ssessment Tests (Marks)	End Sem Examination		
Bloom's Category	1	2	(Marks)		
Remember	30	20	30		
Understand	30	40	40		
Apply	0	0	30		
Analyse	0	0	0		
Evaluate	0	0	0		
Create	0	0	0		



K. S. Rangasamy College of Technology – Autonomous R20								R2022			
60 MC E32 - Automotive Electronics											
				MCT							
Semester	ŀ	Hours / Week		Total hrs	Credit	Max	kimum Marks	S			
Cemester	L	Т	Р		С	CA	ES	Total			
VI	3	0	0	45	3	40	60	100			
Vehicle Sensors Working principle of sensors-speed and pressure sensors, vehicle speed sensors(VSS), manifold absolute pressure sensor(MAP), knock sensor, mass air flow sensor (MAF)-Temperature sensors, coolant and exhaust gas temperature sensor, exhaust oxygen level sensor-position sensors, throttle position sensor, accelerator pedal position sensor and crank shaft position sensor-Air mass flow sensor.											
Ignition and Ignition Syste Distribution le	Injection ems: Ignitic ess ignition	on fundamen , Direct ignit	ital, types ion, IGBT	of electronic igni s automotive ign	tion Systems. Prog ition- Spark plugs - fuel injection – GDI	rammed ign - Injection S	iition, ystems –	[09]			
Engine Management Introduction: Input, output and control strategies, Combined electronic Ignition and Fuel Management Systems – Exhaust Emission Control – Advanced vehicle control systems – New developments in engine management system, fuel injection timing control.							[09]				
Safety and Comfort Antilock Braking System (ABS) – Traction Control System (TCS) —Electric Seats-Power steering, mirrors and sun-roofs – Central locking and electric windows - Cruise Control System (CCS) - Electric power steering - electronic clutch – Electronic suspension system – airbags, seat belt tensioners,							[09]				
collision avoidance Radar warning system and low tire pressure warning system Advanced Vehicle Technology Gasoline Direct Injection Electronic Control of Automatic Transmission (ECAT) – Keyless entry – Noise control – Reverse sensing / parking aid – Car navigation system – Telematics - Global Positioning System, e- mobility							[09]				
Total Hours							45				
Text Book(s):       1.       Tom Denton, "Automobile Electrical and Electronics Systems", Edward Arnold Publishers, 2000.											
<ol> <li>Point Denton, Automobile Electrical and Electronics Systems, Edward Arnold Publishers, 2000.</li> <li>Ribbens, "Understanding Automotive Electronics", 8th Edition, Elsevier, Indian Reprint, 2017.</li> </ol>											
Reference(s):											
1. Allan Bonnick, Automotive computer controlled systems, Kindle Edition, 2012.											
					onics", Butterworth		, Burlington,	2003.			
					s", Check Chart Pul						
4. Boscl	n Automoti	ve Hand Boo	ok, 8 th E	dition, 2011.							
· · · ·											

SDG No.4, 9

BoS Chairman

S.No	Торіс	No. of Hours
1	Vehicle Sensors	
1.1	Working principle of sensors-speed and pressure sensors	1
1.2	Vehicle speed sensors(VSS), manifold absolute pressure sensor(MAP),	1
1.3	Knock sensor, mass air flow sensor (MAF)	1
1.4	Temperature sensors, Coolant and exhaust gas temperature sensor, exhaust oxygen level sensor	1
1.5	Position sensors, throttle position sensor	1
1.6	Accelerator pedal position sensor and crank shaft position sensor	2
1.7	Air mass flow sensor.	2
2	Ignition and Injection	
2.1	Ignition Systems: Ignition fundamental, types of electronic ignition Systems.	1
2.2	Programmed ignition, Distribution less ignition,	1
2.3	Direct ignition, IGBTs automotive ignition	1
2.4	Spark plugs – Injection Systems	2
2.5	Throttle body injection – Multipoint fuel injection	2
2.6	Sequential fuel injection – GDI – CRDI- Supercharger	2
3	Engine Management	
3.1	Introduction: Input, output and control strategies,	2
3.2	Combined electronic Ignition and Fuel Management Systems	1
3.3	Exhaust Emission Control	2
3.4	Advanced vehicle control systems	1
3.5	New developments in engine management system,	1
3.6	Fuel injection timing control.	2
4	Safety and Comfort	
4.1	Antilock Braking System (ABS)	2
4.2	Traction Control System (TCS)	1
4.3	Electric Seats-Power steering, mirrors and sun-roofs – Central locking and electric windows - Cruise Control System (CCS)	2
4.4	Electric power steering - electronic clutch	1
4.5	Electronic suspension system	1
4.6	Airbags, seat belt tensioners, collision avoidance Radar warning system and low tire pressure warning system	2
5	Advanced Vehicle Technology	
5.1	Gasoline Direct Injection.	1
5.2	Electronic Control of Automatic Transmission (ECAT) – Keyless entry	2
5.3	Noise control – Reverse sensing / parking aid	2
5.4	Car navigation system – Telematics	2
5.5	Global Positioning System, e- mobility	2
	Total	45

## **Course Designers**

Dr.C.Vijayakumar – vijayakumarc@ksrct.ac.in

## NPTEL Course Material

Γ	S.No.	Link
	1.	https://onlinecourses.nptel.ac.in/noc24_de03/preview

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC E33	DESIGN OF UAV SYSTEMS	PE	3	0	0	3

- To expose students to concepts needed in modelling and analysing an unmanned system.
- To expose students to the design and development of UAV.
- To expose students to the type of payloads used in UAV.
- To study path planning communication and payload control
- To understand the avionics hardware used in the UAV

## Course Outcomes

## On the successful completion of the course students will be able to

CO1	Understand the concept of UAV system	Remember,
		Understand
CO2	Prepare preliminary design requirements for an unmanned aerial	Remember,
002	vehicle.	Understand
CO3	Identify different hardware for UAV	Remember,
003		Understand
CO4	Perform system testing for unmanned aerial vehicles	Understand
001		onderstand
CO5	Design micro aerial vehicle systems by considering practical limitations.	Apply
		<i>.</i> (pp)

#### Mapping with Programme Outcomes

	~~~····														
	COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3	3	2	2	2	2	2	1	2	2	1	1	2	3
	CO2	3	3	2	3	2	2	2	1	2	3	3	1	3	2
	CO3	3	3	3	3	2	1	2	1	2	1	1	2	2	3
	CO4	2	2	3	3	2	2	2	2	3	1	2	2	3	2
	CO5	3	3	2	1	2	2	2	1	1	1	2	2	2	2
3- Strong;2-Medium;1-Some															

Bloom's	Continuous	Assessment Tests (Marks)	End Sem Examination		
Category	1	2	(Marks)		
Remember	30	20	30		
Understand	30	40	40		
Apply	0	0	30		
Analyse	0	0	0		
Evaluate	0	0	0		
Create	0	0	0		



K. S. Rangasamy College of Technology – Autonomous R									
60 MCE33 - DESIGN OF UAV SYSTEMS MCT									
Semester Hours / Week Total hrs Credit Maximum Marks									
	L	Т	Р		С	CA	ES	Total	
VI	3	0	0	45	3	40	60	100	
INTRODUCTION TO UAV History of UAV –classification – Introduction to Unmanned Aircraft Systemsmodels and prototypes – System Composition-applications									
	o Design s of Airci	and Select raft Types-	Design 3	Standards and F	odynamics and A Regulatory Aspect			[09]	
AVIONICS HARDWARE Autopilot – AGL-pressure sensors-servos-accelerometer –gyros-actuators- power supply processor, integration, installation, configuration, and testing							[09]		
	emetry-tra	cking-Aerial	photogra		) feedback-radio o buble shooting	control frequ	ency range	[09]	
	avigation-	ground con	trol softv	vare- System G dies – Mini and M	round Testing- S icro UAVs.	ystem In-flig	ght Testing	[09]	
						То	otal Hours	45	
Text Book(s									
					AV Systems", UA				
	in "Unma	nnea Aircrat	tSystem	s UAV design, de	evelopment and de	epioyment", V	viley, 2010.		
1 Dr. Arma	Reference(s): 1. Dr. Armand J. Chaput, "Design of Unmanned Air Vehicle Systems", Lockheed Martin Aeronautics Company, 2001								
2. Kimon P. Valavanis, "Advances in Unmanned Aerial Vehicles: State of the Art and the Road Autonomy", Springer, 2007									
	. Nelson,	Flight Stabil	ity and A	utomatic Control,	McGraw-Hill, Inc,	1998.			
SDG No.9									

Course	Contents and Lecture Schedule	
S.No	Торіс	No.of Hours
1	INTRODUCTION TO UAV	
1.1	History of UAV	1
1.2	Classification	1
1.3	Introduction to Unmanned Aircraft Systems	1
1.4	Models and prototypes	1
1.5	System Composition	1
1.6	Applications	1
2	THE DESIGN OF UAV SYSTEMS	
2.1	Introduction to Design and Selection of the System	1
2.2	Aerodynamics and Airframe Configurations	1
2.3	Characteristics of Aircraft Types	1
2.4	UK,USA and Europe Design for Stealth	1
2.5	Control surfaces	1
2.6	Specifications	1
3	AVIONICS HARDWARE	
3.1	Autopilot	1
3.2	AGL-pressure sensors	2
3.3	Servos-accelerometer	1
3.4	Power supply processor	1
3.5	Integration, installation	2
3.6	Configuration, and testing	1
4	COMMUNICATION PAYLOADS AND CONTROLS	
4.1	Payloads	1
4.2	Telemetry-tracking	1
4.3	Aerial photography	1
4.4	Controls-PID feedback.	1
4.5	Radio control frequency range	2
4.6	Modems-memory system	1
4.7	Simulation-ground test-analysis	2
4.8	Trouble shooting	1
5	THE DEVELOPMENT OF UAV SYSTEMS	
5.1	Waypoints navigation	1
5.2	Ground control software	1
5.3	System Ground Testing	1
5.4	System In-flight Testing	1
5.5	Future Prospects and Challenges	1
5.6	Case Studies – Mini and Micro UAVs	1
	Total	45

## NPTEL Course Link

S. No	Link
1	https://archive.nptel.ac.in/courses/101/104/101104073/
Cours	se Designers

Mr.S.Hari Prasadh -hariprasadh@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MCE34	Non-Conventional Machining Processes	PE	3	0	0	3

- Give an exposure about various unconventional machining processes.
- Recognize the role of mechanical energy in unconventional machining processes.
- Gain the knowledge on machining the electrically conductive material through electrical energy in unconventional machining processes
- Impart specifies the concept of machining the hard material using chemical energy and electrochemical energy.
- Familiarity with various thermal energy based unconventional machining processes.

#### Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the classification of non-traditional machining methods and process selection.	Remember, Understand
CO2	Understand the Mechanical energy based unconventional machining processes.	Remember, Understand
CO3	Understand the Electrical energy based unconventional machining processes.	Remember, Understand
CO4	Recognize the Chemical and Electrochemical energy based unconventional machining processes.	Remember, Understand
CO5	Understand the Thermal energy based unconventional machining processes	Remember, Understand

## Mapping with Programme Outcomes

	<u>U</u>													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1		2	2	2	1	3	3	3
CO2	3	3	2	3	1	2		2	2	3	3	3	3	3
CO3	3	3	3	3	1	1		2	2	1	1	3	3	3
CO4	2	2	3	3	1	2		2	3	1	2	3	3	3
CO5	3	3	2	1	1	2		2	1	1	2	3	3	3
3- Str	3- Strong;2-Medium;1-Some													

Bloom's Catagory	Continuous As	sessment Tests (Marks)	End Sem Examination
Bloom's Category	1	2	(Marks)
Remember	30	20	30
Understand	30	40	40
Apply	0	0	0
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

K. S. Rangasamy College of Technology – Autonomous									
60 MCE34 - Non-Conventional Machining Processes									
MCT									
Semester	H	lours / Wee	k	Total hrs	Credit	Ma	ximum Marks	S	
Semester	L	Т	Р	Total III's	С	CA	ES	Total	
VI	3	0	0	45	3	40	60	100	
<b>Introduction</b> Introduction - Need of non-traditional machining Methods - Classification of modern machining processes, Process selection, Materials Applications. Ultrasonic machining: Elements of the process, mechanics of metal removal process, parameters, economic considerations, applications and limitations, recent development.									
equipment,	Machining,	Water Jet Niable, and m	Machining echanics		ater Jet Machining: val (MRR)-applicat			[09]	
	charge Mac electrode/To	hining (EDN	1): Basic		nent, Process Para Wear, Dielectric, F			[09]	
Chemical m Surface finis	achining: E h and MRR and MRF	Etchants, M , Application R Electrica	askant, t ns. Electr I Circuit	o-Chemical mac	oplying mask ants hining: Basic princi ameters, Electroc	ple, equipm	ent, Surface	[09]	
Thermal En Laser Beam	ergy Based machining	d Processes and drilling	<b>s</b> (LBM), p		ning (PAM) and El jues – Applications		m Machining	[09]	
, <u>,</u>		71					otal Hours	45	
Text Book	<b>`</b>								
					Dhanpat Rai & Com				
		I H S Shan,	"Modern	Machining Proce	sses" Tata McGraw	v-Hill, New I	Delhi, 2017.		
Reference(s):         1.       Paul De Garmo, J.T. Black, and Ronald.A. Kohser, Material and Processes in Manufacturing, Pro- Hall of India Pvt. Ltd., New Delhi, 2011.         2       Serope Kalpakjian and Steven Schmid, "Manufacturing Engineering and Technology", 7th Editional Steven Schmid, "Steven Schmid, "Steven Schmid, Steven Schmid, Steve									
<sup>2.</sup> Pea	son educat	ion India Ltd	l, New De	elhi, 2013.				dition,	
					ublishing House, Ne		)10.		
4. Gary	⊢ Benedict	, 'Nontraditio	onal Man	utacturing proces	ses", CRC press, 2	2011			

SDG No. 9, 13

S. No	Торіс	No. of Hours
1	Introduction and Mechanical Energy Based Processes	
1.1	Comparison between traditional and non- conventional machining process	1
1.2	Need for Non - conventional machining process	1
1.3	Classification based on nature of energy employed in machining	1
1.4	Selection of non-conventional machining processes	1
1.5	Specific advantages, limitations and applications	1
1.6	Abrasive Jet Machining - Working Principles – equipment used – Process parameters – MRR - Applications.	1
1.7	Water Jet Machining - Working Principles – equipment used – Process parameters – MRR - Applications.	1
1.8	Abrasive Water Jet Machining - Working Principles – equipment used – Process parameters – MRR - Applications.	1
1.9	Ultrasonic Machining - Working Principles – equipment used – Process parameters – MRR - Applications.	1
2	Thermal and Electrical Energy Based Processes	
2.1	Electric Discharge Machining – Working Principle – equipments - Process Parameters - Surface Finish and MRR - Electrode/Tool – Power and Control Circuits - Tool Wear	1
2.2	Wire cut EDM - Working Principle – equipments - Process Parameters - Surface Finish and MRR - Electrode/Tool – Power and Control Circuits - Tool Wear	1
2.3	Electrical Discharge Grinding Working Principle – equipments - Process Parameters - Surface Finish and MRR - Electrode/Tool – Power and Control Circuits - Tool Wear	1
2.4	Flushing types - Pressure Flushing, Suction Flushing, Side Flushing, Pulsed Flushing.	1
2.5	EDM Process Parameters: Spark Frequency, Current & Spark Gap, Surface Finish, Heat Affected Zone	1
2.6	Laser Beam Machining - Principles – Equipment – Types – Beam control techniques – Applications	1
2.7	Laser Beam Drilling - Principles – Equipment – Types – Beam control techniques – Applications	1
2.8	Plasma Arc Machining - Principles – Equipment – Types – Beam control techniques – Applications	1
2.9	Electron Beam Machining - Principles – Equipment – Types – Beam control techniques – Applications	1
3	Chemical and Electro-Chemical Energy Based Processes	
3.1	Chemical Machining - Process Parameters	1
3.2	Surface Finish and MRR - Applications	1
3.3	Electro-Chemical Machining - Process Parameters	1
3.4	Surface Finish and MRR - Applications	1
3.5	Etchants – Maskant techniques of applying maskants	1
3.6	Principles of ECM - Equipment - Surface Roughness	1
3.7	ECM - MRR - Electrical Circuit	1
3.8	Electro-Chemical Grinding - Process Parameters - Applications	1
3.9	Electro-Chemical Honing - Process Parameters - Applications	1
4	Advanced Nano Finishing Processes	
4.1	Abrasive Flow Machining - working principles, equipments	1
4.2	Effect of process parameters, applications, advantages and limitations	1
4.3	Chemo Mechanical Polishing - working principles, equipments	1
4.4	Effect of process parameters, applications, advantages and limitations	1

BoS Chairman

4.5	Magnetic Abrasive Finishing - working principles, equipments	1
4.6	Effect of process parameters, applications, advantages and limitations	1
4.7	Magnetorheological Abrasive Flow Finishing - working principles, equipments	2
4.8	Effect of process parameters, applications, advantages and limitations	1
5	Recent Trends in Non-conventional Machining Processes	
5.1	Recent developments in non-conventional machining processes	2
5.2	Electric Discharge Diamond Grinding - working principles, equipments	1
5.3	Effect of process parameters, applications, advantages and limitations	1
5.4	Wire Electro Discharge Grinding - working principles, equipments	1
5.5	Effect of process parameters, applications, advantages and limitations	1
5.6	Electro Chemical Spark Machining - working principles, equipments	1
5.7	Effect of process parameters, applications, advantages and limitations	1
5.8	Comparison of non-conventional machining processes	1
	Total Hours	45

## SDG No.9

## NPTEL Course Link

S. No	Link
1	https://nptel.ac.in/courses/112103202
2	https://archive.nptel.ac.in/courses/112/105/112105212/

## **Course Designers**

Dr. A.Ramesh Kumar - rameshkumar@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MCE 35	Product Design and Costing	PE	3	0	0	3

- 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

#### On the successful completion of the course, students will be able to

CO1	Understand the fundamentals of product design, planning, development and product life cycle.	Remember, Understand
CO2	Understand the significance of customer satisfaction and issues associated with it	Remember, Understand
CO3	Learn the economic analysis process, factors affecting it and trade-offs.	Remember, Understand
CO4	Estimate various types of costs for producing components by turning, drilling, shaping, planning, milling, grinding, welding and forging.	Remember, Understand
CO5	Learn the process of work study, method study, tools and techniques used for it and able to calculate the standard time	Understand

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1		2	2	2	2		3	3
CO2	3	3	2	3	2	2		2	2	3	3		3	3
CO3	3	3	3	3	2	1		2	2	1	1		3	3
CO4	2	2	3	3	2	2		2	3	1	2		3	3
CO5	3	3	2	1	1	2		2	1	1	2		3	3
3- Str	ong;2-l	Medium	n;1-Son	ne										•

Plaam'a Catagony	Continuous As	End Sem Examination	
Bloom's Category	1	2	(Marks)
Remember	30	20	30
Understand	30	40	40
Apply	0	0	30
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0

		K. S. Ran	gasamy (	College of Tech	nology – Autonor	nous		R2022
				- Product Desig				
				МСТ				
Semester	H	lours / Wee	k	Total hrs	Credit	Ма	ximum Mark	S
Comester	L	Т	Р	i otar mo	С	CA	ES	Total
VI	3	0	0	45	3	40	60	100
	reativity in product de	design - Pr	oduct dev		ng - Planning proc customer and de			[09]
Customer Ne Customer sati	eds and F sfaction - \ g custome	Voice of cus r needs. Pro	tomer, Ty	pes of customer	needs, customer r cture types - Implic			[09]
	conomic a - Case fina	inalysis - Qu ancial mode	iantitative I - Sensiti		ative analysis. Eco nderstand the proje			[09]
Cost Estimation Cost estimation	on of Manu	ifactured Jol out labor ar	os id total co	osts for simple methods and forged	nachining works su	uch as Turn	ing, Drilling,	[09]
Work Study a Method study	nd Ergon - definitior asurement	omics n - objectives t - purpose	s - Motior	economy princip	bles - Tools and te ues - Standard tim			[09]
<u>pep.ee_ap</u>						Т	otal Hours	45
1. Edition	Úlrich, Ste 2012.	• •	<b>U</b>	Ū	l Development", Ta in Reverse Engine			1th
Z. Develo	pment", Pe	earson educ				5		
<sup>1.</sup> Compa	E Dieter, ny, Londor	n, 2000.			d Processing App			lishing
					election", Butterwor			
A R Kesa	van, C Ela		and B Vij	aya Ramnath, "F	ontrol", McMillan ar Process Planning a			w Age

## SDG No.9

## NPTEL Course Material

S.No.	Link
1.	https://onlinecourses.nptel.ac.in/noc24_me58/preview

## **Course Designers**

Dr.C.Vijayakumar - vijayakumarc@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC E36	Ware House Management	PE	3	0	0	3

- To develop competencies and knowledge of students to become Warehouse professionals
- To orient students in the field of Logistics
- To understand Warehousing and distribution centre operations.
- To study Warehouse Safety Rules and Procedures
- To understand complete the analysis and to select the most appropriate solution for ware-house automation

#### Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the Basic concept of Warehouse	Remember, Understand
CO2	Plan the activity in the field of Logistics	Remember, Understand
CO3	Identify Warehousing and distribution centre operations	Remember, Understand
CO4	Know the Warehouse Safety Rules and Procedures	Remember, Understand
CO5	Understand the basic concept of the most common automations from light to heavy	Remember, Understand

#### Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	2		2	2	2	2		3	3
CO2	3	3	2	3	2	2		2	2	3	3		3	3
CO3	3	3	3	3	2	1		2	2	2	2		3	3
CO4	2	2	3	3	2	2		2	3	2	2		3	3
CO5	3	3	2	2	2	2		1	1	1	2		3	3
3- Str	ong;2-l	Medium	n;1-Son	ne										

## Assessment Pattern

Plaam'a Catagony	Continuous As	ssessment Tests (Marks)	End Sem Examination
Bloom's Category	1	2	(Marks)
Remember	30	20	30
Understand	30	40	70
Apply	0	0	0
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023



				College of Tech 5- Ware House I	nology – Autonoi Management	mous		R2022
		0		MCT	vianagement			
		lours / Wee	Ŀ		Credit	Mo	ximum Marks	
Semester				Total hrs				
VI	 	Т 0	P 0	45	C 3	CA	ES 60	Total
ntroduction t	-	•	0	40	3	40	60	100 [ <b>09</b> ]
(Storage and Warehouses - Associate ware	Packagin Broad fur house -It	g) Backgroun nctions in a s functions	a wareho -equipme	use -warehouse ent available in as	se – Importance layouts and layo ssociate ware hou	out related t se -Video or	o functions.	[03]
Receiving and					Benefits of Wareho	busing.		[09]
Various stages notice (ASN) of inspection of goods receipt r	s involved or invoice goods un note using ns -storag	d in receivir items list-F loaded-Forr computer-I ge location	ng goods Procedure nats for Put away	<ul> <li>Stages involves</li> <li>for Arranging correction</li> <li>recording of good</li> <li>of Goods-Put away</li> </ul>	ved receipt of go of goods on dock ods unloaded from ay list and its need Process of put av	for counting n carriers-G d-Put away c	and Visual eneration of of goods into	[03]
Varehouse A								[09]
mportance in quality check. I or application	a wareho Procedure of cross	buse -qualit to develop docking -l	y parame Packing Informatio	eters -Quality ch list / Dispatch not	cking and dispat eck-need for qua e-Cross docking r coordinating cross g labels	lity check-im nethod -Situa	portance of ations suited	
dentification dentification	es and 'P of Hazard with the	rocedures t dous Cargo industry. He	o be obs o -safety ealth, Saf	data sheet-Ins	house -Hazardou tructions to han nt -safety Equipm and their uses.	dle hazardo	us cargo -	[09]
Warehouse A								[09]
Material Flow	Automatic ick / Put 1	on -Conveyo Fo Light -A F			led Vehicles –Mo Selection – Pick-N			
						Т	otal Hours	45
<sup>1.</sup> 2003.	na, Ware		-	-	ntrol-Vikas Publica			
<sup>2.</sup> Michael	Ten Hom				n of Warehouse an g, First Edition, 20		king Systems,	
Reference(s):								
				ve guide to ware ain. Pearson Edu	ehousing: managii ucation,2014	ng the stora	ge and handl	ing of
Kimon	P. Valav	anis, "Adva			al Vehicles: State	e of the Art	and the Ro	ad to
<sup>2.</sup> Autonon	iy , opini	ger, 2007						
2. Autonon 3. Advance Devices,	d Industr Systems	rial Automa , & Applicati	ons 3D E	dition Author: Te	Ravindra Sharma	er: Delmar		
2. Autonom 3. Advance Devices, A Richards	d Industr Systems , G Wa	rial Automa , & Applicati rehouse ma	ons 3D E nagemer	dition Author: Te		er: Delmar		

BoS Chairman

1         Introduction to Warehouse         1           11         Introduction to Warehouse         1           12         (Storage and Packaging) Background         1           13         Need for Warehouse - Importance of warehouse         1           14         Types of Warehouses-Broad functions in a warehouse         1           15         warehouse layouts and layout related to functions.         1           16         Associate warehouse - Its functions         1           17         equipment available in associate ware houses         1           18         Video on warehouse - Wists to ware houses         1           19         Warehouse Organization Structure -Benefits of Warehousing.         1           21         Receiving and Dispatch of Goods in warehouse         1           22         Various stages involved in receiving goods         1           23         Stages involved in ceipt of goods-Advanced shipment notice (ASN) or invoice items list         1           24         Warehouse Activating of goods on dock for counting and Visual inspection of goods         1           25         Formats for recording of goods unloaded from carriers-Generation of goods receipt note         1           27         storage location codes and its application         1           28         P	S.No	Торіс	No. of Hours
12       (Storage and Packaging) Background       1         13       Need for Warehouse – Importance of warehouse       1         14       Types of Warehouses-Broad functions in a warehouse       1         15.       warehouse layouts and layout related to functions.       1         16.       Associate warehouse – Its functions       1         17.       equipment available in associate ware houses       1         18.       Video on warehouse – Visits to ware houses       1         19.       Warehouse Organization Structure -Benefits of Warehousing.       1         21.       Receiving and Dispatch of Goods in warehouse       1         22.       Various stages involved in receiving goods       1         23.       Stages involved receipt of goods-Advanced shipment notice (ASN) or invoice items list       1         24.       Procedure for Arranging of goods unloaded from carriers-Generation of goods receipt note using computer       1         25.       Formats for recording of goods unloaded, from carriers-Generation of goods into storage locations       1         27.       storage location codes and its application       1         28.       Process of put away activity       1         29.       Procedure to Prepare Warehouse dispatches       1         31.       Warehouse Activities <td>1</td> <td>Introduction to Warehouse</td> <td></td>	1	Introduction to Warehouse	
1.3       Need for Warehouse – Importance of warehouse       1         1.4       Types of Warehouse - Broad functions in a warehouse       1         1.5       warehouse layouts and layout related to functions.       1         1.6       Associate warehouse - Its functions       1         1.7       equipment available in associate ware house       1         1.9       Warehouse – Visits to ware house       1         1.9       Warehouse Organization Structure -Benefits of Warehousing.       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.2       Various stages involved in receiving goods       1         2.3       Stages involved receipt of goods-Advanced shipment notice (ASN) or invoice items list       1         2.4       Various stages involved in receiving goods       1         1.0       unloaded       1       1         2.4       Formats for recording of goods unloaded from carriers-Generation of goods receipt note using computer       1         2.7       storage location codes and its application       1       1         2.8       Proces of put away activity       1       1         2.9       Procedure to Prepare Warehouse dispatches       1       1         3.1       Warehouse Activitites       1	1.1	Introduction to Warehouse	1
1.4       Types of Warehouses Broad functions in a warehouse       1         1.5       warehouse layouts and layout related to functions.       1         1.6       Associate warehouse - Its functions       1         1.7       equipment available in associate ware house       1         1.8       Video on warehouse - Visits to ware houses       1         1.8       Video on warehouse - Visits to ware houses       1         1.9       Warehouse Organization Structure -Benefits of Warehousing.       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.2.1       Natious stages involved in receiving goods       1         2.3       Stages involved in receiving goods       1         2.4       Procedure for Arranging of goods unloaded from carriers-Generation of goods receipt note using computer       1         2.6       Port away of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1       1         2.8       Procedure to Prepare Warehouse dispatches       1       1         3       Warehouse Activities       1       1       1         3.1       Warehouse Activities       1       1       1         3.2       qualit	1.2	(Storage and Packaging) Background	1
1.5       warehouse layout related to functions.       1         1.6       Associate warehouse - Its functions       1         1.7       equipment available in associate ware house       1         1.8       Video on warehouse - Visits to ware house       1         1.9       Warehouse Organization Structure - Benefits of Warehousing.       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.2       Various stages involved in receiving goods       1         2.3       Stages involved receipt of goods-Advanced shipment notice (ASN) or invoice items list       1         2.4       Procedure for Arranging of goods on dock for counting and Visual inspection of goods       1         2.4       Formats for recording of goods unloaded from carriers-Generation of goods receipt note       1         2.5       Indig computer       1       1         2.6       Put away of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1       1         2.8       Process of put away activity       1       1         2.9       Procedure to Prepare Warehouse dispatches       1       1         3.1       Warehouse Activities       1       1         3.1 <td>1.3</td> <td>Need for Warehouse – Importance of warehouse</td> <td>1</td>	1.3	Need for Warehouse – Importance of warehouse	1
1.6       Associate warehouse - Visits to ware house       1         1.7       equipment available in associate ware house       1         1.8       Video on warehouse - Visits to ware houses       1         1.9       Warehouse Organization Structure - Benefits of Warehousing.       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.2       Various stages involved in receiving goods       1         2.3       Stages involved in receiving goods - Advanced shipment notice (ASN) or invoice items list       1         2.4       Unloaded       1         2.5       Formats for recording of goods unloaded from carriers-Generation of goods receipt note       1         2.6       Put way of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1         2.8       Process of put away activity       1         2.9       Procedure to Prepare Warehouse dispatches       1         3.1       Warehouse Activities       1         3.2       Elucidate receiving, sorting, loading, unloading, Picking Packing and dispatch, activities and their importance in a warehouse       1         3.3       quality parameters -	1.4	Types of Warehouses -Broad functions in a warehouse	1
1.7       equipment available in associate ware house       1         1.8       Video on warehouse – Visits to ware houses       1         1.9       Warehouse Organization Structure -Benefits of Warehousing.       1         2       Receiving and Dispatch of Goods in warehouse       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.3       Stages involved receipt of goods-Advanced shipment notice (ASN) or invoice items list       1         2.4       Procedure for Arranging of goods on dock for counting and Visual inspection of goods       1         2.5       Immats for recording of goods unloaded from carriers-Generation of goods receipt note using computer       1         2.6       Put away of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1         2.8       Process of put away activity       1         2.9       Procedure to Prepare Warehouse       1         3.1       Warehouse Activities       1         3.1       Warehouse Activities       1         3.2       quality parameters -Quality check-importance of quality check.       1         3.4       Procedure to develop Packing list / Dispatch note       1         3.4       Warehouse Afity Rules and	1.5	warehouse layouts and layout related to functions.	1
1.8       Video on warehouse - Visits to ware houses       1         1.9       Warehouse Organization Structure -Benefits of Warehouse       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.2       Various stages involved in receiving goods       1         2.3       Stages involved receipt of goods-Advanced shipment notice (ASN) or invoice items list       1         2.4       Procedure for Arranging of goods on dock for counting and Visual inspection of goods       1         2.4       unloaded       1         2.5       Istages involved in receiving goods       1         2.6       Put away of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1         2.8       Process of put away activity       1         2.9       Procedure to Prepare Warehouse dispatches       1         3.1       Warehouse Activities       1         3.2       and their importance in a warehouse       1         3.3       quality parameters -Quality check-need for quality check-importance of quality check.       1         3.4       Warehouse Safety Rules and Procedures       1         3.5       Cross docking method -Situations suited for application of cross docking       1 <td>1.6</td> <td>Associate warehouse -Its functions</td> <td>1</td>	1.6	Associate warehouse -Its functions	1
1.9       Warehouse Organization Structure -Benefits of Warehousing.       1         2       Receiving and Dispatch of Goods in warehouse       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.2       Various stages involved in receiving goods       1         2.3       Stages involved receipt of goods-Advanced shipment notice (ASN) or invoice items list       1         2.4       Procedure for Arranging of goods unloaded from carriers-Generation of goods receipt note using computer       1         2.5       Formats for recording of goods unloaded from carriers-Generation of goods receipt note using computer       1         2.6       Put away of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1         2.8       Process of put away activity       1         2.9       Procedure to Prepare Warehouse dispatches       1         3.1       Warehouse Activities       1         3.2       guality parameters -Quality check-need for quality check-importance of guality check.       1         3.4       Procedure to develop Packing list / Dispatch note       1         3.5       Cross docking method -Situations suited for application of cross docking       1         3.6       Horparateo & proper packing	1.7	equipment available in associate ware house	1
1.9       Warehouse Organization Structure -Benefits of Warehousing.       1         2       Receiving and Dispatch of Goods in warehouse       1         2.1       Receiving and Dispatch of Goods in warehouse       1         2.2       Various stages involved in receiving goods       1         2.3       Stages involved receipt of goods-Advanced shipment notice (ASN) or invoice items list       1         2.4       Procedure for Arranging of goods unloaded from carriers-Generation of goods receipt note using computer       1         2.6       Formats for recording of goods unloaded from carriers-Generation of goods receipt note using computer       1         2.6       Put away of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1         2.8       Process of put away activity       1         2.9       Procedure to Prepare Warehouse dispatches       1         3.1       Warehouse Activities       1         3.2       guality parameters -Quality check-need for quality check-importance of quality check.       1         3.4       Procedure to develop Packing ist/ Dispatch note       1         3.5       Cross docking method -Situations suited for application of cross docking       1         3.6       Information required for coordinatin	1.8	Video on warehouse – Visits to ware houses	1
2         Receiving and Dispatch of Goods in warehouse         1           2.1         Receiving and Dispatch of Goods in warehouse         1           2.2         Various stages involved in receiving goods         1           2.3         Stages involved receiving goods         1           2.4         Unloaded         1           2.5         unloaded         1           2.6         Formats for recording of goods on dock for counting and Visual inspection of goods unloaded from carriers-Generation of goods receipt note using computer         1           2.6         Put away of Goods-Put away list and its need-Put away of goods into storage locations         1           2.7         storage location codes and its application         1           2.8         Process of put away activity         1           2.9         Procedure to Prepare Warehouse dispatches         1           3.1         Warehouse Activities         1         1           3.1         Warehouse Activities         1         1           3.2         Elucidate receiving, sorting, loading, unloading, Picking Packing and dispatch, activities and their importance in a warehouse         1           3.3         quality parameters -Quality check-importance of quality check.         1           3.4         Procedure to develop Packing its / Dispatch note		Warehouse Organization Structure -Benefits of Warehousing.	1
2.1       Receiving and Dispatch of Goods in warehouse       1         2.2       Various stages involved in receiving goods       1         2.3       Stages involved in receiving goods. Advanced shipment notice (ASN) or invoice items list       1         2.4       Procedure for Arranging of goods on dock for counting and Visual inspection of goods unloaded       1         2.5       Formats for recording of goods unloaded from carriers-Generation of goods receipt note using computer       1         2.6       Put away of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1         2.8       Procedure to Prepare Warehouse dispatches       1         3       Warehouse Activities       1         3.1       Warehouse Activities       1         3.2       quality parameters -Quality check-need for quality check.importance of quality check.       1         3.4       Procedure to develop Packing list / Dispatch note       1         3.5       Cross docking method -Situations suited for application of cross docking       1         3.6       Information required for coordinating cross docking       1         3.7       Information required for coordinating cross docking       1         3.8       Inporetance of proper packing       1 <td></td> <td></td> <td></td>			
2.2       Various stages involved in receiving goods       1         2.3       Stages involved receipt of goods-Advanced shipment notice (ASN) or invoice items list       1         2.4       Procedure for Arranging of goods on dock for counting and Visual inspection of goods       1         2.5       Formats for recording of goods unloaded from carriers-Generation of goods receipt note       1         2.5       Formats for recording of goods unloaded from carriers-Generation of goods receipt note       1         2.6       Put away of Goods-Put away list and its need-Put away of goods into storage locations       1         2.7       storage location codes and its application       1         2.8       Process of put away activity       1         2.9       Procedure to Prepare Warehouse dispatches       1         3       Warehouse Activities       1         3.1       Warehouse Activities       1         3.3       quality parameters -Quality check-need for quality check-importance of quality check.       1         3.4       Procedure to develop Packing list / Dispatch note       1         3.7       Information required for coordinating cross docking       1         3.8       Importance of proper packing       1         3.9       Packing materials       1         4       Warehouse Safet			1
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			1
Total 45	5.9		45

BoS Chairman

## **NPTEL Course Material**

SI.No	Nptel Link
1.	http://www.digimat.in/nptel/courses/video/106106093/L31.html
2.	https://archive.nptel.ac.in/courses/110/106/110106045/
3.	https://www.youtube.com/watch?v=m-aKj5ovDfg
4.	http://www.digimat.in/nptel/courses/video/110105094/L01.html
5.	https://archive.nptel.ac.in/courses/110/105/110105141/

## **Course Designers**

Mr.R.Vivek - vivekr@ksrct.ac.in

BoS Chairman

### **Open Elective**

60 MC I 005 Introduction to Occupational Health	Category	L	Т	Ρ	Credit	
60 MC L005	Introduction to Occupational Health	PE	3	0	0	3

## Objective

- To Identify the various fields of safety and risk management
- To Identify and describe the organization of regulatory agencies that deal with issues of occupational safety and health, environmental health, and risk management.
- To Define and understand basic terminology used in the field of occupational safety and health and apply it appropriately.
- To Describe and demonstrate how to access safety information and resources.
- To Describe the history and evolution of occupational safety and health.

### Prerequisite

NIL

## Course Outcomes

On the successful completion of the course, students will be able to

CO1	Need for EHS in industries and related Indian regulations	Understand
CO2	Various types of Health hazards, effect, assessment and control methods	Understand
CO3	Various safety systems in working environments	Apply
CO4	The methodology for preparation of Emergency Plans and Accident investigation	Analyze
CO5	EHS Management System and its elements	Apply

## Mapping with Programme Outcomes

COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	3					2	3	2	3	3
CO2	3	3	2		3					3			2	2
CO3	2		2	2						3	2		3	3
CO4		3	2	3	3					2		3	2	3
CO5	3			3	2						3		3	3
3- Strong;2-Medium;1-Some														

Bloom's Category	Continuous As	End Sem	
	1	2	Examination(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

BoS Chairman

		K			ege of Techno				R2022
			60 MC L	_005– Intro	duction to Oc	cupational l	Health		
				Оре	n to All Branc	hes			
Semes	ster		Hours/Wee	k	Total Hours	Credit		Maximum Mar	ks
		L	Т	Р		С	CA	ES	Tota
IV		3	0	0	45	3	40	60	100
History of need for Physical Hazards, Notifiable Limit(PE Short Te Doccupati Iental H Psychos	of Occupat <b>Health</b> , Types e diseas L),Recon rm Expo ional hea <b>lealth</b> ocial fact	ional hist of hazaı es- Haz nmended sure Limi Ith survei ors and h	ealth- Trian ory- Industr rds ,Physic ard contro Exposure it (STEL) ,L illance nazards in o	ial process cal, Chemic I measures Limit(REL) ong Term E	and hazards. al, Biological -Occupation Threshold Lim Exposure Limit, Shift work –fitt	and Ergono al exposure iit Value-Tim Immediate	mical haza limits – ne Weighte Danger to L	ygiene and wel ards- effect of Permissible E d Average, TL Life and Health of psychosocia	[09] hazard, xposure V-TWA, (IDLH)- [09]
under the nealth ar Hygienis Standarc Safety pi Safety p	e Factori nd Worki t (ACGII ds. ractices rotocols	to minim	948 and Ta itions Code ional Institu ize hazards	amil Nadu F 2020- Intro ute of Occu	actories Rules oduction to Amo pational Safety ontrol hierarchy	,1950 – Ove erican Confe y and Healtl	erview abou erence for G n (NIOSH),	) to occupationa ut Occupational Governmental Ir overview about k design, autor	Safety, idustrial OSHA [09] nation - [09]
								Total Hou	<b>rs</b> 45
De	aldar S K elhi,2017	Reese, "C		•				rs Private Limit roach", CRC Pi	
		10.							000, 010
Ed		10.							
Ed Referenc	e(s):		948", Madr	as Book Ag	ency,Chennai,2	2017			
Ed Reference 1. "TI 2. Ja	c <b>e(s):</b> he Factor yaraj (	ries Act 1	cupational		ency,Chennai,2 Practice in		dustries",	Occupational	health

S.No	Торіс	No.of Hours
1	Basics of Occupational Health	
1.1	History of Occupational Health	1
1.2	Triangle of occupational health	1
1.3	Occupational health	1
1.4	Occupational hygiene	2
1.5	Occupational wellbeing	1
1.6	Need for Occupational history	2
1.7	Industrial process and hazards	1
2	Physical Health	
2.1	Hazards, Types of hazards, Physical, Chemical, Biological and Ergonomical hazards	1
2.2	Effect of hazard, Notifiable diseases	1
2.3	Hazard control measures –Occupational exposure limits	2
2.4	Permissible Exposure Limit(PEL), Recommended Exposure Limit(REL), Threshold Limit Value-Time Weighted Average, TLV	1
2.5	TWA, Short Term Exposure Limit (STEL) ,Long Term Exposure Limit,	2
2.6	Immediate Danger to Life and Health (IDLH)- Occupational health surveillance	1
3	Mental Health	
3.1	Psychosocial factors and hazards in occupation	1
3.2	Shift work	2
3.3	Fitting job to man	1
3.4	Effects of psychosocial factors fatigue	2
3.5	Anxiety and stress	2
3.6	Job rotation	1
3.7	Welfare activities	2
4	Statutory norms	
4.1	National policy on Safety, health and environment at work place	2
4.2	Provisions pertaining to occupational health under the Factories Act,1948 and Tamil Nadu Factories Rules,1950	1
4.3	Overview about Occupational Safety, health and Working Conditions Code 2020	2
4.4	Introduction to American Conference for Governmental Industrial Hygienist (ACGIH)	1
4.5	National Institute of Occupational Safety and Health (NIOSH), overview about OSHA Standards.	2
5	Safety practices	
5.1	Safety protocols to minimize hazards	1
5.2	Hazard control hierarchy	1
5.3	Risk matrix	2
5.4	Work design	1
5.5	Overview on Behavior based safety and safety culture.	2
		45

## **Course Designers**

Mrs.S.Chanderalaka -chanderalaka@ksrct.ac.in Mr.Sanjay – <u>sanjaym@ksrct.ac.in</u>



# 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 2022

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.

بسھ ، د ، د 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	Р	Credits
1.	60 MC H01	Medical Robotics	03	0	0	03
2.	60 MC H02	AI for Robotics	03	0	0	03
3.	60 MC H03	Robot Kinematics and Dynamics	03	0	0	03
4.	60 MC H04	Applied and Industrial Robotics	03	0	0	03
5.	60 MC H05	Robotic Programming	03	0	0	03
6.	60 MC H06	Sensors and Machine Vision Systems	03	0	0	03
		Total	18	0	0	18

		Category	L	Т	Ρ	Credit
60 MC H01	Medical Robotics	PC	3	0	0	3

- Identify and describe different types of medical robots and their potential applications
- Know basic concepts in kinematics, dynamics, and control relevant to surgical manipulators
- Develop the analytical and experimental skills necessary to design and implement Motion control and force control in medical robotics
- Be familiar with the state of the art in applied medical robotics and Haptic Tele manipulation.
- Understand the various roles that robotics can play in Minimally Invasive Surgery

## Pre-requisite

**Robotics Engineering** 

## Course Outcomes

## On the successful completion of the course, students will be able to

CO1	Classify the different types design of control architectures	Remember, Understand, Apply
CO2	Identify the function of -assisted minimally invasive surgery.	Remember, Understand, Apply, Analyse
CO3	Design of control architectures for robotic-assisted tele-medicine. Evaluation of medical robots	Remember, Understand, Apply
CO4	Describe the haptic tele manipulation and control strategies	Remember, Understand, Apply
CO5	Discuss the different techniques minimal invasive surgery	Remember, Understand, Apply, Analyse

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	3	2	3			2		3	3	3
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
3- Str	ong;2-N	ledium;	1-Some											

Bloom's Category	Continuous A	End Sem Examination	
BIODITI'S Category	1	2	(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

			K.S. Ra	ngasam	y College of Teo	hnology-Autono	mous		R2022
				60	NC H01 – Medic	al Robotics			
					MCT				
Seme	Semester Hou			k	Total hrs	Credit	Ma	Maximum Marks	
		L	Т	Р		С	CA	ES	Total
	IV	3	0	0	45	3	40	60	100
Intro	duction	to Medi	cal Robots						
Introduction to medical robotics-Assistive technologies - rehabilitation robotics - surgical robotics-						[09]			
robot	ics for di	agnosis	- Historical p	erspectiv	′e.				
Desig	gn of Su	irgical M	lanipulators	5					
						igurations-Europea			[09]
invasive surgery-Passive and active joints-Remote rotation center-Master-slave mechatronic system					[03]				
	Vinci sys								
					cal robotics				
						ol - Force Control:			
						ol (hybrid position/			[09]
			n Active Obs	servers -	Design of null sp	ace / task space c	ontrollers for	r minimally	
	ive surg								
		nanipula						_	
		archite	ctures- l ele	presence	e - stability and	robustness analysi	s - Contact	parameter	[09]
	ation.								
		asive Su				mentional atting De			<b>5001</b>
Human-machine interfaces - Teleoperation - Cooperative manipulation - Port placement for MIS - Robot design concepts - Video images in MIS - Augmented reality					[09]				
RODU	n design	concept		lages in i	/IIS - Augmented			otal Hours	45
Toyt	Book(s)						•	otal Hours	40
1.			ro E. Modoliu	a Idonti	fication and Cont	trol of Robots, HPS	2 2022		
2						Manipulators, Spri			
	rence(s)			anu anu		ivialipulators, Spri	nger.2020		
1.			dical Poboti		e, DEEC-FCTU	(2018)			
2.						g Private Limited, N	Jow Dolhi 2	011	
۷.						A., "Bio-Medical an			dition
3.	Pearsor	n Educati	ion, New De	lhi, 2012.					
4			"Handbook	of Bio-Me	edical instrument	ation", Tata McGra	aw-Hill Publi	shing Co Ltd	., New
•	Delhi, 2	014.							

SDG No.8, 9

BoS Chairman

S.No	Торіс	No.of Hours
	Introduction to medical robotics	
1.1	Assistive technologies	2
1.2	rehabilitation robotics	1
1.3	surgical robotics	2
1.4	surgical robotics	2
1.5	Robotics for diagnosis -	1
1.6	Historical perspective	1
	Design of Surgical Manipulators	
2.1	Security issues-Manipulators with serial and parallel configurations	1
2.2	European directives	1
2.3	Minimally invasive surgery	1
2.4	Passive and active joints-Remote rotation center	2
2.5	Master-slave mechatronic system	1
2.6	Deviance system.	2
	Motion control and force control in medical robotics	
3.1	Motion Control	1
3.2	Joint space control and task space control	1
3.3	Force Control: Indirect force control (compliant control, impedance control)	1
3.4	direct force control (hybrid position/force control, external force control)	1
3.6	Kalman Active Observers	1
3.7	Design of null space / task space controllers for minimally invasive surgery.	1
	Haptic Tele manipulation	
4.1	Haptic control architectures	1
4.2	Tele presence	1
4.3	stability and robustness analysis	1
4.5	Contact parameter estimation	1
	Minimally Invasive Surgery	1
5.1	Human-machine interfaces	1
5.2	Teleoperation	1
5.3	Cooperative manipulation	2
5.4	Port placement for MIS	1
5.5	Robot design concepts	1
5.6	Video images in MIS	1
5.7	Augmented reality	1
	Total	45

#### **Course Designer**

1. Dr.M.Ravi

- ravi@ksrct.ac.in

BoS Chairman
		Category	Ρ	P Credit		
60 MC H02	AI for Robotics	PC	3	0	0	3

- To impart artificial intelligence principles, techniques and its history.
- To assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving engineering
- To develop intelligent systems by assembling solutions to concrete computational problems
- To artificial intelligence principles related to Logic and Reasoning
- To develop intelligent systems in the aspect of communication related to robotics.

#### Pre-requisite

Robotics Engineering

## Course Outcomes

### On the successful completion of the course, students will be able to

CO1	Evaluate Artificial Intelligence (AI) methods and describe their	Remember, Understand,			
001	foundations.	Apply			
CO2	Apply basic principles of AI in solutions that require problem-solving,	Remember, Understand,			
002	inference, perception, knowledge representation and learning.	Apply, Analyse			
CO3	Demonstrate knowledge of reasoning, uncertainty, and knowledge	Remember, Understand,			
003	representation for solving real-world problems	Apply			
CO4	Analyse and illustrate how search algorithms play a vital role in problem-	Remember, Understand,			
004	solving	Apply			
COF	Understand the Communication of Debatics	Remember, Understand,			
CO5	Understand the Communication of Robotics	Apply, Analyse			

## Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	3	2	3			2		3	3	3
CO2	3	2	2	3	2	2	3		2	3		3	2	3
CO3	2	2	2	2	3	2			3	2		2	2	2
CO4	2	3	2	3	3	2	1			3		3	2	2
CO5	2	3	3	2	2	2	2			2		2	2	2
3- Stro	3- Strong;2-Medium;1-Some													

#### Assessment Pattern

Plaam'a Catagory	Continuous As	End Sem Examination		
Bloom's Category	1	2	(Marks)	
Remember	10	20	30	
Understand	20	25	30	
Apply	20	10	30	
Analyse	10	5	10	
Evaluate	0	0	0	
Create	0	0	0	

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

		K.S. Ra			hnology–Autono	mous		R2022
			60	MC H02 - Al for	Robotics			
	I .			MCT	<b>A</b> 11		<u> </u>	
Semester		lours / Wee		Total hrs	Credit		ximum Marks	
	L	T	P		С	CA	ES	Total
V\VI/VII	3	0	0	45	3	40	60	100
Introduction						• • •		
					of Artificial Intelliger	nce Applicat	ions of AI-	[09]
				of Intelligent Age	ents Environments			
Problem Sol								
					tate Space search			[09]
					Pepth First Search		ed search,	
			nmed Se	arch Methods- B	est First Search, A	Search		
Logic and R			na Dron	anitional Logia F	First Order Logic In	foronoo in l	First Order	[00]
				ward Chaining, R	First Order Logic-In	lierence in i	First Order	[09]
Planning	alion, for		ig, Dacki	waru Chaining, K				
-	nning DI	anning as S	Stata_ena	co soarch Foru	vard search, backw	ward soarch	Planning	
					ondeterministic do			[09]
Planning, Mu			anning	and acting in N			1001-1003	
Communica			Acting					
				age -Probabilist	ic Language Pro	ocessing -l	nformation	[09]
					on- Object Recogni			[00]
				- intege - ernient	e e geor rece g.		otal Hours	45
Text Book(	s):							
	/	Norvia. P"	Artificial I	ntelliaence - A M	lodern Approach", 3	3rd Edition.	Prentice Hall.	2015.
					2nd Edition, Bradfo			
Reference(s			<u> </u>	,	,	, -		
		y, "Fundame	entals of a	Artificial Intelliger	nce", Springer, 202	0.		
					Edition, MIT Press,			
					, Packt Publishing			

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

S.No	Торіс	No.of Hours
1.1	Introduction	2
1.2	Evolution of AI, State of Art	1
1.3	Different Types of Artificial Intelligence Applications of AI	2
1.4	Subfields of Al	2
1.5	Intelligent Agents	1
1.6	Structure of Intelligent Agents Environments	1
	Problem Solving based on Searching	
2.1	Introduction to Problem Solving by searching Methods	1
2.2	State Space search, Uninformed Search Methods	1
2.3	Uniform Cost Search, Breadth First Search	1
2.4	Depth First Search-Depth limited search, Iterative deepening depth	2
2.5	first, Informed Search Methods	1
2.6	Best First Search, A* Search	2
	Logic and Reasoning	
3.1	Introduction to Logic and Reasoning	1
3.2	Propositional Logic	1
3.3	First Order Logic	1
3.4	Inference in First Order Logic	1
3.6	Unification, Forward Chaining, Backward Chaining, Resolution	1
	Planning	
4.1	Classical planning, Planning as State	1
4.2	space search, Forward search, backward search, Planning graphs, Hierarchical Planning,	1
4.2	Planning and acting in Nondeterministic domains	I
4.3	Sensor-less Planning, Multiagent planning	1
	Communicating, Perceiving and Acting	1
5.1	Communication-Fundamentals of Language	1
5.2	Probabilistic Language Processing	1
5.3	Information Retrieval	2
5.4	Information Extraction	1
5.5	Perception-Image Formation	1
5.6	Object Recognition.	1
	Total	45

# **Course Designer**

1. Mr.R.Vivek

- vivekr@ksrct.ac.in

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC H03	Robot Kinematics and Dynamics	PC	3	0	0	3

- Provide a mathematical and geometrical description of robotic manipulators
- To retain the best traditions of traditional calculus.
- Derive from first principles robot dynamics and know how to simulate them
- Understand basic robot control architectures
- Articulate scientific results to your peers

## Pre-requisite

**Robotics Engineering** 

## Course Outcomes

## On the successful completion of the course, students will be able to

CO1	To impart knowledge about kinematic and dynamic analysis of robot manipulators.	Remember, Understand, Apply
CO2	To control both the position and orientation of the tool in the three dimensional space.	Remember, Understand, Apply, Analyse
CO3	The relationship between the joint variables and the position and the orientation of the tool.	Remember, Understand, Apply
CO4	Planning trajectories for the tool to follow on order to perform meaningful tasks.	Remember, Understand, Apply
CO5	To precisely control the high speed motion of the system	Remember, Understand, Apply, Analyse

## Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	2	3			2		3	3	3
CO2	3	2	2	3	2	2	3			2		3	2	3
CO3	3	3	2	2	3	2				2		3	3	3
CO4	2	3	2	3	3	2	2			3		3	3	3
CO5	3	3	3	2	2	2	2			2		2	2	2
3- Str	3- Strong;2-Medium;1-Some													

#### Assessment Pattern

Bloom's Category	Continuous A	End Sem Examination		
Bloom's Category	1	2	(Marks)	
Remember	10	20	30	
Understand	20	25	30	
Apply	20	10	30	
Analyse	10	5	10	
Evaluate	0	0	0	
Create	0	0	0	

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

						hnology–Autonor		F	R2022
			60	MC H03		ics and Dynamics	S		
		1			MCT		r		
Sem	ester	ŀ	Hours / Week		Total hrs	Credit		ximum Marks	
		L	Т	Р		С	CA	ES	Total
	VI/VII	3	0	0	45	3	40	60	100
Intro Roll,	pitch an	position a d yaw an	gles coordin	ate Trans	sformations, Joint	dinate frame Rotat t variables and pos eous coordinates.			[09]
<b>Dire</b> Link SCA	ct Kinen coordina RA Robo	n <b>atics</b> ates D-H ot and thr	Representa	ation, The		. Direct kinematic	analysis fo	r Four axis,	[09]
The		kinema				of solutions. Tool , Articulated robot.	configurati	on, Inverse	[09]
Work work	kspace A space fi	Analysis, xtures, th	e pick and	ope of a place op	Four axis SCA erations, Joint s	RA robot and five pace technique - o e technique in traje	continuous p	bath motion,	[09]
Mani Intro Mani	<b>ipulator</b> duction, ipulator	<b>Dynamic</b> Lagrang inertia te	e's equatior nsor. Gravi	n kinetic ty, Gene	and potential e	nergy. Link inertia agrange-Euler Dy	Tensor, lir namic mod	nk Jacobian el, Dynamic	[09]
mode						Eaglange Ealer is		nobiomo.	
mode					· · · · · · · · · · · · · · · · · · ·			otal Hours	45
	t Book(	s):							45
			ing, Fundam	nentals of		is and Control, PHI	Ť	otal Hours	45
Тех	Rober Richar	t J. Schill rd D. Kla		as .A, Cl	Robotics Analys		T Learning, 2	otal Hours	
<b>Tex</b> 1. 2	Rober Richar Appros erence(s	t <u>J. Schill</u> rd D. Kla ach, Phi I <b>):</b>	after, Thoma _earning., 20	as .A, Cl 009.	Robotics Analys nri Elewski, Micł	is and Control, PHI nael Negin, Robot	T Learning, 2 tics Enginee	otal Hours 009. ering an Integ	
Tex 1. 2 Refe 1.	Rober Richar Appros <b>rence(s</b> John J	t J. Schill rd D. Kla ach, Phi I <b>):</b> J. Craig, I	after, Thoma _earning., 20 ntroduction	as .A, Cl 009. to Robotic	Robotics Analys nri Elewski, Mich cs Mechanics and	is and Control, PHI nael Negin, Robot d Control, Third Ed	Learning, 2 tics Enginee	otal Hours 009. ering an Integ	
<b>Tex</b> 1. 2 <b>Refe</b>	Rober Richar Appros rence(s John J Tsune	t J. Schill rd D. Kla ach, Phi I <b>):</b> J. Craig, I ro Yohikw	after, Thoma _earning., 20 ntroduction t ra, Foundatio	as .A, Cl 009. to Robotio	Robotics Analys nri Elewski, Mich cs Mechanics and potics Analysis ar	is and Control, PHI nael Negin, Robot d Control, Third Ed nd Control, MIT Pre	Learning, 2 ics Enginee ition, Pearso	otal Hours 2009. ering an Integ on, 2008.	grated
<b>Tex</b> 1. 2 <b>Refe</b> 1.	Rober Richar Appros <b>rence(s</b> John J Tsune Bijay I	t J. Schill rd D. Kla ach, Phi I <b>):</b> J. Craig, I ro Yohikw	after, Thoma _earning., 20 ntroduction 1 ra, Foundation n, Ning Xi, 7	as .A, Cl 009. to Robotio	Robotics Analys nri Elewski, Mich cs Mechanics and potics Analysis ar	is and Control, PHI nael Negin, Robot d Control, Third Ed	Learning, 2 ics Enginee ition, Pearso	otal Hours 2009. ering an Integ on, 2008.	grated

BoS Chairman

S.No	Торіс	No.of Hours
1.1	Introduction, position and orientation of objects	2
1.2	objects coordinate frame Rotation matrix	1
1.3	Euler angles Roll	2
1.4	pitch and yaw angles coordinate Transformations	2
1.5	Joint variables and position of end effector	1
1.6	Dot and cross products, coordinate frames,	1
1.7	Rotations, Homogeneous coordinates	
	Direct Kinematics	1
2.1	Link coordinates D-H Representation	1
2.2	The ARM equation. Direct kinematic analysis for Four axis	1
2.3	SCARA Robot and three	1
2.4	five and six axis Articulated Robots	2
	Inverse Kinematics	
3.1	The inverse kinematics problem	1
3.2	General properties of solutions	1
3.3	Tool configuration	1
3.4	Inverse kinematics of four axis SCARA robot and three and five axis	1
3.6	Articulated robot	1
	Workspace Analysis and Trajectory Planning	
4.1	Workspace Analysis	1
4.2	work envelope of a Four axis SCARA robot and five axis articulated robot workspace fixtures	1
4.3	the pick and place operations, Joint space technique	1
4.5	continuous path motion, Interpolated motion	1
4.6	straight line motion and Cartesian space technique in trajectory planning	
	Manipulator Dynamics	1
5.1	Introduction, Lagrange's equation kinetic and potential energy	1
5.2	Link inertia Tensor	1
5.3	Link Jacobian Manipulator inertia tensor. Gravity,	2
5.4	Generalized forces, Lagrange	1
5.5	Euler Dynamic model	1
5.6	Dynamic model of a Two-axis planar robot	1
5.7	Newton Euler formulation	1
5.8	Lagrange Euler formulation, problems	
	Total	45

# **Course Designer**

1. Dr.M.Ravi

- ravi@ksrct.ac.in

BoS Chairman

		Category	L	Т	Ρ	Credit
60 MC H04	Applied and Industrial Robotics	PC	3	0	0	3

- To familiarize robot structures, classification and Types, levels, need of Automation.
- To develop knowledge in Grippers and Sensors for Robotics.
- To develop skills in performing Drives, Transmission and Control for Robotics.
- To develop knowledge in the Artificial Intelligence for Robotics.
- To design and develop a robotic system for a given industrial application.

## Pre-requisite

Robotics Engineering

## Course Outcomes

#### On the successful completion of the course, students will be able to

CO1	Identify and understand the automation concepts for Industries.	Remember, Understand, Apply
CO2	Understand various grippers and sensors for robotics	Remember, Understand, Apply, Analyse
CO3	Interpret terminologies related to drives, actuators and controllers.	Remember, Understand, Apply
CO4	Analyze the principles of AI in robot system integration	Remember, Understand, Apply
CO5	Integrate the applications of robots and digital technology.	Remember, Understand, Apply, Analyse

## Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
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
3- Str	3- Strong: 2-Medium: 1-Some													

3- Strong;2-Medium;1-Some

#### Assessment Pattern

Bloom's Category	Continuous A	Assessment Tests (Marks)	End Sem Examination		
Bloom's Category	1	2	(Marks)		
Remember	10	20	30		
Understand	20	25	30		
Apply	20	10	30		
Analyse	10	5	10		
Evaluate	0	0	0		
Create	0	0	0		

R1/ w.e.f.27/12/2023 Passed in the BoS Meeting Held on 24/11/2023 Approved in Academic Council Meeting held on 23/12/2023

BoS Chairman

					hnology-Autono		F	R2022
		60	MC H04	- Applied and Ir MCT	ndustrial Robotic	S		
Semester	Г I	Hours / Wee		Total hrs	Credit	Ma	vinum Morko	
Semester	F		P	Total hrs			ximum Marks	
V\VI/VII	2 3	Т 0	Р 0	45	C 3	CA 40	ES 60	Total 100
Introduction	-	-	0	40	3	40	60	100
Elements of type of drive,	Robotic S Associate	Systems, Ro ed paramete e. Introducti	er - resolution to Pr	ition, accuracy, r	ification of Roboti epeatability, dexte egies of Automat	rity, complia	nce, Remote	[09]
Grippers and Grippers for various basic and applicati sensors and	<b>J Sensor</b> Robotics   gripper s   ons of s   vision sys	s for Robot - Types of ( system. Sen ensors, Ch stem in the v	<b>ics</b> Grippers, Isors for f aracteristi vorking ar	Robots - Types o	esign for robotic g of Sensors used ir devices, Selection pot.	n Robotics, C	Classification	[09]
robot system	s of Drive	s, Types of	transmiss		uators and its sele		esigning a	[09]
standards, Ir robotics, Nev	nic aspe troduction v trends	n to Artificia & recent up	al Intellige odates in	ence, Al technic robotics. Mobile	ts for robot desigues, Need and a Robot locomotic onter the second second second second second second second se	application o on: Types of	f AI, mobile	[09]
Inspection &	ufacturing Quality C sical prod	i, Constructi Control, Harv uction syste	ion, Medi /esting, P ems, data	ainting & Coatin	ogistics & Storage g, Cleaning & Hyg on, industrial inter	giene, Aeros	pace, basics	[09]
0,			U			Т	otal Hours	45
Text Book(s	):							
1. S. K. Sa 2 John.J.	aha, Intro Craig, " Ir				A McGraw Hills Ed			18.
Reference(s								
					a Publishing Hous			
					nics and Control",			
<sup>3.</sup> robots",	2nd Edit	ion, MIT Pre	ess, 2011.		Scaramuzza, "Int			
4 S.R. De	h Roboti	ics Technold	bay and fle	exible automation	n, 2nd Edition, Tat	a McGraw-H	ill Education	2017

BoS Chairman

S.No	Introduction to Robotics	No.o Hour
1.1	Elements of Robotic Systems	2
1.2	Robot anatomy, DOF, Classification of Robotic systems	1
1.3	work volume, type of drive	2
1.4	Associated parameter	2
1.5	resolution, accuracy, repeatability, dexterity, compliance	1
1.6	Remote Center of Compliance	1
1.7	Introduction to Principles & Strategies of Automation	
1.8	Types & Levels of Automations, Need of automation	
	Grippers and Sensors for Robotics	
2.1	Grippers for Robotics	1
2.2	Types of Grippers, Guidelines for design for robotic gripper	1
2.3	Force analysis for various basic gripper system.	1
2.4	Sensors for Robots	2
2.5	Types of Sensors used in Robotics, Classification and applications of sensors	
2.6	Characteristics of sensing devices, Selections of sensors	
2.7	Need for sensors and vision system in the working and control of a robot	
	Drives and Control for Robotics	
3.1	Drive	1
3.2	Types of Drives	1
3.3	Types of transmission systems	1
3.4	Actuators and its selection while designing a robot system	1
3.5	Control Systems: Types of Controllers,	1
3.6	Introduction to closed loop control	
	AI in Robotics	•
4.1	Socio-Economic aspect of robotisation.	1
4.2	Economical aspects for robot design	1
4.3	Safety for robot and standards	1
4.4	Introduction to Artificial Intelligence	1
4.4	Al techniques, Need and application of Al	
4.5	Mobile robotics, New trends & recent updates in robotics.	
4.6	Mobile Robot locomotion: Types of locomotion, hopping robots	
4.7	Legged robots, wheeled robots, stability, manoeuvrability, controllability.	
	Applications and Digital Manufacturing	1
5.1	Robots Manufacturing, Construction, Medical	1
5.2	Defence, Logistics & Storage, Packing & Palletizing	1
5.3	Inspection & Quality Control, Harvesting	2
5.4	Painting & Coating, Cleaning & Hygiene	1
5.5	Aerospace, basics in cyber-physical production systems, data	1
5.6	driven production, industrial internet of things,	1
5.7	Digital twin technology and simulation methodologies.	1
		otal 45

1. Mr.S.Hari Prasadh - hariprasadh@ksrct.ac.in

BoS Chairman

		Category L T F		Ρ	Credit	
60 MC H06	Sensors and Machine Vision System	PC	3	0	0	3

- Acquaint students with the various 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

#### Pre-requisite

**Robotics Engineering** 

### Course Outcomes

### On the successful completion of the course, students will be able to

CO1	Identify and classify various sensor types based on their principles and applications.	Remember, Understand, Apply
CO2	Assess the suitability of different sensors for specific tasks based on their characteristics.	Remember, Understand, Apply, Analyse
CO3	Describe the optical components, image formation process, and image sensor technologies in machine vision systems.	Remember, Understand, Apply
CO4	Apply image enhancement, transformation, and segmentation techniques to preprocess images for analysis.	Remember, Understand, Apply
CO5	Utilize image processing libraries and tools to extract relevant features from images.	Remember, Understand, Apply, Analyse

#### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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
3- Str	3- Strong;2-Medium;1-Some													

#### Assessment Pattern

Bloom's Category	Continuous A	Assessment Tests (Marks)	End Sem Examination
Bloom S Calegory	1	2	(Marks)
Remember	10	20	30
Understand	20	25	30
Apply	20	10	30
Analyse	10	5	10
Evaluate	0	0	0
Create	0	0	0

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BoS Chairman

			K.S. Ra	ngasam	y College of Teo	hnology-Autono	mous	F	R2022
			60 M	IC H06 - 3		chine Vision Syst	em		
					MCT		-		
Sem	ester	ŀ	Hours / Wee	k	Total hrs	Credit		ximum Marks	
		L	Т	Р		С	CA	ES	Total
	/I/VII	3	0	0	45	3	40	60	100
		to Sense							
						on based on phys			[09]
			cal, mechar	nical, opt	ical, thermal-Se	nsor characteristic	s: sensitivit	y, accuracy,	[00]
-	sion, res								
		nologies							
Introduction to different sensor types: temperature, pressure, proximity, motion- Resistive, capacitive, inductive, and piezoelectric sensors- Optical sensors: photodiodes, phototransistors, lasers- Sensor								[09]	
					cal sensors: pho	todiodes, phototra	nsistors, las	sers- Sensor	
			nsation tech						
			d Signal Co						
Analog and digital sensor interfaces- Amplification and filtering of sensor signals- Analog-to-digital conversion (ADC) and digital-to-analog conversion (DAC)- Noise reduction and error handling in							[09]		
	•	ADC) an	a algital-to-	analog c	onversion (DAC	)- Noise reduction	n and error	nandling in	• •
	or data								
			damentals	noreanti	an lunara farr	notion. Ionooo		ation Color	1001
					ors: CCD and CN	nation: lenses, c 40S	ameras, o	ptics- Color	[09]
			chniques	age cone					
				stoaram	equalization. cc	ontrast adjustment	- Image tra	nsformation:	
						n: thresholding, e			[09]
			lges, texture		J J	<b>J</b> ,	9		
							Т	otal Hours	45
Text	Book(s)								
1.					ors" CRC Press,				
2		0 /	Markus Ulric	ch, and C	hristian Wiedema	ann "Machine Visio	on Algorithm	s and Applica	tions"
	Wiley,2								
	rence(s)								
1.						nd Signal Conditio	ning" Wiley,	2010	
2.					andbook", Newn				
3.						ations" CRC Press			
4	E.R.Da	avies "Co	omputer and	Machine	Vision: Theory,	Algorithms, Practic	alities" Acad	demic Press,2	015

S.No	Introduction to Robotics	No.of Hours
1.1	Elements of Robotic Systems	2
1.2	Robot anatomy, DOF, Classification of Robotic systems	1
1.3	Work volume, type of drive, Associated parameter	2
1.4	resolution, accuracy, repeatability, dexterity, compliance	2
1.5	Remote Center of Compliance	1
1.6	Introduction to Principles & Strategies of Automation	1
1.7	Types & Levels of Automations, Needof automation	
	Grippers and Sensors for Robotics	-
2.1	Grippers for Robotics	1
2.2	Types of Grippers, Guidelines for design for robotic gripper	1
2.3	Force analysis for various basic gripper system. Sensors for Robots	1
2.4	Types of Sensors used in Robotics, Classification and applications of sensors	2
2.5	Characteristics of sensing devices, Selections of sensors	
2.6	Need for sensors and vision system in the working and control of a robot	
	Drives and Control for Robotics	
3.1	Drive	1
3.2	Types of Drives, Types of transmission systems	1
3.3	Actuators and its selection while designing a robot system	1
3.4	Control Systems: Types of Controllers	1
3.5	Introduction to closed loop control	1
	Al in Robotics	
4.1	Socio-Economic aspect of robotisation.	1
4.2	Economical aspects for robot design	1
4.3	Safety for robot and standards, Introduction to Artificial Intelligence	1
4.4	Al techniques, Need and application of Al, mobile robotics	1
4.4	New trends & recent updates in robotics. Mobile Robot locomotion:	
4.5	Types of locomotion, hopping robots	
4.6	legged robots, wheeled robots, stability, maneuverability, controllability	
	Applications and Digital Manufacturing	1
5.1	Robots Manufacturing, Construction, Medical	1
5.2	Defense, Logistics & Storage, Packing & Palletizing	1
5.3	Inspection & Quality Control, Harvesting	2
5.4	Painting & Coating, Cleaning & Hygiene	1
5.5	Aerospace, basics in cyber-physical production systems, data	1
5.6	driven production, industrial internet of things,	1
5.7	Digital twin technology and simulation methodologies.	1
	Total	45

# **Course Designer**

1. Mrs.V.Indumathi

- indumathi@ksrct.ac.in