

# **B.TECH. - MECHANICAL ENGINEERING**

# ACADEMIC REGULATIONS 2023 (R-2023)

# CURRICULUM AND SYLLABI Volume – IV

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# **COLLEGE VISION AND MISSION**

# VISION

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

# Mission

# **M1: Quality Education:**

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

# M2: Research and Innovation:

To foster value-based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

#### M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill based training.

#### M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

# **DEPARTMENT VISION AND MISSION**

# VISION

The Mechanical Engineering department strives to be recognized as an excellent academic and research center for creating outstanding Engineers, Entrepreneurs and Leaders

# Mission

#### M1: Professional Skills:

To provide quality education to enhance students inter-personal and intra-personal skills

#### M2: State-of-art facilities:

To render excellent infrastructure facilities and laboratories to excel as skilled professionals

# M3: Research Exposure:

To Strengthen Research and Development within the department through industrial associations

# M4: Employability:

To put enthusiastic exertions to enhance employability and entrepreneurship skills of students

# M5: Human Values:

To empower students with professional ethics and human values to serve the society

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# **PROGRAMME 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, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

# PO3: Design/development of solutions:

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

#### PO4: Conduct investigations of complex problems:

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

#### PO5: Modern tool usage:

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

# PO6: The engineer and society:

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

#### PO7: Environment and sustainability:

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

#### PO8: Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

# PO9: Individual and team work:

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

# **PO10: Communication:**

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

#### PO11: Project management and finance:

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

#### PO12: Life-long learning:

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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# **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

# PEO1: Technical knowledge

To foster our young graduates with cogent technical knowledge so as to make them employable

# **PEO2: Real-Time Applications**

To apply the acquired knowledge in the field of Mathematics, Science and Engineering in developing real-time projects

# **PEO 3: Design Ability**

To design a system, component or process to meet the desired needs within realistic constraints such as manufacturing, economy, environmental sustainability, social, health and safety

# **PEO 4: Ethics**

To prepare the students to become entrepreneurs with professional attitude in the broader ethical perspective

# PEO 5: Life - Long Learning

To craft curiosity among students for life-long learning through self-study

# PROGRAM SPECIFIC OUTCOMES (PSOs)

# **PSO 1: Solving real time problems**

To develop capability to identify, analyze and solve engineering problems in concern to mechanical engineering along with associated engineering streams.

# **PSO 2: Pursue Professional career**

To bestow quality learning environment to pursue professional career in mechanical engineering with integrated knowledge

# **PSO 3: Concentrating on skill development**

To enflame the student's technical capabilities in engineering design process, intra and inter personnel, linguistic and higher level professional skills required in engineering.

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S.No	Course Category	Breakdown of Credits
1	Humanities and Social Science and Management courses (HS)	15
2	Basic Sciences (BS)	20
3	Engineering Sciences (ES)	29
4	Professional Core (PC)	66
5	Professional Electives (PE)	18
6	Open Electives (OE)	09
7	Professional Activities (PA)	13
8	Ability Enhancement Courses (AEC*)	-
9	Mandatory courses (MC*)	-
	Total	170

# STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAM

SI.		Credits per Semester								
No	Course Category	I	II	III	IV	v	VI	VII	VIII	
1	Humanities and Social Sciences and Management courses (HS)	3	5	1	1	2	-	-	3	
2	Basic Sciences(BS)	7	4	5	4	-	-	-	-	
3	Engineering Sciences (ES)	9	8	4	4	4	-	-	-	
4	Professional Core (PC)	3	4	14	11	8	15	11	-	
5	Professional Electives (PE)	-	-	-	3	3	3	3	6	
6	Open Electives (OE)	-	-	-	-	3	3	3	-	

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23

# SCHEME OF CREDIT DISTRIBUTION - SUMMARY

\* AEC and MC are not included for CGPA calculation

Total

Professional Activities (PA)

Mandatory courses (MC\*)

Ability Enhancement Courses (AEC\*)

7

8

9

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1

-

-

21

1

-

-

22

3

-

-

20

8

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17

Total

Credits

15

20

29

66

18

09

13

-

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	SEMESTER – I									
SI.	Course	Course Title	Category	Pe	erio	ds	Credits	М	ax. Mar	ks
No.	Code		Oalcyory	L	Τ	Ρ	orcuits	CAM	ESM	Total
Theo	Theory									
1	U23MATC01	Engineering Mathematics - I	BS	3	1	0	4	25	75	100
2	U23BSTC01	Physical Science for Engineers	BS	3	0	0	3	25	75	100
3	U23ESTC02	Engineering Mechanics	ES	2	1	0	3	25	75	100
4	U23ESTC03	Basics of Electrical and Electronics Engineering	ES	3	0	0	3	25	75	100
5	U23MET101	Concept of Engineering Design	PC	3	0	0	3	25	75	100
Theo	Theory cum Practical									
6	U23ENBC01	Communicative English - I	HS	2	0	2	3	50	50	100
Prac	tical				_					
7	U23ESPC01	Basics of Electrical and Electronics Engineering Laboratory	ES	0	0	2	1	50	50	100
8	U23ESPC02	Design Thinking and IDEA Lab	ES	0	0	2	1	50	50	100
9	U23ESP101	Engineering Mechanics Laboratory	ES	0	0	2	1	50	50	100
Ability Enhancement Course										
10	U23MEC1XX	Certification Course - I **	AEC	0	0	4	-	100	-	100
Mandatory Course										
11	11   U23MEM101   Induction Programme   MC   2 Weeks				eks	-	-	-	-	
	TOTAL						22	425	575	1000

	SEMESTER – II										
SI.	Course	Course Title	Category	Pe	erio	ds	Credits		ax. Mar	'ks	
No.	Code	Course Title	Category	L	Τ	Ρ	Credits	CAM	ESM	Total	
Theo	Theory										
1	U23MATC02	Engineering Mathematics – II	BS	3	1	0	4	25	75	100	
2	U23CSTC01	Programming in C	ES	3	0	0	3	25	75	100	
3	U23ESTC01	Basics of Civil and Mechanical Engineering	ES	3	0	0	3	25	75	100	
4	U23MET202	Engineering Metallurgy	PC	3	0	0	3	25	75	100	
5	U23HSTC01	Universal Human Values-II	HS	2	0	0	2	25	75	100	
Theo	Theory cum Practical										
6	U23ENBC02	Communicative English - II	HS	2	0	2	3	50	50	100	
Prac	tical										
7	U23CSPC01	Programming in C Laboratory	ES	0	0	2	1	50	50	100	
8	U23ESPC03	Engineering Graphics using AutoCAD	ES	0	0	2	1	50	50	100	
9	U23MEP201	Manufacturing and Metallurgy Laboratory	PC	0	0	2	1	50	50	100	
Abili	Ability Enhancement Course										
10	U23MEC2XX	Certification Course – II **	AEC	0	0	4	-	100	-	100	
Man	Mandatory Course										
11	U23MEM202	Sports, Yoga and NSS	MC	0	0	2	-	100	-	100	
	TOTAL         21         525         575         1100								1100		

<sup>#</sup> Professional Electives are to be selected from the list given in Annexure I

<sup>\$</sup> Open electives are to be selected from the list Annexure II

\*\* Certification courses are to be selected from the list given in Annexure III

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	SEMESTER – III									
SI.	Course	Course Title	Category	Pe	erio	ds	Credits		ax. Mai	'ks
No.	Code		Category	L	Τ	Ρ	Credits	CAM	ESM	Total
Theo	Theory									
1	U23MATC03	Probability and Statistics	BS	3	1	0	4	25	75	100
2	U23ADTC01	Programming in Python	ES	3	0	0	3	25	75	100
3	U23MET303	Applied Thermodynamics	PC	2	1	0	3	25	75	100
4	U23MET304	Fluid Mechanics and Hydraulic Machines	PC	2	1	0	3	25	75	100
5	U23MET305	Manufacturing Processes	PC	3	0	0	3	25	75	100
Theo	ory cum Practic	al								
6	U23MEB301	Strength of Materials	PC	2	0	2	3	50	50	100
Prac	Practical									
7	U23ENPC01	General Proficiency - I	HS	0	0	2	1	50	50	100
8	U23MAPC01	Engineering Mathematics Laboratory	BS	0	0	2	1	50	50	100
9	U23ADPC01	Programming in Python Laboratory	ES	0	0	2	1	50	50	100
10	U23MEP302	Manufacturing Processes Laboratory	PC	0	0	2	1	50	50	100
11	Fluid Mechanics and						1	50	50	100
Abili	Ability Enhancement Course									
12	U23MEC3XX	Certification Course – III	AEC	0	0	4	-	100	-	100
13	U23MES301	Skill Enhancement Course - I: Two wheeler Troubleshooting	AEC	0	0	2	-	100	-	100
Mandatory Course										
14	U23MEM303	Climate Change	MC	2	0	0	-	100	-	100
	TOTAL 24 725 675 1400							1400		

	SEMESTER – IV									
SI.	Course	Course Title	Category	Pe	erio	ds	Credits		ax. Mar	'ks
No.	Code	Course Title	Calegory	L	Τ	Ρ	Credits	CAM	ESM	Total
Theo	ory									
1	U23MATC04	Numerical Methods and Optimization	BS	3	1	0	4	25	75	100
2	U23ITTC02	Programming in Java	ES	3	0	0	3	25	75	100
3	U23MET406	Heat and Mass Transfer	PC	2	1	0	3	25	75	100
4	U23MET407	Computer Aided Design	PC	3	0	0	3	25	75	100
5	U23MEE4XX	Professional Elective – I #	PE	3	0	0	3	25	75	100
Theo	Theory cum Practical									
6	U23MEB402	Kinematics of Machinery	PC	2	0	2	3	50	50	100
Prac	tical									
7	U23ENPCO2	General Proficiency - II	HS	0	0	2	1	50	50	100
8	U23ITPC02	Programming in Java Laboratory	ES	0	0	2	1	50	50	100
9	U23MEP404	CAD/CAM Laboratory	PC	0	0	2	1	50	50	100
10	U23MEP405	Heat Transfer Laboratory	PC	0	0	2	1	50	50	100
Abili	ty Enhancemei	nt Course								
11	U23MEC4XX	Certification Course – IV	AEC	0	0	4	-	100	-	100
12	U23MES402	Skill Enhancement Course- II*	AEC	0	0	2	-	100	-	100
Mandatory Course										
13	U23MEM404	Right to Information and Good Governance	MC	2	0	0	-	100	-	100
		TOTAL					23	675	625	1300

\* Skill Enhancement Courses (I and II) are to be selected from the list given in Annexure III

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	SEMESTER – V									
SI.	Course	Course Title	Category	Pe	Periods		Credits Max. Mar		rks	
No.	Code		outogory	L	Т	Ρ	oround	CAM	ESM	Total
Theo	ory									
1	U23HSTC02	Research Methodology	HS	2	0	0	2	25	75	100
2	U23CSTC03	Data Structures	ES	3	0	0	3	25	75	100
3	U23MET508	Dynamics of Machinery	PC	2	1	0	3	25	75	100
4	U23MET509	Design of Machine Elements	PC	2	1	0	3	25	75	100
5	U23MEE5XX	Professional Elective – II #	PE	3	0	0	3	25	75	100
6	U23XXO5XX	Open Elective - I	OE	3	0	0	3	25	75	100
Prac	Practical									
7	U23CSPC02	Data Structures Laboratory	ES	0	0	2	1	50	50	100
8	U23MEP506	Analysis and Simulation Laboratory	PC	0	0	2	1	50	50	100
9	U23MEP507	Dynamics of Machinery Laboratory	PC	0	0	2	1	50	50	100
Proj	ect Work									
10	U23MEW501	Micro Project	PA	0	0	2	1	100	-	100
Abili	ity Enhanceme	nt Course								
11	U23MEC5XX	Certification Course – V	AEC	0	0	4	-	100	-	100
Man	Mandatory Course									
12	U23MEM505	Essence of Indian Traditional Knowledge	MC	2	0	0	-	100	-	100
	TOTAL						21	600	600	1200

	SEMESTER – VI									
SI.	Course	Course Title	Category	Pe	erio	ds	Credits	Μ	lax. Ma	rks
No.	Code		earegery	L	Τ	Ρ		CAM	ESM	Total
Theo	ory									
1	U23MET610	Metrology and Measurement	PC	3	0	0	3	25	75	100
2	U23MET611	Thermal Engineering	PC	2	1	0	3	25	75	100
3	U23MET612	Manufacturing Technology and Automation	PC	3	0	0	3	25	75	100
4	U23MEE6XX	Professional Elective – III #	PE	3	0	0	3	25	75	100
5	U23XXO6XX	Open Elective - II	OE	3	0	0	3	25	75	100
Theo	Theory cum Practical									
6	U23MEB603	Automobile Engineering	PC	2	0	2	3	50	50	100
Prac	Practical									
7	U23MEP608	Thermal Engineering Laboratory	PC	0	0	2	1	50	50	100
8	U23MEP609	Metrology and Measurements Laboratory	PC	0	0	2	1	50	50	100
9	U23MEP610	Advanced Manufacturing Laboratory	PC	0	0	2	1	50	50	100
Proj	ect Work									
10	U23MEW602	Mini Project	PA	0	0	2	1	100	-	100
Ability Enhancement Course										
11	U23MEC6XX	Certification Course – VI	AEC	0	0	4	-	100	-	100
Mandatory Course										
12	U23MEM606	Gender Equality	MC	2	0	0	-	100	-	100
	TOTAL 22 625 575 1200							1200		

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	SEMESTER – VII													
SI.	Course	Course Title	Category	P	Periods		Periods		Periods		Credits	Max. Marks		
No.	Code		oategory	L	Т	Ρ	Oreans	CAM	ESM	Total				
Theo	Theory													
1	U23MEDC01	Production Planning and Cost Estimation	PC	3	0	0	3	25	75	100				
2	U23MET713	Industrial Automation and Robotics	PC	3	0	0	3	25	75	100				
3	U23MET714	Design of Transmission System	PC	2	1	0	3	25	75	100				
4	U23MEE7XX	Professional Elective - IV #	PE	3	0	0	3	25	75	100				
5	U23XXO7XX	Open Elective - III	OE	3	0	0	3	25	75	100				
Prac	tical		•											
6	U23MEP711	Industrial Automation and Robotics Laboratory	PC	0	0	2	1	50	50	100				
7	U23MEP712	Seminar	PC	0	0	2	1	100	-	100				
Project Work														
8	U23MEW703	Project Phase – I	PA	0	0	4	2	50	50	100				
9	U23MEW704	Internship / Inplant Training	PA	-	-	2	1	100	-	100				
	TOTAL							425	475	900				

	SEMESTER – VIII									
SI.	Course Litle Catedory		Periods		ods Credit		М	lax. Marks		
No.	Code		calogery	LTP	Ρ	<b>C</b> i Cuito	CAM	ESM	Total	
Theo	Theory									
1	U23HSTC03	Entrepreneurship and Business Management	HS	3	0	0	3	25	75	100
2	U23MEE8XX	Professional Elective – V#	PE	3	0	0	3	25	75	100
3	U23MEE8XX	Professional Elective – V I #	PE	3	0	0	3	25	75	100
Proje	Project Work									
4	U23MEW805	Project Phase – II	PA	0	0	16	8	50	100	150
	Total							125	325	450

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# <u>ANNEXURE - I</u>

# **PROFESSIONAL ELECTIVE COURSES**

SI. No.	onal Elective – I (Offe Course Code	Course Title			
31. NO. 1	U23MEE401	Gas Dynamics and Jet propulsion			
2	U23MEE401	Geometric Tolerance and Dimensioning			
3	U23MEDC02	Product Design and Development			
4	U23MEE403	Industrial Casting Technology			
5	U23MEE404	Non-Conventional Energy Sources			
	onal Elective – II (Off				
SI. No.	Course Code	Course Title			
1	U23MEE505	Turbo Machinery			
2	U23MEE506	Powder Metallurgy and Surface Coating			
3	U23MEE507	Green Manufacturing			
4	U23MEE508	Fluid Power Automation			
5	U23MEE509	IoT and Smart Manufacturing			
Professio	onal Elective – III (Off	ered in Semester VI)			
SI. No.	Course Code	Course Title			
1	U23MEE610	Finite Element Analysis For Mechanical Engineers			
2	U23MEE611	Computational Fluid Dynamics			
3	U23MEE612	Quality Control and Improvement			
4	U23MEE613	Additive Manufacturing			
5	U23MEE614	Energy and Climate Change			
Professio	onal Elective – IV (Of	fered in Semester VII)			
SI. No.	Course Code	Course Title			
1	U23MEE715	Industrial Tribology			
2	U23MEE716	Advanced Welding Technology			
3	U23MEE717	Power Plant Engineering			
4	U23MEE718	Nano Technology in Materials			
5	U23MEDC05	Simulation Modeling of Manufacturing System			
Professio	onal Elective – V (Off	ered in Semester VIII)			
Professic SI. No.	onal Elective – V (Off Course Code	ered in Semester VIII) Course Title			
		Course Title			
SI. No.	Course Code	Course Title Lean Manufacturing			
<b>SI. No.</b> 1	Course Code U23MEE819	Course Title			
<b>SI. No.</b> 1 2	Course Code U23MEE819 U23MEE820	Course Title Lean Manufacturing Cryogenic Engineering			
<b>SI. No.</b> 1 2 3	Course Code           U23MEE819           U23MEE820           U23MEE821           U23MEE822	Course Title         Lean Manufacturing         Cryogenic Engineering         Autotronics         Optimization Techniques in Engineering Design			
<b>SI. No.</b> 1 2 3 4 5	Course Code           U23MEE819           U23MEE820           U23MEE821           U23MEE822           U23MEE822           U23MEE823	Course TitleLean ManufacturingCryogenic EngineeringAutotronicsOptimization Techniques in Engineering DesignTotal Quality Management			
Sl. No.           1           2           3           4           5           Profession	Course Code U23MEE819 U23MEE820 U23MEE821 U23MEE822 U23MEE823 onal Elective – VI (Of	Course Title         Lean Manufacturing         Cryogenic Engineering         Autotronics         Optimization Techniques in Engineering Design         Total Quality Management         Fered in Semester VIII)			
SI. No. 1 2 3 4 5 Profession SI. No.	Course Code U23MEE819 U23MEE820 U23MEE821 U23MEE822 U23MEE823 onal Elective – VI (Off Course Code	Course Title         Lean Manufacturing         Cryogenic Engineering         Autotronics         Optimization Techniques in Engineering Design         Total Quality Management         fered in Semester VIII)         Course Title			
Sl. No.           1           2           3           4           5           Profession           Sl. No.           1	Course Code U23MEE819 U23MEE820 U23MEE821 U23MEE822 U23MEE823 onal Elective – VI (Of Course Code U23MEE824	Course Title         Lean Manufacturing         Cryogenic Engineering         Autotronics         Optimization Techniques in Engineering Design         Total Quality Management         fered in Semester VIII)         Course Title         Composites Material			
SI. No.         1         2         3         4         5         Profession         SI. No.         1         2	Course Code U23MEE819 U23MEE820 U23MEE821 U23MEE822 U23MEE823 onal Elective – VI (Of Course Code U23MEE824 U23MEE824 U23MEE825	Course Title         Lean Manufacturing         Cryogenic Engineering         Autotronics         Optimization Techniques in Engineering Design         Total Quality Management         fered in Semester VIII)         Course Title         Composites Material         Engineering Failure Analysis			
Sl. No.           1           2           3           4           5           Profession           Sl. No.           1	Course Code U23MEE819 U23MEE820 U23MEE821 U23MEE822 U23MEE823 onal Elective – VI (Of Course Code U23MEE824	Course Title         Lean Manufacturing         Cryogenic Engineering         Autotronics         Optimization Techniques in Engineering Design         Total Quality Management         fered in Semester VIII)         Course Title         Composites Material			

dr. A. 800

# ANNEXURE - II

# **OPEN ELECTIVE COURSES**

S. No.	Course Code	Course Title	Offering Department	Permitted Departments							
	Open Elective – I (Offered in Semester V/VI)										
1	U23MEOC01	Rapid Prototyping	MECH	EEE, ECE, ICE, CIVIL, BME, FT							
2	U23MEOC02	Material Handling System	MECH	EEE, ICE, CIVIL, Mechatronics							
		Open Elective – II (Offere	d in Semeste	er VII)							
3	U23MEOC03	Creativity Innovation and New Product Development	MECH	EEE, ECE, ICE, CIVIL, BME, Mechatronics							
4	U23MEDC03	Supply Chain Management	MECH	EEE, ECE, CIVIL, Mechatronics							

# <u>ANNEXURE – III</u>

# ABILITY ENHANCEMENT COURSES - (A) CERTIFICATION COURSES

S. No	Course Code	Course Title	Certified By
1	U23MECX01	Adobe Photoshop	Adobe
2	U23MECX02	Adobe Animate	Adobe
3	U23MECX03	Adobe Dreamweaver	Adobe
4	U23MECX04	Adobe After Effects	Adobe
5	U23MECX05	Adobe Illustrator	Adobe
6	U23MECX06	Adobe InDesign	Adobe
7	U23MECX07	Autodesk AutoCAD -ACU	Autodesk
8	U23MECX08	Autodesk Inventor - ACU	Autodesk
9	U23MECX09	Autodesk Revit - ACU	Autodesk
10	U23MECX10	Autodesk Fusion 360 - ACU	Autodesk
11	U23MECX11	Autodesk 3ds Max - ACU	Autodesk
12	U23MECX12	Autodesk Maya - ACU	Autodesk
13	U23MECX13	Cloud Security Foundations	AWS
14	U23MECX14	Cloud Computing Architecture	AWS
15	U23MECX15	Cloud Foundation	AWS
16	U23MECX16	Cloud Practitioner	AWS
17	U23MECX17	Cloud Solution Architect	AWS
18	U23MECX18	Data Engineering	AWS
19	U23MECX19	Machine Learning Foundation	AWS
20	U23MECX20	Robotic Process Automation / Medical Robotics	Blue Prism
21	U23MECX21	Advance Programming Using C	CISCO
22	U23MECX22	Advance Programming Using C ++	CISCO
23	U23MECX23	C Programming	CISCO
24	U23MECX24	C++ Programming	CISCO
25	U23MECX25	CCNP Enterprise: Advanced Routing	CISCO
26	U23MECX26	CCNP Enterprise: Core Networking	CISCO



27	U23MECX27	Cisco Certified Network Associate - Level 2	CISCO
28	U23MECX28	Cisco Certified Network Associate- Level 1	CISCO
29	U23MECX29	Cisco Certified Network Associate- Level 3	CISCO
30	U23MECX30	Fundamentals Of Internet of Things	CISCO
31	U23MECX31	Internet Of Things / Solar and Smart Energy System with IoT	CISCO
32	U23MECX32	Java Script Programming	CISCO
33	U23MECX33	NGD Linux Essentials	CISCO
34	U23MECX34	NGD Linux I	CISCO
35	U23MECX35	NGD Linux II	CISCO
36	U23MECX36	Advance Java Programming	Ethnotech
37	U23MECX37	Android Programming / Android Medical App Development	Ethnotech
38	U23MECX38	Angular JS	Ethnotech
39	U23MECX39	Catia	Ethnotech
40	U23MECX40	Communication Skills for Business	Ethnotech
41	U23MECX41	Coral Draw	Ethnotech
42	U23MECX42	Data Science Using R	Ethnotech
43	U23MECX43	Digital Marketing	Ethnotech
44	U23MECX44	Embedded System Using C	Ethnotech
45	U23MECX45	Embedded System with IOT / Arduino	Ethnotech
46	U23MECX46	English For IT	Ethnotech
47	U23MECX47	Plaxis	Ethnotech
48	U23MECX48	Sketch Up	Ethnotech
49	U23MECX49	Financial Planning, Banking and Investment Management	Ethnotech
50	U23MECX50	Foundation Of Stock Market Investing	Ethnotech
51	U23MECX51	Machine Learning / Machine Learning for Medical Diagnosis	Ethnotech
52	U23MECX52	IOT Using Python	Ethnotech
53	U23MECX53	Creo (Modelling & Simulation)	Ethnotech
54	U23MECX54	Soft Skills, Verbal, Aptitude	Ethnotech
55	U23MECX55	Software Testing	Ethnotech
56	U23MECX56	MX-Road	Ethnotech
57	U23MECX57	CLO 3D	Ethnotech
58	U23MECX58	Solid works	Ethnotech
59	U23MECX59	Staad Pro	Ethnotech
60	U23MECX60	Total Station	Ethnotech
61	U23MECX61	Hydraulic Automation	Festo
62	U23MECX62	Industrial Automation	Festo
63	U23MECX63	Pneumatics Automation	Festo
64	U23MECX64	Agile Methodologies	IBM
65	U23MECX65	Block Chain	IBM
66	U23MECX66	Devops	IBM
67	U23MECX67	Artificial Intelligence	ITS
68	U23MECX68	Cloud Computing	ITS

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B.Tech. Mechanical Engineering

15

		-	
69	U23MECX69	Computational Thinking	ITS
70	U23MECX70	Cyber Security	ITS
71	U23MECX71	Data Analytics	ITS
72	U23MECX72	Databases	ITS
73	U23MECX73	Java Programming	ITS
74	U23MECX74	Networking	ITS
75	U23MECX75	Python Programming	ITS
76	U23MECX76	Web Application Development (HTML, CSS, JS)	ITS
77	U23MECX77	Network Security	ITS & Palo alto
78	U23MECX78	MATLAB	MathWorks
79	U23MECX79	Azure Fundamentals	Microsoft
80	U23MECX80	Azure AI (AI-900)	Microsoft
81	U23MECX81	Azure Data (DP -900)	Microsoft
82	U23MECX82	Microsoft 365 Fundamentals (SS-900)	Microsoft
83	U23MECX83	Microsoft Security, Compliance and Identity (SC-900)	Microsoft
84	U23MECX84	Microsoft Power Platform (PI-900)	Microsoft
85	U23MECX85	Microsoft Dynamics Fundamentals 365 – CRM	Microsoft
86	U23MECX86	Microsoft Excel	Microsoft
87	U23MECX87	Microsoft Excel Expert	Microsoft
88	U23MECX88	Securities Market Foundation	NISM
89	U23MECX89	Derivatives Equinity	NISM
90	U23MECX90	Research Analyst	NISM
91	U23MECX91	Portfolio Management Services	NISM
92	U23MECX92	Cyber Security	Palo alto
93	U23MECX93	Cloud Security	Palo alto
94	U23MECX94	PMI – Ready	PMI
95	U23MECX95	Tally – GST & TDS	Tally
96	U23MECX96	Advance Tally	Tally
97	U23MECX97	Associate Artist	Unity
98	U23MECX98	Certified Unity Programming	Unity
99	U23MECX99	VR Development	Unity

# ABILITY ENHANCEMENT COURSES - (B) SKILL ENHANCEMENT COURSES

SI. No.	Course Code	Course Title
1	U23MES301	Skill Enhancement Course - I: Two wheeler Troubleshooting
	Skill Enhancement C	Course - II:
	U23MES402	1) Four wheeler Troubleshooting
2	U23MES403	2) Demonstration Wood routing
	U23MES404	3) Demonstration LASER cutting

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# SEMESTER I

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Department	Mathe	matics		Progra	amme :	B.Tech.							
Semester	I			Cours	e Categ	ory: <b>BS</b>	Er	nd Semeste	er Exam Ty	/pe: <b>TE</b>			
Course				Pe	riods/W	eek	Credit	Max	kimum Mar	ks			
Code	U23M	ATC01		L	Т	Р	С	CAM	ESE	ТМ			
Course Name	ENGI	NEERIN	IG MATHEMATICS – I	3	1	0	4	25	75	100			
ļ			(Common to All I	Branches	Except (	CSBS)	.1	i.	۵				
Prerequisite	Basic	Mathen	natics										
	On con	npletio	n of the course, the stude	nts will be	e able to	D			BT Ma (Highes				
ř	CO1	lInder	stand the concept of Eigen val	lups and Fi	non voct	ore Diago	nalization	of a Matrix	K	, , , , , , , , , , , , , , , , , , ,			
Courso	CO2					JIS, Diago			K				
Course	CO2       Solve higher order differential equations         CO3       Understand the different types of partial differential equations												
Outcome	CO4				•				K	_			
			about the Applications of doub	-	-								
	CO5       Gain the knowledge about Vector Calculus and its Applications       K3												
UNIT – I	Matrio								iods:12	1			
1	-		Linear Equations – Character Diagonalization of Matrices.	ristic equati	on – Cay	/ley Hami	ton Theor	em – Eigen	values and	CO1			
UNIT – II	Differ	ential E	equations (Higher Order)					Per	iods:12				
1	Linear Differential equations of higher order with constant coefficients – Euler's linear equation of higher order wit coefficients – Method of Variation of parameters.												
UNIT – III	Funct	ions of	Several Variables					Per	iods:12				
Partial derivativ	ves – To	tal deriv	atives – Maxima and Minima o	of two variat	oles – La	grange's l	Method of	multipliers.		CO3			
UNIT – IV	Multip	ole Inte	grals					Per	iods:12				
Multiple Integra – Volume as a		•	order of integration (Cartesian artesian form).	form). App	lications:	Area as a	a double ir	ntegral (Carl	esian form)	CO4			
UNIT – V	Vecto	r Calcu	lus					Per	iods:12				
	-		rl – Directional derivatives – Ir prem and Stoke's Theorem (wi			noidal vec	tor fields -	- Properties	(Statement	CO5			
Lecture Perio	ds: 45		Tutorial Periods: 15	Practica	al Perio	ds: -		Tot	al Periods	: 60			
Text Books								i.					
			eering Mathematics", The Nati		•			-					
		-	, "A Text Book of Engineering						-				
3. S.Narayana Pvt Ltd, 200		.K. Mani	ckavasagam Pillay," Differentia	al Equations	and Its A	Applicatior	ıs", Viswar	nathan. S, P	rinters & Pul	olishers			
Reference Bo	oks												
1. G. Balaji, "N	<b>Natrices</b>	and Cal	culus (Engineering Mathematic	cs – I)" Bala	iji Publica	ations, 9 <sup>th</sup>	Edition Ju	ne 2023					
-		-	ng Mathematics – I", Meenaksh	-									
-	-		Engineering Mathematics ", W	-									
	-	-	neering Mathematics", Tata Mo				dition, 201	8.					
	-	eering N	Athematics", A Programmed A	Approach, 3	Edition	n, 2019.							
Web Referenc		<i>h</i>	/math 1005/alide a /ah anta x//ttl					ation hand					
-	-		/math1025/slides/chapter/kuttl wn0g/2ch6a.pdf	er-inearaig	eura –Sli	ues- syste	ens or equ	auon-nando	ur.hai				
-			22/104/122104017/										
			11/106/111106051/										
			11/108/111108081/										

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# Academic Curriculum R-2023

# COs/POs/PSOs Mapping

COs	Program Outcomes (POs)										Program Specific Outcomes (PSOs)				
	P01	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12										PO12	PSO1	PSO2	PSO3
1	3	2	1	-	2	1	1	-	-	-	-	1	3	-	-
2	3	2	1	1	-	1	1	-	-	-	-	1	3	-	-
3	3	2	1	1	-	1	1	-	-	-	-	1	3	-	-
4	3	2	1	1	-	1	1	-	-	-	-	1	3	-	-
5	2	2	1	-	-	-	1	-	-	-	-	1	3	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

		Cont	M)	End Semester	Total		
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

A. A. 800

Department	Physi	ics / Chemistry	Progra	amme :	B.Tech.							
Semester	I		Cours	e Categ	ory: BS	End S	emester I	Exam Type	: TE			
Course	U23BSTC01 Periods/Week Credit Maximum Mark											
Code	UZJD	51001	L	Т	Р	С	CAM	ESE	ТМ			
Course Name	PHYS	SICAL SCIENCE FOR ENGINEERS	3	0	0	3	25	75	100			
	·	(Common te										
Prerequisite	Physi	cs of 12th standard or equivalent / Che	emistry c	of 12th s	tandard c	or equivale	nt.	DT M-				
		mpletion of the course, the students						BT Ma (Highest				
	CO1	Understand the basic of properties of ma			•			K	2			
	CO2       Identify the wave nature of the particles, physical significance of wave functions       K3											
Course	CO3	Understand the basic principles of laser a	and fiber	optics co	mmunicat	ion		K	2			
Outcome	CO4	Understand and familiar with the water tre	eatment.					K	2			
	CO5	Understand the electrode potential for uses of various batteries.		-				K	2			
	CO6	Understand the specific operating co suggest a method to control corrosion.	ondition	under	which coi	rrosion oco	curs and	K	2			
		SECTION	A - PH	SICS								
UNIT- I	Magn	etic, Dielectric and Superconducting	g Mater	ials			Per	iods: 08				
materials-fer	rites-Die	etic materials, Ferromagnetism- Domain lectric materials-Typesof polarization – La - Ferroelectric materials-Superconducting	angevin-	Debye e	quation-Fr	equency ef			C01			
UNIT- II	Quan	tum Mechanics					Per	iods: 07				
		roglie Wavelength - Uncertainty Principle - endent - Time Independent - Application to	-	-				-	CO2			
UNIT- III		and Fiber Optics					Por	iods: 07				
Laser Action	n – com of light i	of Laser - Spontaneous and Stimulated Er ponents of laser - Types of Lasers - Nd n optical fiber - Numerical aperture and ac	YAG, CO	D <sub>2</sub> laser,	GaAs La	ser Fiber C	Optics - P	rinciple and	CO3			
		SECTION B	– CHEN	IISTRY								
UNIT- IV	Wate	r and its treatment					Per	iods: 08				
alkalinity, TD - Treatment	S, COD of boiler	impurities, Water quality parameters: Defin and BOD. Desalination of brackish water: feed water: Internal treatment (phosphate on exchange demineralization and zeolite p	Reverse e, colloid	osmosis	-disadvant	ages of usi	ng hard wa	ater in boiler	CO4			
UNIT- V	Elect	rochemical Cells and Storage Device	es				Per	iods: 08				
measuremer	nt. Nerna d fuel ce	e electrode potential, standard electrode st equation. Electrolyte concentration co Ils: Types of batteries - alkaline battery-lea	ell. Refe	rence e	lectrodes-l	hydrogen,	calomel a	ndAg/AgCl.	CO5			
UNIT- VI	Corro	sion					Per	iods: 07				
control – mat cathodic me	terial sele thod. Us	tion - factors – types – chemical, electroc ection and design aspects – electrochemica es of inhibitors, metallic coating – anodic ss plating of nickel.	l protecti	on – sacı	ificial ano	de method a	and impres	sed current	CO6			
Lecture Per	riods: 4	5 Tutorial Periods: -	Practic	al Perio	ods: -		Tota	I Periods:	45			
Fext Books												
		gineering Physics", 2nd Edition, TMH, New										
		t book of Engineering Chemistry" - 15th Ed										
3. C.Jain, N	lonica Ja	in, " Engineering Chemistryll" 17thEd. Dha	npatRai l	Pub. Co.	NewDelh	i, (2015).						

L. A. 800

B.Tech. Mechanical Engineering

Re	ference Books
1.	R.Murugeshan, "Modern Physics", S. Chand &Co, New Delhi 2006.
2.	William D Callister Jr., "Material Science and Engineering", 6th Edition, John Wiley and sons, 2009.
3.	Jain & Jain "Engineering chemistry", 23rd Edition, DhanpatRai Publishing Company. 2022
4.	Mars Fontana "Corrosion Engineering", July 2017
5.	JinaRedlin, "Handbook of Electrochemistry", March 28, 2005
We	b References
1.	https://www.sciencedaily.com/terms/materials_science.htm.
2.	https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/materials science.html.
3.	https://study.com/academy/lesson/semiconductors-superconductors-definition-properties.html
4.	https://mechanicalc.com/reference/engineering-materials
5.	http://ndl.ethernet.edu.et/bitstream/123456789/89589/1/%5BPerez_N.%5D_Electrochemistry_and_corrosion%28BookZZ.org%2 9.pdf

COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	-	-	-	-	-	-	-	-	-	-	-
2	3	2	3	2	-	-	-	-	-	-	-	-	-	-	-
3	3	2	3	2	-	-	-	-	-	-	-	-	-	-	-
4	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
5	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total	
Assessment	CAT 1	CAT 2	Model Assignment* Att		Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100	

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Mech	Mechanical Engineering Programme : B.Tech.											
Semester	I		Cours	e Categ	ory: <b>ES</b>	,	End Sei	meste	r Exam T	уре: <b>ТЕ</b>			
Course	U23E	STC02	Pe	riods/We	eek	Cred	dit	Max	imum Ma	rks			
Code		····	L	Т	Р	C	C	AM	ESE	ТМ			
Course Name	ENGI	NEERING MECHANICS	2	1	0	3		25	75	100			
		(Common to EEE, ECE, MECH	H, CIVIL	., Mecha	atronics E	Branch	es)						
Prerequisite	Engine	eering Physics							DT M	onnina			
		mpletion of the course, the students							(Highes	apping st Level)			
	CO1	Recognize the basics of equilibrium of pa								(2			
Course													
Outcome	CO3	Solve problem related to friction force.								(3			
	CO4	Compute the center of mass and momen								(3			
	CO5	Predict displacement, velocity and accele	eration o	f dynami	c particles	i.		I		(3			
UNIT- I		Basics and Statics of Particles Periods: 09											
Parallelogran	n and tri	nd Dimensions - Vectorial representation o angular Law of forces -Resolution of force force - Free body diagram				-							
UNIT- II	Equili	brium of Rigid Bodies						Per	iods: 09				
theorem - Eq systems of UNIT - III	uilibrium forces - Struct	axis -Vectorial representation of moments of Rigid bodies in two dimensions – Force Equilibrium of Rigid bodies in three dimens tural Analysis of Trusses and Frictio	es in spa sions (De o <b>n</b>	ce -Equil scriptive	ibrium of a only).	a parti	cle in s	pace - <b>Per</b> i	Equivalen	t CO2			
		f a truss - Simple Trusses - Analysis of Tru n - equilibrium analysis of simple systems w			•					- CO3			
UNIT - IV	Prope	rties of Surfaces and Solids						Per	iods: 09				
		troid of areas, volumes and mass - Pappu neorem and perpendicular axis theorem, ra							•				
UNIT - V	Dynar	nics of Particles						Per	ods: 09				
		city and acceleration, their relationship - F articles -Impulse and Momentum -Impact o			Curvilinea	ar motio	on - New	/ton's	law - Worl	<sup>K</sup> CO5			
Lecture Pe	riods: 3	30 Tutorial Periods: 15	Practic	al Perio	ods: -			Tota	al Period	s: 45			
Text Books													
		n Jr. E.R. "Vector Mechanics for Engineers											
		Karidge, Engineering Volume I and Engine	-		: Dynamic	s, 8th e	dition, W	iley stu	ident editic	on, 2016.			
3. R.C, Hibb	-	ngineering Mechanics", Prentice Hall, 14th	edition, 2	2016.									
		and Richard J. Schmidt, "Engineering M	lechanic	s: Static	s and Dv	namics	". Thoms	son As	ia Private	Limited.			
Singapore	e, 2010.	neering Mechanics", Dorling Kindersley Inc			-		,			,			
3. S.Rajasek	3. S.Rajasekaran, Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt., Ltd., 2012.												
4. S.S.Bhavi	katti anc	I K.G. Rajashekarappa, Engineering Mecha	anics, Ne	ew Age Ir	nternation	al(P) Lt	d, New [	Delhi, 7	th Edition	, 2019.			
-	· · ·	ineering Mechanical" second edition, Laksh	nmi Publ	cation (F	P), Ltd., 20	)11.							
Web Referen													
		in/video.php?subjectId=112103108		/ <b>F</b> a a line a									
2. http://wwv	v.nptel.ii	tm.ac.in/courses/Webcourse-contents/IIT-K	ANPUR	/Enginee	eringmech	anics/T	able of C	ontent	s.html				

N. A. 800

- 3. https://nptel.ac.in/courses/112/106/112106286/
- 4. https://www.coursera.org/learn/engineering-mechanics-statics
- 5. https://nptel.ac.in/courses/122/104/122104014/

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2
2	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2
3	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2
4	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2
5	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

Accoment		Con	itinuous Assessi	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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epartment	EEE	and ECE	Progra	amme :	B.Tech.				
Semester	I		Cours	e Categ	gory: <b>ES</b>	End	Semester	Exam Typ	be: TE
Course	U23E	STC03	Pe	riods/W	eek	Credit	tr	mum Mar	ks
Code	DAG		L	Т	Р	C	CAM	ESE	ТМ
Course Name		ICS OF ELECTRICAL AND CTRONICS ENGINEERING	3	0	0	3	25	75	100
rerequisite		Common to CSE, IT, MECH, CIVIL, Mematics and Physics	ICTR, CC	E, AI&E	DS, FT ar	nd CSBS B	ranches)		
	On co	mpletion of the course, the studen	ts will be	able to	C			BT Ma (Highes	
	CO1	Apply the basic concepts and various la	ws in DC o	circuits.				K	
	CO2	Analyze the AC circuits and develop circuits.	resonance	e conditi	ons for tr	ansmitter a	nd receiver	к	3
Course Outcome	CO3	Gain the knowledge of power system co and real time applications of transforme			ance of ele	ctrical safet	y measures	к	2
	CO4	Understand the operator of semiconduc	tor diode a	and its ap	oplications	-		K	2
	CO5	Explain the characteristics and operatio	n of BJT a	nd FET.				К	2
	CO6	Relate and Explain Different Communic						К	2
		SECTION A - E	lectrical	Enginee	ering				
UNIT- I	<b>i</b>	i <b>rcuits</b> Difference, Current, Resistance, Induc						ods: 08	
in polar and Resonance	rectangu in series	ons - form factor, peak factor, R-L, R-C, F lar form, concept of impedance, admittanc and parallel circuits, band-width and qua – Two Wattmeter method.	ce, active,	reactive,	apparent	and comple	x power, po	wer factor,	
UNIT- III	Elect	rical Safety and Electrical Machine	S				Peri	ods: 07	
-	-	oower system and its functions, Wiring A , Safety devices - fuse, relay and circuit b				-	Necessity o	f earthing,	
Faraday's La principle, loa	aw of ele ad test an	ctromagnetic induction, Fleming's Right a d performance characteristics - Auto trans apacitor start and run induction motor – L	nd Left hai sformer, S	nd rule -	DC Gene	rator and DO			
		SECTION B – Ele	ectronics	Engine	ering				<b>i</b>
UNIT- IV	Semi	conductor Diodes and Applications	S				Peri	ods: 07	
characteristi	cs - diffu	ductor materials – Doping - Intrinsic a sion and depletion capacitance - Rectifier lator – Light Emitting Diode (LED) - Solar	, Half wave			-			
UNIT- V	Trans								
-		istors					Peri	ods: 07	
		istors sistor - construction – operation - Comm sing - numerical application. Junction Fie OSFET-DMOSFET operation characteris	eld Effect	Transisto	or (JFET),		llector Conf	guration -	
	istor, EM	isistor - construction – operation - Comm sing - numerical application. Junction Fie	eld Effect	Transisto	or (JFET),		llector Conf e semicondu	guration -	1

Lecture Periods: 45	Tutorial Periods: -	Practical Periods: -	Total Periods: 45

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Тех	t Books
1.	R. K. Rajput, "Basic Electrical and Electronics Engineering", University Science Press, 2 <sup>nd</sup> Edition, 2017.
2.	Dr. R. Saravanakumar, Dr.V. Jegathesan, Dr. K. Vinoth Kumar, Dr. K. Kowsalya, "Basic Electrical and Electronics Engineering", Wiley Publisher, 2 <sup>nd</sup> Edition, 2022.
3.	R. Muthusubramaniam, S. Salivahanan and K. A. Mureleedharan, "Basic Electrical Electronics and Computer Engineering", Tata McGraw Hill, 2018
Refe	erence Books
1.	A. Sudhakar and S. P. Shyam Mohan, "Circuits and Networks: Analysis and Synthesis", Tata McGraw Hill Publishing Company Ltd., New Delhi, 4 <sup>th</sup> Edition, 2017.
2.	D.P.Kothari and I.J. Nagrath, "Electric Machines", Tata McGraw Hill, New Delhi, 5th Edition, 2017.
3.	B. L. Theraja, A. K. Theraja, "A Textbook of Electrical Technology – Volume - II", S Chand & Co. Ltd., New Delhi, 23rd Edition, 2009.
4.	David. A. Bell, "Electronic Devices and Circuits", PHI Learning Private Ltd, India, Fourth Edition, 2020
5.	Wayne Tomasi, "Electronic Communication Systems- Fundamentals Theory Advanced", Sixth Edition, Pearson Education, 2018.
Web	References
1.	https://nptel.ac.in/courses/108/108/108108076/
2.	https://www.electrical4u.com/
3.	https://nptel.ac.in/courses/108/102/108102146/
4.	https://onlinecourses.nptel.ac.in/noc21_ee55/
5.	https://nptel.ac.in/courses/117/102/117102059

COs					Prog	gram O	utcome	es (POs	)					ram Spe omes (P	
	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-
2	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-
3	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-
4	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-
5	3	3	3	-	2	-	-	-	-	-	-	1	3	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

Assessment		Con	ntinuous Assessi	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Mecha	anicai		Progra	amme :	B.Tech.				
Semester	I			Cours	e Categ	jory: <b>PC</b>	End S	emester I	Exam Typ	e: TE
Course	U23M	ET101		Per	riods/W	eek	Credit	Max	imum Ma	arks
Code	02011			L	Т	Р	С	CAM	ESE	ТМ
Course Name	CONC	EPT OF	ENGINEERING DESIGN	3	0	0	3	25	75	100
D	Mataria	I Science		MECH						
Prerequisite			ard overview of generic concept	of docian	wold a	mbols on	d standards			
			nts to attain knowledge on desi				u stanuarus	•		
Course			s engineering materials and pro	· · ·						
Objectives			oth knowledge on stress, strain	•	us loadir	ng conditio	ns.			
	To kno	w about t	ne applications of green design	in industr	у.					
	On com	pletion o	f the course, the students wil	l be able	to					lapping st Level)
	CO1	Understa	nd the concepts of work, energy	/, torque, j	power ar	nd free boo	dy diagrams	5.		K2
Course	CO2	Understa	nd various design principles.							K2
Outcome	CO3	Explain d	fferent classes of material and	their prope	erties.					K3
	CO4	Illustrate 1	he various loading and failures	theory me	ethods.					K3
	CO5	Exposed	to light engineering product and	l green de	sign pro	cess.				K3
UNIT- I		n Consid						i	iods: 9	
			, torque, power, load analysis, e ions, practical considerations, F	-	-					;
UNIT- II	Desig	n Termin	ology					Per	iods: 9	
Definition-vari	ous meth		forms of design-importance of		-			oducts-vari	ous desig	
Definition-vario	ous meth hology of	ods and design-re			-			oducts-vari	ous desig	
Definition-vario	ous meth hology of duct and	ods and design-re	forms of design-importance of quirements of a good design-co ycles-bench marking		-			oducts-vari ngineering	ous desig	Ч
Definition-varie projects-morpl standards-pro <b>UNIT- III</b> Creativity and brainstorming,	ous meth hology of duct and Creatin problem , synectic	ods and design-re process c vity in D solving-v cs, force	forms of design-importance of quirements of a good design-co ycles-bench marking	ention-psy	engineer	ring-compu	uter aided e ental block	oducts-vari ngineering <b>Per</b> s-Creativit	ous desig -codes an <b>iods: 9</b> y methods	d CO2
Definition-varie projects-morpl standards-pro <b>UNIT- III</b> Creativity and brainstorming, conceptual de	ous meth hology of duct and Creativ problem , synectic composit	ods and design-re process c vity in D solving-v cs, force ion creatin	forms of design-importance of quirements of a good design-co ycles-bench marking esign ertical and lateral thinking-inve fitting methods, mind map, co ng design concepts.	ention-psy	engineer	ring-compu	uter aided e ental block	oducts-vari ngineering Per s-Creativit lem solvin	ous desig -codes an <b>iods: 9</b> y methods g (TRIZ)	d CO2
Definition-varie projects-morpl standards-pro UNIT- III Creativity and brainstorming, conceptual de UNIT- IV	ous meth hology of duct and Creativ problem , synectic composit Materi	ods and design-re process c vity in D solving-v s, force ion creatin als and	forms of design-importance of quirements of a good design-co ycles-bench marking esign ertical and lateral thinking-inve fitting methods, mind map, co	ention-psy	engineer chologic ıp Theor	ring-compu al view, m ry of innov	uter aided e lental block vative prob	oducts-vari ngineering Per s-Creativit lem solvin Per	ous desig -codes an iods: 9 y methods g (TRIZ) iods: 9	<sup>d</sup> CO2
Definition-varie projects-morpl standards-pro <b>UNIT- III</b> Creativity and brainstorming, conceptual de <b>UNIT- IV</b> Engineering m and polymers	ous meth hology of duct and problem synectic composit Materi naterials materials	ods and design-re process of vity in D solving-v cs, force ion creatin als and s, Moduli	forms of design-importance of quirements of a good design-co ycles-bench marking esign ertical and lateral thinking-inve fitting methods, mind map, co ng design concepts. Their Properties	ention-psy incept ma	engineer chologic ap Theor mers, S ulus – m	ring-compu al view, m ry of innov tress-strain	uter aided e lental block vative prob	oducts-vari ngineering Per s-Creativit lem solvin Per of metallic	ous desig -codes an <b>iods: 9</b> y methods g (TRIZ) <b>iods: 9</b> c, Ceramic	d CO2
Definition-varie projects-morph standards-pro <b>UNIT- III</b> Creativity and brainstorming, conceptual de <b>UNIT- IV</b> Engineering m and polymers thermal condu <b>UNIT- V</b>	ous meth hology of duct and <b>Creatin</b> problem , synectic composit <b>Materi</b> naterials activity, lin <b>Green</b>	ods and design-re process of vity in D solving-v cs, force ion creatin and their s, Moduli hear therm Design	forms of design-importance of quirements of a good design-co ycles-bench marking esign ertical and lateral thinking-inve fitting methods, mind map, co ng design concepts. Their Properties classification: Metals, Ceramics of elasticity, Poisson's ratio, sl al expansion coefficient, specif Process	ention-psy incept ma s and poly near modu ic heat ca	engineer chologic p Theor mers, S ulus – m pacity.	ring-compu- al view, m ry of innov tress-strain naterial stra	n diagrams	oducts-vari ngineering Per s-Creativit lem solvin of metallic ience and Per	ous desig -codes an iods: 9 y methods g (TRIZ) iods: 9 c, Ceramic toughness iods: 9	d CO2
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N. A. 800

B.Tech. Mechanical Engineering

2.	https://nptel.ac.in/courses/113/104/113104096/	
3.	https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-842	
4.	https://www.ifeu.de/en/methods/life-cycle-assessment-and-material-flow-analyses	
5.	https://www.webdesignerdepot.com/2011/02/the-8020-rule-applied-to-web-design	

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	-	2	1	1	1	1	1	2	2	1	1
2	3	1	1	1	-	1	1	1	2	1	1	2	2	2	2
3	3	2	1	1	-	2	2	1	2	1	1	2	2	2	3
4	3	1	1	1	-	1	1	1	2	1	1	2	2	2	2
5	3	1	1	1	-	2	2	2	1	1	2	2	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

Accessment		Cor	ntinuous Assessi	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

fr. fr. 300

Department	Engli	sn		Progr	amme :	B.Tech.					
Semester	I			Cours	e Categ	ory: <b>HS</b>	Enc	d Sem	neste	r Exam 7	ype: T
Course	U23E	NBC01		Pe	riods/W	eek	Credit		Max	imum Ma	arks
Code				L	Т	Р	C	CA	M	ESE	TM
Course Name	СОМІ	IUNICAT	TIVE ENGLISH - I	2	0	2	3	5	0	50	100
	· _ ·	<u> </u>	(Common to A	LL Branches	s except	CSBS)					
Prerequisite	Basics	of English	Language								onnina
	On co	mpletion	of the course, the stud	dents will be	e able to	)					apping st Leve
	CO1	Understa	and the communication flow	in organizatio	on and its	objective	S				<b>&lt;</b> 2
Course	CO2	Write the	technical contents with gra	ammatically pr	ecise sei	ntences					۲2
Outcome	CO3	Articulate	e with correct pronunciation	and overcom	e vernac	ular impad	ct in speakin	ng			∢3
	CO4	Express	opinions confidently in form	nal and inform	al comm	unicative o	contexts				<b>{2</b>
	CO5	Attend in	terview with assertiveness								<b>≺</b> 3
UNIT- I	Work	stead Co	mmunication						Peri	ods: 10	
Communicatio	on, Defir	ition, Pro	cess, Channels, Barriers,	Strategies fo	r Effectiv	ve Comm	unication, V	/erbal	and	Nonverba	al
			es, Barriers, Enhancing List	-							
UNIT- II	Comr	non Erro	rs In Writing And Com	prehension	Strateg	ies			Peri	ods: 10	
-	Agreem	ent, Mispl	aced Modifiers, Squinting	Modifiers, Da	angling N	Nodifier, F			Com	ma Splice	1
Sentence Frag Reading, Prec	-	-	omprehension: Technical p tual Meaning	oassage, Strat	egies: Sk	timming, S	Scanning, In	tensiv	e and	I Extensiv	e CO2
	1								Peri	ods: 10	i.
UNIT- III	Phon	HICS									
-			onants and vowels, Sounds	s Mispronound	ed, Silen	t and Non	-silent Lette	rs, Into			g
	Guidelir	es to cons	onants and vowels, Sounds ed, Mother Tongue Influenc						onatic	on, Spellin	•
Pronunciation Rules and Wo	Guidelir ords ofter	es to cons n misspelle	ed, Mother Tongue Influence						onatic Mothe	on, Spellin er Tongue	•
Pronunciation Rules and Wo UNIT- IV List of Exerci	Guidelir ords ofter Comr ises	es to cons n misspelle nunicatic	ed, Mother Tongue Influenc on Practice - I						onatic Mothe	on, Spellin	•
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Pronunciation Rules and Wo UNIT- IV List of Exerci Listening: Se Speaking: Se Reading: Nor	Guidelir ords ofter <b>Comr</b> ises elf Introdu elf-Introdu	es to cons n misspelle nunicatio nuction vide nction, Ext cal Compre	ed, Mother Tongue Influenc on Practice - I os empore, and Role Play ehension Passage						onatic Mothe	on, Spellin er Tongue	COS
Pronunciation Rules and Wo UNIT- IV List of Exerci Listening: Se Speaking: Se Reading: Non Writing: Com	Guidelir ords ofter <b>Comr</b> ises elf Introdu elf-Introdu mon Erro	es to cons n misspelle nunicatio nunication nunication, Ext cal Compre- prs in Writi	ed, Mother Tongue Influence on Practice - I os empore, and Role Play ehension Passage ing						onatic Mothe <b>Peri</b>	on, Spellin er Tongue i <b>ods: 15</b>	COS
Pronunciation Rules and Wo UNIT- IV List of Exerci Listening: Se Speaking: Se Reading: Non Writing: Com UNIT- V	Guidelir ords ofter ises off Introdu on-Technic imon Erro Interp	es to cons n misspelle nunicatio nunication nunication, Ext cal Compre- prs in Writi	ed, Mother Tongue Influenc on Practice - I os empore, and Role Play ehension Passage						onatic Mothe <b>Peri</b>	on, Spellin er Tongue	COS
Pronunciation Rules and Wo UNIT- IV List of Exerci Listening: Se Speaking: Se Reading: Non Writing: Com	Guidelir ords ofter ises off Introdu on-Technic imon Erro Interp ises	es to cons n misspelle nunicatio nunicatio nunication nunicatio nunicatio nunicatio nunication nunicatio nun	ed, Mother Tongue Influence on Practice - I os empore, and Role Play ehension Passage ing Communication - I						onatic Mothe <b>Peri</b>	on, Spellin er Tongue i <b>ods: 15</b>	COS
Pronunciation Rules and Wo UNIT- IV List of Exerci Listening: Se Speaking: Se Reading: Nor Writing: Com UNIT- V List of Exerci Listening: Sp Speaking: De	Guidelir ords ofter ises off Introdu off-Introdu mon Erro ises peech Sc obate, St	es to cons n misspelle nunicatio nction vide nction, Exte cal Compre- prs in Writi ersonal unds, Inte nuctured G	ed, Mother Tongue Influence on Practice - I os empore, and Role Play ehension Passage ing Communication - I rview Videos roup Discussion, and Conv	e (MTI), Vario					onatic Mothe <b>Peri</b>	on, Spellin er Tongue i <b>ods: 15</b>	CO:
Pronunciation Rules and Wo UNIT- IV List of Exerci Listening: Se Speaking: Non Writing: Com UNIT- V List of Exerci Listening: Sp Speaking: De Reading: Com	Guidelir ords ofter ises off Introdu on-Technic mon Erro ises oeech Sco obate, Sto nmonly (	es to cons n misspelle nunicatio nction vide nction, Ext cal Compro- prs in Writi ersonal unds, Inte cuctured G Confused \	ed, Mother Tongue Influence on Practice - I os empore, and Role Play ehension Passage ing Communication - I rview Videos roup Discussion, and Conv	e (MTI), Vario					onatic Mothe <b>Peri</b>	on, Spellin er Tongue i <b>ods: 15</b>	COS
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B.Tech. Mechanical Engineering

2.	https://opentextbc.ca/advancedenglish/chapter/misplaced-and-dangling-modifiers/	
3.	https://www.hitbullseye.com/Reading-Comprehension-Tricks.php	
4.	https://www.softwaretestinghelp.com/how-to-crack-the-gd/	
5.	https://worldscholarshipvault.com/neutralize-mother-tongue-interference/	

COs		Program Outcomes (POs)													ecific SOs)
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
2	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
3	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
4	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
5	1	-	-	-	-	-	-	-	1	3	-	1	-	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

			Т	heory		
	Conti	nuous Ass	sessment Marks	End Semester		
Assessment	CAT 1	CAT 2	Model Exam	Attendance	Examination (ESE) Marks	Total Marks
Morko	5	5	5	5	75	60
Marks	20	) ( to be we	ighted for 10 mar	rks)	(to be weighted for 50 marks)	60

		Practical						
Continuous Assessm	ent Internal Evaluation	End Seme	ster Internal Evaluation	Total Marks				
30 (to be weig	hted for 10 marks)		30 marks					
Listening (L)*	10	Listening (L)*	10					
Speaking(S)	5	Speaking(S)	5	40				
Reading(R)*	10	Reading(R)*	10					
Writing(W)*	5	Writing(W)*	5					

LRW components of Practical can be evaluated through Language Lab Software

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Department	EEE/	ECE	Progr	amme :	B.Tech.							
Semester	I		Cours	e Categ	ory: <b>ES</b>	En	d Semest	er Exam	Type: <b>LE</b>			
Course		Ma	ximum M	arks								
Code	U23E	SPC01	L	Т	Р	С	CAM	ESE	ТМ			
Course Name	ELEC	CS OF ELECTRICAL AND TRONICS ENGINEERING DRATORY	0	0	2	1	50	50	100			
	(Common to CSE, IT, MECH, CIVIL, CCE, AI&DS, FT, MCTR, CSBS Branches)											
Prerequisite	Basic	Knowledge of Science										
	On completion of the course, the students will be able to BT Ma (Highes											
	CO1	Build the different wiring for domestic		K3								
	CO2	Design and analyze the domestic pow	ver distributio	on.				К3				
Course	CO3	Estimate the performance of transform	ner and mot	ors by co	onducting	load test.		K3				
Outcome	CO4											
	CO5											
	CO6	Understand Rectifiers and Regulators	;						K2			
List of Expe	eriment											
		Section – A E	Electrical E	Experim	ents							
Demonstration Engineering	onstration on Power Sources, Ammeter, Voltmeter, Wattmeter and Energy meter are Pre-requisite for conducting this Electric											
<ol> <li>Engineering Lab.</li> <li>Electrical safety precautions and study of tools, accessories, electrical joints and electrical symbols.</li> <li>Domestic Wiring Practice         <ul> <li>Staircase wiring</li> </ul> </li> </ol>												

- Doctor's room wiring
- Godown wiring
- Wiring of Ceiling fan, LED lamps and Iron Box.
- Design of Domestic power distribution.
- 4. Measurement of 3-phase power using two wattmeter method
- 5. Load test on DC shunt motor.

3.

- 6. Load test on single phase transformer.
- 7. Load test on single phase Induction Motor.

# Section – B Electronics Experiments

- 1. Study of Electronic components and equipment: Resistor, Capacitor
- 2. Measurement of AC signal parameter (Peak-Peak, rms period, frequency) using CRO.
- 3. VI Characteristics of PN junction diode, Zener diode
- 4. Input and output characteristics of Common Emitter configuration of BJT
- 5. Characteristics of JFET
- 6. Measurement of Ripple factor of HWR, FWR
- 7. Voltage Regulator using Zener Diode

Lecture Periods: -	<b>Tutorial Periods: -</b>	Practical Periods: 30	Total Periods: 30								
Reference Books											
1. S. Gowri, T. Jevapoovan	Nadar, "Engineering Practices I	ab Manual". Vikas Publishing House Priva	te Limited, New Delhi, 5th								

- S. Gowri, T. Jeyapoovan Nadar, "Engineering Practices Lab Manual", Vikas Publishing House Private Limited, New Delhi, 5th Edition, 2014.
- A.Sudhakar and Shyam Mohan.S.P, "Circuits and Networks Analysis and Synthesis", Tata McGraw Hill Publishing Company Ltd., New Delhi, 4<sup>th</sup> edition, 2017.
- 3. D.P.Kothari and I.J. Nagrath, "Electric Machines", Tata McGraw Hill, New Delhi, 5<sup>th</sup> Edition, 2017.
- Edward Hughes, John Hiley, Keith Brown, Ian McKenzie Smith, Electrical and Electronics Technology, Pearson Education Limited, New Delhi, 12<sup>th</sup> edition 2016.
- 5. S.K. Sahdev, "Fundamentals of Electrical Engineering and Electronics", DhanpatRai and Co, 2017.

# Web References

- 1. http://eie.sliet.ac.in/laboratories/basic-electrical-engineering-lab/
- 2. https://www.electronics-tutorials.ws/accircuits/series-circuit.html
- 3. https://www.allaboutcircuits.com/textbook/experiments/
- 4. https://www.electronicshub.org/measurements-of-ac-current/
- 5. http://www.electronics-tutorials.ws

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COs					Prog	ram O	utcom	es (PO	s)				Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-
2	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-
3	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-
4	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-
5	3	2	3	-	-	1	-	-	3	-	-	1	3	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

	Co	ontinuous /	Assess	ment Marks (CAM	)		
Assessment	Performance clas	e in Practic sses	al	Model		End Semester Examination (ESE)	Total Marks
	Conduction of Record viva		Practical Examination	Attendance	Marks		
Marks	Marks 15 5 5		5	15	10	50	100

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Department	Mech	anical Engineering	Progra	amme :	B.Tech.							
Semester	I		Cours	e Categ	ory: <b>ES</b>	Enc	Semeste	er Exam	Type: <b>LE</b>			
Course			Periods/Week Credit Ma									
Code	U23E	SPC02	L	Т	Р	С	CAM	ESE	ТМ			
Course Name	DESI	GN THINKING AND IDEA LAB	0	0	2	1	50	50	100			
	(Common to ALL Branches) rerequisite Basic Knowledge of Science											
Prerequisite												
	On completion of the course, the students will be able to											
	CO1	Demonstrate a comprehensive understanding of the tools and inventory associated with the IDEA Lab.										
	CO2	Develop proficiency in ideation techniques to generate creative and innovative solutions for various design challenges and problems										
Course Outcome	CO3	Acquire practical knowledge of mecha hands-on experience with machinery, assembly of physical components.				•			K3			
	CO4	Cultivate the skills necessary for devel ability to integrate user needs, marked design process.				•	•		K4			
	CO5	Apply iterative design methodologies user testing, and evaluation of functior		-			n feedbacł	<b>,</b>	K4			

**Design process:** Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design, Innovative design: Breaking of patterns, Reframe existing design problems, Principles of creativity Empathy: Customer Needs, Insight-leaving from the lives of others/standing on the shoes of others, Observation

**Design team-Team formation, Conceptualization:** Visual thinking, Drawing/sketching, New concept thinking, Patents and Intellectual Property, Concept Generation Methodologies, Concept Selection, Concept Testing, Opportunity identification Prototyping: Principles of prototyping, Prototyping technologies, Prototype using simple things, Wooden model, Clay model, 3D printing; Experimenting/testing.

Sustainable product design, Ergonomics, Semantics, Entrepreneurship/business ideas, Product Data Specification, Establishing target specifications, Setting the final specifications. Design projects for teams.

# List of Lab Activities and Experiments

- 1. Schematic and PCB layout design of a suitable circuit, fabrication and testing of the circuit.
- 2. Machining of 3D geometry on soft material such as softwood or modelling wax.
- 3. 3D scanning of computer mouse geometry surface. 3D printing of scanned geometry using FDM or SLA printer.
- 4. 2D profile cutting of press fit box/casing in acrylic (3 or 6 mm thickness)/cardboard, MDF (2 mm) board using laser cutter & engraver.
- 5. 2D profile cutting on plywood /MDF (6-12 mm) for press fit designs.
- 6. Familiarity and use of welding equipment.
- 7. Familiarity and use of normal and wood lathe.
- 8. Embedded programming using Arduino and/or Raspberry Pi.
- 9. Design and implementation of a capstone project involving embedded hardware, software and machined or 3D printed enclosure.
- 10. Discussion and implementation of a mini project.
- 11. Documentation of the mini project (Report and video).

Lecture Periods: -	Tutorial Periods: -	Practical Periods: 30	Total Periods: 30								
Text Books											
1. Tim Brown, Change by D	esign: How Design Thinking Tra	Insforms Organizations and Inspires Ir	novation, HarperCollins Publishers								
Ltd											
2. Workshop / Manufactur	ing Practices (with Lab Manual),	Khanna Book Publishing.									

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# **Reference Books**

- 1. Ulrich and Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004
- 2. The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018.
- 3. The Total Inventors Manual (Popular Science): Transform Your Idea into a Top-Selling Product. Sean Michael Ragan, Weldon Owen; 2017.
- 4. The Art of Electronics. 3rd edition. Paul Horowitz and Winfield Hill. Cambridge University Press.
- 5. Practical Electronics for Inventors. 4th edition. Paul Sherz and Simon Monk. McGraw Hill.
- 6. Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education.
- 7. Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill.
- 8. Venuvinod, PK., MA. W., Rapid Prototyping Laser Based and Other Technologies, Kluwer
- 9. Chapman W.A.J, "Workshop Technology", Volume I, II, III, CBS Publishers and Distributors, 5th Edition, 2002.

# Web References

1. https://onlinecourses.nptel.ac.in/noc23\_mg72

# **COs/POs/PSOs Mapping**

COs					Prog	ram O	utcom	es (PO	s)				Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	2	2	-	-	2	-	3	2	-	-	-
2	3	3	3	2	2	2	-	-	2	-	3	2	-	-	-
3	3	3	3	2	3	2	-	-	2	-	3	2	-	-	-
4	3	3	3	2	3	2	-	-	2	-	3	2	-	-	-
5	3	3	3	2	3	2	-	-	2	-	3	2	-	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

Assessment	Co	ontinuous /					
	Performanco clas	e in Practic sses	al	Model		End Semester Examination (ESE)	Total Marks
	Conduction of Practical	Record work	viva	Practical Examination	Attendance	Marks	
Marks	15 5 5		15	10	50	100	

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	Mech	anical Engineering	Progr	Programme : <b>B.Tech.</b>							
Semester	I		Cours	e Categ	gory: <b>ES</b>	End	nd Semester Exam Type: L				
Course	1123E	SP101	Pe	Periods/Week Credit					arks		
Code	UZJL		L	Т	Р	С	CAM	ESE	ТМ		
Course Name		NEERING MECHANICS DRATORY	0	0	2	1	50	50	100		
	7		MECH								
Prerequisite	isite Basic Knowledge of Science										
	On completion of the course, the students will be able to										
	CO1	Applies the concept of law of forc	K2								
Course	CO2	<b>O2</b> Computes the axial forces acting in the truss members and centroid of a lamina.									
Outcome	CO3	Applies the coefficient of friction and Newton's law of motion.									
	CO4	4 Infers about the concept of moment of inertia of a flywheel.							K2		
	CO5	Demonstrates the concept of conservation of energy.									
<ol> <li>Verification</li> <li>Determinication</li> <li>Verification</li> <li>Determinication</li> </ol>	on of ce nation of on of ne nation of	ial forces in the members of a truss ntroid of different lamina coefficient of friction between two wton's laws of motion moment of inertia of a flywheel	surfaces								
		otion parameters using conservatio									
Lecture Peri		Tutorial Periods: -	Practi	cal Peri	ods: 30		Tota	l Periods			
Reference Bo		Bhoot, Engineering Mechanics lab	oratory manual	Sciontific	D				s: 30		

- 4. https://www.coursera.org/learn/engineering-mechanics-statics
- 5. https://nptel.ac.in/courses/122/104/122104014/

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
2	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
3	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
4	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
5	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

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B.Tech. Mechanical Engineering

# **Evaluation Methods**

Assessment	Co	ontinuous /					
	Performanco clas	e in Practic sses	al	Model		End Semester Examination (ESE)	Total Marks
	Conduction of Practical	Record work	viva	Practical Examination	Attendance	Marks	
Marks	15 5 5		15	10	50	100	

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Department	Mechanical E	ngineering	Progra	amm	e: <b>B.</b>	Tech.	•			
Semester	I		Cours	e Ca	itego	ry: <b>MC</b>	End	d Semeste	er Exam Ty	pe: -
Course Code			Per	iods	/We	ek	Credit	Ma	ximum Mar	ks
	U23MEMC01		L		Т	Р	С	CAM	ESE	ТМ
Course Name	INDUCTION P	ROGRAMME	-		-	-	Non-Credi	t –	-	-
Prerequisite	-									
Course	The course will	enable the student to	)						(Hig	apping ghest vel)
Outcome	CO1 Develop	holistic attitude and har	mony in the in	divid	ual, fa	amily, an	d Society		ł	<2
	CO2 Acquire	grammar skills and capa	able to write ar	nd sp	eak E	English c	onfidently		r	<b>&lt;2</b>
	CO3 Underst	and the basic concepts i	in Mathematics	s and	l Prog	Iramming	g		ł	(2
	CO4 Know at	bout the art and culture,	language and	litera	iture o	of this va	st secular nat	ion	ł	<2
	CO5 Identify	the inherent talent and d	levelop it profe	ssior	nally				ł	(3
UNIT- I	Universal Hur	nan Values						Periods:	12	
Management, A Hostel life, Rel Competition and	nger, Stress Perso ationships - Hom I Cooperation, Pee	ciety, Nation, Fixing one nality Development, Sel e sickness, Gratitude er Pressure, Society - Pa for a Holistic Perspectiv	f-improvement towards Parei articipation in \$	, Hea nts, Socie	alth - I Teacl ety, Na	Health is ners and atural Er	sues, Healthy d others Rag ivironment - F	v diet, Heal gging and Participatio	thy lifestyle, interaction,	CO1
UNIT- II	Proficiency in	English						Periods:	12	
	skills - Prognostic	c test on Grammar - S		-				mpletion, I	dioms and	CO2
		Homophones, Homony		•			ct-verb			002
		vriting, Letter writing, Es		-		pment.		Devieder	40	
UNIT- III Mathematics:	Bridge Course	e in Mathematics and	a C Program	min	g			Periods:	12	
Continuity of a Derivatives of el substitution - Dir functions contain - Definite integ	function - Concept ementary functions fferentiation of part ning linear function	integral calculus: Theor t of differentiation - Cor s from first principle - De ametric functions -Differ s -Method of integration ite integrals - Propertie solid.	ncept of deriva rivatives of inv rentiation of im (Decompositio	ative erse plicit	- Slo funct func func thod,	pe of a ions - Lo tions - H method	curve -Differe garithmic difference igher order d of substitutio	entiation Terentiation erentiation erivatives. n, integration	echniques - - Method of Integrals of on by parts)	CO3
C Programming										
Features of C a	nd its basic Structu	ure - Keywords - consta statement - Arrays - Fun		-				atted input	and output	
UNIT- IV	Literary activi	ties						Periods: 1	2	
-		al Exercises - Group dis தொழில்நுட்பம்.	cussion, Deba	ite, E	xtem	pore, Ro	le play, சிறப்	ப்பு சொற்	பொழிவு -	CO4
UNIT- V	Creative arts							Periods:	12	
ntroduction to pa Cinematic - Mimic	-	ned artworks - Documer	ntary and Sho	rt filn	ns - N	lusic - Vo	ocal, Instrume	ental - Dano	ce - Classical	<sup>,</sup> CO5
Lecture Period	ds: 60	Tutorial Periods: -	Practi	cal	Peric	ods: -	Т	otal Peri	ods: 60	
2 <sup>nd</sup> Revise 2. Kumar Mo 3. Seely, Joh 4. B.V. Rama	R. Asthana, G.P. d Edition, 2019. han R, "English Gr n," Oxford A-Z of ( ana," Higher Engine garavelu, "Enginee	Bagaria," A Foundation ammar for all (Functiona Grammar and Punctuatio eering Mathematics", Ta ring Mathematics - I", Mo	al and Applied on, Oxford Pub ta McGraw – I	Grar licati Hill, N	nmar on, 2 New D	)", Unica 013. )elhi, 6 <sup>th</sup>	re Academy, Edition, 2018	2022.	el Books, Ne	w Delh
<ol><li>E. Balagur</li></ol>	USAMV "PROGRA	MĂING IN ANSI C", Mo								

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- 9. தமிழக வரலாறு மக்களும் பண்பாடும், பிள்ளை, கே. கே. , சென்னை : உலகத் தமிழாராய்ச்சி நிறுவனம் , 2002.
- 10. கணினித்தமிழ் முனைவர் இல.சுந்தரம், விகடன் பிரசுரம்.
- 11. கீழடி வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம், தமிழக தொல்லியல் துறை

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- 1. http://www.newsociety.com/Books/S/Slow-isBeautiful
- 2. https://www.aplustopper.com/formal-letter/
- 3. https://www.javatpoint.com/c-programming-language-tutorial
- 4. http://www.math.cum.edu/~wn0g/2ch6a.pdf
- 5. https://education.nsw.gov.au/teaching-and-learning/curriculum/creative-arts

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B.Tech. Mechanical Engineering

Department	Mechanical Engineering	Progr	Programme : <b>B.Tech.</b>								
Semester	I	Cours	e Categ	gory: <b>AE</b>	C	End	End Semester Exam Type: -				
Course		Pe	riods/W	eek	Cre	edit	Maximum Marks				
Code	U23MEC1XX	L	Т	Р	(	2	CAM	ESE	ТМ		
Course Name	<b>CERTIFICATION COURSE - I</b>	0	0	4		-	100	-	100		
		MECH									
Students sl	hall choose an International / Reputed orga	anization certifi	cation co	ourse of 4	40-50 l	nours	duration s	specified i	in the		

Students shall choose an International / Reputed organization certification course of 40-50 hours duration specified in the curriculum (It is mandatory to do a minimum of six courses) which will be offered through the Centre of Excellence. These courses have no credit and will not be considered for CGPA calculation.

- (i) Certification Courses are required to be completed to fulfil the degree requirements. All Certification courses are assessed internally for 100 marks.
- (ii) The Course coordinator handling the course will assess the student through attendance and MCQ test, and declare the student as "pass" on satisfactory completion. A letter grade "P" is awarded to declare pass.
- (iii) The marks scored in these courses will not be taken into consideration for the SGPA / CGPA calculations in the grade sheet.

#### **Evaluation Methods**

Assessment	Continuous Ass	Total Marks	
Assessment	Report	MCQ Test	Total Marks
Marks	10	90	100

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## **SEMESTER II**

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B.Tech. Mechanical Engineering

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	Mathe	ematics				B.Tech.				
Semester						ory: <b>BS</b>		I Semest	er Exam Ty	/pe: TE
Course	U23M	ATC02		Pe	riods/W	eek	Credit	Ma	ximum Mar	ks
Code				L	T	Р	С	CAM	ESE	ТМ
Course Name	e ENGI	NEERIN	G MATHEMATICS – II	3	1	0	4	25	75	100
			(Common to ALL E	Branches E	xcept C	SBS, FT	)			
Prerequisite	Basic	Mathem	atics							
	On cor	npletior	n of the course, the stude	ents will be	e able t	0			BT Ma	
		-							(Highest	
_	CO1		rt a periodic function into serie						K	
Course	CO2	•	ite Fourier transforms of vario						K	
Outcome	CO3		Differential Equations using La	-					K	
	CO4		nverse Laplace transform of s	-					K	
	CO5		difference equations using Z -	- transforms	•				K	3
UNIT - I	İ	er Serie							riods:12	
Dirichlet's cone of intervals – F			Fourier series – Odd and Even	functions -	Half-Ra	nge sine s	eries and co	osine serie	es – Change	CO
	7							<b>n</b>	iada-40	<u> </u>
UNIT - II		er Trans		oform (		f) [	roincord -	I	riods:12	
their properties			se – Properties of Fourier Tran	isiorm (with	out proo	ı) — Fourie	r sine and c	usine I rar	isiorms and	co
UNIT - III	Lapla	ce Tran	sforms					Pe	riods:12	
			y functions and Periodic functial and final value theorems.	tions – Bas	ic proper	ties (exclu	iding proof)	– Laplace	e transforms	co:
UNIT - IV	Invers	se Lapla	ace Transforms					Pe	riods:12	
			ansforms – Convolution theore constant coefficients.	em (excludi	ng proof	) – Solutio	ns of Linea	r Ordinary	Differential	CO4
UNIT - V	Z – Tr	ansforn	ns					Pe	riods:12	
Z-transforms - equations usin		•	perties – Inverse Z-transforms	s (using pai	tial fract	ion and R	esidues) –	Solution c	of difference	cos
Lecture Peri	-		Tutorial Periods: 15	Practica	D Porio	dei -		То	tal Periods	. 60
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Text Books	raian "F	naineeri	ng Mathematics" Tata Mc(	Graw Hill	New De	Ihi 3rd Ec	dition 201			
1. T. Veera	-	-	ng Mathematics", Tata Mc Singh. M. Kumar, "Engine						McGraw Hil	I, Nev
1. T. Veera	pta, Shr	ee Ram	ng Mathematics", Tata Mco Singh. M. Kumar, "Engine						McGraw Hil	ll, Nev
<ol> <li>T. Veeral</li> <li>C. P. Gu Delhi, 2<sup>nc</sup></li> </ol>	pta, Shr <sup>1</sup> Edition,	ee Ram , 2016.	-	ering Mat	hematic	s for sem	nester I & I	I", Tata I	McGraw Hil	ll, Nev
<ol> <li>T. Veeral</li> <li>C. P. Gu Delhi, 2<sup>nc</sup></li> <li>H.K. Das</li> </ol>	pta, Shr <sup>1</sup> Edition, s, "Adva <b>ooks</b>	ee Ram 2016. nced Er	Singh. M. Kumar, "Engine	eering Mat	hematic Iew Del	s for sem hi, 22 <sup>nd</sup> E	ester I &	II", Tata I 9.		
<ol> <li>T. Veeral</li> <li>C. P. Gu Delhi, 2<sup>nc</sup></li> <li>H.K. Das</li> <li>Reference Base</li> <li>N.P. Bali at</li> </ol>	pta, Shr <sup>d</sup> Edition, s, "Adva <b>ooks</b> and Dr. M	ee Ram 2016. nced Er	Singh. M. Kumar, "Engine ngineering Mathematics", S oyal, "A Textbook of Engineeri	eering Mat . Chand, N ng Mathem	hematic Iew Del atics", Ui	s for sem hi, 22 <sup>nd</sup> E niversity S	ester I & Edition 201 cience Pres	II", Tata I 9. s, India, 8	<sup>th</sup> Edition, 20	)16.
<ol> <li>T. Veeral</li> <li>C. P. Gu Delhi, 2<sup>nc</sup></li> <li>H.K. Das</li> <li>Reference Bo</li> <li>N.P. Bali a</li> <li>P. Sivarar</li> </ol>	pta, Shr <sup>d</sup> Edition, s, "Adva <b>ooks</b> and Dr. M	ee Ram 2016. nced Er	Singh. M. Kumar, "Engine	eering Mat . Chand, N ng Mathem	hematic Iew Del atics", Ui	s for sem hi, 22 <sup>nd</sup> E niversity S	ester I & Edition 201 cience Pres	II", Tata I 9. s, India, 8	<sup>th</sup> Edition, 20	)16.
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<ol> <li>T. Veeral</li> <li>C. P. Gu Delhi, 2<sup>nc</sup></li> <li>H.K. Das</li> <li>Reference Bo</li> <li>N.P. Bali a</li> <li>P. Sivarar 2017.</li> <li>Erwin Kre</li> </ol>	pta, Shr <sup>3</sup> Edition, s, "Adva ooks and Dr. M makrishna yszig, "Ac	ee Ram , 2016. nced Er lanish Gc a Das an dvanced I	Singh. M. Kumar, "Engine ngineering Mathematics", S oyal, "A Textbook of Engineeri d C. Vijayakumari, "Engineeri	eering Mat . Chand, N ng Mathem ing Mathem hn Wiley &	hematic Iew Del atics", Ui natics", P Sons, Ne	s for sem hi, 22 <sup>nd</sup> E niversity S Pearson In ew Delhi, <sup>2</sup>	ester I & Edition 201 cience Pres dia Education,	I", Tata I 9. s, India, 8 on service 2019.	<sup>th</sup> Edition, 20 s Pvt. Ltd, I	)16. ndia 1
<ol> <li>T. Veeral</li> <li>C. P. Gu Delhi, 2<sup>nd</sup></li> <li>H.K. Das</li> <li>Reference Bo</li> <li>N.P. Bali a</li> <li>P. Sivarar 2017.</li> <li>Erwin Kre</li> <li>G. Balaji,</li> </ol>	pta, Shro d Edition, s, "Adva ooks and Dr. M makrishna yszig, "Ac "Enginee	ee Ram , 2016. nced Er lanish Gc a Das an dvanced I ring Math	Singh. M. Kumar, "Engine ngineering Mathematics", S oyal, "A Textbook of Engineeri d C. Vijayakumari, "Engineeri Engineering Mathematics", Jo	eering Mat . Chand, N ng Mathem ing Mathem hn Wiley & rtial Differer	hematic lew Del atics", Ui natics", P Sons, Na tial Equa	s for sem hi, 22 <sup>nd</sup> E niversity S Yearson In ew Delhi, <i>'</i> ations", G.	ester I & Edition 201 cience Pres dia Education,	I", Tata I 9. s, India, 8 on service 2019.	<sup>th</sup> Edition, 20 s Pvt. Ltd, I	)16. ndia 1
<ol> <li>T. Veeral</li> <li>C. P. Gu Delhi, 2<sup>nd</sup></li> <li>H.K. Das</li> <li>Reference Ba</li> <li>N.P. Bali a</li> <li>P. Sivarar 2017.</li> <li>Erwin Kre</li> <li>G. Balaji,</li> <li>B.V. Ram</li> </ol>	pta, Shru <sup>3</sup> Edition, s, "Adva <b>ooks</b> and Dr. M makrishna yszig, "Ac "Enginee ana, "Hig	ee Ram , 2016. nced Er lanish Gc a Das an dvanced I ring Math	Singh. M. Kumar, "Engine ngineering Mathematics", S oyal, "A Textbook of Engineeri d C. Vijayakumari, "Engineeri Engineering Mathematics", Jo rematics - Transforms and Pa	eering Mat . Chand, N ng Mathem ing Mathem hn Wiley & rtial Differer	hematic lew Del atics", Ui natics", P Sons, Na tial Equa	s for sem hi, 22 <sup>nd</sup> E niversity S Yearson In ew Delhi, <i>'</i> ations", G.	ester I & Edition 201 cience Pres dia Education,	I", Tata I 9. s, India, 8 on service 2019.	<sup>th</sup> Edition, 20 s Pvt. Ltd, I	)16. ndia 1
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COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	3	2	2	-	-	1	-	-	-	-	-	1	1	-	-		
2	3	2	1	1	-	1	-	-	-	-	-	1	3	-	-		
3	3	2	1	1	-	1	-	-	-	-	-	1	3	-	-		
4	3	2	1	1	-	1	-	-	-	-	-	1	3	-	-		
5	3	2	1	1	-	1	-	-	-	-	-	1	3	-	-		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

dr. d. 800

Department	Comp	outer Science and Engineering	Progra	amme :	B.Tech.							
Semester	11		Cours	e Categ	ory: <b>ES</b>	End S	emester	Exam Type	e: TE			
Course	11000	ST C04	Pe	riods/W	eek	Credit	Max	kimum Mar	ks			
Code	0236	STC01	L	Т	Р	С	CAM	ESE	тм			
Course Name	PROG	GRAMMING IN C	3	0	0	3	25	75	100			
		(Common	to <u>ALL</u> Br	anches	)							
Prerequisite	Nil											
	On cor	npletion of the course, the studer	nts will be	e able to	D			BT Ma (Highes				
	CO1	Comprehend the basics of Computers						K				
Course	CO2	Illustrate the concepts of control struct	ures and lo	ooping.								
Outcome	CO3	Implement programs using arrays and					K2					
Cateonio	CO4	Demonstrate programs using Structure						K3 K3				
	CO5		ĸ									
UNIT - I		Build the programs using Union and Fi					Por	iods: 09	J			
-		fication of Computers - Block Diagram	of a Comr			of Software						
		ary – Decimal – Conversion – Algorithm	•		•		INCLINUIK	- Structure -	C01			
UNIT - II	C Pro	gramming Basics					Per	iods: 09				
	- Expres	gramming – Basic structure of a 'C' prog sions using operators in 'C' – Managing		-	-	-						
UNIT - III	Array	s and Functions					Per	iods: 09	i			
-		Declaration – One dimensional and Tw		mai arrav	/s String-	String oper	ations – St	ring Arrays				
value – Pass b		ng- searching – matrix operations- Fund nce – Recursion		-	-							
value – Pass b UNIT - IV	y refere			-	-		of functio					
UNIT - IV Structure Introd	by refere Struc duction - nition -	nce – Recursion	ction – defi ation – Stru	inition of	function – thin a stru	Declaration	of function	n – Pass by <b>iods: 09</b> al Structure.	CO3			
UNIT - IV Structure Introd Pointers - Defi	by refere Struc duction - nition - ms.	nce – Recursion ture and Pointers – Structure definition – Structure declara	ction – defi ation – Stru	inition of	function – thin a stru	Declaration	of function Per Referentia Pointer and	n – Pass by <b>iods: 09</b> al Structure.	CO3			
UNIT - IV Structure Introd Pointers - Defi Simple program UNIT - V Union Introduc Functions - Ra	by refere Struc duction – nition – ms. Unior ction - P andom A	nce – Recursion ture and Pointers – Structure definition – Structure declara Initialization – Pointers arithmetic – Poi	ction – defi ation – Stru inters and – Introduct	ucture wi arrays -F	function – thin a stru Pointer to le - File C	Declaration cture – Self Function – I perations -	Per Referentia Pointer and Per File Input	n – Pass by iods: 09 al Structure. d Structure- iods: 09 and Output	CO3			
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PO2

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pping												
		Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
PO3	PO4	PO5	<b>PO6</b>	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
-	-	3	-	-	-	-	-	-	-	3	-	3
-	-	3	-	-	-	-	-	-	-	3	-	3

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## COs/POs/PSOs Mapp

**PO1** 

2

2

3

3

3

COs

1

2

3

4

5

Correlation Level: 1 - Low, 2 - Medium, 3 - High

1

1

1

1

1

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3

3

3

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## **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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3

3

3

3

3

3

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		Mechan	ical	Progra	amme : <b>E</b>	B.Tech.					
Semester	11			Cours	e Catego	ory: ES	E	nd Semes	ter Exam Ty	ype:	TE
Course	U23ES	STC01		Pe	riods / W	eek	Credi	t N	/laximum M	larks	
Code Course Name		S OF CI		L 3	т 0	P 0	C 3	CAM 25	ESE 75		тм 100
	LITON		Common to ECE, EEE, ICE	E, MECH, Civ	/il, Mech	atronics	Branche	s)			
Prerequisite	Basic	Science	· · · · · · · · · · · · · · · · · · ·								
	On con	pletion	of the course, the students	will be able	to				1	-	ping Level)
	CO1	Unders	tand the types of buildings an	d materials.						K2	
Course	CO2 CO3		arize on the various component the various infrastructure fac		gs and si	urveying c	oncepts			K2 K2	
Outcome	CO4		rize the working principles of		nd autom	obile svs	tems			K2	
	CO5		tand about the power general	<u> </u>						K2	
	CO6		knowledge about the various			•				K2	
			SECTION A	- CIVIL ENG	SINEERI	NG					
UNIT - I	Buildi	ngs and	Buildings Materials					P	eriods: 08	,	
of Smart citie	es - Gre	en build	fication according to NBC-plir ing, Benefits from green bui properties and uses			•	· ·				C01
UNIT - II	Build	ngs Con	nponents and Surveying					P	eriods: 08	t	
types – Floor –Leveling	-	-	s and their functions. Founda ypes. Surveying: Objects – C				-		-		CO2
	Basic I	ofractruc						P	oriods: 07		
_		nfrastruc		advantages.	Railways	- Permar	nent way a	L	eriods: 07 ients. Sourc	es	
Roads and B	ridges – ality of V	types, co	omponents advantage and dis omestic sewage Treatment – F	Rain Water ha	irvesting	– Dams -	-	nd its elem	ents. Sourc		CO3
Roads and B of Water - Qu types of dam	ridges – ality of V s.	types, cc Vater- Dc	omponents advantage and dis omestic sewage Treatment – F SECTION B – ME	Rain Water ha	irvesting	– Dams -	-	ind its elem tion for dan	ents. Sourc		CO3
Roads and B of Water - Qu types of dam UNIT- IV IC engines – and demerits	ridges – ality of V s. Intern Classifi	types, cc Vater- Dc al and E cation –	omponents advantage and disonmestic sewage Treatment – F SECTION B – ME xternal Combustion System Working principles – Diesel a	Rain Water ha ECHANICAL Is and Petrol Er	ENGINE	– Dams - ERING wo stroke	site selec	nd its elem tion for dan P stroke en	ents. Sourc n construction eriods: 08 gines – me	on, rits	
Roads and B of Water - Qu types of dam UNIT- IV IC engines – and demerits Steam gener	ridges – ality of V s. Intern Classifi ators (B	types, cc Vater- Dc al and E cation – oilers) –	omponents advantage and dis omestic sewage Treatment – F SECTION B – ME xternal Combustion System	Rain Water ha ECHANICAL Is and Petrol Er	ENGINE	– Dams - ERING wo stroke	site selec	nd its elem tion for dan P stroke en	ents. Sourc n construction eriods: 08 gines – me	on, rits	
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4.	https://nptel.ac.in/courses/105102088/
5.	https://nptel.ac.in/courses/105104101/

COs		Program Outcomes (POs)												ram Spe omes (P	
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	-	1	-	-	-	-	-	-	1	-	-	-
2	3	1	1	-	1	-	-	-	-	-	-	1	-	-	-
3	3	1	1	-	1	-	-	-	-	-	-	1	-	-	-
4	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-
5	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total	
Assessment	CAT 1	CAT 1 CAT 2 Model Exam		Assignment* Attendance		Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100	

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	Mechanica	l Engineering	Programme : <b>B.Tech.</b>											
Semester	I		Cours	e Catego	ory: <b>PC</b>	End	Semeste	r Exam Ty	pe: <b>TE</b>					
Course	U23MET202		Pei	riods/We	ek	Credit	Max	imum Mar	ks					
Code	02011202		L	Т	Р	С	CAM	ESE	ТМ					
Course Name	e ENGINEERII	NG METALLURGY	3	0	0	3	25	75	100					
			MECH											
Prerequisite	Nil							DT Mo	nnina					
	On completio	on of the course, the stude	nts will be	e able to	)			BT Ma (Highest						
	CO1 Unders	stand the fundamentals of solid	ification, me	etal struct	ure, and	solid solutio	n metals.	K	2					
Course	CO2 Recog	nize the phase and equilibrium	diagram wi	th reactio	ns.			K	2					
Outcome	CO3 Apply	the principles of heat-treatment	processes.					K	3					
	CO4 Unders	Understand the polymers processing methods and its engineering applications. K3												
	CO5 Perform													
UNIT - I	Solidificatio	n and Theory of Alloys					Per	iods: 09	•					
homogenous	•	solidification of metals: pure neterogeneous nucleation. Solid Ile-Allotropy			· ·	•	•		CO1					
UNIT - II	Phase Diagr	am and Iron - Carbon Equ	ilibrium D	iagram			Per	iods: 09						
Iron Carbon	equilibrium diagra	n of binary phase diagrams – Ty ams – Classification of steel m st Iron, Alloy cast iron.						-	CO2					
UNIT - III	Heat Treatm	ent of Steels					Per	iods: 09	.1					
	-	portant of heat treatment of ste ment of stainless steel: austenit							CO3					
UNIT - IV	Polymers ar	nd Ceramics					Per	iods: 09						
Transfer mole	ding, Properties of	pes - PMMA, PET, PVC- Proce of polymers and Applications, E ) – Silicon Nitride (Si3N4) - Part					olding, Blo	w molding,						
			tially Stabili						CO4					
UNIT - V	Deformation	and Materials Testing	tially Stabili						CO4					
Mechanical p	properties of mate		esting of m	zed Zirco naterials,	nia (PSZ) Tensile, (	and Sialon	Per	of Alumina iods: 09 ss (micro &	CO4					
Mechanical p macro), Impa	properties of mate act, Fatigue and (	and Materials Testing erials - Deformation – types - T	esting of m	zed Zircon naterials, , fatigue t	nia (PSZ) Tensile, ( behavior-	and Sialon	Per n, Hardnes design ag	of Alumina iods: 09 ss (micro &	CO5					
Mechanical p macro), Impa and fatigue.	properties of mate act, Fatigue and (	<b>a and Materials Testing</b> erials - Deformation – types - T Creep testing. Mechanism cree	esting of m	zed Zircon naterials, , fatigue t	nia (PSZ) Tensile, ( behavior-	and Sialon	Per n, Hardnes design ag	of Alumina iods: 09 ss (micro & ainst creep	CO5					
Mechanical p macro), Impa and fatigue. Lecture Peri Text Books	properties of mate act, Fatigue and ( iods:45	<b>a and Materials Testing</b> erials - Deformation – types - T Creep testing. Mechanism cree	esting of m p behavior	zed Zircon naterials, , fatigue t al Perioc	nia (PSZ) Tensile, ( behavior- <b>ds: -</b>	and Sialon. Compressio S-N Curve	Per n, Hardnes design ag Tot	of Alumina iods: 09 ss (micro & ainst creep	CO5					
Mechanical p macro), Impa and fatigue. Lecture Peri Text Books 1. S. K.Manc 2. Srinivasar	broperties of mate act, Fatigue and ( iods:45 dal, Steel Metallur h, Engineering Ma	a and Materials Testing erials - Deformation – types - T Creep testing. Mechanism cree Tutorial Periods: rgy: Properties, Specifications a aterials and Metallurgy, Tata Mo	esting of m behavior <b>Practica</b> And Applicat	zed Zirco naterials, , fatigue t al Perioc ions, McC Education	nia (PSZ) Tensile, ( behavior- <b>ds: -</b> Graw-Hill ,2nd editi	and Sialon Compressio S-N Curve	Per n, Hardnes design ag Tot	of Alumina iods: 09 ss (micro & ainst creep	CO5					
Mechanical p macro), Impa and fatigue. Lecture Peri Text Books 1. S. K.Manc 2. Srinivasar 3. A. Lavaku	broperties of mate act, Fatigue and ( iods:45 dal, Steel Metallur h, Engineering Ma mar, Concept of i	and Materials Testing erials - Deformation – types - T Creep testing. Mechanism cree Tutorial Periods:	esting of m behavior <b>Practica</b> And Applicat	zed Zirco naterials, , fatigue t al Perioc ions, McC Education	nia (PSZ) Tensile, ( behavior- <b>ds: -</b> Graw-Hill ,2nd editi	and Sialon Compressio S-N Curve	Per n, Hardnes design ag Tot	of Alumina iods: 09 ss (micro & ainst creep	CO5					
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Mechanical p macro), Impa and fatigue. Lecture Peri Text Books 1. S. K.Mano 2. Srinivasar 3. A. Lavaku Reference Boo 1. Sidney H. 2. Romesh C 3. L. Krishna	broperties of mate act, Fatigue and ( iods:45 dal, Steel Metallur h, Engineering Ma mar, Concept of i oks Avner, Introductio C. Sharma, Principles	and Materials Testing erials - Deformation – types - T Creep testing. Mechanism cree Tutorial Periods: rgy: Properties, Specifications a aterials and Metallurgy, Tata Mo in physical metallurgy, Morgan o on to Physical Metallurgy, Tata ples of heat treatment of steels, s of Engineering Metallurgy, Ner	Practica Practica And Applicat Graw-Hill E & clay publi McGraw-Hi New Age I w Age Publ	zed Zirco naterials, , fatigue t al Perioc ducation cation,20 ill Publish nternatior ishing Co	nia (PSZ) Tensile, ( behavior- <b>Js: -</b> Graw-Hill ,2nd editi 17 ing comp nal, 2010.	and Sialon. Compressio S-N Curve Education, 2 on,2015 any Ltd, 2nd	Per n, Hardnes design ag Tot: 2014.	of Alumina iods: 09 as (micro & ainst creep al Periods	CO5					
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COs		Program Outcomes (POs)													Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
1	3	2	2	-	1	1	-	1	-	1	-	1	1	1	1			
2	3	1	2	-	-	-	-	1	-	1	-	1	2	1	1			
3	3	1	1	-	-	1	-	-	-	1	-	2	1	1	1			
4	3	1	1	1	-	1	1	1	-	1	1	2	1	1	2			
5	3	2	1	1	2	1	-	1	2	2	1	2	1	1	2			

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

			Cont	inuous Asse	essment Marks (CA	M)	End Semester	Total
Assessme			CAT 1 CAT 2 Model Exam		Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks		5	5	5	5	5	75	100

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Department	Mech	anical E	ngineering	F	Progra	imme :	B.Tech.						
Semester	11			C	Course	e Categ	ory: <b>HS</b>	E	nd Sei	mester	Exam Ty	pe: TE	
Course	U23H	STC01			Per	iods/We	eek	Credit		Maxir	num Marl	s	
Code					L	Т	Р	С	C	AM	ESE	ТМ	
Course Name	UNIV	ERSAL	HUMAN VALUES - II		2	0	0	2	2	:5	75	100	
			(C	common to	o all B	ranch)							
Prerequisite	UHV ·	-											
	On co	mpletior	n of the course, the s	students v	vill be	able to	D				BT Mar (Highest		
	CO1		e the significance of valu profession	ie inputs in f	formal	educatio	on and sta	rt applying	them	in their	K2	2	
Course	CO2	-	ish between values and I the Body, Intention and					of physica	l facilit	ies, the	K2	2	
Outcome	CO3	<b>CO3</b> Analyze the value of harmonious relationship based on trust and respect in their life and profession											
	CO4	Examin	e the role of a human be	ing in ensu	ring ha	armony i	n society a	and nature	э.		K2	2	
	CO5	Apply th professi	ne understanding of eth on.	ical conduc	ct to fo	ormulate	the strate	egy for et	hical I	ife and	K2	2	
UNIT - I	Intro	duction t	to Value Education							Perio	ods: 06		
Value Educatio	on - Self	-explorati	hip and Physical Facility on as the Process for Va Fulfil the Basic Human As	alue Educati								C01	
UNIT - II	Harm	ony in t	he Human Being							Perio	ods: 06	<b>.</b>	
-	ensure	self-regu	rument of the Self-Unde lation and Health he Family and Societ		Harmo	ny in the	e Self-Hai	rmony of	the Se		the Body- ods: 06	CO2	
•	her Fee	elings, Ju	Init of Human Interaction stice in Human-to-Humai					•			•	CO3	
UNIT - IV	Harm	ony in t	he Nature / Existence	е						Perio	ods: 06	.1	
÷		•	Nature-Interconnectedne Co-existence at All Leve		•				•	e Four	Orders of	CO4	
UNIT - V	Impli	cations	of the Holistic Under	rstanding	- A L	ook at l	Professi	onal Eth	ics	Perio	ods: 06	<u> </u>	
Humanistic Co	tance o nstitutio	of Humar on and Ur	Values - Definitivenes hiversal Human Order-C lels-Typical Case Studies	ss of (Ethic Competence	cal) Hu e in Pr	uman Co ofession	onduct - al Ethics-l	Basis for Holistic Te	Huma	ogies, F	roduction	C05	
Lecture Perio	ds: 30	)	Tutorial Periods:	Pra	actica	I Perio	ds: -			Tota	Periods:	30	
										1			
Fext Books					1 1								
Fext Books	w Delh		P. Bagaria, "A Foundatior	n Course in	Huma	n values	and Profe	essional E	thics",	Excel E	ooks, 2nd	Revise	

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4.	https://fdp-si.aicte-india.org/8dayUHV_download.php
5.	https://www.youtube.com/watch?v=8ovkLRYXIjE

COs		Program Outcomes (POs)													ecific SOs)
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	2	3	2	2	-	-	3	-	-	-
2	-	-	-	-	-	2	3	2	2	-	-	3	-	-	-
3	-	-	-	-	-	3	3	2	2	-	-	3	-	-	-
4	-	-	-	-	-	2	3	2	2	-	-	3	-	-	-
5	-	-	-	-	-	2	3	2	2	-	-	3	-	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

_		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Engli	ish		Progra	amme :	B.Tech.				
Semester				Cours	e Categ	ory: <b>HS</b>	End	Semester	Exam Ty	pe: TE
Course	11225	NBC02		Per	riods/W	eek	Credit	Maxir	num Mark	s
Code	UZJE	INDCUZ		L	Т	Р	С	CAM	ESE	ТМ
Course Name	СОМІ	MUNICAT	IVE ENGLISH - II	2	0	2	3	50	50	100
	Decie	o of Englis	(Common to ALL	Branches	except	CSBS)				
Prerequisite	Basics	s or Englis	sh Language						DT Mo	nina
	On co CO1	-	of the course, the studer						BT Maı (Highest <b>K2</b>	Level)
	CO2		mechanics of creative writing						K3	
Course	CO3		anguage skills professionally				lity through	sensitizing	K2	
Outcome			tiquettes in real time situation							
	CO4		language fluency and gain sel		е				K3	
	CO5		houghts and ideas with clarity	/ and focus				T	K2	2
UNIT- I	1		espondence					i.	ods: 10	
Official Letters	: Applyi Editor, C	ing for Edu alling for a	da, Memoranda, Notice, Instru Icational / Car / Home Loans / a quotation, Placing Order, Le	Joining Re	port, Lea	ave Letter,	Industrial V	isit, In plant	Training,	CO1
UNIT- II	Funct	tional Wri	iting Skills					Perio	ods: 10	
	Writing	, Sentence	Structure, Art of condensation aph writing, Techniques of Est	•	•		•	•	nd clause	CO2
UNIT- III	Etiqu	ettes						Perio	ods: 10	.L
	•		porate Etiquette, Meeting Et nunication Etiquette	tiquette, Te	lephone	Etiquette	, Email Etic	luette, Soc	ial Media	CO3
UNIT- IV		nunicatio	on Practice - II					Perio	ods: 15	
	etter writ ust a Min riety of e	nute, Impro examples fo	mptu Speech, Contemporary or Modes of Writing	Issues						CO4
	Join yp	es or letter	÷							
UNIT- V	 •		÷					Peric	ods: 15	
List of Exerci Listening: V Speaking: T Reading: Ph	Interp ses ideos or eam Pre trase and	Dersonal ( In different t esentation, d Clause	S	ice				Peric	ods: 15	CO5
List of Exerci Listening: V Speaking: T Reading: Ph	Interp ses rideos or eam Pre arase and e writing	Dersonal ( In different t esentation, d Clause g on any giv	s Communication - II types of Etiquettes Negotiation Skills		al Perio	ods: 30			ods: 15 Periods: (	
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Fre	Interp ses rideos or eam Pre arase and e writing	Dersonal ( In different t esentation, d Clause g on any giv	s Communication - II cypes of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi		al Perio	ods: 30				
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Fre Lecture Peri Text Books 1. PC Das, "L	Interp ses fideos or eam Pre arase and e writing iods: 3	Dersonal ( In different t esentation, d Clause g on any giv 0 n any giv	s Communication - II cypes of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi Tutorial Periods: -	Practic	Central B	ook Ageno	sy, 2020.			
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Free Lecture Per Text Books 1. PC Das, "L 2. Kumar, Sa	Interp ses (ideos or eam Pre arase and e writing iods: 30 iods: 30 iods: 40 iods: 40	Dersonal ( n different t esentation, d Clause g on any giv 0 n any giv 0	s <b>Communication - II</b> types of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi <b>Tutorial Periods: -</b> ling Official and Business Lett ' Communication Skills''. Oxfo	Practic ers", New C rd Universit	Central B y Press,	ook Ageno 2018.	-			
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Free Lecture Per Text Books 1. PC Das, "L 2. Kumar, Sa 3. Raman, Me	Interp ses (ideos or eam Pre arase and e writing iods: 30 iods: 30 iods: 40 iods: 40	Dersonal ( n different t esentation, d Clause g on any giv 0 n any giv 0	s Communication - II cypes of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi Tutorial Periods: -	Practic ers", New C rd Universit	Central B y Press,	ook Ageno 2018.	-			
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Fre Lecture Peri Text Books 1. PC Das, "L 2. Kumar, Sa 3. Raman, Me Reference B	Interp ses Videos or eam Pre arase and e writing iods: 30 iods: 30 iods: 40 iods: 40	oersonal ( n different t esentation, d Clause g on any giv 0 nany giv 0 niting includ shpalatha,' i&Sangeet	s <b>Communication - II</b> types of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi <b>Tutorial Periods: -</b> ling Official and Business Lett " Communication Skills". Oxfo ha Sharma," Communication S	Practic ers", New C rd Universit Skills", New	Central B y Press, y Delhi: C	ook Agend 2018. DUP, 2018		Total	Periods: (	60
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Fre Lecture Peri Text Books 1. PC Das, "L 2. Kumar, Sai 3. Raman, Me Reference B 1. Sahukar, N	Interp ses (ideos or eam Pre- arase and e writing iods: 30 iods: 30 iods: 30 iods: 40 iods: 4	Dersonal ( In different t esentation, d Clause g on any giv g on any giv 0 riting includ shpalatha,' i&Sangeet	S Communication - II types of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi Tutorial Periods: - ling Official and Business Lett "Communication Skills". Oxfo ha Sharma," Communication Section Statement em,, "The book of Etiquettes	Practic ers", New C rd Universit Skills", New and Manne	Central B y Press, y Delhi: C rs".Pusta	ook Ageno 2018. DUP, 2018 akMahal F	Publisher, Ne	Total   w Delhi; 1s	Periods: (	6 <b>0</b> 009.
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Free Lecture Peri Text Books 1. PC Das, "L 2. Kumar, Sau 3. Raman, Me Reference B 1. Sahukar, N 2. Gerson Sh	Interp ses (ideos or eam Pre arase and e writing iods: 30 iods: 30 iods: 40 iods: 40	bersonal ( n different t esentation, d Clause on any giv on any giv on any giv iting includ shpalatha,' i&Sangeet Bhalla, Pre Steven M. (	s Communication - II types of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi Tutorial Periods: - ling Official and Business Lett " Communication Skills". Oxfo ha Sharma," Communication S em,, "The book of Etiquettes Gerson, "Technical Writing Pro-	Practic ers", New C rd Universit Skills", New and Manne ocess and F	Central B y Press, v Delhi: C rs".Pusta Product",	ook Ageno 2018. DUP, 2018 akMahal F Pearson I	Publisher, Ne	Total   w Delhi; 1s	Periods: (	6 <b>0</b> 009.
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Free Lecture Peri Text Books 1. PC Das, "L 2. Kumar, Sar 3. Raman, Me Reference B 1. Sahukar, N 2. Gerson Sh 3. Grussendo	Interp ses Videos or eam Pre arase and e writing iods: 30 iods: 30 iods: 30 etter Wr njay, Pu eenaksh ooks limeran, aron J, S orf, Maric	Dersonal ( In different t esentation, d Clause g on any giv 0 niting includ shpalatha,' ii&Sangeett Bhalla, Pre Steven M. ( on, "English	S Communication - II types of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi Tutorial Periods: - ling Official and Business Lett "Communication Skills". Oxfo ha Sharma," Communication S em,, "The book of Etiquettes Gerson, "Technical Writing Pro- n for Presentations". Oxford U	Practic ers", New C rd Universit Skills", New and Manne ocess and F niversity Pre	Central B y Press, r Delhi: C rs".Pusta Product", ess, Oxfo	ook Ageno 2018. DUP, 2018 akMahal F Pearson I ord, 2007.	Publisher, Ne	Total   w Delhi; 1s	Periods: (	6 <b>0</b> 009.
List of Exerci Listening: V Speaking: T Reading: Ph Writing: Fre Lecture Peri Text Books 1. PC Das, "L 2. Kumar, Sai 3. Raman, Me Reference B 1. Sahukar, N 2. Gerson Sh 3. Grussendo 4. Seely John	Interp ses fideos or eam Pre- arase and e writing iods: 30 iods: 3	Dersonal ( In different t esentation, d Clause g on any giv g on any giv on any giv fiting includ shpalatha,' i&Sangeet Bhalla, Pre Steven M. ( on, "English Oxford Guid	s Communication - II types of Etiquettes Negotiation Skills ven topic, Paraphrasing Practi Tutorial Periods: - ling Official and Business Lett " Communication Skills". Oxfo ha Sharma," Communication S em,, "The book of Etiquettes Gerson, "Technical Writing Pro-	Practic ers", New C rd Universit Skills", New and Manne ocess and F niversity Pre Dxford Unive	Central B y Press, r Delhi: C rs".Pusta Product", ess, Oxfo ersity Pre	ook Ageno 2018. DUP, 2018 akMahal F Pearson I prd, 2007. ess, 2006.	Publisher, Ne Education P	Total   ew Delhi; 1s vt. Ltd. 3rd	Periods: ( t Edition 2 Edition, 20	6 <b>0</b> 009. 09.

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2	https://owlcation.com/humanities/Four-Types-of-Writing	1
2.	· · · ·	-
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4.	https://www.businessnewsdaily.com/8262-email-etiquette-tips.html	
5.	https://www.youtube.com/watch?v=UOceysteljo	

COs		Program Outcomes (POs)													ecific 'SOs)
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
2	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
3	1	-	-	-	-	-	1	-	-	3	-	1	-	-	-
4	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-
5	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

Theory												
	Cont	inuous Ass	sessment Marks	(CAM)	End Semester							
Assessment	CAT 1 CAT 2 Model Exam		Attendance	Examination (ESE) Marks	Total Marks							
Marks	5	5	5	5	75	60						
IVIAI KS	2	0 ( to be we	ighted for 10 mar	ks)	( to be weighted for 50 marks)	00						

Practical										
Continuous Assessment Internal Evaluation End Semester Internal Evaluation Total Ma										
30 (to be weighte	d for 10 marks)	:	30 marks							
Listening (L)*	10	Listening (L)*	10							
Speaking(S)	5	Speaking(S)	5	40						
Reading(R)*	10	Reading(R)*	10							
Writing(W)*         5         Writing(W)*         5										

LRW components of Practical can be evaluated through Language Lab Software

dr. dr. 8000

Department	Mecr	anical Er	ngineering	Programme : <b>B.Tech.</b>							
Semester	11			Course	e Categ	ory: <b>ES</b>	End	d Semeste	er Exam <sup>-</sup>	Type: LE	
Course				Per	iods/W	eek	Credit Ma		aximum Marks		
Code	U23E	SPC03		L	Т	Р	С	CAM	ESE	ТМ	
Course Name		INEERIN( OCAD	G GRAPHICS USING	0	0	2	1	50	50	100	
			(Commo	on to all Bra	nches)						
Prerequisite	Nil										
	On co	mpletion	of the course, the stude	ents will be	able to	)				lapping est Level	
	CO1	Familiariz	e with the fundamentals and	l standards o	f engine	ering gra	ohics.			K3	
Course	CO2	Perform of	drawing of basic geometrical	construction	s and m	ultiple vie	ws of object	s.		K2	
Outcome	CO3		the isometric and perspective			-				K3	
Outcome	CO4		side view associate on front v							K4	
	CO5		sectional views and lateral s	s of vario	us solids.			K4			
List of Expe	İ								İ		
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COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)			
	PO1	01 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO												PSO2	PSO3	
1	3	1	-	-	3	-	-	-	3	-	-	2	3	3	3	
2	3	1	-	-	3	-	-	-	3	-	-	3	3	3	3	
3	3	1	-	-	3	-	-	-	3	-	-	3	3	3	3	
4	3	1	-	-	3	-	-	-	3	-	-	2	3	3	3	
5	3	1	-	-	3	-	-	-	3	-	-	3	3	3	3	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

	C	continuous	1)				
Assessment		ce in practio asses	cal	Model		End Semester Examination	Total Marks
	Conduction of practical	Record work	viva	Practical Examination	Attendance	(ESE) Marks	
Marks	15	5	5	15	10	50	100

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epartment	Comp	outer Science Engineering	Programme: <b>B.Tech.</b>						
Semester	II		Course	e Catego	ory: <b>ES</b>	End Se	emester E>	kam Typ	e: LE
Course			Per	iods/We	eek	Credit	Maxi	mum Ma	arks
Code	0230	SPC01	L	Т	Р	С	CAM	ESE	ТМ
Course Name	PROG	RAMMING IN C LABORATORY	0	0	2	1	50	50	100
		(Commor	n to All Bra	nches)					
Prerequisite	Nil								
	On co	mpletion of the course, the studen	ts will be	able to	)				lapping st Level
	CO1	Implement logical formulations to solve	simple prol	blems lea	ading to s	pecific appli	ications.		K3
Course	CO2	Execute C programs for simple applic strings.	ations mak	king use	of basic	constructs,	arrays and		K3
Outcome	CO3	Experiment C programs involving function	ons, recurs	ion, poin	iters, and	structures.			K3
	CO4	Demonstrate applications using sequen	itial and rar	ndom acc	cess file p	rocessing.			K3
	CO5	Build solutions for online coding challen	ges.						K3
Eoror		S							
<ol> <li>Write</li> <li>Write</li> <li>Demo</li> <li>Find ti</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Develo</li> <li>Const</li> <li>Develo</li> <li>Develo</li> <li>Develo</li> <li>Develo</li> <li>Develo</li> <li>Write</li> </ol>	a C prog nstrate d he factor a C prog a C prog op a C prog op a C prog op a C prog a C prog a C prog ruct a C a C prog a C prog a File by a C prog		ong with the numbers. C. alindrome of not? by value and element in a nctions like og except al sing pointer nteger array ng Structure e monitor s retrieve the s. Merge th	eir square r not? d call by an array. strlen, s phabets rs. y using p es creen. contents ne two file	reference strcpy, stro oointers.	at, strcmp. e using file	operation co	ommands	5.
<ol> <li>Write</li> <li>Write</li> <li>Demo</li> <li>Find ti</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Develition</li> <li>Constition</li> <li>Develition</li> <li>Write</li> <li>Develition</li> <li>Write</li> <li>Develition</li> <li>Write</li> </ol>	a C prog a C prog nstrate d he factor a C prog a C prog op a C prog op a C prog a C prog a C prog a C prog a C prog a File by a C prog a C prog	172. ram to check whether a given character i ram to Print the numbers from 1 to 10 alc o—While loop in C to find the sum of 'n' i al of a given number using Functions in 0 ram to check whether a given string is pa ram to check whether a value is prime or rogram to swap two numbers using call b program to find the smallest and largest e rix multiplication using C program. ram to perform various string handling fu rogram to remove all characters in a strin ram to find the Sum of an integer array us ram to find the Maximum element in an in program to display Employee details usin ram to display the contents of a file on th getting the input from the keyboard and ram to create two files with a set of value	ong with the numbers. C. alindrome of not? by value and element in a nctions like og except al sing pointer nteger array ng Structure e monitor s retrieve the s. Merge th	eir square or not? d call by an array. e strlen, s lphabets. rs. y using p es creen. e contents ne two file uments.	reference strcpy, stro oointers. s of the fil e contents	at, strcmp. e using file	operation co single file	ommands <b>Periods</b>	
<ol> <li>Write</li> <li>Write</li> <li>Demo</li> <li>Find tl</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Devel</li> <li>Const</li> <li>Impler</li> <li>Write</li> <li>Devel</li> <li>Write</li> <li>Devel</li> <li>Write</li> </ol>	a C prog a C prog nstrate d he factor a C prog op a C prog op a C prog op a C prog a C prog a C prog a C prog a C prog a C prog a C prog a C prog a C prog a C prog a C prog	172. ram to check whether a given character i ram to Print the numbers from 1 to 10 ald o—While loop in C to find the sum of 'n' al of a given number using Functions in G ram to check whether a given string is pa ram to check whether a value is prime or rogram to swap two numbers using call b program to find the smallest and largest of rix multiplication using C program. ram to perform various string handling fu rogram to remove all characters in a strin ram to find the sum of an integer array us ram to find the Maximum element in an in program to display Employee details usin ram to display the contents of a file on th getting the input from the keyboard and ram to create two files with a set of value ram to pass the parameter using comma <b>Tutorial Periods: -</b>	ong with the numbers. C. alindrome o not? by value and element in a nctions like g except al sing pointer nteger array ng Structure e monitor s retrieve the s. Merge the nd line argu	eir square r not? d call by an array. e strlen, s phabets. rs. y using p es creen. e contents ne two file uments. <b>al Peric</b>	reference strcpy, stro pointers. s of the fill e contents ods: 30	e using file	operation co single file Total	Periods	s: 30
<ol> <li>Write</li> <li>Write</li> <li>Demo</li> <li>Find tl</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Develine</li> <li>Consting</li> <li>Nerite</li> <li>Develine</li> <li>Write</li> <li>Develine</li> <li>Write</li> /ol>	a C prog a C prog nstrate d he factor a C prog op a C prog op a C prog op a C prog	172. ram to check whether a given character i ram to Print the numbers from 1 to 10 ald o—While loop in C to find the sum of 'n' ial of a given number using Functions in G ram to check whether a given string is parant ram to check whether a value is prime or rogram to swap two numbers using call b program to find the smallest and largest of rix multiplication using C program. ram to perform various string handling fur rogram to remove all characters in a strin ram to find the sum of an integer array us ram to find the Maximum element in an in program to display Employee details usin ram to display the contents of a file on th getting the input from the keyboard and ram to pass the parameter using comma <b>Tutorial Periods: -</b> Irin C the Hard Way: Practical Exercises	ong with the numbers. C. alindrome o not? by value and element in a nctions like ing except al sing pointer nteger array ng Structure e monitor s retrieve the s. Merge the nd line argu <b>Practic</b> on the Cor	eir square r not? d call by an array. e strlen, s phabets. rs. y using p es contents acceen. e two file uments. <b>al Peric</b>	es. reference strcpy, stro pointers. s of the fil e contents ods: 30 nal Subje	at, strcmp. e using file to form a s	operation co single file <b>Total</b> ep Avoiding	<b>Periods</b> (Like C)	s: 30
<ol> <li>Write</li> <li>Write</li> <li>Demo</li> <li>Find ti</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Devel</li> <li>Const</li> <li>Implei</li> <li>Write</li> <li>Devel</li> <li>Write</li> <li>Devel</li> <li>Write</li> <li>Devel</li> <li>Write</li> <l< td=""><td>a C prog a C prog nstrate d he factor a C prog op a C prog op a C prog op a C prog op a C prog</td><td>172. ram to check whether a given character i ram to Print the numbers from 1 to 10 ald o—While loop in C to find the sum of 'n' i al of a given number using Functions in 0 ram to check whether a given string is param to check whether a value is prime or rogram to swap two numbers using call b program to find the smallest and largest of the sum of an integer array us the same to find the Maximum element in an in program to display the contents of a file on th getting the input from the keyboard and the same to pass the parameter using comma <b>Tutorial Periods: -</b> The the Hard Way: Practical Exercises ay Mittal," Computer Fundamentals and p</td><td>ong with the numbers. C. alindrome of not? by value and element in a nctions like g except al sing pointer nteger array ng Structure e monitor s retrieve the es. Merge the nd line argu <b>Practic</b> on the Cor</td><td>eir square or not? d call by an array. e strlen, s phabets. rs. y using p es creen. e contents creen. e two file uments. <b>al Peric</b> mputation ng in C",</td><td>es. reference strcpy, stro oointers. s of the fil e contents ods: 30 nal Subje Pearson f</td><td>e using file to form a s cts You Kee</td><td>operation co single file <b>Total</b> ep Avoiding First edition,</td><td><b>Periods</b> (Like C)</td><td>s: 30</td></l<></ol>	a C prog a C prog nstrate d he factor a C prog op a C prog op a C prog op a C prog op a C prog	172. ram to check whether a given character i ram to Print the numbers from 1 to 10 ald o—While loop in C to find the sum of 'n' i al of a given number using Functions in 0 ram to check whether a given string is param to check whether a value is prime or rogram to swap two numbers using call b program to find the smallest and largest of the sum of an integer array us the same to find the Maximum element in an in program to display the contents of a file on th getting the input from the keyboard and the same to pass the parameter using comma <b>Tutorial Periods: -</b> The the Hard Way: Practical Exercises ay Mittal," Computer Fundamentals and p	ong with the numbers. C. alindrome of not? by value and element in a nctions like g except al sing pointer nteger array ng Structure e monitor s retrieve the es. Merge the nd line argu <b>Practic</b> on the Cor	eir square or not? d call by an array. e strlen, s phabets. rs. y using p es creen. e contents creen. e two file uments. <b>al Peric</b> mputation ng in C",	es. reference strcpy, stro oointers. s of the fil e contents ods: 30 nal Subje Pearson f	e using file to form a s cts You Kee	operation co single file <b>Total</b> ep Avoiding First edition,	<b>Periods</b> (Like C)	s: 30
<ol> <li>Write</li> <li>Write</li> <li>Demo</li> <li>Find ti</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Devel</li> <li>Const</li> <li>Implei</li> <li>Write</li> <li>Devel</li> <li>Write</li> <li>Devel</li> <li>Write</li> <li>Maureen</li> </ol>	a C prog a C prog nstrate d he factor a C prog a C prog op a C prog op a C prog op a C prog	172. ram to check whether a given character i ram to Print the numbers from 1 to 10 ald o—While loop in C to find the sum of 'n' ial of a given number using Functions in 0 ram to check whether a given string is para ram to check whether a value is prime or rogram to swap two numbers using call b program to find the smallest and largest of rix multiplication using C program. ram to perform various string handling fur rogram to remove all characters in a strin ram to find the sum of an integer array us ram to find the Maximum element in an ir program to display Employee details usin ram to display the contents of a file on th getting the input from the keyboard and ram to pass the parameter using comma <b>Tutorial Periods: -</b> Trin C the Hard Way: Practical Exercises ay Mittal," Computer Fundamentals and p p. Jim Hubbard," Problem Solving and Pro-	ong with the numbers. C. alindrome of not? by value and element in a nctions like g except al sing pointer nteger array ng Structure e monitor s retrieve the es. Merge the nd line argu <b>Practic</b> on the Con	eir square r not? d call by an array. e strlen, s phabets. rs. y using p es contents accreen. e contents. al <b>Peric</b> mputation ng in C", Concep	es. reference strcpy, stro oointers. s of the fil e contents ods: 30 nal Subje Pearson f	e using file to form a s cts You Kee	operation co single file <b>Total</b> ep Avoiding First edition,	<b>Periods</b> (Like C)	s: 30
<ol> <li>Write</li> <li>Write</li> <li>Demo</li> <li>Find ti</li> <li>Write</li> <li>Write</li> <li>Write</li> <li>Develine</li> <li>Constination</li> <li>Constination</li> <li>Write</li> <li>Develine</li> <li>Write</li> <li>Develine</li> <li>Write</li> /ol>	a C prog a C prog nstrate d he factor a C prog op a C prog op a C prog op a C prog	172. ram to check whether a given character i ram to Print the numbers from 1 to 10 ald o—While loop in C to find the sum of 'n' i al of a given number using Functions in 0 ram to check whether a given string is param to check whether a value is prime or rogram to swap two numbers using call b program to find the smallest and largest of the sum of an integer array us the same to find the Maximum element in an in program to display the contents of a file on th getting the input from the keyboard and the same to pass the parameter using comma <b>Tutorial Periods: -</b> The the Hard Way: Practical Exercises ay Mittal," Computer Fundamentals and p	ong with the numbers. C. alindrome o not? by value and element in a nctions like g except al sing pointer nteger array ng Structure e monitor s retrieve the s. Merge the nd line argu <b>Practic</b> on the Con orogramming dition,2008	eir square r not? d call by an array. e strlen, s phabets. rs. y using p es contents e contents. al Peric mputation ng in C", Concep	es. reference strcpy, stro oointers. s of the fil e contents ods: 30 nal Subje Pearson f ts," Pears	e using file to form a s to form a s ducation, F on,9 <sup>th</sup> Editio	operation co single file <b>Total</b> ep Avoiding First edition, on, 2011.	<b>Periods</b> (Like C)	s: 30

- 2. https://www.geeksforgeeks.org/c-programming-language/
- 3. http://cad-lab.github.io/cadlab\_data/files/1993\_prog\_in\_c.pdf
- 4. https://www.tenouk.com/clabworksheet/clabworksheet.html
- 5. https://fresh2refresh.com/c-programming/

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COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	2	1	-	-	3	-	-	-	-	-	-	-	3	-	3	
2	2	1	-	-	3	-	-	-	-	-	-	-	3	-	3	
3	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3	
4	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3	
5	3	2	1	1	3	-	-	-	-	-	-	-	3	-	3	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

	C		End				
Assessment	Performance i	in practical	classes	Model		Semester	Total
	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

A. A. 800

B.Tech. Mechanical Engineering

Department	Mech	anical Engi	neering	Progra	amme :	B.Tech.					
Semester	11			Cours	e Categ	gor: <b>PC</b>	End	Semeste	er Exam 🛛	Гуре: <b>LE</b>	
Course	11001			Pe	riods/W	eek	Credit	Мах	imum Ma	arks	
Code	UZ3IV	IEP201		L	Т	Р	С	CAM	ESE	ТМ	
Course Name	1	JFACTURIN DRATORY	IG AND METALLUR	GY 0	0	2	1	50	50	100	
				MECH							
Prerequisite	Basic	s of Mechani	ical Engineering								
	On co	mpletion of	the course, the stu	dents will be	able to	D				lapping st Level)	
	CO1	Be conversa	ant with the basic manuf	facturing proce	sses.					K3	
Course	CO2	Identify and	apply suitable tools and	d instruments fo	or machi	ining, ass	embly and fit	ting		K3	
Outcome	CO3	Use differen	t moulding tools, patter	ns and prepare	sand m	oulds				K3	
	CO4	Select suitat	ole welding for the giver	n material and	perform	various o	perations.			K3	
	CO5	Evaluate the	effect of heat treatmer	nt on properties	of steel	and mea	sure the hard	dness		K3	
List of Expe	riments			· · · · ·					<u>.</u>		
Metallurgy I 9. Study 10. Prepa 11. Prepa	Laborato of metal aration ar aration ar	bry Ilurgical micros and study of the	d lap joints by using ma scope and sample prep microstructure of copp crostructure of aluminur t	aration. er and its alloy	'S						
Lecture Perio	-	5									
T CLIME FELL		т.		Dractic	al Porio	de: 20		Total	Periode	30	
	noke	Τι	utorial Periods: -	Practica	al Perio	ds: 30		Total	Periods:	30	
<ul> <li>Reference Bond</li> <li>1. Hajra Cher</li> <li>Promoter</li> <li>2. Hajra Cher</li> <li>Pvt Ltd, Mark</li> </ul>	oudhury rs & Publ oudhury ⁄Iumbai,	S.K., Hajra C ishers Private S.K., Nirjhar F 2010.	utorial Periods: - Choudhury A.K., Nirjha Limited, Mumbai, 2008 Roy, "Elements of Work	r Roy, "Elemei 3. shop Technolo	nts of W ogy-Volu	/orkshop ıme-2", 18	oth Edition, M	- Vol. I", 1 ledia Pron	4th Editic	n, Media	
Reference Bo 1. Hajra Ch Promoter 2. Hajra Ch Pvt Ltd, N 3. R.C. Sha	oudhury rs & Publ oudhury ⁄lumbai, irma, Prii	S.K., Hajra C ishers Private S.K., Nirjhar F 2010. nciples of Hea	utorial Periods: - Choudhury A.K., Nirjha Limited, Mumbai, 2008 Roy, "Elements of Work t Treatment of Steel.1 E	r Roy, "Eleme 3. shop Technolo Edition, New Ag	nts of W ogy-Volu ge Intern	/orkshop ıme-2", 18	oth Edition, M	- Vol. I", 1 ledia Pron	4th Editic	n, Media	
Reference Bo 1. Hajra Ch Promoter 2. Hajra Ch Pvt Ltd, N 3. R.C. Sha 4. Vijendra	ioudhury rs & Publ oudhury Mumbai, Irma, Prii Singh, he	S.K., Hajra C ishers Private S.K., Nirjhar F 2010. nciples of Hea eat treatment o	utorial Periods: - Choudhury A.K., Nirjha Limited, Mumbai, 2008 Roy, "Elements of Work	r Roy, "Eleme 3. shop Technolo Edition, New Ag blishers, 2020.	nts of W ogy-Volu ge Intern	/orkshop ıme-2", 18	oth Edition, M	- Vol. I", 1 ledia Pron	4th Editic	n, Media	
<ul> <li>Reference Bence /li></ul>	ioudhury rs & Publ oudhury Mumbai, Irma, Prii Singh, he t, Manufa	S.K., Hajra C ishers Private S.K., Nirjhar F 2010. nciples of Hea eat treatment o	utorial Periods: - Choudhury A.K., Nirjha Limited, Mumbai, 2008 Roy, "Elements of Work t Treatment of Steel.1 E of metals. Standard Pul	r Roy, "Eleme 3. shop Technolo Edition, New Ag blishers, 2020.	nts of W ogy-Volu ge Intern	/orkshop ıme-2", 18	oth Edition, M	- Vol. I", 1 ledia Pron	4th Editic	n, Media	
<ul> <li>Reference Bence /li></ul>	ioudhury rs & Publ oudhury Mumbai, rrma, Prin Singh, hi t, Manufa <b>ces</b>	S.K., Hajra C ishers Private S.K., Nirjhar F 2010. nciples of Hea eat treatment of acturing Proce	utorial Periods: - Choudhury A.K., Nirjha Limited, Mumbai, 2008 Roy, "Elements of Work t Treatment of Steel.1 E of metals. Standard Pul	r Roy, "Elemer 3. ashop Technolo Edition, New Ag olishers, 2020. ions, 2020.	nts of W ogy-Volu ge Intern	/orkshop ıme-2", 18	oth Edition, M	- Vol. I", 1 ledia Pron	4th Editic	on, Media	
Reference B         1. Hajra Ch         Promoter         2. Hajra Ch         Pvt Ltd, N         3. R.C. Sha         4. Vijendra         5. K. Rajput         Web Reference         1. http://www	ioudhury rs & Publ oudhury Mumbai, irma, Prii Singh, h t, Manufa <b>ces</b> w.nptelvi	S.K., Hajra C ishers Private S.K., Nirjhar F 2010. nciples of Hea eat treatment of acturing Proce deos.in/2012/	utorial Periods: - Choudhury A.K., Nirjha Limited, Mumbai, 2008 Roy, "Elements of Work t Treatment of Steel.1 E of metals. Standard Pul sses, Lakshmi Publicat	r Roy, "Elemer 3. Edition, New Ag blishers, 2020. ions, 2020.	nts of W ogy-Volu ge Intern	/orkshop ıme-2", 18	oth Edition, M	- Vol. I", 1 ledia Pron	4th Editic	n, Media	
Reference B1.Hajra Ch Promoter2.Hajra Ch Pvt Ltd, N3.R.C. Sha4.Vijendra5.K. RajputWeb Reference1.http://www2.http://eco3.https://www	ioudhury rs & Publ oudhury Mumbai, irma, Prii Singh, he t, Manufa <b>ces</b> w.nptelvi purseson ww.tpctra	S.K., Hajra C ishers Private S.K., Nirjhar F 2010. nciples of Hea eat treatment of acturing Proce deos.in/2012/ line.iasri.res.in ining.com/coll	utorial Periods: - Choudhury A.K., Nirjha Limited, Mumbai, 2008 Roy, "Elements of Work t Treatment of Steel.1 E of metals. Standard Pul sses, Lakshmi Publicat 12/manufacturing-proce n/mod/page/view.php?ic lections/machine-shop-	r Roy, "Elemel 3. Shop Technolo Edition, New Ag blishers, 2020. ions, 2020. esses-ii.html d=3804 practices-traini	nts of W ogy-Volu ge Intern	/orkshop ıme-2", 18	oth Edition, M	- Vol. I", 1 ledia Pron	4th Editic	on, Media	
Reference B         1.       Hajra Ch         Promoter         2.       Hajra Ch         Pvt Ltd, N         3.       R.C. Sha         4.       Vijendra         5.       K. Rajput         Meb Reference       1.         http://www       2.         http://www       3.         4.       thtp://www         5.       K. Rajput	ioudhury rs & Publ oudhury Mumbai, irma, Prin Singh, ho t, Manufa ces w.nptelvi ourseson ww.tpctra ww.rubig	S.K., Hajra C ishers Private S.K., Nirjhar F 2010. nciples of Hea eat treatment of acturing Proce deos.in/2012/ line.iasri.res.in ining.com/coll .com/en/heat-	utorial Periods: - Choudhury A.K., Nirjha Limited, Mumbai, 2008 Roy, "Elements of Work t Treatment of Steel.1 E of metals. Standard Pul sses, Lakshmi Publicat 12/manufacturing-proce	r Roy, "Elemel 3. Shop Technolo Edition, New Ag blishers, 2020. ions, 2020. esses-ii.html d=3804 practices-traini	nts of W ogy-Volu ge Intern	/orkshop ıme-2", 18	oth Edition, M	- Vol. I", 1 ledia Pron	4th Editic	on, Media	

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COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	-	1	-	-	-	-	2	1	-	-	2	2	3
2	2	1	-	1	-	-	-	-	1	1	-	-	2	1	2
3	2	1	-	1	-	-	-	-	1	1	-	-	2	2	1
4	2	1	-	1	-	-	-	-	1	1	-	-	1	2	2
5	2	1	-	1	-	-	-	-	1	1	-	-	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

	C	ontinuous /	1)				
Assessment		ce in practio asses	cal	Model		End Semester Examination	Total Marks
	Conduction of practical	Record work	viva	Practical Examination	Attendance	(ESE) Marks	inaine
Marks	15	5	5	15	10	50	100

dr. dr. 8000

Department	Mechanical Engineering         Programme : B.Tech.										
Semester	II	Cours	e Categ	ory: AE	С	End	End Semester Exam Type: -				
Course		Pe	riods/W	eek	Cre	edit	Max	imum Ma	rks		
Code	U23MEC2XX	L	Т	Р	(	2	CAM	ESE	ТМ		
Course Name	<b>CERTIFICATION COURSE - II</b>	0	0	4		-	100	-	100		
		MECH									
Students sl	hall choose an International / Reputed orga	anization certifi	cation co	ourse of a	40-50 l	nours	duration s	specified i	n the		

curriculum (It is mandatory to do a minimum of six courses) which will be offered through the Centre of Excellence. These courses have no credit and will not be considered for CGPA calculation.

- (i) Certification Courses are required to be completed to fulfil the degree requirements. All Certification courses are assessed internally for 100 marks.
- (ii) The Course coordinator handling the course will assess the student through attendance and MCQ test, and declare the student as "pass" on satisfactory completion. A letter grade "P" is awarded to declare pass.
- (iii) The marks scored in these courses will not be taken into consideration for the SGPA / CGPA calculations in the grade sheet.

#### **Evaluation Methods**

Assessment	Continuous Ass	sessment Marks (CAM)	Total Marks
Assessment	Report	MCQ Test	
Marks	10	90	100

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Department	Mechanical Engineering         Programme : B.Tech.										
Semester	II				Cours	e Categ	ory: MC	End	Semeste	r Exam Ty	/pe: -
Course	U23M	EM202			Per	iods/We	eek	Credit	Max	imum Mar	ks
Code					L	Т	Р	С	CAM	ESE	ТМ
Course Name	SPOR	TS, YOG	A AND NSS		0	0	2	Non- Credit	100	-	100
				(Commo	on to all E	Branch)					
Prerequisite	-									·····•	
	On cor	npletio	n of the course,	the studen	nts will be	able				BT Ma (Highes	
	CO1	Practice relaxati	e Physical activitie on.	es and Hatha	Yoga focu	using on	yoga for	strength, fle	xibility and	ĸ	2
Course Outcome	CO2		tand basic skills as y, balance and co		n yoga and	physica	l activities	s including st	rength and	ĸ	2
Outcome	CO3	Develo	o understanding of	psychologica	al problem	s associa	ated with a	age and lifes	tyle.	ĸ	2
	CO4	Recogr	ize the importance	e of national s	service in c	ommuni	ty develop	oment.		к	2
	CO5	Conve	rt existing skills int	o socially rele	evant life sl	kills.				к	2
UNIT - I	Introd	duction	to Physical Educ	ation					Peri	ods: 06	
Definition, Aim	s and O	bjectives	of Physical Educa	ation - Chang	ing trends	in Physic	cal Educa	tion			
Physical Fitne	ess, We	liness and related	nd Lifestyle: Impo fitness - Compor	ortance of Phy	/sical Fitne	ess and V	Vellness ·	Component	•		CO1
UNIT - II	Yoqa	and Lif	estvle						Peri	ods: 06	
	-		its of Yoga - Intr	oduction - As	sanas Pra	inavama	Meditat	ion and You			
concentration	and rela	ated Asa	nas (Sukhasana, -nidra. Asanas as	Tadasana, Pa	admasana	and Sha	ashankas	ana) - Relax	ation Tech	nniques for	000
UNIT - III	Train	ing and	Planning in Sp	orts					Per	ods: 06	
Training - War League/Round			bering down-Skill, bination.	Technique a	nd Style -	Objectiv	es of Pla	nning – Tour	nament -	Knock-Out,	
Development - and Types of	Adoles Aggres	cent prob sions in	portant of Psychol lems and their Ma Sports - Psychol pe and techniques	nagement - E ogical benefit	motion: Co ts of exerc	oncept, T cise - Ar	ype and ( nxiety and	Controlling of d Fear and	femotions	- Concepts	CO3
UNIT - IV	Introc	duction	To National Se	rvice Schen	ne				Peri	ods: 06	
International Ir voluntary blood	nportan d donatio	ce - Sen on - The	: History, motto, sitizing about the role of SHGs and N rious clubs and so	thrust areas NGOs in comr	and aware nunity dev	eness ac elopmen	tivities - t – CSR -	mportance of Life skills and	of tree plar	ntation and	CO4
UNIT - V	Comr	nunity l	ssues and the	use of Tech	nology				Peri	ods: 06	
products - Ser	vice lea	rning an	ia - Technology de d youth volunteeri an and green envi	ng – Shramd	laan - Car	npus cle	aning - F	ield visit to r	nearby con	-	
Lecture Peric	ods: -		Tutorial Period	ds: -	Practica	I Perio	ds: 30		Tota	al Periods	:: 30
Reference Bo1.Brar Ajmer Publishers2.B.K.S. Iyer3.Joseph, Si4.Barman Pr5.Prof R.B.S6.Sibereisen	oks r Singh, , 6 <sup>th</sup> Edi ngar, "Li by K, M rateeti, ( , Verma , K, Ric	tion, 201 ight on Y ahodaya Goswam a, "Field \ hard M, '	ar Singh, Bains Ja 4 oga: The Definitive , "Bharat Essays o , "Document on P Vork Practicum in Lerner Approache	gdish, "Mode e Guide to Yo on Conflict Re eace Education Social Work- es to Positive Y	rn Textboo ga Practico ssolution", I on", Triven Emerging Youth Dev	e", Thors nstitute i Akansh Concern elopmen	sical Edu ons Publi of Gandhi ia Publish s", Rapid t", Sage I	ishers, Thors an Studies F ing House, N Publisher, Lu Publications,	n and Spor sons Class Publishers, New Delhi, ucknow, 20 New Delh	ts- I", Kalya ics edition, 2007 2009 020 i, 2007	ani
7. Hoshiar Si	ngh, "Ao	dministra	tion of Rural Deve	lopment in In	dia", Sterlii	ng Publis	sher, the l	Jniversity of	Michigan,	2009	

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Web	b References
1.	http://www.thebetterindia.com/140/national-service-scheme-nss
2.	http://en.wikipedia.org/wiki/national-service-scheme 19=http://nss.nic.in/adminstruct
3.	http://nss.nic. in
4.	http://socialworknss.org/about.html
5.	Young Journal on Youth published by SAGE: http://you.sagepub.com

## **Evaluation Methods**

Assessment		sessment Marks (CAM)	Total Marks	
Assessment	Attendance	MCQ Test	Presentation / Activity / Assignment	
Marks	10	30	60	100

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# SEMESTER III

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B.Tech. Mechanical Engineering

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Department	Mathematics         Programme : B.Tech.									
Semester			Cours	e Categ	ory: <b>BS</b>	Enc	Semeste	er Exam Ty	pe: <b>TE</b>	
Course	110084	AT000	Pe	riods/W	eek	Credit	Max	imum Marl	٢S	
Code	U23IVI	ATC03	L	Т	Р	С	CAM	ESE	ТМ	
Course Name	PROB	ABILITY AND STATISTICS	3	1	0	4	25	75	100	
		(Common to AL	.L Branches	Except	CSBS)					
Prerequisite	Basic	Mathematics								
	On con	npletion of the course, the stud	lents will b	e able t	D			BT Ma (Highest		
	CO1	Apply the concept of probability.						K		
Course	CO2	Solve the problem on Random varia	ables.					K		
Outcome	CO3	Evaluate the correlation and Regres						K		
Outcome	CO4	Find Correlation between variables.						K		
	CO5	Analyze the problems in small sam						ĸ		
UNIT - I		y of Probability					Por	iods:12	•	
	L	Sample Space - Exhaustive events-	Aviama of pr	obobility	Conditi	anal probabi	i			
- Bayes theore			Axionis oi pi	obability	- Conditio	Shai probabi	iity – Tota	i probability	CO1	
UNIT - II	1	om Variables					Per	iods:12	<u>.</u>	
	1	erating functions and their propertie	es. Binomia	l distribu	ition – Po	oisson distri				
	•	tribution (Excluding Derivation of Mea						1	CO2	
UNIT - III	Desia	n Of Experiments					Per	iods:12		
		he way and two-way classifications. C	Correlation –	Rank cor	relation a	nd Regressi			CO3	
UNIT - IV	Largo	Samples					Por	iods:12		
	L	Propositions – Difference of Proportio	ons – Sinale I	Mean – F	Difference	of Mean – D				
Deviations	enigie i		engie i						CO4	
UNIT - V	Small	Samples					Per	iods:12		
Test for Mean -	- Test for	Ratio of Variances – Chi-Square tes	t for Goodne	ss of Fit	and Indep	endence of	Attributes.		CO5	
							T			
Lecture Peric	ods:45	Tutorial Periods: 15	Practica	al Perio	ds: -		Tot	al Periods	: 60	
Lecture Peric Text Books							Tot	al Periods	: 60	
Lecture Peric Text Books 1. B.S. Grewa	al, "Highe	er Engineering Mathematics", Khanna	a publishers,	3 <sup>rd</sup> Editio	n, 2017.	lition 2008	Tot	al Periods	: 60	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj	al, "Highe an, "Prol	er Engineering Mathematics", Khanna bability, Statistics and Random Proce	a publishers, a	3 <sup>rd</sup> Editio McGraw-	n, 2017.	dition, 2008.	Tot	al Periods	: 60	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singaray	al, "Highe jan, "Prol velu, "Pro	er Engineering Mathematics", Khanna	a publishers, a	3 <sup>rd</sup> Editio McGraw-	n, 2017.	lition, 2008.	Tot	al Periods	: 60	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo	al, "Highe jan, "Prol velu, "Pro	er Engineering Mathematics", Khanna bability, Statistics and Random Proce obability and Statistics", Meenakshi A	a publishers, esses", Tata I gency, 2019	3 <sup>rd</sup> Editio ⁄/cGraw-	n, 2017. Hill, 3 <sup>rd</sup> Ec		Tot	al Periods	: 60	
Lecture Perio Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. S	al, "Highe ian, "Prol velu, "Pro <b>oks</b> Singh, M	er Engineering Mathematics", Khanna bability, Statistics and Random Proce bbability and Statistics", Meenakshi A ukul Bhatt "Engineering Mathematics"	a publishers, esses", Tata I gency, 2019. ", McGraw-H	3 <sup>rd</sup> Editio McGraw-	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017	•				
Lecture Perio Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. S	al, "Highe an, "Prol velu, "Pro <b>oks</b> Singh, M endenhal	er Engineering Mathematics", Khanna bability, Statistics and Random Proce obability and Statistics", Meenakshi A	a publishers, esses", Tata I gency, 2019. ", McGraw-H	3 <sup>rd</sup> Editio McGraw-	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017	•				
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. § 2. William Me 15 <sup>th</sup> Edition, 3. Richard. A.	al, "Highe ian, "Prol velu, "Pro <b>oks</b> Singh, Mi endenhal , 2019. . Johnso	er Engineering Mathematics", Khanna bability, Statistics and Random Proce bbability and Statistics", Meenakshi A ukul Bhatt "Engineering Mathematics"	a publishers, i esses", Tata I gency, 2019 ", McGraw-H I. Beaver: "Ir	3 <sup>rd</sup> Editio McGraw- ill, 1 <sup>st</sup> Edi htroductio	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017 on to Prol	pability & S	tatistics", (	Cengage Le	arning,	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. S 2. William Me 15 <sup>th</sup> Edition, 3. Richard. A. Edition, 20	al, "Highe ian, "Prol velu, "Pro <b>oks</b> Singh, Mi endenhal , 2019. . Johnso 18.	er Engineering Mathematics", Khanna bability, Statistics and Random Proce obability and Statistics", Meenakshi A ukul Bhatt "Engineering Mathematics I, Robert J. Beaver and Barbara M n, Irwin Miller and John E. Freund,"	a publishers, . esses", Tata I .gency, 2019 ", McGraw-H . Beaver: "Ir Probability a	3 <sup>rd</sup> Editio McGraw- ill, 1 <sup>st</sup> Edi ntroductio	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017 on to Prol stics for E	pability & S ingineers",	tatistics", ( Pearson E	Cengage Le Education, A	arning,	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. S 2. William Me 15 <sup>th</sup> Edition, 3. Richard. A. Edition, 20' 4. Vijay K. Ro	al, "Highe an, "Prol velu, "Pro o <b>oks</b> Singh, Mi endenhal , 2019. . Johnso 18. .hatgi an	er Engineering Mathematics", Khanna bability, Statistics and Random Proce obability and Statistics", Meenakshi A ukul Bhatt "Engineering Mathematics" I, Robert J. Beaver and Barbara M	a publishers, . esses", Tata I .gency, 2019 ", McGraw-H . Beaver: "Ir Probability a	3 <sup>rd</sup> Editio McGraw- ill, 1 <sup>st</sup> Edi ntroductio	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017 on to Prol stics for E	pability & S ingineers",	tatistics", ( Pearson E	Cengage Le Education, A	arning,	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. S 2. William Me 15 <sup>th</sup> Edition, 3. Richard. A. Edition, 20 <sup>o</sup> 4. Vijay K. Ro	al, "Highe jan, "Prol velu, "Pro o <b>oks</b> Singh, Mi endenhal , 2019. . Johnso 18. hatgi an <b>ces</b>	er Engineering Mathematics", Khanna bability, Statistics and Random Proce obability and Statistics", Meenakshi A ukul Bhatt "Engineering Mathematics I, Robert J. Beaver and Barbara M n, Irwin Miller and John E. Freund,"	a publishers, . esses", Tata I .gency, 2019 ", McGraw-H . Beaver: "Ir Probability a	3 <sup>rd</sup> Editio McGraw- ill, 1 <sup>st</sup> Edi ntroductio	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017 on to Prol stics for E	pability & S ingineers",	tatistics", ( Pearson E	Cengage Le Education, A	arning,	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. S 2. William Me 15 <sup>th</sup> Edition, 3. Richard. A. Edition, 20' 4. Vijay K. Ro Web Reference 1. www.stat11	al, "Highe jan, "Prol velu, "Pro <b>oks</b> Singh, Mi endenhal , 2019. . Johnso 18. . Johnso 18. hatgi and <b>ces</b> 10.net	er Engineering Mathematics", Khanna bability, Statistics and Random Proce obability and Statistics", Meenakshi A ukul Bhatt "Engineering Mathematics" I, Robert J. Beaver and Barbara M n, Irwin Miller and John E. Freund," d A.K. Md. Ehsanes Saleh, "An Introd	a publishers, . esses", Tata I .gency, 2019 ", McGraw-H . Beaver: "Ir Probability a	3 <sup>rd</sup> Editio McGraw- ill, 1 <sup>st</sup> Edi ntroductio	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017 on to Prol stics for E	pability & S ingineers",	tatistics", ( Pearson E	Cengage Le Education, A	arning,	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. S 2. William Me 15 <sup>th</sup> Edition, 3. Richard. A. Edition, 20 4. Vijay K. Ro Web Reference 1. www.stat11 2. http://www.	al, "Highe an, "Prol velu, "Pro o <b>oks</b> Singh, Mi endenhal , 2019. . Johnso 18. .hatgi an <b>ces</b> 10.net nptel.ac.	er Engineering Mathematics", Khanna bability, Statistics and Random Proce obability and Statistics", Meenakshi A ukul Bhatt "Engineering Mathematics" I, Robert J. Beaver and Barbara M n, Irwin Miller and John E. Freund," d A.K. Md. Ehsanes Saleh, "An Introd	a publishers, . esses", Tata I .gency, 2019 ", McGraw-H . Beaver: "Ir Probability a	3 <sup>rd</sup> Editio McGraw- ill, 1 <sup>st</sup> Edi ntroductio	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017 on to Prol stics for E	pability & S ingineers",	tatistics", ( Pearson E	Cengage Le Education, A	arning,	
Lecture Peric Text Books 1. B.S. Grewa 2. T. Veeraraj 3. A. Singarav Reference Bo 1. Ravish R. S 2. William Me 15 <sup>th</sup> Edition, 3. Richard. A. Edition, 20 4. Vijay K. Ro Web Reference 1. www.stat11 2. http://www.	al, "Highe an, "Prol velu, "Pro <b>oks</b> Singh, Mi endenhal , 2019. Johnso 18. Johnso 18. hatgi and <b>ces</b> 10.net nptel.ac.	er Engineering Mathematics", Khanna bability, Statistics and Random Proce obability and Statistics", Meenakshi A ukul Bhatt "Engineering Mathematics" I, Robert J. Beaver and Barbara M n, Irwin Miller and John E. Freund," d A.K. Md. Ehsanes Saleh, "An Introd in/courses/111105035 (R.V) litycourse.com.	a publishers, . esses", Tata I .gency, 2019 ", McGraw-H . Beaver: "Ir Probability a	3 <sup>rd</sup> Editio McGraw- ill, 1 <sup>st</sup> Edi ntroductio	n, 2017. Hill, 3 <sup>rd</sup> Ec tion, 2017 on to Prol stics for E	pability & S ingineers",	tatistics", ( Pearson E	Cengage Le Education, A	arning,	

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COs		Program Outcomes (POs) D1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO1												Program Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
1	3	2	1	1	-	-	-	-	-	-	-	1	1	1	1			
2	3	2	1	1	-	-	-	-	-	-	-	1	1	1	1			
3	2	2	-	-	-	1	-	-	-	-	-	1	1	1	1			
4	3	2	1	1	-	1	-	-	-	-	-	1	1	1	1			
5	3	2	1	1	-	1	-	-	-	-	-	1	1	1	1			

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	M)	End Semester	Total	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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	1	cial Intellige	nce and Data Science	amme : <b>B.Tech.</b>						
Semester					e Categ		Enc	Semeste	er Exam T	ype: <b>TE</b>
Course	11234	DTC01		Pe	riods/We	eek	Credit	Max	ximum Ma	rks
Code	OZUA			L	Т	Р	С	CAM	ESE	ТМ
Course Name	PROG	GRAMMING	N PYTHON	3	0	0	3	25	75	100
			(Common	to All Bra	anches)					
Prerequisite	-									
	On cor	mpletion of	the course, the studer	nts will be	e able to	D				apping st Level
	CO1	Interpret the	e basic concepts of Pythor	n programs	5.					(2
Course	CO2	Articulate th	e concepts of Sets, Dictio	naries and	l Object-0	Oriented c	oncepts.		ł	(2
Outcome	CO3	Experiment	with Numpy package.						ł	(3
	CO4	Apply and a	nalyze Data Manipulation	with Pand	as.				ł	(3
	CO5	Illustrate pro	ogramming concept for Vis	sualization	with Mat	plotlib.			ľ	(3
UNIT - I		duction to P	vthon			•		Per	riods: 09	
-	i		ying mechanism of Modul	e Executio	n – Brand	ching and	Looping – F			1
•		•	ambda Functions – Lists a			•				C01
UNIT - II	Seau	ience Datati	pes and Object-Orien	nted Prog	rammin	a		Per	riods: 09	
-			Dictionaries. Classes: Cl	_		-	ritance – I	-		-
•			sing "re" module.						5	CO2
UNIT - III	Using	g Numpy						Per	riods: 09	<u>I</u>
•••••		3								·····
Basics of Num	Py - Cor	mputation on I	NumPy – Aggregations –	Computati	on on Ar	rays – Co	mparisons	– Masks a	ind Boolear	1
	-	-	NumPy – Aggregations – ays – Structured Data: Nu	-		-	mparisons	– Masks a	ind Boolear	
	/ Indexing	g – Sorting Ar		-		-	mparisons		ind Boolear riods: 09	
Arrays – Fancy UNIT - IV Introduction to	/ Indexing Data Pandas	g – Sorting Arr Manipulatic Objects – Da	rays – Structured Data: Nu on with Pandas ta indexing and Selection	umPy's Str n – Operat	uctured A	Array. Data in Pa	ndas – Har	Per ndling Mis	<b>riods: 09</b> sing Data -	- CO3
Arrays – Fancy UNIT - IV Introduction to Hierarchical In	/ Indexing Data Pandas dexing –	g – Sorting Arr Manipulatic Objects – Da - Combining E	rays – Structured Data: Nu	umPy's Str n – Operat nd Groupir	uctured A ting on D ng – Pivo	Array. Data in Pa	ndas – Har	Per ndling Mis	<b>riods: 09</b> sing Data -	- CO3
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N. A. 800

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	P01	PO2	PO3	PO4	PO5	<b>PO6</b>	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	2	1	-	-	3	-	-	-	-	-	-	-	3	-	3		
2	2	2	1	3	-	-	-	-	-	-	-	2	2	2	3		
3	3	2	2	3	-	-	-	-	-	-	-	2	3	2	3		
4	3	3	2	3	-	-	-	-	-	-	-	3	3	3	3		
5	3	3	2	3	-	-	-	-	-	-	-	2	3	3	3		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Asse	M)	End Semester	Total	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

A. A. 800

	Mech	nanical		Progra	amme: <b>I</b>	B.Tech.				
Semester	III			Cours	e Categ	ory: <b>PC</b>	End S	emester E	xam Typ	e: TE
Course	1123M	ET303		Pei	riods/W	eek	Credit	Maxi	mum Ma	arks
Code	02511	L1303		L	Т	Р	С	CAM	ESE	ТМ
Course Name	APPL	IED THE	RMODYNAMICS	2	1	0	3	25	75	100
Prerequisite	Physic	al Science	e for Engineers	MECH						
Fielequisite									BT N	lapping
		-	of the course, the students							est Level)
	C01		the laws of thermodynamics		-	-				K2
Course	CO2		e second law and exergy con	•		-				K3
Outcome	CO3		the phase change process a		-					К3
	CO4	Categor	ize the substance properties u	using ideal g	as, real (	gas and th	ermodynan	nic relations	•	К3
	CO5	Recogni	ze the properties of air and pe	sychrometric	process	es.				K3
UNIT- I			ermodynamics			-:			ods: 09	
•			roperties of a system - state a oth law of thermodynamics -	•	-			•	•	
analysis of clo	-		-							" CO1
UNIT- II			f thermodynamics					L	ods: 09	
•	•	•	refrigerators - Kelvin-Planck a - Inequality of Clausius – Exe					lence - reve	ersible an	d CO2
-	1							<b></b> .		
UNIT- III Phases of a p			pure substances						ods: 09	
			hace change process of nure	euhetancae	- nrone	rtv diaaran	ne for nhae	a change ni		_
			hase change process of pure Thermodynamic Properties of						rocesses	
	ation of	Steam – T	hermodynamic Properties of	Steam - Use	e of stear			hart.		- CO3
Steam - Form UNIT- IV Concept of Ide	ation of <b>Ideal</b> eal and I	Steam – T <b>and Rea</b> Real Gase	hermodynamic Properties of I Gases and Thermodyna es and its Properties - Equation	Steam - Use amic Relati on of State -	e of stear <b>ons</b> Van der	n tables ar Waals Eq	nd mollier c uation of S	hart. Perio tate - Therm	ods: 09 nodynam	CO3
Steam - Form UNIT- IV Concept of Ide	ation of <b>Ideal</b> eal and I dS Equa	Steam – T <b>and Rea</b> Real Gase tions - Dif	hermodynamic Properties of I Gases and Thermodyna	Steam - Use amic Relati on of State -	e of stear <b>ons</b> Van der	n tables ar Waals Eq	nd mollier c uation of S	hart. Perio tate - Therm	ods: 09 nodynam	CO3
Steam - Form UNIT- IV Concept of Ide Relations – To	ation of Ideal eal and I dS Equa Coefficier	Steam – T <b>and Rea</b> Real Gase tions - Dif	hermodynamic Properties of I Gases and Thermodyna es and its Properties - Equation ference and ratio of Heat Cap	Steam - Use amic Relati on of State -	e of stear <b>ons</b> Van der	n tables ar Waals Eq	nd mollier c uation of S	hart. Perio tate - Therm Clapeyron E	ods: 09 nodynam	CO3
Steam - Form UNIT- IV Concept of Ide Relations – To Joule-Kelvin C UNIT- V Properties of	ation of Ideal eal and I dS Equa Coefficien Psycl Atmospl	Steam – T and Rea Real Gase tions - Dif nt. nrometry neric Air -	hermodynamic Properties of I Gases and Thermodyna es and its Properties - Equation ference and ratio of Heat Cap	Steam - Use amic Relati on of State - pacities - Ma chrometric P	of stear ons Van der axwell's I	n tables ar Waals Eq Equations	nd mollier c uation of S - Clausius-	hart. Perio tate - Therm Clapeyron E Perio	ods: 09 nodynam Equation ods: 09	CO3
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COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	3	2	3	2	2	2	2	-	-	-	-	2	3	2	1		
2	3	3	3	2	2	2	2	1	-	-	-	2	3	2	2		
3	3	2	2	2	2	2	2	-	-	-	-	2	3	2	1		
4	3	3	2	3	1	1	1	-	-	-	-	2	3	1	1		
5	3	2	3	2	2	2	3	1	-	-	-	2	3	2	2		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

Accessment		Cor	itinuous Assessi	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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	Mecha	anical	Programme : <b>B.Tech.</b>											
Semester			Cour	se Cateç	gory: <b>PC</b>	Enc	Semeste	r Exam Ty	pe: <b>TE</b>					
Course	U23M	ET301	Pe	eriods/W	eek	Credit	Maxi	mum Marl	ks					
Code			L	T	P	С	CAM	ESE	ТМ					
Course Name	FLUID	MECHANICS AND HYDRAUL	2	1	0	3	25	75	100					
Prerequisite	Fundai	mentals of Physics	MECH											
Terequisite		mpletion of the course, the st	udents will	be able	to			BT Ma						
	CO1	Demonstrate the significance of systems	fluid propertie	es and la	ws of fluid	statics to e	ngineering	(Highest						
Course	CO2	Apply the momentum and energy	v equations to	fluid flow	problems.			ĸ	3					
Outcome	CO3	Analyze the viscous flow through			-	es.		K						
Calconic	CO4	machines.												
	CO5	Analyze the performance of hydr	aulic pumps.					K	4					
UNIT - I	Fluid	Properties and Fluid Statics					Peri	ods: 09						
surface tension	and cap	d density, specific weight, specific v billarity. Fluid statics: Pascal's Law Pressure, Vacuum Pressures, Man	, Pressure Va	riation in	a Fluid at l	Rest, Abso	lute Pressu	re, Gauge	CO1					
UNIT - II	Fluid	Kinematics and Fluid Dynam	ics				Peri	ods: 09						
Euler's Equation	n of Motio	ncept of control volume, application on along a Streamline Bernoulli's eq lary layer separation.	-	-		-		-	co					
UNIT - III	Incom	pressible Fluids and Flow Th	orough Pine	2			Dari	ods: 09	<u> </u>					
			nough i ipc	5			Peri	0u5. 09						
Reynolds numb	er, critic	w between parallel plates, Reynolo al Reynolds number, Darcy - Wei es in series and in parallel, Selecti	ds experiment sbach equatio	to classify n, Major	and minor	energy loss	flows, sign	ificance of	CO:					
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2.	https://nptel.ac.in/courses/112104118/

- 3. http://fm-nitk.vlabs.ac.in
- 4. https://www.coursera.org/courses?query=fluid%20mechanics
- 5. https://apm.iitm.ac.in/fluid\_mechanics.html

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	PO1	PO2	PO3	PO4	PO12	PSO1	PSO2	PSO3							
1	3	1	1	1	-	1	-	1	-	-	-	1	1	2	1
2	3	2	1	2	-	1	-	1	-	-	-	1	1	2	2
3	3	2	1	1	-	1	-	1	-	-	-	1	2	2	2
4	3	3	2	2	2	3	-	1	1	-	1	2	2	3	3
5	3	3	2	2	2	3	-	1	1	-	2	2	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Conti	inuous Asse	M)	End Semester	Total		
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	75	100				

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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	Mecn	anical Engineering	Progra	amme :	B.Tech.				
Semester	111		Cours	e Categ	ory: <b>PC</b>	End	Semeste	er Exam Ty	/pe: <b>TE</b>
Course	1123M	ET305	Pe	riods/W	eek	Credit	Max	kimum Mar	ks
Code	0251		L	Т	Р	С	CAM	ESE	ТМ
Course Name	MANU	IFACTURING PROCESSES	3	0	0	3	25	75	100
			MECH						
Prerequisite	Basic	s of Mechanical Engineering							
	On co	mpletion of the course, the stude	ents will be	able to	)			BT Ma (Highes	
	CO1	Expertise in a variety of casting and	molding prac	tices.				K	2
Course	CO2	Apply variety of joining techniques in	real life.					K	3
Outcome	CO3	Exhibit the knowledge of different dri	lling techniqu	les.				к	2
	CO4	Recognize the extrusion, rolling, and	forging proc	esses.				к	2
	CO5	Understand in plastic manufacturing	and surface	finishing	process			к	2
UNIT- I	Castir	ng Processes			•		Per	iods: 09	
		g and Casting. Pattern making: Patter	n materials	types of	nattorne	and Pattern			
		edients - Preparation of green sand an							CO.
UNIT- II	Joinir	ig Processes					Per	iods: 09	
Shielded Arc	Welding,	sses - Electric Arc Welding – Electrode Tungsten Inert - Gas Welding, Gas Met plications - Welding Defects.			-		-		:
UNIT - III	Drillin	g and Allied Operations					Per	iods: 09	
-		lassification – Sensitive, Upright, Gan erations – Reaming and Tapping Tool -	-	-		-	tions - To	ol mounting	co:
	T								
UNIT - IV	Bulk I	Deformation Processes					Per	iods: 09	<b>i</b>
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Hot working a and Rotary fo - hot and colo UNIT - V Surface finish	and Cold orging. Ro d extrusio <b>Surfa</b> hing proc	working of metals - Forging machines Iling of metals - Types of rolling mills - D n.	Defects in roll <b>cturing</b> uffing - Plasti	ed parts	- Principles	s of extrusio	losed die f n - Types Per	iorging, Roll of Extrusion iods: 09	CO
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COs														ram Spe omes (P	
	PO1												PSO1	PSO2	PSO3
1	3	2	2	-	-	2	1	1	2	-	-	2	2	1	2
2	3	2	2	-	-	2	1	1	2	-	-	2	2	1	2
3	3	2	2	-	-	2	1	1	2	-	-	2	2	1	2
4	3	2	2	-	-	2	1	1	2	-	-	2	2	1	2
5	3	2	2	-	-	2	1	1	2	-	-	2	2	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

Accessment		Cor	ntinuous Assessi		End Semester Examination	Total	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

fr. fr. 800

Department	Mech	anical En	gineering	Progra	amme :	B.Tech.				
Semester				Cours	e Categ	ory: <b>PC</b>	End S	emester Ex	am Type:	TE
Course	1123M	EB301		Pei	riods/W	eek	Credit	Maxir	num Mark	s
Code	02510			L	Т	Р	С	CAM	ESE	ТМ
Course Name	STRE	NGTH OF	- MATERIALS	2	0	2	3	50	50	100
<b></b>	· - ·	· • • •	•	MECH						
Prerequisite	Engine	ering Mecl	nanics						BT Map	ning
		-	f the course, the students v						(Highest	
	C01		and the concepts of stress an		-	-			K2	
Course	CO2		hend the load transferring r force and bending moment	mechanism	in beam	ns and str	ess distribu	ution due to	K2	
Outcome	CO3	Calculate	e the slope and deflection in	beams and	buckling	failure in c	olumns.		K2	
	CO4	Develop	the theoretical understanding	g of the med	hanical	properties	of materials	5	K3	
	CO5		e the various mechanical pr trength, torsion strength and	-			compressi	ve strength	КЗ	
UNIT- I	Stres	ses and S	Strains					Peric	ods: 10	
			ept and of stress and strain, E esses in composite bar- Rela					•	and strain	CO1
UNIT- II	Beam	s and Sir	nple Bending					Peric	ods: 10	
	hear For	ce and Ben	supports and loadings. Def ding Moment Diagrams (Poir							CO2
UNIT- III	Defle	ction of B	Beams and Columns					Peric	ods: 10	
Deflection of	beams:	Cantilever	and simply supported beam	by Double	integratio	on method	(only) for a	computation	of slopes	
and deflectior Theory of col cylinders.	-	Long colur	mn and short column - Eule	r's formula -	- Rankin	e's formul	a. Deforma	tion of Thin	and thick	CO3
UNIT- IV			Strength of Mat	terials Pra	ctice I			Peric	ods:15	
<ol> <li>Tension</li> <li>Torsion</li> <li>Comp</li> <li>Impac</li> <li>Impac</li> </ol>	on test on test pression t of test on of test on	est a metallic : a metallic :	sting machine. specimen - Izod test specimen - Charpy test Iness testing machine.							CO4
UNIT- V			Strength of Mat	erials Prac	ctice II			Peri	ods:15	
	iess test	on metallic	specimen - (Brinell)					i.		
			specimen (Rockwell)							CO5
<ol> <li>11. Ductili</li> <li>12. Spring</li> </ol>	ity test: S g test –Te	Sheet metal ension	specimen (Vicker's hardnes Is (Al, GI and MS) n	s)						
11. Ductili	ity test: S g test –To g test - C	Sheet metal ension ompression	Is (AI, GI and MS)		al Perio	ods: 30		Total I	Periods: (	50
11. Ductili 12. Spring 13. Spring	ity test: S g test –To g test - C	Sheet metal ension ompression	ls (Al, GI and MS)		al Perio	ods: 30		Total I	Periods: (	50
11. Ductili 12. Spring 13. Spring Lecture Per Text Books	ity test: S g test –To g test - C <b>iods: 3</b>	Sheet metal ension ompression <b>0</b>	ls (Al, GI and MS)	Practic		ods: 30		Total I	Periods: (	50
<ol> <li>Ductili</li> <li>Spring</li> <li>Spring</li> <li>Lecture Per</li> <li>Text Books</li> <li>R.K. Bans</li> <li>D.S. Bedi</li> </ol>	ity test: S g test – To g test - C <b>iods: 3</b> sal, "Streng	Sheet metal ension ompression <b>0</b> ngth of Ma th of Mater	ls (Al, GI and MS) n <b>Tutorial Periods: -</b> terials", Laxmi Publications, 6 rials", Khanna Publishing, 6th	Practic 6th edition 2 n edition 201	019. 9.	ods: 30		Total I	Periods: (	50
<ol> <li>Ductili</li> <li>Spring</li> <li>Spring</li> <li>Spring</li> </ol> Lecture Per Text Books <ol> <li>R.K. Bans</li> <li>D.S. Bedi</li> <li>R.K. Rajp</li> </ol>	ity test: S g test – To g test - C <b>iods: 3</b> sal, "Streng out, "Streng	Sheet metal ension ompression <b>0</b> ngth of Ma th of Mater	ls (Al, GI and MS) n <b>Tutorial Periods: -</b> terials", Laxmi Publications, 6	Practic 6th edition 2 n edition 201	019. 9.	ods: 30		Total	Periods: (	50
<ol> <li>11. Ductili</li> <li>12. Spring</li> <li>13. Spring</li> <li>Lecture Per</li> <li>Text Books</li> <li>1. R.K. Bans</li> <li>2. D.S. Bedi</li> <li>3. R.K. Rajp</li> <li>Reference Bo</li> </ol>	ity test: S g test – To g test - C <b>'iods: 3</b> sal, "Stre , "Streng out, "Stre ooks	Sheet metal ension ompression <b>0</b> Ingth of Ma th of Mater ngth of Mat	ls (Al, GI and MS) n <b>Tutorial Periods: -</b> terials", Laxmi Publications, ( rials", Khanna Publishing, 6th terials", S. Chand Publication	Practic 6th edition 2 n edition 201 ns, 7th editio	019. 9. n 2018.	ods: 30		Total I	Periods: (	50
<ol> <li>Ductili</li> <li>Spring</li> <li>Spring</li> <li>Spring</li> <li>Lecture Per</li> <li>Text Books</li> <li>R.K. Bans</li> <li>D.S. Bedi</li> <li>R.K. Rajp</li> <li>Reference Bo</li> <li>Punmia, C</li> </ol>	ity test: S g test – To g test - C <b>iods: 3</b> sal, "Streng out, "Streng out, "Streng out, "Streng out, and	Sheet metal ension ompression <b>0</b> ngth of Ma th of Mater ngth of Mater Jain, "Mec	ls (AI, GI and MS) n <b>Tutorial Periods: -</b> terials", Laxmi Publications, 6 rials", Khanna Publishing, 6th terials", S. Chand Publication hanics of Materials" , Laxmi F	Practic 6th edition 2 n edition 201 ns, 7th editio Publications	019. 9. n 2018. .2019				Periods: (	50
<ol> <li>Ductili</li> <li>Spring</li> <li>Spring</li> <li>Spring</li> <li>Lecture Per</li> <li>Text Books</li> <li>R.K. Bans</li> <li>D.S. Bedi</li> <li>R.K. Rajp</li> <li>Reference Bo</li> <li>Punmia, J</li> <li>R.C.Hibbe</li> </ol>	ity test: S g test – To g test - C <b>iods: 3</b> sal, "Streng out, "Streng out, "Streng out, "Streng out, "Streng out, "Streng out, "Streng	Sheet metal ension ompression 0 ngth of Ma th of Mater ngth of Mater Jain, "Mech chanics of	Is (AI, GI and MS) <b>Tutorial Periods: -</b> terials", Laxmi Publications, 6 rials", Khanna Publishing, 6th terials", S. Chand Publication hanics of Materials", Laxmi F Materials", Pearson Education	Practic 6th edition 2 n edition 201 ns, 7th editio Publications on, 9th Editio	019. 9. n 2018. .2019 on, 2018				Periods: (	50
<ol> <li>11. Ductili</li> <li>12. Spring</li> <li>13. Spring</li> <li>Lecture Per</li> <li>Text Books</li> <li>1. R.K. Bans</li> <li>2. D.S. Bedi</li> <li>3. R.K. Rajp</li> <li>Reference Bo</li> <li>1. Punmia, J</li> <li>2. R.C.Hibbe</li> <li>3. U.C.Jinda</li> </ol>	ity test: S g test – To g test - C <b>'iods: 3</b> sal, "Streng out, "Streng ooks Jain and eler, "Me al., "Strer	Sheet metal ension ompression <b>0</b> Ingth of Ma th of Mater ngth of Mater Jain, "Mec chanics of ngth of Mat	Is (AI, GI and MS) n <b>Tutorial Periods: -</b> terials", Laxmi Publications, ( rials", Khanna Publishing, 6th terials", S. Chand Publication hanics of Materials" , Laxmi F Materials", Pearson Educatio erials", Asian Books Pvt. Ltd.	Practic 6th edition 2 n edition 201 ns, 7th editio Publications on, 9th Editio ., 2nd editior	019. 9. n 2018. .2019 on, 2018 n New De	əlhi, 2018.	2016		Periods: (	50
<ol> <li>Ductili</li> <li>Spring</li> <li>Spring</li> <li>Spring</li> <li>Spring</li> <li>Lecture Per</li> <li>Text Books</li> <li>R.K. Bans</li> <li>D.S. Bedi</li> <li>R.K. Rajp</li> <li>Reference Bo</li> <li>Punmia, J</li> <li>R.C.Hibbe</li> <li>U.C.Jinda</li> <li>S.S. Ratta</li> </ol>	ity test: S g test – To g test - C <b>iods: 3</b> sal, "Streng out, "Streng out, "Streng Jain and eler, "Me al., "Strer an " Strer	Sheet metal ension ompression <b>0</b> ngth of Ma th of Mater ngth of Mater chanics of ngth of Mater	Is (AI, GI and MS) <b>Tutorial Periods: -</b> terials", Laxmi Publications, 6 rials", Khanna Publishing, 6th terials", S. Chand Publication hanics of Materials", Laxmi F Materials", Pearson Education	Practic 6th edition 2 n edition 201 ns, 7th editio Publications on, 9th Editio ., 2nd editior n (India) Pv	019. 9. n 2018. .2019 on, 2018 n New De t. Ltd., 3r	elhi, 2018. d Edition,	2016		Periods: (	50

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4.	http://www.facweb.iitkgp.ac.in/~jeevanjyoti/teaching/mechsolids/2019/
5.	https://www.coursera.org/courses?query=mechanics%20of%20materials
6.	https://virtlabs.tech/strength-of-materials
<b>.</b>	

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1												PSO1	PSO2	PSO3
1	3	2	2	2	1	1	-	-	-	-	-	1	2	2	1
2	3	2	2	2	1	1	-	-	-	-	-	1	2	2	1
3	3	2	2	2	1	1	-	-	-	-	-	1	2	2	1
4	3	2	1	2	1	-	-	2	2	1	-	1	2	2	1
5	3	2	1	2	1	-	-	2	2	1	-	1	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

## Assessment method for theory cum practical courses

			Conti	nuous Ass	sessm	ent Marks (C	AM)			End		
		Continu (T		ssment	Continuous ssessment (Practical)					Semester Examination (ESE)	End Semester Examination	
Assessment	(Theory) sment CAT 1 CAT 2 Model Attenda ce			Attendan ce	Total	Conduction of Practical	Report	Viva	Total	Marks (Practical – Internal Evaluation)	(ESE) Marks (Theory)	Total Marks
Marks	5	5	5	5	20*	15	10	5	30*		75**	-
*To be	weighte	ed for 10	Marks		10	*To be w	eighted f Marks	or 10	10	30	*To be weighted for 50 Marks	100

dr. A. 800

Department	Engl	ish	Progran	nme: <b>B</b>	.Tech.				
Semester	III		Course	Catego	ory Code:	HS *End	d Semest	er Exam Ty	pe:LE
_			Perio	ds/We	ek	Credit	Ma	aximum Mar	ks
Course Code	U23E	INPC01	L	Т	Р	С	CAM	ESE	ТМ
Course Name	GENE	RAL PROFICIENCY- I	0	0	2	1	50	50	100
	-	(Common to A	LL Branches	except	CSBS)				
Prerequisite	Basics	s of English Language							-
	On co	mpletion of the course, the stu	udents will be	e able t	: <b>O</b>			BT Ma (Highest	
	CO1	Interpret meaning and apply read	ing strategies i	n technic	cal and no	n-technical	context	K	3
Course	CO2	Develop interpersonal communica	ation skills profe	essional	ly			K	4
Outcome	CO3	Demonstrate various forms of for	mal writing					K	3
	CO4	Decode graphical data coherently	1					K	2
	CO5	Apply the techniques of verbal ap	titude in compe	titive ex	ams			K	3
UNIT- I	Com	prehension Analysis						Periods: (	)6
-	ading: R	ed on social contexts (IELTS base eading technical passage (IELTS b			-			-	CO1
UNIT- II	Perso	onality Development						Periods: (	)6
the Flash Card Phrases (IELTS	(IELTS I	bout the everyday social issues (IEL based) - Reading: British & America						Idioms and	CO2
UNIT- III	.1	ential Learning						Periods: (	)6
-	Reading	between 4 people regarding educa g: Distinguish between facts & opinio erbs (IELTS)							CO3
UNIT- IV	Interp	pretation and Functional Writin	ng					Periods: (	)6
-	d and rev	n an academic subject (IELTS based view (Books, Magazines) - Writing: \ s (IELTS)			-	-			CO4
	7	al Aptitude - I						Periods: (	)6
		nt: Articles, Preposition, Conjunction	n						
Verbal Ability	Enhance	ement: Ordering of sentences, Blo Word Analogy, Word Groups (GAT	od Relation, C	ompletin	ig Statemo	ents- Cloze	test, Spot	ting Errors -	CO5
Lecture Period	ls: -	Tutorial Periods: -	Practic	al Perio	ods:30	Т	otal Peri	ods:30	
<ol> <li>Patterson, K Publication,</li> <li>Comfort, Je Cambridge:</li> <li>Agarwal, R.</li> <li>Wren, Perc</li> <li>Web Reference</li> <li>https://www</li> <li>https://ieltsf</li> </ol>	Cerry, Jos 2nd Edit eremy, e Reprint S. "A M ival Chris <b>25</b> .ielts-exa ocus.cor	t.al. "Speaking Effectively: Develo 2011. odern Approach to Verbal & Non Ve stopher, and Wren Martin. "High Sch am.net/grammar/ n/2017/08/02/collocations-ielts/	zler, "Crucial C ping Speaking erbal Reasoning nool English Gr	onversa Skills f g". S. Ch ammar a	tion Tools for Busine aand, 2010 and Comp	s for talking ss English" ).	when Sta , Cambrid	ge University	
		slive.com/online-test/blood-relations-	-						
-		om/guides/english-language/reading ook.com/word-analogy-test-questio			iest/				

N. A. 800

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
2	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
3	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
4	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1
5	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	Pra	actical		
Continuous Assessment Internal Evaluation		End Semester Ext	ernal Evaluation	Total Marks
50 marks		50 ma	ırks	
Conduction of Practical (Assignment 1&2 -10 Marks Performance in practical classes - 5 Marks)	15	Listening (L)	20	
Record	5	Speaking(S)	10	1
Viva	5	Reading(R)	10	100
Model Practical Examination (Model Exam is conducted for 50 Marks that will be converted to 15 Marks)	15	Writing(W)	10	
Attendance	10	1		

dr. dr. 8000

Department	Mathe	ematics		Progr	amme:	B.Tech.				
Semester				Cours	e Categ	ory: <b>BS</b>	End Se	emester E	Exam Typ	e: LE
Course				Pe	riods/W	eek	Credit	Max	kimum M	arks
Code	U23M	APC01		L	Т	Р	С	CAM	ESE	ТМ
Course Name	:	NEERING DRATORY	MATHEMATICS	0	0	2	1	50	50	100
			(Common to a	all Branches	Except	CSBS)				
Prerequisite	Matric	ces, Fourie	er Transforms, Laplace T	ransforms						
	On co	mpletion	of the course, the stud	lents will be	able to	D				/lapping est Level
	CO1	Perform a	nd evaluate Matrix Operati	ions						К3
Course	CO2	Solve Diff	erential and Integral Equation	ions						K3
Outcome	CO3	Construct	Fourier series and Fourier	Transforms of	of the giv	en functior	ו			K3
	CO4	Find the N	leasures of Central tenden	ю						K3
	CO5	Analyze C	Correlation and Regression	lines						К3
List of Expe			igen values and Eigen Vec	tors of the m	atrix					
			ential equation.		auix.					
		ation of $\int_{a}^{b}$	•							
		er series of								
5. Find t	he Fouri	er Transfori	m of f(x).							
	-	ce Transfo								
		, Median ai								
		Pie and Ba	•							
		ession lines								
Lecture Per	iods: -		Tutorial Periods: -	Practio	al Peri	ods: 30		Tota	I Periods	3: 30
Reference I	Books							·		
1. T. Veerar January 2	-	ngineering I	Mathematics, Tata McGraw	/ Hill Educatio	on (India)	Private Li	mited Chen	nai 2nd Ec	dition Pape	erback –
		•	ering Mathematics, The Na		~					
	•	ı, "Probabili	ty and Statistics", Meenaks	shi Agency, P	aperbac	k – 1, 2019	).			
Neb Refere		rmiak aarth	wootorp odu/doourpooto/-	udopto/updor	araduata	/introduction	n to moti-	h ndf		
•			western.edu/documents/stu n/niist/wp-content/uploads/					•		
/					1/ 1/ 1		// / / / /			

3. https://www.studocu.com/row/document/comsats-university-islamabad/signals-and-systems/lab-lab-manual/38332410

# COs/POs/PSOs Mapping

COs					Proç	gram O	utcome	es (POs	)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	1	1	-	1	-	-	-	-	-	1	1	-	-
2	3	2	1	1	-	1	-	-	-	-	-	1	1	-	-
3	2	1	-	-	-	1	-	-	-	-	-	1	1	-	1
4	2	1	-	-	-	1	-	-	-	-	-	1	1	-	-
5	3	2	1	1	-	1	-	-	-	-	-	1	1	-	-
Corr	elation	Level:	1 - Low	. 2 - Me	edium. 🗧	3 – Hial	h								

Correlation Level: 1 - Low, 2 - Medium, 3 – High

	0	Continuous	Assessme	ent Marks (CAM)		End	
Assessment	Performance i	in practical	classes	Model		Semester	Total
Assessment	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100
			di. to	.000	B.Teo	ch. Mechanical	Engineering

Department	Artific	ial Intelligence and Data Science	Progra	amme: I	B.Tech.				
Semester	111		Cours	e Categ	ory: <b>ES</b>	End Se	emester E	Exam Typ	e: LE
Course			Pe	riods/W	eek	Credit	Мах	kimum Ma	arks
Code	U23A	DPC01	L	Т	Р	С	CAM	ESE	ТМ
Course Name		RAMMING IN PYTHON RATORY	0	0	2	1	50	50	100
		(Common	to all Br	anches)	)				
Prerequisite	Nil								
	On co	mpletion of the course, the student	s will be	e able to	D				lapping est Leve
	CO1	Describe common Python functionality a	nd feature	es used f	for data sc	ience.			K2
Course	CO2	Query Data Frame structures for cleanin	g and pro	cessing.					K2
Outcome	CO3	Configure your programming environme	nt						K3
Outcome	CO4	Experiment the concept using data visua							K3
	CO5	Analyze real time datasets,							K3
List of Exp	I	-							NJ
tha a	ontonco h	an environment with show the started states and a last					e function		
<ul> <li>4. Build</li> <li>5. Build input</li> <li>6. Build the a</li> <li>7. Build (set i area</li> <li>8. Build</li> <li>9. Build</li> <li>10. Build</li> <li>11. Build</li> <li>12. Build</li> <li>13. Build</li> <li>14. Build</li> </ul>	a program a Python list. a python ge of the a python t to 0 for of derived a python a python a python a python a python a python a python a python	as any word with duplicate letters, else re n to perform arithmetic operations using la program that takes a list of numbers as i program to create a class called Car with car in years. program to create a base class called Sh now). Then, create two derived classes F classes. program to implement aggregation using program to perform Indexing and Sorting. program to perform Undexing and Sorting. program to perform usage of Pivot table u program to perform use of eval () and que program to perform Scatter Plot program to perform 3D plotting application to process a real time data.	ambda fur nput and attributes ape that h Rectangle Numpy. Jata. using Titan	nction. returns a Compan nas a me and Circ	thod called	containing o and year. In d area whicl	nly the eve nplement a h returns th	en number a method th he area of	hat return the shap
<ul> <li>4. Build</li> <li>5. Build input</li> <li>6. Build the a</li> <li>7. Build (set i area</li> <li>8. Build</li> <li>9. Build</li> <li>10. Build</li> <li>11. Build</li> <li>12. Build</li> <li>13. Build</li> <li>14. Build</li> </ul>	a program a Python list. a python ge of the a python t to 0 for of derived a python a python	n to perform arithmetic operations using la program that takes a list of numbers as i program to create a class called Car with car in years. program to create a base class called Sh now). Then, create two derived classes F d classes. program to implement aggregation using program to perform Indexing and Sorting. program to perform Handling of missing of program to perform usage of Pivot table of program to perform use of eval () and que program to perform Scatter Plot	ambda fur nput and attributes ape that h Rectangle Numpy. Jata. Jata. Jata. Jata.	nction. returns a Compan nas a me and Circ	thod called thod called that inh	containing o and year. In d area whicl	nly the eve nplement a h returns th e Shape c	en number a method th he area of	hat returr the shap Iculate th
<ol> <li>Build</li> <li>Build</li> <li>Input</li> <li>Build</li> <li>Input</li> <li>Build</li> <li>the a</li> <li>Ruild</li> <li>(set i</li> <li>area</li> <li>Build</li> </ol>	a program a Python list. a python ge of the a python of derived a python a python	n to perform arithmetic operations using la program that takes a list of numbers as i program to create a class called Car with car in years. program to create a base class called Sh now). Then, create two derived classes F classes. program to implement aggregation using program to perform Indexing and Sorting, program to perform Handling of missing of program to perform usage of Pivot table of program to perform use of eval () and que program to perform 3D plotting application to process a real time data.	ambda fur nput and attributes ape that h Rectangle Numpy. Jata. Jata. Jata. Jata.	nction. returns a Compan nas a me and Circ	thod called thod called that inh	containing o and year. In d area whicl	nly the eve nplement a h returns th e Shape c	en number a method ti he area of lass to ca	hat returr the shap Iculate th
<ul> <li>4. Build</li> <li>5. Build input</li> <li>6. Build the a</li> <li>7. Build (set i area</li> <li>8. Build</li> <li>9. Build</li> <li>10. Build</li> <li>11. Build</li> <li>12. Build</li> <li>13. Build</li> <li>14. Build</li> <li>15. Imple</li> </ul> Lecture Pe	a program a Python list. a python ge of the a python t to 0 for of derived a python a python	n to perform arithmetic operations using la program that takes a list of numbers as i program to create a class called Car with car in years. program to create a base class called Sh now). Then, create two derived classes F classes. program to implement aggregation using program to perform Indexing and Sorting, program to perform Handling of missing of program to perform usage of Pivot table of program to perform use of eval () and que program to perform 3D plotting application to process a real time data.	ambda fur nput and attributes ape that h Rectangle Numpy. data. using Titan ery ()	nction. returns a Compan nas a me and Circ nic datas	ny, model, s thod called cle that inh sets sets	containing o and year. In d area which erit from th	nly the eve nplement a h returns th e Shape c	en number a method ti he area of lass to ca	hat returr the shap Iculate th
<ul> <li>4. Build</li> <li>5. Build</li> <li>input</li> <li>6. Build</li> <li>the a</li> <li>7. Build</li> <li>(set i</li> <li>area</li> <li>8. Build</li> <li>9. Build</li> <li>10. Build</li> <li>11. Build</li> <li>12. Build</li> <li>13. Build</li> <li>14. Build</li> <li>15. Imple</li> </ul> Lecture Pe Reference 1. Chirag S	a program a Python list. a python ge of the a python t to 0 for of derived a python a python a python a python a python ment an <b>riods: -</b> <b>Books</b> hah, "A H	n to perform arithmetic operations using la program that takes a list of numbers as i program to create a class called Car with car in years. program to create a base class called Sh now). Then, create two derived classes F d classes. program to implement aggregation using program to perform Indexing and Sorting. program to perform Handling of missing of program to perform usage of Pivot table of program to perform use of eval () and que program to perform 3D plotting application to process a real time data. <b>Tutorial Periods: -</b>	ambda fur nput and attributes ape that h Rectangle Numpy. data. using Titar ery () <b>Practic</b> ambridge	nction. returns a Compan nas a me and Circ nic datas cal Perio	ithod called cle that inh sets ods: 30	containing o and year. In d area which erit from th	nly the even nplement a h returns th e Shape c	en number a method ti he area of lass to ca	hat returr the shap Iculate th
<ol> <li>Build</li> <li>Build</li> <li>input</li> <li>Build</li> <li>the a</li> <li>Build</li> <li>(set i area</li> <li>Build</li> /ol>	a program a Python list. a python ge of the a python t to 0 for of derived a python a python	n to perform arithmetic operations using la program that takes a list of numbers as i program to create a class called Car with car in years. program to create a base class called Sh now). Then, create two derived classes F classes. program to implement aggregation using program to perform Indexing and Sorting. program to perform Handling of missing of program to perform usage of Pivot table of program to perform use of eval () and que program to perform 3D plotting application to process a real time data. <b>Tutorial Periods: -</b> ands-On Introduction to Data Science", C	ambda fur nput and attributes ape that h Rectangle Numpy. data. using Titan ery () <b>Practic</b> ambridge Media Ar	nction. returns a Compan nas a me and Circ nic datas cal Perio Universi nalytics",	ity, model, i thod called cle that inh sets <b>ods: 30</b> ity Press, 2 Packt Put	containing o and year. In d area which herit from th 2020.	nly the even nplement a h returns th e Shape c Tota 17.	en number n method ti he area of lass to ca	hat returr the shap Iculate th
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COs					Proç	gram O	utcome	es (POs	)					jram Spe omes (P	
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	1	3	-	-	-	-	-	-	-	2	2	2
2	2	3	2	2	3	-	-	-	-	-	-	-	2	3	2
3	3	3	3	2	3	-	-	-	-	-	-	-	3	3	3
4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	(	Continuous	Assessme	ent Marks (CAM)		End	
Assessment	Performance i	in practical	classes	Model		Semester	Total
Assessment	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

A. A. 800

Department	Mech	anical Engineering	Progra	amme :	B.Tech.				
Semester	III		Cours	e Categ	ory: <b>PC</b>	Enc	Semester	r Exam T	Гуре: <b>LE</b>
Course			Pe	riods/We	eek	Credit	Maxi	mum Ma	arks
Code	U23M	EP302	L	Т	Р	С	CAM	ESE	ТМ
Course Name		JFACTURING PROCESSES	0	0	2	1	50	50	100
Inamo				L	<u>.</u>	<u>.</u>			l
	Морц	facturing Processes							
Prerequisite	Ivianu	lacturing Flocesses							lapping
	On co	mpletion of the course, the stude	nts will be	e able to	)				st Leve
	<b>.</b>	Know the various basic Manufactur	ina process	es used	in indus	trv for con	verting raw	,	
	CO1	materials into finished products.					i oi iling i all	l	K3
Course	CO2	Demonstrate the various operation of	the drilling n	nachines					K2
Outcome	CO3	Acquire knowledge about the various	-			nd Cutter m	achine		K3
	CO4	Perform the various machining operation							K3
	CO5	Analyze the properties of molding sand		attorn an	nd mold ca	vity using s	and casting		K3 K4
List of Exper	1	Analyze the properties of molding sand	is, piepaie p	alleman		vity using so	and casting.	•	N4
Drilling Mac									
-		g machine.							
-	and Ta	-							
-	,								
3. Drilling	and Bo	prina.							
	and Bo and Re	-							
	and Re	-							
4. Drilling Grinding Ma	and Re <b>chine:</b>	-							
4. Drilling Grinding Ma 5. Study	and Re <b>chine:</b> of grindi	eaming.							
<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Cylind</li> </ol>	g and Re <b>chine:</b> of grindi Surface g rical grir	eaming. ng machine grinding.							
<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Cylind</li> <li>Shaping Ma</li> </ol>	g and Re chine: of grindi Surface g rical grin chine:	eaming. ng machine grinding. Iding.							
<ul> <li>4. Drilling</li> <li>Grinding Ma</li> <li>5. Study</li> <li>6. Plain S</li> <li>7. Cylind</li> <li>Shaping Ma</li> <li>8. Study</li> </ul>	and Re chine: of grindi Surface ( rical grir chine: of shapi	eaming. ng machine grinding. Iding. ng machine							
<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Cylind</li> <li>Shaping Ma</li> <li>Study</li> <li>Square</li> </ol>	y and Re chine: of grindi Gurface y rical grin chine: of shapi e head s	eaming. ng machine grinding. iding. ng machine shaping							
<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Cylind</li> <li>Shaping Ma</li> <li>Study</li> <li>Study</li> <li>Square</li> <li>Hexag</li> </ol>	y and Re chine: of grindi Surface y rical grin chine: of shapi e head s onal hea	eaming. ng machine grinding. Iding. ng machine Ishaping ad shaping							
<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Plain S</li> <li>Cylind</li> <li>Shaping Ma</li> <li>Study</li> <li>Square</li> <li>Hexag</li> <li>Tool and Cu</li> </ol>	y and Re chine: of grindi Surface y rical grin chine: of shapi e head s onal hea tter mag	eaming. ng machine grinding. nding. ng machine shaping ad shaping <b>chine:</b>							
<ul> <li>4. Drilling</li> <li>Grinding Ma</li> <li>5. Study</li> <li>6. Plain S</li> <li>7. Cylind</li> <li>Shaping Ma</li> <li>8. Study</li> <li>9. Square</li> <li>10. Hexag</li> <li>Tool and Cu</li> <li>11. Study</li> </ul>	y and Re chine: of grindi Surface y rical grin chine: of shapi e head s onal hea tter mad of Tool a	eaming. ng machine grinding. Iding. Ing machine Ishaping ad shaping <b>chine:</b> and Cutter machine							
<ul> <li>4. Drilling</li> <li>Grinding Ma</li> <li>5. Study</li> <li>6. Plain S</li> <li>7. Cylind</li> <li>Shaping Ma</li> <li>8. Study</li> <li>9. Square</li> <li>10. Hexag</li> <li>Tool and Cu</li> <li>11. Study</li> <li>12. Tool g</li> </ul>	and Re chine: of grindi Surface g rical grin chine: of shapi e head s onal hea tter mad of Tool a rinding -	eaming. ng machine grinding. ading. ng machine shaping ad shaping <b>chine:</b> and Cutter machine Single point cutting tool.							
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<ul> <li>4. Drilling</li> <li>Grinding Ma</li> <li>5. Study</li> <li>6. Plain S</li> <li>7. Cylind</li> <li>Shaping Ma</li> <li>8. Study</li> <li>9. Square</li> <li>10. Hexag</li> <li>Tool and Cu</li> <li>11. Study</li> <li>12. Tool g</li> <li>13. V tool</li> <li>Foundry</li> </ul>	and Re chine: of grindi Surface g rical grin chine: of shapi e head s onal hea tter mad of Tool a rinding - grinding ration of ods: -	eaming. ng machine grinding. nding. ng machine shaping ad shaping <b>chine:</b> and Cutter machine Single point cutting tool. a sand mold using split pattern	Practica	al Perioc	ls: 30		Total I	Periods:	30
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<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Cylind</li> <li>Shaping Ma</li> <li>Study</li> <li>Square</li> <li>Study</li> <li>Square</li> <li>Hexag</li> <li>Tool and Cu</li> <li>Study</li> <li>Tool g</li> <li>V tool</li> <li>Foundry</li> <li>Prepare</li> <li>Lecture Period</li> <li>Reference Bo</li> <li>Hajra Cho</li> <li>Promoters</li> <li>B.S. Ragh</li> <li>Hajra Cho</li> <li>Pvt Ltd, M</li> </ol>	and Re chine: of grindi Surface g rical grin chine: of shapi e head s onal hea tter mad of Tool a rinding - grinding grinding ration of ods: - ooks oudhury s & Publi uumbai, 2	eaming. ng machine grinding. nding. ng machine shaping ad shaping chine: and Cutter machine Single point cutting tool a sand mold using split pattern Tutorial Periods: - S.K., Hajra Choudhury A.K., Nirjhar R ishers Private Limited, Mumbai, 2023. i, "Manufacturing Processes", Dhanpat S.K., Nirjhar Roy, "Elements of Worksho 2016.	koy, "Elemer Rai & Co. (F p Technolo <u>c</u>	nts of Wo ?) Ltd, Ja gy - Volur	orkshop T nuary 202 me - 2", 15	0 ith Edition, I	- Vol. I", 16 Media Prom	6th Editic	on, Medi
<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Cylind</li> <li>Shaping Ma</li> <li>Study</li> <li>Square</li> <li>Square</li> <li>Hexag</li> <li>Tool and Cu</li> <li>Tool and Cu</li> <li>Tool g</li> <li>V tool</li> <li>Foundry</li> <li>Tool Reference Boo</li> <li>Hajra Choo</li> <li>Pvt Ltd, M</li> <li>N Khurmi,</li> </ol>	and Re chine: of grindi Surface g rical grin chine: of shapi e head s onal hea tter mad of Tool a rinding - grinding grinding ration of ods: - ooks budhury s & Publi uwansh udhury s kumbai, 2 R.S Kh	eaming. Ing machine grinding. Ing machine grinding. Ing machine shaping ad shaping chine: and Cutter machine Single point cutting tool a sand mold using split pattern Tutorial Periods: - S.K., Hajra Choudhury A.K., Nirjhar R ishers Private Limited, Mumbai, 2023. i, "Manufacturing Processes", Dhanpat S.K., Nirjhar Roy, "Elements of Worksho 2016. urmi, "Workshop Technology: Manufact	koy, "Elemer Rai & Co. (F p Technolog uring Proces	nts of Wo ?) Ltd, Ja gy - Volur	orkshop T nuary 202 me - 2", 15	0 ith Edition, I	- Vol. I", 16 Media Prom	6th Editic	on, Media
<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Cylind</li> <li>Shaping Ma</li> <li>Study</li> <li>Square</li> <li>Study</li> <li>Square</li> <li>Study</li> <li>Square</li> <li>Hexag</li> <li>Tool and Cu</li> <li>Tool and Cu</li> <li>Study</li> <li>Tool g</li> <li>V tool</li> <li>Foundry</li> <li>Prepar</li> <li>Lecture Period</li> <li>Reference Bo</li> <li>Hajra Cho</li> <li>Promoters</li> <li>B.S. Ragh</li> <li>Hajra Cho</li> <li>Pvt Ltd, M</li> <li>N Khurmi,</li> <li>R.K. Rajp</li> </ol>	and Re chine: of grindi Surface g rical grin chine: of shapi e head s onal hea tter mad of Tool a rinding - grinding grinding ration of ods: - ooks oudhury s & Publi uwansh udhury s umbai, 2 R.S Kh ut, Manu	eaming. ng machine grinding. nding. ng machine shaping ad shaping chine: and Cutter machine Single point cutting tool a sand mold using split pattern Tutorial Periods: - S.K., Hajra Choudhury A.K., Nirjhar R ishers Private Limited, Mumbai, 2023. i, "Manufacturing Processes", Dhanpat S.K., Nirjhar Roy, "Elements of Worksho 2016.	koy, "Elemer Rai & Co. (F p Technolog uring Proces	nts of Wo ?) Ltd, Ja gy - Volur	orkshop T nuary 202 me - 2", 15	0 ith Edition, I	- Vol. I", 16 Media Prom	6th Editic	on, Media
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<ol> <li>Drilling</li> <li>Grinding Ma</li> <li>Study</li> <li>Plain S</li> <li>Cylind</li> <li>Shaping Ma</li> <li>Study</li> <li>Square</li> <li>Square</li> <li>Square</li> <li>Hexag</li> <li>Tool and Cu</li> <li>Tool and Cu</li> <li>Tool g</li> <li>V tool</li> <li>Foundry</li> <li>Tool Study</li> <li>V tool</li> <li>Foundry</li> <li>Prepar</li> <li>Lecture Period</li> <li>Reference Boo</li> <li>Hajra Choo</li> <li>Pvt Ltd, M</li> <li>N Khurmi,</li> <li>R.K. Rajp</li> <li>Veb Reference</li> <li>https://npt</li> </ol>	and Re chine: of grindi Surface g rical grin chine: of shapi e head s onal hea tter mad of Tool a rinding - grinding grinding ration of ods: - ooks budhury s & Publi uwansh udhury s umbai, 2 R.S Kh ut, Manu el.ac.in/	eaming. Ing machine grinding. Ing machine grinding. Ing machine shaping ad shaping chine: and Cutter machine Single point cutting tool a sand mold using split pattern Tutorial Periods: - S.K., Hajra Choudhury A.K., Nirjhar R ishers Private Limited, Mumbai, 2023. i, "Manufacturing Processes", Dhanpat S.K., Nirjhar Roy, "Elements of Worksho 2016. urmi, "Workshop Technology: Manufact ufacturing Processes, Lakshmi Publicatio courses/112105127	Rai & Co. (F p Technolog uring Proces ons, 2020.	nts of Wo ?) Ltd, Ja gy - Volur	orkshop T nuary 202 me - 2", 15	0 ith Edition, I	- Vol. I", 16 Media Prom	6th Editic	on, Media
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COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	-	-	-	3	-	-	-	3	3	-	-	3	1	2
2	2	-	-	-	3	-	-	-	3	3	-	-	3	1	2
3	2	-	-	-	3	-	-	-	3	3	-	-	3	1	2
4	2	-	-	-	3	-	-	-	3	3	-	-	3	1	2
5	2	-	-	-	3	-	-	-	3	3	-	-	3	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	C	continuous	Assessi	ment Marks (CAN	1)		
Assessment		ce in practio asses	cal	Model		End Semester Examination	Total Marks
	Conduction of practical	Record work	viva	Practical Examination	Attendance	(ESE) Marks	
Marks	15	5	5	15	10	50	100

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Department	Mech	anical Engineering	Progr	amme :	B.Tech.				
Semester			Cours	e Categ	ory: PC	Enc	d Semeste	er Exam	Type: LE
Course	U23N	IEP303	Pe	riods/W	eek	Credit	Мах	imum Ma	arks
Code			L	Т	Р	С	CAM	ESE	ТМ
Course Name		D MECHANICS AND HYDRAULIC HINES LABORATORY	0	0	2	1	50	50	100
			MECH						
Prerequisite	-								
	On co	mpletion of the course, the studen	ts will be	e able to	D				lapping est Level
	CO1	Analyse and Interpret fluid flow paramete experimental setups.	ers by con	ducting e	experimen	ts on ventur	e and orific	e	K3
Course Outcome	CO2	Perform the variety of practical fluid flow principles in design.	v and mea	suring de	evices an	d utilize fluid	mechanic	S	K2
Outcome	CO3	Analyse the performance characteristic	of various	types of	turbines.				K3
	CO4	Estimate the performance parameters o	f a given (	Centrifug	al and Re	ciprocating	pump.		K3
	CO5	Conduct and analyze an appropriate turk	oine with re	eference	to given s	ituation in p	ower plants		K3
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> </ol>	ion of ma ion of mii ting expe	the coefficient of discharge of given Vent jor losses in pipe fittings. nor losses in pipe fittings. riments and drawing the characteristics c	urves of c	-					
<ol> <li>Estimati</li> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> <li>Conduct</li> <li>Conduct</li> <li>Conduct</li> <li>Conduct</li> <li>Conduct</li> <li>Conduct</li> <li>Conduct</li> <li>Conduct</li> </ol>	ion of main ting expe ting expe ting expe ting expe ting expe ting expe ting expe	jor losses in pipe fittings. nor losses in pipe fittings. riments and drawing the characteristics c riments and drawing the characteristics c	urves of c urves of s urves of je urves of M urves of G urves of P urves of P	ubmersik et pump. /ulti Stag eciprocat Gear pum Pelton wh	ple pump. Je Centrifu ing pump Ip. eel.				
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> </ol>	ion of main ion of mini- ting expe- ting expe- ting expe- ting expe- ting expe- ting expe- ting expe-	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics contribution of the characteristics of	urves of c urves of s urves of je urves of M urves of G urves of P urves of F	ubmersik et pump. /lulti Stag eciprocat Gear pum Pelton wh Trancis tu	ple pump. ge Centrifu ing pump gp. eel. rbine.		Total	Pariode	30
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> </ol>	ion of main ting expe ting expe ting expe ting expe ting expe ting expe ting expe ting expe ting expe ting expe	jor losses in pipe fittings. nor losses in pipe fittings. riments and drawing the characteristics c riments and drawing the characteristics c	urves of c urves of s urves of je urves of M urves of G urves of P urves of F	ubmersik et pump. /ulti Stag eciprocat Gear pum Pelton wh	ple pump. ge Centrifu ing pump gp. eel. rbine.		Total	Periods:	30
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> <li>Reference Between Section 2012</li> </ol>	ion of ma ion of mili ting expe ting expe ting expe ting expe ting expe ting expe ting expe ods: - ooks	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics c eriments and drawing the characteristics c	urves of c urves of s urves of je urves of M urves of G urves of P urves of F	ubmersik et pump. /lulti Stag eciprocat Gear pum Pelton wh Trancis tu	ple pump. ge Centrifu ing pump gp. eel. rbine.		Total	Periods:	30
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> /ol>	ion of ma ion of min ting expe ting expe ting expe ting expe ting expe ting expe ting expe ods: - ooks	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics contribution of the characteristics of	urves of c urves of s urves of je urves of M urves of G urves of P urves of F <b>Practic</b>	ubmersik et pump. Aulti Stag eciprocat Gear pum Pelton wh Grancis tu <b>al Perioc</b>	ple pump. le Centrifu ing pump lp. eel. rbine. ds: 30		I		30
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> /ol>	ion of main ion of mini- ting expe- ting exp	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics contributions and drawing the characteristics contributions and drawing the characteristics contribution and drawing the characteristics contribution and drawing the characteristics contributions a	urves of c urves of s urves of je urves of M urves of G urves of P urves of F <b>Practic</b>	ubmersik et pump. Aulti Stag eciprocat Gear pum Pelton wh Trancis tu al Perioo	ple pump. ge Centrifu ing pump gp. eel. rbine. <b>ds: 30</b>		I		30
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> /ol>	ion of ma ion of min ting expe- ting expe- t	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics c eriments urves of c urves of s urves of je urves of M urves of G urves of P urves of F <b>Practic</b> y manual, hi, 8th Edi luid Mech	ubmersite et pump. Aulti Stag eciprocat Gear pum Pelton wh Trancis tu <b>al Perioo</b> Charotar tion, 201 anics and	ple pump. Je Centrifu ing pump p. eel. rbine. <b>ds: 30</b> r Publishir 6 d Fluid Ma	ng House Pv achines, Mc	rt. Ltd. 2006 Graw Hill, 2	3. 2017.	30	
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> /ol>	ion of ma ion of min ting expe- ting expe- t	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics c eriments urves of c urves of s urves of je urves of M urves of G urves of P urves of F <b>Practic</b> y manual, hi, 8th Edi luid Mech	ubmersite et pump. Aulti Stag eciprocat Gear pum Pelton wh Trancis tu <b>al Perioo</b> Charotar tion, 201 anics and	ple pump. Je Centrifu ing pump p. eel. rbine. <b>ds: 30</b> r Publishir 6 d Fluid Ma	ng House Pv achines, Mc	rt. Ltd. 2006 Graw Hill, 2	3. 2017.	30	
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> /ol>	ion of ma ion of min ting expe- ting expe- t	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics c eriments and drawing the characteristic eriments and the characteristics c eriments and the	urves of c urves of s urves of je urves of M urves of G urves of P urves of F <b>Practic</b> y manual, hi, 8th Edi luid Mech	ubmersite et pump. Aulti Stag eciprocat Gear pum Pelton wh Trancis tu <b>al Perioo</b> Charotar tion, 201 anics and	ple pump. Je Centrifu ing pump p. eel. rbine. <b>ds: 30</b> r Publishir 6 d Fluid Ma	ng House Pv achines, Mc	rt. Ltd. 2006 Graw Hill, 2	3. 2017.	30
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> /ol>	ion of ma ion of min ting expe- ting expe- ting expe- ting expe- ting expe- ting expe- ting expe- ting expe- ting expe- ods: - ooks rdraulics rasamy, I M., "Fluic , Gautam sal, "Fluic ces -nitk.vlat	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics c eriments and drawing the characteristic eriments and the characteristics c eriments and the	urves of c urves of s urves of je urves of M urves of G urves of P urves of F <b>Practic</b> y manual, hi, 8th Edi luid Mech	ubmersite et pump. Aulti Stag eciprocat Gear pum Pelton wh Trancis tu <b>al Perioo</b> Charotar tion, 201 anics and	ple pump. Je Centrifu ing pump p. eel. rbine. <b>ds: 30</b> r Publishir 6 d Fluid Ma	ng House Pv achines, Mc	rt. Ltd. 2006 Graw Hill, 2	3. 2017.	30
<ol> <li>Estimati</li> <li>Estimati</li> <li>Conduct</li> <li>Kumar</li> <li>White, F.I</li> <li>Som S K,</li> <li>R.K.Bans</li> <li>Web Reference</li> <li>http://fmc</li> <li>https://ap</li> </ol>	ion of ma ion of mili ting expe- ting expe-	jor losses in pipe fittings. nor losses in pipe fittings. eriments and drawing the characteristics c eriments urves of c urves of s urves of je urves of M urves of G urves of P urves of F <b>Practic</b> y manual, hi, 8th Edi luid Mech	ubmersite et pump. Aulti Stag eciprocat Gear pum Pelton wh Trancis tu <b>al Perioo</b> Charotar tion, 201 anics and	ple pump. Je Centrifu ing pump p. eel. rbine. <b>ds: 30</b> r Publishir 6 d Fluid Ma	ng House Pv achines, Mc	rt. Ltd. 2006 Graw Hill, 2	3. 2017.	30	

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	3	2	-	1	-	-	-	1	-	-	-	1	1	2	1		
2	3	2	-	2	-	-	-	1	-	-	-	1	1	2	2		
3	3	1	-	2	-	-	-	1	-	-	-	2	2	2	2		
4	3	2	-	2	3	1	-	1	-	-	-	1	2	3	3		
5	3	2	-	3	3	2		1	-	-	-	2	2	3	3		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

A. A. 800

	C	continuous	Assessi	ment Marks (CAM	1)		
Assessment		ce in practio asses	cal	Model		End Semester Examination	Total Marks
	Conduction Record viv			Practical Examination	Attendance	(ESE) Marks	inditio
Marks	15	5	5	15	10	50	100

dr. A. 800

Department	Mechanical Engineering	Programme : <b>B.Tech.</b>										
Semester	Ш	Cours	se Categ	Semeste	ester Exam Type: -							
Course		Pe	riods/W	eek	Crec	dit	Maxi	mum Ma	rks			
Code	U23MEC3XX	L	Т	Р	С		CAM	ESE	ТМ			
Course Name	<b>CERTIFICATION COURSE - III</b>	0	0	4	-		100	-	100			
MECH												
Students s	hall choose an International / Reputed organiza	tion certifi	cation co	ourse of 40	0-50 hc	ours c	duration s	specified in	n the			

curriculum (It is mandatory to do a minimum of six courses) which will be offered through the Centre of Excellence. These courses have no credit and will not be considered for CGPA calculation.

- (i) Certification Courses are required to be completed to fulfil the degree requirements. All Certification courses are assessed internally for 100 marks.
- (ii) The Course coordinator handling the course will assess the student through attendance and MCQ test, and declare the student as "pass" on satisfactory completion. A letter grade "P" is awarded to declare pass.
- (iii) The marks scored in these courses will not be taken into consideration for the SGPA / CGPA calculations in the grade sheet.

Assessment	Continuous Ass	essment Marks (CAM)	Total Marks
Assessment	Report	MCQ Test	
Marks	10	90	100

fr. fr. cola

Department	Mechanical	Programme: <b>B.Tech.</b>										
Semester	Ш	Cou	rse Cat	End Sem	nester Exam Type:-							
		Р	eriods/	Week	Credit	Maxi	mum Mar	ks				
Course Code	U23MES301	L	Т	Р	С	CAM	ESE	ТМ				
Course Name	SKILL ENHANCEMENT COURSE - I	0	0	2	-	100	-	100				
MECH												

## TWO WHEELER TROUBLESHOOTING

The main objective of this programme is to build students familiar with the Workshop situation and as well as to afford the opportunities to know about the basics of the two wheeler servicing workshop and its environment to make qualified and skilled man power for the two wheeler service sector. And also to create an opportunity for the students to have practical knowledge and to increase their employability. The course has the detailed explanation on the classification of two wheelers, working principles, its components functions. To make the students familiarize with the procedure of troubleshooting of two wheelers with both theoretical and practical approach.

Lecture Periods:30	Tutorial Periods: -	Practical Periods:	Total Periods: 30
Web References			
1. https://www.bajajauto	o.com.np/english/riders/how-to/trouble	eshooting/	
2. https://www.cycleped	lia.com/four-stroke-motorcycle-trouble	eshooting-guide/	
3. https://www.taverner	motorsports.com.au/troubleshooting-	10-common-moorcycle-problems/	

#### **Evaluation Methods**

Assessment	Continu	ious Assessment	: Marks (CAM)	Total Marks
Assessment	Attendance	Report	Presentation/Demo/ Skill Test	
Marks	10	40	50	100

fr. fr. 800

Department	Mech	nanical		Program	nme: <b>B.</b>	Tech.					
Semester				Course	Catego	ry: <b>MC</b>		*End Se	emester E	Exam	Туре: <b>-</b>
Course Code	U23M	EM303		Perio	ods/Wee	k	Credit	Ma	ximum N	larks	
				L	Т	Р	С	CAM	1 E	SE	ТМ
Course Name	CLIM	ATE CHAN	IGE	2	0	0	-	100		-	100
	.1			MECH			.1		l		1
Prerequisite	-			meen							
Toroquiono		-	f the course, the stu						(	Highe	lapping st Level
Course	CO1	Inspect th	he characteristics and Te	emperature pro	file of the	atmos	phere				K2
Dutcome	CO2	Analyze p	bast climate, human influ	ience on globa	l warming	g, and p	predict fut	ure climate	es	I	K3
	CO3			K3							
	CO4			K2							
	CO5		e carbon credits and ev		•			nologies			K2
UNIT- I			_			amag		noiogioo			ods:06
			d its Components al Chemical Character	istics of Atmo	sphere-	Vertica	al structu	re of the	e atmospł		
Composition of	the atn	nosphere-At	tmospheric stability-Ten								CO1
UNIT- II	Globa	al Climate								Perio	ods:06
			tal indicators and instrur		– Human	Footpi	rints on gl	obal warm	ing- Predi	cting	CO2
future climates-	1	-	e – Extreme climate ever	nts.						_ ·	
UNIT- III			ate Change of Temperature in the e								ods:06
Change on varie	ous secto //ethods a	ors – Agricul and Scenar	ture, Forestry and Ecosy ios – Projected Impacts	/stem – Water	Resource	es – Hu	man Heal	th – Indus	try, Settle	ment	CO3
UNIT- IV	Obse	rved Chan	ges and its Causes						P	Period	ls:06
	and Car	⁺bon credits ks -The Mor	- Initiatives in India-Kyot htreal Protocol – UNFCC								CO4
UNIT-V	Clima	te Change	e and Mitigation Mea	sures					P	Period	ls:06
	<u>i</u>		arbon Trading- example		ean Tech	nology	- Biodies	sel – Natu			
	nologies	and Practice	ergy – Hydrogen – Bio- es- Carbon sequestratior								CO5
Lecture Period	ds: 30	٦	Tutorial Periods:-	Practic	al Perio	ds:-			TotalP	eriod	s:30
Textbooks	ierald. "G				o" Ovfor	d Unive	rsitv Pres	s, 2020.			
<ol> <li>Joan Fitzg</li> <li>J. David N</li> <li>Robin Moi</li> <li>Andrew D</li> <li>Edition, 20</li> </ol>	leelin, "Cl Iveen, "F essler ar )19.	limate chang undamental nd Edward <i>i</i>	a: Urban Leadership on ( ge and climate modelling s of weather and climate A. Parson, "The Scienc Change – An Indian Pers	g", Cambridge e", Oxford Univ e and Politics	University ersity Pre of Globa	/ press ess, 2 <sup>nd</sup> I Clima	, 2011. Edition, 2 te Chang	010. e", Cambi		/ersity	press, 3
<ol> <li>Joan Fitzg</li> <li>J. David N</li> <li>Robin Moi</li> <li>Andrew D Edition, 20</li> <li>Dash Susl</li> </ol>	leelin, "Cl lveen, "F essler ar )19. hil Kumar	limate chang undamental nd Edward <i>i</i>	ge and climate modelling s of weather and climate	g", Cambridge e", Oxford Univ e and Politics	University ersity Pre of Globa	/ press ess, 2 <sup>nd</sup> I Clima	, 2011. Edition, 2 te Chang	010. e", Cambi		versity	press, 3
<ol> <li>Joan Fitzg</li> <li>J. David N</li> <li>Robin Moi</li> <li>Andrew D Edition, 20</li> <li>Dash Sust</li> </ol>	leelin, "Cl Iveen, "F essler ar )19. hil Kumar <b>poks</b>	limate chang undamental nd Edward <i>i</i> r, "Climate C	ge and climate modelling s of weather and climate A. Parson, "The Scienc Change – An Indian Pers	g", Cambridge e", Oxford Univ e and Politics spective", Caml	University ersity Pre of Globa oridge Ur	y press ess, 2 <sup>nd</sup> I Clima iiversity	, 2011. Edition, 2 te Chang v Press In	010. e", Cambi dia Pvt. Lt	d, 2007.	versity	press, 3
<ol> <li>Joan Fitzg</li> <li>J. David N</li> <li>Robin Moi</li> <li>Andrew D Edition, 20</li> <li>Dash Susi</li> <li>Reference Bo</li> <li>Bill McKibb</li> <li>Jason Sme</li> <li>Adaptation</li> </ol>	leelin, "Cl lveen, "F essler ar )19. hil Kumar <b>boks</b> en, "The erdon, "Cl and mitig	limate chang undamental nd Edward <i>i</i> r, "Climate C Global War imate Chan gation of clin	ge and climate modelling s of weather and climate A. Parson, "The Scienc Change – An Indian Pers ming Reader: A Century ge: The Science of Glob nate change-Scientific T	g", Cambridge e", Oxford Univ e and Politics spective", Cambrid of writing about oal Warming an fechnical Analy	University ersity Pre of Globa oridge Ur ut Climate d our Ene sis, Cam	y press ess, 2 <sup>nd</sup> I Clima iversity e Chan ergy Fu bridge	, 2011. Edition, 2 te Chang / Press In ge", Peng lture", Col University	010. e", Cambi dia Pvt. Lt uin, 2012. umbia Un	d, 2007. iversity, 20		press, 3
<ol> <li>Joan Fitzg</li> <li>J. David N</li> <li>Robin Moi</li> <li>Andrew D Edition, 20</li> <li>Dash Sust</li> <li>Reference Bo</li> <li>Bill McKibb</li> <li>Jason Sme</li> <li>Adaptation</li> <li>J.M. Wallact</li> </ol>	leelin, "Cl lveen, "F essler ar 019. hil Kumar <b>boks</b> en, "The erdon, "Cl and mitig ce and P.	limate chang undamental nd Edward <i>i</i> r, "Climate C Global War imate Chan gation of clin V. Hobbs, " <i>i</i>	ge and climate modelling s of weather and climate A. Parson, "The Scienc Change – An Indian Pers ming Reader: A Century ge: The Science of Glob nate change-Scientific T Atmospheric Science", E	g", Cambridge e", Oxford Univ e and Politics spective", Cambridge of writing about al Warming an echnical Analy Elsevier/ Acade	University ersity Pre of Globa pridge Un ut Climate d our End sis, Cam mic Pres	y press pss, 2 <sup>nd</sup> I Clima iversity e Chan ergy Fu bridge s, 2006	, 2011. Edition, 2 te Chang v Press In ge", Peng ture", Col University 5.	010. e", Cambi dia Pvt. Lt uin, 2012. umbia Un Press, 20	iversity, 2006.	009	
<ol> <li>Joan Fitzg</li> <li>J. David N</li> <li>Robin Moi</li> <li>Andrew D Edition, 20</li> <li>Dash Sust</li> <li>Reference Bo</li> <li>Bill McKibb</li> <li>Jason Sme</li> <li>Adaptation</li> <li>J.M. Wallac</li> <li>Jan C. van</li> </ol>	leelin, "Cl lveen, "F essler ar )19. hil Kumar <b>Doks</b> en, "The erdon, "Cl and mitig ce and P. Dam, Im	limate chang undamental nd Edward <i>i</i> r, "Climate C Global War imate Chan gation of clin V. Hobbs, " <i>i</i>	ge and climate modelling s of weather and climate A. Parson, "The Scienc Change – An Indian Pers ming Reader: A Century ge: The Science of Glob nate change-Scientific T	g", Cambridge e", Oxford Univ e and Politics spective", Cambridge of writing about al Warming an echnical Analy Elsevier/ Acade	University ersity Pre of Globa pridge Un ut Climate d our End sis, Cam mic Pres	y press pss, 2 <sup>nd</sup> I Clima iversity e Chan ergy Fu bridge s, 2006	, 2011. Edition, 2 te Chang v Press In ge", Peng ture", Col University 5.	010. e", Cambi dia Pvt. Lt uin, 2012. umbia Un Press, 20	iversity, 2006.	009	
<ol> <li>Joan Fitzg</li> <li>J. David N</li> <li>Robin Moi</li> <li>Andrew D Edition, 20</li> <li>Dash Susi</li> <li>Reference Bo</li> <li>Bill McKibb</li> <li>Jason Sme</li> <li>Adaptation</li> <li>J.M. Wallac</li> <li>Jan C. van</li> <li>Neb Reference</li> </ol>	leelin, "Cl lveen, "F essler ar 019. hil Kumar <b>boks</b> en, "The erdon, "Cl and mitig ce and P. Dam, Im <b>es</b>	limate chang undamental nd Edward <i>i</i> r, "Climate C Global War imate Chan gation of clin V. Hobbs, " <i>i</i> pacts of "Cli	ge and climate modelling s of weather and climate A. Parson, "The Scienc Change – An Indian Pers ming Reader: A Century ge: The Science of Glob nate change-Scientific T Atmospheric Science", E imate Change and Clima	g", Cambridge e", Oxford Univ e and Politics spective", Cambridge of writing about al Warming an echnical Analy Elsevier/ Acade	University ersity Pre of Globa pridge Un ut Climate d our End sis, Cam mic Pres	y press pss, 2 <sup>nd</sup> I Clima iversity e Chan ergy Fu bridge s, 2006	, 2011. Edition, 2 te Chang v Press In ge", Peng ture", Col University 5.	010. e", Cambi dia Pvt. Lt uin, 2012. umbia Un Press, 20	iversity, 2006.	009	
<ol> <li>Joan Fitzg</li> <li>J. David N</li> <li>Robin Moi</li> <li>Andrew D Edition, 20</li> <li>Dash Susi</li> <li>Reference Bo</li> <li>Bill McKibb</li> <li>Jason Sme</li> <li>Adaptation</li> <li>J.M. Wallact</li> <li>Jan C. van</li> <li>Web Reference</li> <li>https://npte</li> </ol>	leelin, "Cl lveen, "F essler ar 019. hil Kumar <b>Doks</b> en, "The erdon, "Cl and mitig ce and P. Dam, Im <b>es</b> I.ac.in/co	limate chang undamental nd Edward <i>i</i> r, "Climate C Global War imate Chan gation of clin V. Hobbs, " <i>i</i>	ge and climate modelling s of weather and climate A. Parson, "The Scienc Change – An Indian Pers ming Reader: A Century ge: The Science of Glob nate change-Scientific T Atmospheric Science", E imate Change and Clima	g", Cambridge e", Oxford Univ e and Politics spective", Cambridge of writing about al Warming an echnical Analy Elsevier/ Acade	University ersity Pre of Globa pridge Un ut Climate d our End sis, Cam mic Pres	y press pss, 2 <sup>nd</sup> I Clima iversity e Chan ergy Fu bridge s, 2006	, 2011. Edition, 2 te Chang v Press In ge", Peng ture", Col University 5.	010. e", Cambi dia Pvt. Lt uin, 2012. umbia Un Press, 20	iversity, 2006.	009	

N. A. 800

COs		Program Outcomes (POs)													Program Specific Outcomes (PSOs)			
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
1	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1			
2	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1			
3	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1			
4	3	3	2	2	-	3	3	-	ŀ	-	-	2	1	1	1			
5	3	3	2	2	-	3	3	-	-	-	-	2	1	1	1			

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment	Continu	Continuous Assessment Marks (CAM)							
	Attendance	MCQ Test	Presentation / Activity / Assignment						
Marks	10	30	60	100					

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N. A. 800

# **SEMESTER IV**

A. A. Sola

B.Tech. Mechanical Engineering

N. A. 800

Department	Mathe	ematics			Programme : <b>B.Tech.</b>									
Semester	IV				Cours	e Categ	jory: <b>BS</b>	End S	Semester	Exam Typ	e: TE			
Course	110084	ATOOA			Pe	riods/W	eek	Credit	Max	kimum Mai	rks			
Code		ATC04			L	Т	Р	С	CAM	ESE	ТМ			
Course Name		RICAL N	NETHODS ANI	D	3	1	0	4	25	75	100			
	<u> </u>		mon to EEE, E	CE, ICE, B	ME, MECH	H, CIVIL	& MECH	IATRONIC	S)					
Prerequisite	Basic	Mathema	atics							DTM				
	On co	mpletion	of the course	e, the stude	ents will b	e able	to			BT Ma (Highes				
	CO1	Solve Alg	gebraic and Tran	scendental e	equations					ĸ	3			
Course	CO2	Solve Sir	nultaneous Equa	ations by var	rious Numer	ical Tec	hniques.			ĸ	3			
Outcome	CO3	Apply the	Numerical Tech	hniques of in	terpolation	in variou	s Intervals	5.		ĸ	3			
	CO4		K											
	CO5		ĸ											
			solution of Trans gebraic and T	-	-			Value						
UNIT - I	Probl		georaio ana r	lansoenae	intai Equa	cions a		Vulue	Per	iods: 12				
-			endental equatio by Power method		on method -	Method	of False po	osition – Nev	wton Raph	son method	CO1			
UNIT - II	Linea	r Simulta	aneous Equati	ions					Per	iods: 12				
Solutions of Lir methods – Gau			equations and N ss Seidel.	Matrix Inversi	ion – Gauss	Elimina	tion and G	auss - Jord	an method	s – Iterative	CO2			
UNIT - III	Intern										İ			
	-		and Solution o	-					I	iods: 12				
Interpolation b intervals – Inte solving first ord	y Newto egration der Diffe	on's Forwa by Trapez rential Equ	ard and Backwar zoidal and Simps uations.	rd Difference son's rules (\$	e formula fo	or equal	intervals -	• •	s method Inge-Kutta	for unequal method for	1			
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COs	Program Outcomes (POs)													Program Specific Outcomes (PSOs)			
	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	2	2	2	1	-	1	-	-	-	-	-	1	1	1	1		
2	3	3	3	2	-	1	-	-	-	-	-	1	1	1	1		
3	3	3	3	2	-	1	-	-	-	-	-	1	1	1	1		
4	3	3	3	2	1	1	1	-	-	-	1	1	1	1	1		
5	3	3	3	2	1	1	1	-	-	-	1	1	1	1	1		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester Total				
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks			
Marks	5	5	5	5	5	75	100			

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

fr. fr. 800

B.Tech. Mechanical Engineering

Department	Information Technology         Programme : B.Tech.												
Semester	IV		Cours	e Categ	ory: <b>ES</b>		End Se	mester	· Exam Ty	pe: <b>TE</b>			
Course		T000	Per	iods/We	eek	Cre	dit	Maxi	mum Mar	ks			
Code	U23IT	1002	L	Т	Ρ	С	C	AM	ESE	ТМ			
Course Name	PROG	RAMMING IN JAVA	3	0	0	3	3	25	75	100			
		(Common to	o All Bra	nches)									
Prerequisite	Basic I	knowledge of Object-Oriented Program	iming P	rinciples	;								
	On co	mpletion of the course, the students	will be	able to	)				BT Ma (Highes				
	CO1	Articulate the concept of Java fundamenta	als, OOP	s and St	rings				K	2			
Course	CO2	Demonstrate the principles of inheritance, applications	package	es and in	terfaces v	vith rea	Il time		K	2			
Outcome	CO3	Create real time applications using exception handling and thread programming. <b>K3</b>											
	CO4	Build distributed applications using Collec	tions and	d IO strea	ams				K	3			
	CO5	Design and build simple GUI programs us	ing AWT	, Swings	and build	datab	ase appl	ications	K	3			
UNIT- I		luction						1	ods: 09				
		listory – Features – JVM - JRE – JDK –		•				•••					
Primitives), C OOPs with J Objects, Obje	onditiona ava: Intr ct Life-C	Assignment Statements, Input/Output State al and Iterative Control Structures - Arrays roduction to OOPs Concepts - Class – Ot cycle - Garbage Collection-Constructors - tl	ojects – his – stat	Methods	s - Access	s Modi	fiers – C	reating		CO1			
		Built-in Methods – StringBuilder - StringBui	ner						- 1- 00				
UNIT- II		itance, Interfaces and Packages f Inheritance – is-a Relationship, has-a Rela	ationchin	cupor	koword	final	kowword		ods: 09				
		nd Method overriding – Abstract Class	auonsnip	– super	Keyworu	- Illiai	keyworu	– Polyn	iorphism -				
	•	Extend – Implement – Access - Interfaces v	/s Abstra	ct classe	es, Type C	convers	sions (Pri	mitives	to Objects	CO2			
		ng and Auto unboxing											
UNIT - III		Create – Access – Import						<b>D</b> = =!	! 00				
	•	otion Handling and Multithreading	المعادما		4				ods: 09				
User Defined	Exception			-	-				-	CO3			
	-	ead – Life cycle – Defining and Running er-Thread Communication	g – imp	pernenta	tion Type	S – 11	iread Pr	ionties	- Inread				
UNIT - IV		ctions and I/O Streams							ods: 09				
	List: A	rrayList and LinkedList. Set: HashSet a	nd Tree	Set. Ma	p: HashN	lap –	Stack -	Queue	. Lambda				
		s – Byte Streams and Character Streams	-		n and File	outpu	tStream	– FileR	eader and	CO4			
		alization: ObjectInputStream and ObjectOu	ItputStre	am.				1					
UNIT - V		nd JDBC						Perie	ods: 09				
		Controls – Event Handling. onents – Layout Management.								005			
		cture – JDBC Driver Types – Implementatio	n of JDB	C.						CO5			
Lecture Pe				al Perio	ods: -			Tota	I Periods	: 45			
Text Books													
1. Allen B. D	owney a	nd Chris Mayeld, "Think Java - How to Thir	nk Like a	Comput	er Scientis	st", 2 <sup>nd</sup>	Edition,	Green T	ea Press,	2020			
		ava: The Complete Reference", TMH Publi	-				2018.						
		J.Dietel, "Java How to Program", 11 <sup>th</sup> Editio											
-		, Gary Cornell, "Core Java Volume - I Fund	lamental	s", 9 <sup>th</sup> Ec	lition, Prer	ntice H	all, 2013.						
Reference B			f	/			11	::: P		Line:4			
2018.		Karthik, Gajalakshmi, "JAVA Programming				irners"	Univers	illes Pre	ess Private	Limited,			
		ey Deitel, "Java SE 8 for programmers", 3 <sup>rd</sup> ⁄I Dietel, "Java for Programmers", Pearson				1							
		a bioto, vava loi i logianineis, i edisoli	Luuvail	, J LU		••							

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	Academic Curriculum R-2023 98	
4.	Steven Holzner, "Java 2 Black book", Dreamtech Press, 2011.	
We	b References	
1.	https://www.javatpoint.com/java-tutorial	
2.	https://docs.oracle.com/en/java/	
3.	https://www.studytonight.com/java/	
4.	https://onlinecourses.nptel.ac.in/	

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1 PSO2 PS			
1	3	1	1	-	1	-	-	-	-	-	-	2	3	2	1		
2	3	3	3	-	3	-	-	-	-	-	-	2	3	2	1		
3	3	3	3	1	3	-	-	-	-	-	-	2	3	2	1		
4	3	3	3	1	3	-	-	-	-	-	-	2	3	2	1		
5	3	3	3	1	3	-	-	-	-	-	-	2	3	2	1		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

Accessment		Cor	ntinuous Assess	ment Marks (CAM)		End Semester Examination					
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks				
Marks	5	5	5	5	5	75	100				

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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	Mechanical Engineering         Programme : B.Tech.										
Semester	IV		Cours	Course Category: PC End Semester Exam Type:							
Course	1100M	ET406	Pe	riods/W	eek	Credit	Maxi	mum Mar	ks		
Code	UZƏIVI	E1408	L	Т	Р	С	CAM	ESE	ΤМ		
Course Name	HEAT	AND MASS TRANSFER	2	1	-	3	25	75	100		
	<u></u>		MECH								
Prerequisite	Appl	ied Thermodynamics	_								
		mpletion of the course, the stud	lents will be	e able to	D			BT Ma (Highest			
	C01	Understand the mechanisms of heat	transfer unde	r steady	conditions	s in composi	e systems.	K			
_	CO2	Provide knowledge on unsteady stat	e heat transf	er and fi	n	-	-	ĸ	2		
	Course CO3 Learn the fundamental concept and principle in convection heat transfer										
Outcome	tcome CO3 Determine the radiation properties of a black and grey body Radiation										
	CO5	erformance	K:								
UNIT- I	Cond	uction I					Peri	ods: 09			
Introduction (	<u>i</u>	ansfer – significant modes of heat tr	ansfer in pra	ctical ap	plications.	– Law of he	at conduct	ion – heat			
conduction ea	quations-	- Cartesian Coordinates- cylindrical Co all - cylinder and sphere – Heat transf	oordinate- On	e dimens	sional stea	dy state hea			CO,		
UNIT- II	Cond	uction II					Peri	ods: 09			
Conduction - Heisler's char	- Lumpe rts	nal Heat Generation in plane wall,cyli d parameter analysis, Infinite bodies						-	CO		
	Conv	action					Dori	odo: 00			
UNIT - III		ection					I	ods: 09			
Boundary lay Cylinders -Int	er theory	ection – Hydrodynamic and Thermal Bounc w through pipes– Natural convection i					w – Flow ov		CO		
Boundary lay	er theory	<ul> <li>Hydrodynamic and Thermal Bound</li> <li>w through pipes- Natural convection in</li> </ul>					w – Flow ov s.		CO:		
Boundary lay Cylinders -Int <b>UNIT - IV</b> Radiation hea	ver theory ternal flov <b>Radia</b> at transfe	<ul> <li>Hydrodynamic and Thermal Bound</li> <li>w through pipes- Natural convection in</li> </ul>	n vertical and tion – Black b	horizont	al surface cept – Gre	s – Cylinder ey body radia	w – Flow ov s. <b>Peri</b> ation -Emiss	ver Plates, ods: 09			
Boundary lay Cylinders -Int UNIT - IV Radiation hea	ternal flo Radia at transfe	<ul> <li>Hydrodynamic and Thermal Bound</li> <li>through pipes– Natural convection in</li> <li>tion</li> <li>ar –Thermal radiation – Laws of radiat</li> </ul>	n vertical and tion – Black b surfaces – El	horizont ody conc ectrical A	al surface cept – Gre	s – Cylinder ey body radia	w – Flow ov s. Peri ation -Emiss nields.	ver Plates, ods: 09			
Boundary lay Cylinders -Int UNIT - IV Radiation hea – Radiation s UNIT - V	rer theory ternal flor <b>Radia</b> at transfe hape fac <b>Phase</b>	<ul> <li>Hydrodynamic and Thermal Bound w through pipes– Natural convection in tion</li> <li>Thermal radiation – Laws of radiat tor-radiation heat exchange between</li> </ul>	n vertical and tion – Black b surfaces – El at Exchange	horizont ody cond ectrical A ers	al surface cept – Gre vnalogy –	s – Cylinder y body radia Radiation Sl	w – Flow ov s. Ation -Emiss hields. Perio	ver Plates, ods: 09 sive power ods: 09			
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Boundary lay Cylinders -Int <b>UNIT - IV</b> Radiation hea – Radiation s <b>UNIT - V</b> Condensatior Boiling – Ford and Effective	rer theory ternal flo <b>Radia</b> at transfe hape fac <b>Phase</b> n and Bo ced conv ness – N	<ul> <li>Hydrodynamic and Thermal Bound w through pipes– Natural convection in tion</li> <li>Thermal radiation – Laws of radiat tor-radiation heat exchange between</li> <li>Change Heat Transfer and Heat biling – Film wise and drop wise cond ection boiling. Heat Exchangers – Typ TU method.</li> </ul>	n vertical and tion – Black b surfaces – El <b>at Exchange</b> densation – F pes of heat E	horizont ody cond ectrical A ers Film cond xchangel	al surface cept – Gre analogy – densation r – Analys	s – Cylinder ey body radia Radiation Sl on a Vertica	w – Flow ov s. Ation -Emiss hields. Peri al plate – R changer Us	ver Plates, ods: 09 sive power ods: 09 legimes of sing LMTD	CO		
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COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	2	3	2	1	1	1	-	-	-	-	1	1	2	2	3	
2	2	3	2	1	1	1	-	-	-	-	1	1	2	2	3	
3	2	3	2	1	1	1	-	-	-	-	1	1	2	2	3	
4	2	3	2	1	1	1	-	-	-	-	1	1	3	3	3	
5	2	3	2	1	1	1	-	-	-	-	1	1	2	2	2	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

Assessment		Con	ntinuous Assessi	ment Marks (CAM)		End Semester Examination (ESE) Marks				
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance					
Marks	5	5	5	5	5	75 100				

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

A. A. 800

Department	t Mechanical Engineering Programme : B.Tech.								
Semester	IV		Cours	e Categ	ory: PC	End	Semeste	r Exam T	ype: <b>TE</b>
Course	1123M	ET407	Pei	iods/We	eek	Credit	Max	imum Ma	rks
Code	025141		L	Т	Р	С	CAM	ESE	ТМ
Course Name	СОМ	PUTER AIDED DESIGN	3	0	0	3	25	75	100
		Μ	ECH						
Prerequisite	-								
	On co	mpletion of the course, the students	will be	able to	)				apping st Level)
	CO1	Explain the fundamentals of CAD and geo	ometric tr	ansform	ation con	cepts.		k	(2
Course	CO2	Develop various model using geometric a	nd surfa	ce model	lling techr	niques		k	(2
Outcome	CO3	Identify the importance of visual realism a	Igorithm	5				K	(3
	CO4	Identify various factors in computer aided		-		-	-	k	(3
	CO5	Apply various standards and Justify impor of PLM	rtance ar	nd need o	of various	components	s/elements	k	(3
UNIT- I	Funda	amentals					Peri	ods: 09	
Speech contro applications -	ol device Coordin	AM/CAE, Graphics Input devices-cursor cor as and Touch, panels, Product cycle, Sequel ate systems - Two and Three dimensional T and Viewing, Orthographic and perspective	ntial and ransform	Concurr ations -	ent Engin	eering, CAD	- Architect	ure, Tools	° CO1
UNIT- II	Geom	netric and Surface Modelling					Peri	ods: 09	
Concept of Pa Surface Mode	arametrio elling: So ameteriz	2D wire frame modelling, 3D Wire frame in c and non-parametric representation of curv urface modelling and entities, Algebraic an zation of surface patch, Subdividing cylindri urface	ve, Curve nd geom	e fitting te	echniques m, Param	s, Definitions netric space	of cubic sp of Surface	olines. , Blending	CO2
UNIT - III	Visua	I Realism					Peri	ods: 09	L
Tubes, Flat Pa oriented algo algorithm, Ray	anel disp rithms.	ices, Cathode Ray Tube, Random & Rast olay, Hard copy printers and plotters, Coher Hidden Surface removal algorithm, Depth g algorithm, Shading and Coloring, types. C	ence typ 1 buffer	es. Hidd and Wa	en line rei rnock''s a	moval algorit	hm, Priorit	y and Area	CO3
UNIT - IV	Assei	mbly Modeling and Advanced Model	ing Teo	hnique	S		Peri	ods: 09	
of freedom, C drawing.	•	nterference of Positions and orientations, CA ts and Simulation concepts. Introduction to					•		1 1
UNIT - V	Stand	lards in CAD and PLM Fundamentals	5				Peri	ods: 09	
:	oduct Li	ter graphics (GKS) and Data exchange s ife Cycle, Components / Elements of PLM, stry verticals.							
Lecture Pe	riods:	45 Tutorial Periods:	Practic	al Perio	ods: -		Tota	al Period	s: 45
Text Books									
		, S. Subramanyan,V. Raju, "CAD/CAM/CIM		-			2020.		
		AM: Principles and Applications", Tata McG							
		R. Sivasubramaniam, CAD/CAM : Theory a		-	Edition, T	ata McGraw	Hill, 2009		
		Product Lifecycle Management, McGraw-H	ill, 2006.						
Reference E1. Mikell P. 02019		"Automation, Production Systems and Co	mputer I	ntegrate	d Manufa	cturing", Pea	arson Educ	cation, 5th	Edition
	arn and	M.Pauline Baker "Computer Graphics" with	h OpenG	L Prentie	ce Hall, Ir	nternational,	2011		
3. James A.	Rehg, H	lenry W. Kraebber, "Computer Integrated M	lanufactu	iring", Pe	earson Ed	lucation. 200	7		
4. Sareen Ku	Ildeep, C	Grewal Chandandeep, CAD/CAM: Theory a	nd Conc	ept, 2nd	Edition, S	S Chand & C	ompany, 2	007	
5. Chris McN 1992.	lahon, Ji	immie Browne CADCAM: Principles, Practic	ce and M	anufactu	iring Mana	agement, 2nd	d Edition, P	earson pu	blications

fr. fr. Sola



We	eb References
1.	https://nptel.ac.in/courses/112/102/112102101/
2.	http://www.nptelvideos.in/2012/12/computer-aided-design.html
3.	https://mech.iitm.ac.in/meiitm/course/cad-in-manufacturing/
4.	https://freevideolectures.com/course/2362/computer-aided-design-and-manufacturing
5.	https://www.iitk.ac.in/me/me761a
6.	https://www.autodesk.com/certification/learn/course/fusion360-generative-design-intro-expert

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1 PSO2 PSC			
1	3	2	1	-	-	-	-	-	-	-	1	1	3	-	-	
2	3	3	2	-	-	-	-	-	-	-	1	1	3	2	1	
3	3	3	1	3	1	-	-	-	-	-	1	1	3	2	1	
4	3	2	2	2	3	-	-	-	-	-	1	1	3	2	1	
5	3	2	2	-	3	-	-	-	-	1	1	1	3	2	1	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

Accoment		Con	tinuous Assess	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

dr. d. 800

<b>O</b>		nanical En	gineering				B.Tech.	T				
Semester	IV						ory: <b>PC</b>	1	emester E			
Course	U23M	EB402			Pei	riods/W	eek	Credit	T	mum Mar	٢S	
Code					L	Т	Р	С	CAM	ESE	ТМ	
Course Name	KINEI	MATICS C	F MACHIN	ERY	2	0	2	3	50	50	100	
	<b>F</b>				MECH							
Prerequisite	Engine	ering Mech	lanics							BT Mo	oning	
	On con	npletion of	the course,	the students v	will be able	to				BT Ma (Highest		
	CO1	Familiariz	ze the studen	ts to understan	d the basic	concepts	of mecha	inism		K2		
Course	CO2	Understa accelerat		us types of m	notion of lin	k interm	s of displa	acement, v	elocity and	nd K2		
Outcome	CO3	Perform	synthesis of n	nechanism by a	analytical an	d graphi	cal metho	d		K2		
	CO4	Demonst	ration of simp	ole mechanism	s and to perf	form its k	inematic a	ananlysis		K	ŀ	
	CO4       Demonstration of simple mechanisms and to perform its kinematic ananlysis         CO5       Design a layout of cam for specified motion and to develop a simple gear train for kinematic analysis											
UNIT- I	Basic	s of Mech	anisms						Perie	ods: 10		
				ematic chain,							_	
				er chain and fo				ons Mechan	ism with lov	wer pairs -	CO1	
	-		ysis of Med	nd approximate		i project	5.		Dent	1 40		
UNIT- II			-		fairenta ala					ods: 10		
				ion diagrams o ytical method.	or simple plai	har mecr	nanisms d	y grapnicai	(Instantane	ous center	CO	
UNIT- III	Kinen	natic Synt	hesis of Me	echanisms					Peri	ods: 10		
				elative pole me								
-		-	-	ev's spacing of		oints - Fr	eudenstei	n Method o	f three point	t synthesis	CO	
	echanism	n and slider		anism- Coupler		1				- 1- 45		
UNIT- IV 1. Demons	stration o	f mechanis		natics of Ma				t		ods:15		
			m-identificatio	on various type	s links and i	oints-DC		types of Inv	ersion			
				on various type am for simple p	es links and j blanar mecha		n -vanous	types of inv	ersion			
<ol> <li>To draw</li> <li>Four ba</li> </ol>	va velocit Ir mechar	y and acce	leration diagra analysis using	am for simple p ADAMS softw	olanar mecha vare		i -vanous	types of inv	ersion		0	
<ol> <li>To draw</li> <li>Four ba</li> <li>Force a</li> </ol>	va velocit Ir mechar nalysis o	y and acce nism force a f slider med	leration diagra analysis using chanism using	am for simple p ADAMS softw ADAMS softw	olanar mecha vare		n -vanous	types of inv	ersion		со	
<ol> <li>To draw</li> <li>Four ba</li> <li>Force a</li> <li>To stud</li> </ol>	va velocit ir mechar nalysis o y about v	y and acce nism force a f slider meo various type	leration diagra analysis using chanism using s CAM and F	am for simple p ADAMS softw ADAMS softw ollower	olanar mecha vare		n -vanous	types of inv	ersion		CO	
<ol> <li>To draw</li> <li>Four ba</li> <li>Force a</li> <li>To stud</li> </ol>	va velocit ir mechar nalysis o y about v	y and acce nism force a f slider meo various type	leration diagra analysis using chanism using s CAM and F e for Knif edg	am for simple p ADAMS softw ADAMS softw ollower e follower	olanar mecha vare vare	anisms.		types of inv		ods:15	co	
<ol> <li>To draw</li> <li>Four ba</li> <li>Force a</li> <li>To stud</li> <li>Sketch</li> <li>UNIT- V</li> <li>Sketch</li> </ol>	va velocit ir mechar nalysis o y about v the radia the radia	y and acce nism force a f slider med various type I cam profile	leration diagra analysis using chanism using s CAM and F e for Knif edg <b>Kinem</b> e for Flat follo	am for simple p ADAMS softw ADAMS softw ollower e follower <b>atics of Mac</b> wer	olanar mecha vare vare	anisms.		types of inv		ods:15	СО	
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<ol> <li>To draw</li> <li>Four ba</li> <li>Force a</li> <li>To stud</li> <li>Sketch</li> <li>UNIT- V</li> <li>Sketch</li> <li>Sketch</li> <li>Sketch</li> <li>Sketch</li> <li>Sketch</li> </ol>	va velocit r mechai nalysis o y about v the radia the radia the radia the offse	y and acce nism force a f slider med various type I cam profile I cam profile I cam profile t CAM profi	leration diagra analysis using chanism using s CAM and F e for Knif edg <b>Kinem</b> e for Flat follo e for roller foll le for the med	am for simple p ADAMS softw ADAMS softw ollower e follower <b>atics of Mac</b> ower lower chanical applica	olanar mecha vare <b>hinery Pra</b>	anisms.		types of inv		ods:15		
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- 3. https:/ ocw.mit.edu
- 4. https://easyengineering.net/me6401-kinematics-of-machinery/
- 5. https://link.springer.com/book/10.1007/978-94-007-1156-3

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	<b>PO1</b>	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12										PO12	PSO1	PSO2	PSO3		
1	3	2	2	3	1	-	-	-	-	-	3	2	2	2	3		
2	3	2	2	3	1	-	-	-	-	-	-	2	2	2	3		
3	3	2	2	3	1	-	-	-	-	-	-	2	2	2	3		
4	3	3 3 3 3 3 2									2	2	2	3			
5	3	3	3	3	3	-	-	-	3	-	-	2	2	2	3		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

#### Assessment method for theory cum practical courses

			Conti	nuous Ass	sessm	ent Marks (C	AM)			End		
	Continuous ssessment (Theory)					Continuous ssessment (Practical)				Semester Examination (ESE)	End Semester Examination	
Assessment	CAT 1	CAT 2	Model	Attendan ce	Total	Conduction of Practical	Report	Viva	Total	Marks (Practical – Internal Evaluation)	(ESE) Marks (Theory)	Total Marks
Marks	5	5	5	5	20*	15	10	5	30*		75**	-
*To be	weighte	ed for 10	Marks		10		reighted f Marks	1 for 10 10		30	*To be weighted for 50 Marks	100

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Department	Engli	ish		Program	nme: <b>B</b> .	Tech.	••••••				
Semester	IV			Course	Catego	ry Code:	HS *End	d Semeste	r Exam T	ype:LE	
<b>a a i</b>				Perio	ods/Wee	ək	Credit	Max	kimum Ma	arks	
Course Code	U23E	INPC02		L	Т	Р	С	CAM	ESE	ТМ	
Course Name	GENE	RAL PROFICIE	NCY- II	0	0	2	1	50	50	100	
			(Common to AL	L Branches	except	CSBS)					
Prerequisite	Basics	s of English Lang	uage								
	On co	mpletion of the	course, the stud	dents will b	e able t	0				apping st Level)	
	CO1	Infer ideas to a productive skill	ttend internation	al standardiz	zed test	by broad	lening rece	ptive and	K2		
Course	CO2	Interpret the ty	ł	(3							
Outcome	CO3	Acquire meticu	lous exposure in	speaking ar	nd get ri	id of perfe	ormance ai	nxiety		(2	
Catconic	CO4	Articulate the i			(2						
	CO5		(4								
UNIT- I	Caree		Periods:	06							
Listening: Lister Reading: Read	and Re	view -Newspaper	peaking: Demonsti Advertisement, C ary: Synonyms and	Company Har	ndbooks,	•	•	harts, grapl	ns, maps)	-	
UNIT- II	1	orate Skills		, , , , , , , , , , , , , , , , , , ,	,				Periods:	06	
-	es (cloze		roducing in own w Analytical Writing:		-			-			
UNIT- III	Funct	ional Skills							Periods:	06	
-	-	Talks - Speaking: e - Vocabulary: Wo	Brainstorming & Ir	ndividual Pres	entation	- Reading	g: Text Com	pletion (GR	E Based)	- CO3	
UNIT- IV	Trans	ferrable Skills							Periods:	06	
-	-		aking notes - Spea LTS) - Vocabulary:	-		-		-	ng trends	- CO4	
UNIT-V	Verba	I Aptitude - II							Periods:	06	
Verbal Ability E	nhance	ment: Letter Series	nge of Voice, Conc s, Coding &Decodir Substitution, Jumble	ng, Sentence	-	nce (GRE	) Analytical I	Reasoning	and Logica	<sup> </sup> CO5	
Lecture Period	ls: -	Tutoria	al Periods: -	Practic	al Peric	ods:30	Т	otal Perio	ods:30		
training".Ca 2. Prasad, Hau 3. Lougheed, I	uline, Ar mbridge ri Mohan Lin. "Bar	, 2014. , Sinha, Uma Rani ron's Writing for the	nd Vanessa Jaker , "Objective Englisł e TOEFL IBT: With entations", Oxforo	h for Competi Audio CD". E	tive Exar 3arron's ∣	minations' Education	', Tata Mc G al series, 20	raw Hill: No		-	
			Use with answers	•				udents, Car	mbridge: C	UP,2004	
Web Reference											
1. https://www	-	-	nouns-compound.		plotion/l	2m1					
<ol> <li>https://lofoy</li> <li>https://www</li> </ol>	.gramma		-and-clauses-quiz.l lish-euphemisms-f	html	-						

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COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12									PO12	PSO1	PSO2	PSO3				
1	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1		
2	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1		
3	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1		
4	1 1 - 3 - 2									2	1	1	1				
5	1	-	-	-	-	-	-	1	-	3	-	2	1	1	1		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Practical									
Continuous Assessment Internal Evaluation		End Semester Exte	ernal Evaluation	Total Marks					
50 marks		50 ma	rks						
Conduction of Practical (Assignment 1&2 -10 Marks Performance in practical classes - 5 Marks)	15	Listening (L)	20						
Record	5	Speaking(S)	10	1					
Viva	5	Reading(R)	10	100					
Model Practical Examination (Model Exam is conducted for 50 Marks that will be converted to 15 Marks)	15	Writing(W)	10						
Attendance	10								

dr. A. 800

Department	Inforn	nation Technology	Progr	amme :	B.Tech.						
Semester	IV		Cours	e Categ	gory: <b>ES</b>	Enc	Semeste	er Exam	Type: <b>LE</b>		
Course	U23IT	DC02	Pe	riods/W	'eek	Credit	Max	kimum M	arks		
Code	UZJII	r GUZ	L	T	P	С	CAM	ESE	TM		
Course Name	PROG	RAMMING IN JAVA LABORATORY	0	0	2	1	50	50	100		
		(Common to	o All Bra	anches)							
Prerequisite	Basic c	concepts of Object-Oriented Programming F	Principle	S							
	On co	mpletion of the course, the students	s will be	e able to	0				/lapping est Level		
	<b>CO1</b> Apply and practice logical formulations to solve simple problems leading to specific applications.										
Course	CO2 Demonstrate the use of inheritance, interface and package in relevant applications										
Outcome	CO3	1	K3								
	CO4	Build java distributed applications using C	ollectior	is and IC	) streams.				K3		
	CO5	Implement Graphical User Interface base features and Swing in Java.	d applica	ation pro	grams by	utilizing eve	nt handling		К3		
<ol> <li>Devel</li> <li>Create</li> <li>Create</li> <li>Devel</li> <li>Implex</li> <li>Devel</li> <li>Devel</li> <li>Write</li> </ol>	op a java e java ap op a sim ment sim op applic a Java F	rogram to demonstrate inheritance and inte a program that implements the Packages. oplications using Exception Handling for error ple real life application program to illustrate aple applications using Collections. cation using the concept of I/O Streams Program to demonstrate AWT and Swing Co ple application and use JDBC to connect to	or handli the use	of Multi-							
Lecture Peri	ods: -	Tutorial Periods:	Praction	cal Peri	ods: 30		Tot	al Period	ds: 30		
Reference B											
2. Sagayara 2018	j, Denis, rstmann	and Chris Mayeld, "Think Java - How to Thin Karthik, Gajalakshmi, "JAVA Programming and Gary Cornell, "Core Java 2", Vol 2, Ad	for core	and adv	anced lea	arners", Univ	ersities Pro	ess Privat			
1. http://www	v.ibm.co	m/developerworks/java/									
		com/javase/tutorial/rmi/									
		Swings, AWT controls and JDBC.									
4. https://ww		_									
<ol><li>https://ww</li></ol>	/w.geeks	forgeeks.org.									

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1	
2	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1	
3	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1	
4	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1	
5	3	2	1	1	3	-	-	-	-	-	-	-	3	2	1	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

dr. d. 800

B.Tech. Mechanical Engineering

	C	ontinuous /	Assessi	ment Marks (CAM	1)		
Assessment		ce in practio asses	al	Model	Attendence	End Semester Examination	Total Marks
	Conduction of practical	Record work	viva	Practical Examination	Attendance	Attendance (ESE) Marks	
Marks	15	5	5	15	10	50	100

N. A. 800

Department	Mech	anical Engineering	Progra	amme :	B.Tech.				
Semester	IV		Cours	e Categ	ory: <b>PC</b>	Enc	Semeste	r Exam <sup>-</sup>	Гуре: <b>LE</b>
Course	11001		Pe	riods/W	eek	Credit	Max	imum Ma	arks
Code	UZ3IV	IEP404	L	Т	Р	С	CAM	ESE	ТМ
Course Name	CAD/	CAM LABORATORY	0	0	2	1	50	50	100
	<u>.</u>		MECH	<u>.</u>	<u>.</u>		<u>.</u>		i
Prerequisite	Comp	uter Aided Design							
	On co	mpletion of the course, the stude	ents will be	e able to	)			1	lapping st Leve
	CO1	Generate 2-D and 3-D drawings using templates	g parametric	solid sof	tware's as	s per industr	у		K3
Course	CO2	Understand and interpret machine Components	manufacturir	ng drawi	ngs and	assemble v	/arious 3D		K2
Outcome	CO3	Interpret the given drawing as per BIS	S conventions	s and exp	posure in (	CNC machi	ning		K3
	CO4	Understand the CNC control in mode	rn manufactu	uring syst	tem				K2
	CO5	Extend CAM software to generate NC	C code						К3
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> </ol>	ng a com ng a com ng and as ng and as ng and as	s conent (Isomentric View 1) using Extru conent (Isomentric View 2) using Trans sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint	sformation to	ols in a 3	BD CAD Pa	-			
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> </ol>	ng a com ng a com ng and as ng and as ang and as mming ar mming ar mming ar	conent (Isomentric View 1) using Extru conent (Isomentric View 2) using Trans sembly of flange coupling sembly of universal coupling	SFORMATION TO CNC turning CAM softwa CNC machi CAM softwa	ols in a 3 g center. are (Lathe ning cen are (Millin	BD CAD Pa e). ter. ng).	-			
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> </ol>	ng a com ng a com ng and as ng and as ng and as mming ar mming ar mming ar mming ar	conent (Isomentric View 1) using Extru conent (Isomentric View 2) using Trans sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad simulation of given component using ad machining of given component using ad machining of given component using	GONC turning CAM softwa CAM softwa CAM softwa CAM softwa Universal M	ols in a 3 g center. are (Lathe ning cen are (Millin Iilling Ma	BD CAD Pa e). ter. ng).	-	Tota	al Perioc	ls: 30
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> <li>Progra</li> </ol>	ng a comp ng a comp ng and as ng and as mming ar mming ar mming ar mming ar mming ar <b>Periods:</b>	conent (Isomentric View 1) using Extru conent (Isomentric View 2) using Trans sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad simulation of given component using ad machining of given component using ad machining of given component using	GONC turning CAM softwa CAM softwa CAM softwa CAM softwa Universal M	ols in a 3 g center. are (Lathe ning cen are (Millin Iilling Ma	e). ter. ng). chine.	-	Tota	al Perioc	ls: 30
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Progra</li> </ol>	ng a comp ng a comp ng and as ng and as mming ar mming ar mming ar mming ar <b>mming ar</b> <b>Periods:</b> <b>Books</b> nid, CNC	connent (Isomentric View 1) using Extru- bonent (Isomentric View 2) using Trans- sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad machining ad given component using ad machining ad given componen	sformation to CNC turning CAM softwa CNC machi CAM softwa CAM softwa Universal M Practic sive guide to	ols in a 3 g center. are (Latho ning cen are (Millin filling Ma <b>cal Perio</b> practical	e). ter. ng). chine. <b>ods: 30</b> I CNC pro	gramming, I	I		
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Prograt</li> /ol>	ng a comp ng a comp ng and as ng and as ang and as mming ar mming ar mming ar <b>Periods:</b> <b>Books</b> nid, CNC ns, "Prog	connent (Isomentric View 1) using Extru- bonent (Isomentric View 2) using Trans- sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given componen	sformation to CNC turning CAM softwa CNC machi CAM softwa CAM softwa Universal M Practic sive guide to Press Inc., U	ols in a 3 g center. are (Latho ning cen are (Millin filling Ma <b>cal Perio</b> practical	e). ter. ng). chine. <b>ods: 30</b> I CNC pro	gramming, I	I		
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Prograt</li> /ol>	ng a comp ng a comp ng and as ng and as mming ar mming ar mming ar mming ar <b>reriods:</b> <b>Books</b> nid, CNC ns, "Progi	connent (Isomentric View 1) using Extru- bonent (Isomentric View 2) using Trans- sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given component using ad machining ad given componen	Sformation to CNC turning CAM softwa CNC machi CAM softwa Universal M Practic Sive guide to Press Inc., U 2012.	ols in a 3 g center. are (Latho ning cen are (Millin lilling Ma <b>cal Perio</b> practical J.S.; Four	e). ter. ng). chine. ods: 30 I CNC pro rth edition	gramming, I , 2016.	ndustrial pr	ress, 2018	3.
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Prograi</li> <li>Reference I</li> <li>Peter Smithering</li> <li>Ken Evant</li> <li>P. J. Shat</li> <li>R.K. Sing</li> </ol>	ng a comp ng a comp ng and as ng and as mming ar mming ar mming ar mming ar <b>reriods:</b> <b>Books</b> nid, CNC ns, "Progi	conent (Isomentric View 1) using Extru- bonent (Isomentric View 2) using Trans- sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component	Sformation to CNC turning CAM softwa CNC machi CAM softwa Universal M Practic Sive guide to Press Inc., U 2012.	ols in a 3 g center. are (Latho ning cen are (Millin lilling Ma <b>cal Perio</b> practical J.S.; Four	e). ter. ng). chine. ods: 30 I CNC pro rth edition	gramming, I , 2016.	ndustrial pr	ress, 2018	3.
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<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Prograv</li> <li>Reference I</li> <li>Peter Sm</li> <li>R.K. Sing</li> <li>Ltd; New</li> </ol>	ng a comp ng a comp ng and as ng and as mming ar mming ar mming ar mming ar mming ar <b>Periods:</b> <b>Books</b> nid, CNC ns, "Progu a, "Engine gal, Mridu 7 Delhi, 20 shaPraks	bonent (Isomentric View 1) using Extru- bonent (Isomentric View 2) using Trans- sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component using ad machining di given component	sformation to CNC turning CAM softwa CNC machi CAM softwa CAM softwa Universal M Practic sive guide to Press Inc., U 2012. Machining	ols in a 3 g center. are (Lathoning centrate (Milling Ma cal Perio practical J.S.; Four and Mac	e). ter. ng). chine. ods: 30 I CNC pro rth edition. hine Tools	gramming, I , 2016. 5" - I.K. Inter	ndustrial pr	ress, 2018 Jublishing I	3.
<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Prograt</li> /ol>	ng a comp ng a comp ng and as ng and as mming ar mming ar mming ar mming ar mming ar <b>Periods:</b> <b>Books</b> nid, CNC ns, "Progu a, "Engine gal, Mridu v Delhi, 20 shaPraks ences TIA/Creo/	conent (Isomentric View 1) using Extru- bonent (Isomentric View 2) using Trans- sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of CNC Machines", Industrial ramming of CNC Machines", Industrial ering Graphics" S Chand & Company, I Singal, Rishi Singal. "Fundamentals of 08.         h& Dr. G. S. Servesh, "Computer Aidee "Autodesk Inventor/ Solidworks /ANSYS"	sformation to CNC turning CAM softwa CNC machi CAM softwa CAM softwa Universal N Practic sive guide to Press Inc., U 2012. Machining d Design Lat	ols in a 3 g center. are (Lathoning centare (Milling Ma cal Perio J.S.; Four and Mac	e). ter. ng). chine. ods: 30 I CNC pro rth edition. hine Tools	gramming, I , 2016. 5" - I.K. Inter	ndustrial pr	ress, 2018 Jublishing I	3.
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<ol> <li>Modelin</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Detailir</li> <li>Prograt</li> <li>Reference I</li> <li>Reference I</li> <li>Reference I</li> <li>Reference I</li> <li>R.K. Sing Ltd; New</li> <li>M. N. Se</li> <li>Web Refere</li> <li>www.CA</li> <li>https://sit</li> <li>https://sit</li> </ol>	ng a comp ng a comp ng and as ng and as mming ar mming ar mming ar mming ar <b>Periods:</b> <b>Books</b> nid, CNC ns, "Prog a, "Engine gal, Mridu v Delhi, 20 shaPraks <b>ences</b> TIA/Creo/ tes.ualber ww.vlab.c	conent (Isomentric View 1) using Extru- bonent (Isomentric View 2) using Trans- sembly of flange coupling sembly of universal coupling sembly of Knuckle Joint ad machining of given component using ad simulation of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of given component using ad machining of CNC Machines", Industrial ramming of CNC Machines", Industrial ering Graphics" S Chand & Company, I Singal, Rishi Singal. "Fundamentals of 08.         h& Dr. G. S. Servesh, "Computer Aidee "Autodesk Inventor/ Solidworks /ANSYS"	sformation to CNC turning CAM softwa CNC machi CAM softwa CAM softwa Universal M Practic Sive guide to Press Inc., U 2012. Machining d Design Lak S- Software	ols in a 3 g center. are (Lathoning centare (Milling Ma cal Perio J.S.; Four and Mac	e). ter. ng). chine. ods: 30 I CNC pro rth edition. hine Tools	gramming, I , 2016. 5" - I.K. Inter	ndustrial pr	ress, 2018 Jublishing I	3.

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COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
2	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
3	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
4	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
5	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	C	continuous	Assessi	ment Marks (CAN	I)		
Assessment		ce in practio asses	cal	Model	Attendence	End Semester Examination	Total Marks
	Conduction of practical	Record work	viva	Practical Examination	Attendance	(ESE) Marks	
Marks	15	5	5	15	10	50	100

dr. A. 800

Department	Mech	anical Engineering	Progra	amme :	B.Tech.						
Semester	IV		Cours	e Categ	ory: <b>PC</b>	Enc	d Semeste	er Exam	Type: <b>LE</b>		
Course	1122M	EP405	Pe	riods/W	eek	Credit	Max	kimum M	arks		
Code	UZƏIVI	EF403	L	Т	Р	С	CAM	ESE	ТМ		
Course Name	HEAT	TRANSFER LABORATORY	0	0	2	1	50	50	100		
			MECH								
Prerequisite	Applie	d Thermodynamics									
	On co	mpletion of the course, the stude						1	/lapping est Level		
	CO1 Analyse heat transfer parameters by conducting experiments on conduction and Convection experimental set-up.								K4		
Course	CO2	Interpret heat transfer parameters by oup.	conducting ex	kperimen	its on radia	ation experi	mental Set	-	К4		
Outcome	CO3	Evaluate the performance of tubes in		-				1	K4		
	CO4	Analyse the surface emissivity of a compare With theoretical value	i test plate	and Stef	fan¬ Boltz	zmann's co	nstant and	1	К4		
	CO5	Calculate and compare the thermal c	onductivity of	differen	t materials	5			K4		
<ol> <li>Experim</li> <li>Experim</li> <li>Experim</li> <li>Experim</li> </ol>	nent to e nent to e nent on nent on	n a composite wall. evaluate Stefan Boltzmann constan evaluate the emissivity of a specime Parallel flow heat exchanger Counter flow heat exchanger es of pool boiling and determination	ən.	eat flux							
Lecture Pe	eriods:	- Tutorial Periods:	Practio	al Perio	ods: 30		Tot	al Perio	ds: 30		
Reference B							1				
1. C. P. Koth 2022.	nandarar	nan and S. Subramanyan, Heat and M	ass Transfer	Data Bo	ok, Fifth E	dition, New	Age Interr	national P	ublishers,		
		Fundamentals of Heat and Mass Transf	· •			-					
		t Transfer, 9th Edition, McGraw-Hill Pu	-			1.					
		text book on Heat Transfer, Fourth Edi bbia, Heat Transfer XIII Simulation and				e Transfor		2012			
			схрепшен			s mansier,	VIII FIESS	, 2013.			
Web Referer		ac in/									
•		courses/103/103/103103032/									
• •		courses/112/101/112101097/									
		.in/me/heat-transfer-laboratory									
		iitb.ac.in/webpage_data/nptel/Mechani	cal/Heat%20	and%201	Mass%20	Transfer/TC	C htm				

N. A. 800

COs	Program Outcomes (POs)									ram Spe omes (P					
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	1	-	-	-	-	1	-	-	1	2	2	2
2	2	2	2	1	-	-	-	-	1	-	-	1	2	2	2
3	2	2	2	1	-	-	-	-	1	-	-	1	2	2	2
4	2	2	2	2	-	-	-	-	1	-	-	1	2	2	2
5	2	2	2	1	-	-	-	-	1	-	-	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	C	ontinuous /	1)				
Assessment		ce in practio asses	cal	Model		End Semester Examination	Total Marks
	Conduction of practical	Record work	viva	Practical Examination	Attendance	(ESE) Marks	
Marks	15	5	5	15	10	50	100

dr. dr. 8000

Mechanical Engineering	Programme : <b>B.Tech.</b>						
IV	Cours	Course Category: AEC End Semester Exam Ty					
	Pe	riods/W	eek	Cred	lit Max	imum Ma	arks
U23MEC4XX	L	Т	Р	С	CAM	ESE	ТМ
<b>CERTIFICATION COURSE - IV</b>	0	0	4	-	100	-	100
	MECH						
	IV U23MEC4XX	IV Cours U23MEC4XX CERTIFICATION COURSE - IV 0	IV     Course Category       U23MEC4XX     Periods/W       CERTIFICATION COURSE - IV     0	IV     Course Category: AE       U23MEC4XX     Periods/Week       L     T       CERTIFICATION COURSE - IV     0     0	IV         Course Category: AEC         I           U23MEC4XX         Periods/Week         Cred           L         T         P         C           CERTIFICATION COURSE - IV         0         0         4         -	IVCourse Category: AECEnd SemesterU23MEC4XXPeriods/WeekCreditMaximularLTPCCAMCERTIFICATION COURSE - IV004-100	IV     Course Category: AEC     End Semester Exam       U23MEC4XX     Periods/Week     Credit     Maximum Ma       L     T     P     CAM     ESE       CERTIFICATION COURSE - IV     0     0     4     -     100     -

Students shall choose an International / Reputed organization certification course of 40-50 hours duration specified in the curriculum (It is mandatory to do a minimum of six courses) which will be offered through the Centre of Excellence. These courses have no credit and will not be considered for CGPA calculation.

- (i) Certification Courses are required to be completed to fulfil the degree requirements. All Certification courses are assessed internally for 100 marks.
- (ii) The Course coordinator handling the course will assess the student through attendance and MCQ test, and declare the student as "pass" on satisfactory completion. A letter grade "P" is awarded to declare pass.
- (iii) The marks scored in these courses will not be taken into consideration for the SGPA / CGPA calculations in the grade sheet.

#### **Evaluation Methods**

Assessment	Continuous Ass	Continuous Assessment Marks (CAM)				
Assessment	Report	MCQ Test	Total Marks			
Marks	10	90	100			

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Department	Mechanical	Prog	Programme: <b>B.Tech.</b>							
Semester	IV	Cou	Course Category: AEC End Semester Exam Type:							
<u> </u>	1000050004	Р	eriods/	Week	Credit	Maxii	Maximum Marks			
Course Code	023MES301	L	Т	Р	С	CAM	ESE	ТМ		
Course Name	SKILL DEVELOPMENT COURSE II	0	0	2	-	100	-	100		
	(Choose anyone of the below three courses)									

## 1. Four Wheeler Troubleshooting

The main goal of this programme is to in cultivate students with the broad knowledge on the Workshop situation and as well as to afford the opportunities to know about the basics of the four wheeler servicing workshop and its environment to make qualified and skilled man power for the two wheeler service sector. And also to create an opportunity for the students to have a practical knowledge and to increase their employability. The course has the detailed explanation on the classification of four wheelers, working principles, its components functions such as clutches, shock absorber, chassis, braking systems, battery maintenance etc. To make the students familiarize with the procedure of troubleshooting of four wheelers with both theoretical and practical approach.

#### 2. Demonstration Wood Routing

This course is aimed for mechanical engineering students to provide a Wood Routing operation. It is the process of hollowing out an area in a material (like composites, polymers, and soft metal) to cut various shapes in the material. A router is the power tool that is used in the process. With the birth of computer technology came CNC routers. CNC is short for Computer Numerical Control. The common CNC machine problems, such as improper tool setting, irregular maintenance and poor programming were focused and its remedial measures were provided to the students

#### 3. Demonstration Laser Cutting

This course covers Laser cutting is a versatile and precise method of cutting various materials using a focused laser beam. Here's an overview of laser cutting, Laser cutting is a slitting process with which it is possible to cut metallic and non-metallic raw materials of different material thicknesses. This is based around a laser beam which is guided, formed, and bundled. When it hits the work piece, the material heats up to the extent that it melts or vaporizes. To make the students familiarize with the procedure of demonstration laser cutting with both theoretical and practical approach.

Lecture Periods:30	Tutorial Periods: -	Practical Periods:	Total Periods: 30
Web References			

#### 1. https://www.liveoutdoors.com/motorsports/166897-atv-troubleshooting-most-common-issues/

- 2. https://www.cyclepedia.com/four-stroke-motorcycle-troubleshooting-guide/
- 3. https://www.typhoontoys.dk/pdf/Adly%2050\_service%20manual.pdf
- 4. https://downloads.intelitek.com/Manuals/CNC/Discontinued%20Machines/Stepper\_Router\_WIN\_Manual.pdf
- 5. https://www.youtube.com/watch?v=xLxCEBb-74s
- 6. https://www.youtube.com/watch?v=Zf22Fil1z14
- 7. https://www.daniels.utoronto.ca/sites/default/files/daniels\_digital\_fabrication\_laser\_cutter\_manual.pdf

Assessment	Continu	ious Assessment	Marks (CAM)	Total Marks
Assessment	Attendance	Report	Presentation/Demo/ Skill Test	
Marks	10	40	50	100

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Department	Mecha	nical Programme: B.Tech.							
Semester	IV		Cou	rse Cat	tegory: I	MC	End Seme	ster Exa	m Type:•
<b>.</b>			F	eriods/	Week	Credit	Maxim	um Marl	٢S
Course Code	U23M	EM404	L	Т	Р	С	CAM	ESE	ТМ
Course Name		T TO INFORMATION AND GOOD	2	0	0	-	100	-	100
		(Common to ALL E	Branches	excep	t CSBS)				
Prerequisite	-								
	On con	npletion of the course, the students	s will be	able to	)				lapping st Level)
	CO1	Describe and analyze concept and							K2
	CO2	Develop critical thinking skills to ide failed to meet their obligations	-		•				K3
Course	CO3	Critically assess the challenges a Information Commissions				-			K2
Outcomes	CO4	Analyze the structure and function regional, national.	<u> </u>	-	-				K2
	CO5	Analyze the impact of the RTI Act o citizen empowerment in India	on promo	ing trai	nsparen	cy, account	tability, and		K2
UNIT- I		<b>luction</b> d – Right to know – Open Government -						Period	
UNIT- II Obligations of 7 -Exemption	Oblig public au from dis	<ul> <li>Right to Information Act, 2005- Scope an</li> <li>ation of Public Authorities</li> <li>thorities: Section 4 - Designation of Public</li> <li>sclosure of information: Section 8 - Group</li> </ul>	Informatio	on Office					
-		) - Third party information: Section 11						T	
UNIT-III	<u>i</u>	al and State Information Commission and State Information Commissions - Te		fico ond	1 oonditie	no of convio	o Pomovo	Perioc	
		ner or Information Commissioner - Powe							CO3
UNIT- IV		iary and Right to Information Act						Period	
Protection of r right to inform	-	ccess the information- Role of the Suprem	ie Court a	nd High	Courts -	<ul> <li>Recent atte</li> </ul>	empts of dilut	on of the	CO4
UNIT- V	Right	to Information Act, 2005 and its rel	evance f	o othe	r laws			Period	ls:06
Public Record	s Act, 19	93 - Whistle Blowers Protection Act, 2014	- Officia	Secret	s Act, 19	23			CO5
Lecture Perio	ods:30	Tutorial Periods: -	Pra	ctical F	Periods:		Total Perio	ds:30	
2. R. M. Pal,	, Somen (	nika Negi," Right to Information: Key to Go Chakraborty "Human Rights Education in It to Information and Good Governance - \	India" Indi	an Socia	al Institut	e, 2000			University
Reference B									
2. Sairam Bl	hat, Right	Right to Information and Good Governance to Information, Eastern Book House, 201 sumer Protection and Right to Informatior	2. [ISBN-9	9788380	021553]	-		52]	
Web Referen			i, Cential	monna					

Web References

1. https://archive.nptel.ac.in/courses/129/106/129106001/

2. https://onlinecourses.nptel.ac.in/noc20\_lw01/preview

3. https://www.classcentral.com/course/swayam-right-to-information-and-good-governance-19988

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COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-	
2	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-	
3	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-	
4	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-	
5	1	-	-	-	-	-	-	-	-	3	-	1	-	-	-	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment	Continu	/larks (CAM)	Total Marks	
	Attendance	MCQ Test	Presentation / Activity / Assignment	
Marks	10	30	60	100

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Department	MBA		Progra	amme :	B.Tech.				
Semester	V		Course	e Categ	ory: <b>HS</b>	End	Semester	Exam Ty	pe: <b>TE</b>
Course	U23H	STC02	Per	iods/W	eek	Credit	Maxi	num Marl	٢S
Code	02311	51002	L	Т	Р	С	CAM	ESE	ТМ
Course Name	RESE	ARCH METHODOLOGY	2	0	0	2	25	75	100
	1	(Commo	on to All bran	ches)					
Prerequisite	-								-
	On cor	npletion of the course, the stud	dents will be	e able t	0			BT Maj	
		Interpret the different types of I	research and	i ovolai	n how rea	search met	hode can	(Highest	
	C01	be used to address engineering			11 110 10 10			K	2
	CO2	Discuss the research problems utilize tools and services for eff				erature rev	ews, and	ĸ	2
Course Outcome	CO3	Apply appropriate methods to results using both numerical an	d graphical t	echniq	ues.		-	K	3
	CO4	Analyze and apply ethical guide dissertations, ensuring academ	ic integrity a	nd avoi	ding plag	iarism.	•	K	4
	CO5	Examine the fundamentals of i them, with emphasis on their ro engineering.						K	3
UNIT - I	Introc	luction to Research					Perio	ods: 6	
Overview of the	e Resea	ce of Research, Types of Research rch Process, Defining a Research I production to Research Design: Basic	Problem: Key	Consid	erations, S	Setting Rese	earch Objec	tives and	C01
UNIT - II	T	em Formulation and Literature		-prodoin			Ĩ	ods: 6	<u>.</u>
Identifying and	Formula	ting Research Problems, conducting ues. Sources of Information: Overvie	g a Literature			-	i.		CO2
UNIT - III	Resea	arch Methods and Data Analysi	S				Perio	ods: 6	<u>.</u>
		ental Research, Developing Hypoth Analysis: Numerical and Graphical						pling and	CO3
UNIT - IV	Writin	g and Presenting Research					Perio	ods: 6	
		Report: Key Sections (Abstract, n: Brief Overview.	Introduction,	Method	lology, Re	esults, Disc	ussion, Co	nclusion).	CO4
UNIT - V	Ethic	s and Intellectual Property in R	Research				Perio	ods: 6	
		n Research: Introduction to Scientific and Trademarks – Case studies on e				ual Property	Rights - In	troduction	CO5
Lecture Peric	ods:30	Tutorial Periods: -	Practica	l Perio	ds: -		Tota	l Periods:	: 30
Text Books							i		
		n Methodology: A Step-by-Step Guid	-		dition, SAC	GE Publication	ons, 2019.		
,	•	ch methods, Rawat Publications, 2 <sup>nd</sup>	-					eth E IV	<u> </u>
3. Creswell, J. Publication		Creswell, J. D. Research Design: Qu	Jalitative, Qua	ntitative	, and Mixed	a Methods A	pproacnes,	5" Edition,	SAGE
Reference Bo									
verelence po	lesearch	methods for engineers. Cambridge:	Cambridge U	niversity	Press; 20	14.			
1. Thiel DV. R	D	ch methodology for engineers. Cher							
<ol> <li>Thiel DV. R</li> <li>Ganesan R</li> </ol>			oav. New Delh	i: Comm	nonwealth	Publishers;	2012.		
<ol> <li>Thiel DV. R</li> <li>Ganesan R</li> <li>Agarwal C,</li> </ol>	Sharma	V. Research methodology in sociolo				~			
<ol> <li>Thiel DV. R</li> <li>Ganesan R</li> <li>Agarwal C,</li> <li>Thody A. W</li> </ol>	Sharma /riting ar	d presenting research. 2 <sup>nd</sup> edition, L	ondon: SAGE	Publica			mational	ublicherer	0000
<ol> <li>Thiel DV. R</li> <li>Ganesan R</li> <li>Agarwal C,</li> <li>Thody A. W</li> <li>Kothari CR</li> </ol>	Sharma /riting ar . Resear		ondon: SAGE	Publica			ernational P	ublishers; 2	2023.
<ol> <li>Thiel DV. R</li> <li>Ganesan R</li> <li>Agarwal C,</li> <li>Thody A. M</li> <li>Kothari CR</li> <li>Web Reference</li> </ol>	Sharma /riting ar . Resear <b>:es</b>	d presenting research. 2 <sup>nd</sup> edition, L ch methodology – methods and tech	ondon: SAGE	Publica			rnational P	ublishers; 2	2023.
<ol> <li>Thiel DV. R</li> <li>Ganesan R</li> <li>Agarwal C,</li> <li>Thody A. W</li> <li>Kothari CR</li> <li>Web Reference</li> <li>https://conjection</li> </ol>	Sharma /riting ar . Resear <b>ces</b> ointly.co	d presenting research. 2 <sup>nd</sup> edition, L ch methodology – methods and tech m/kb/	ondon: SAGE iniques. 5 <sup>th</sup> ed	Publica ition, Ne	ew Delhi: N	lew Age Inte		ublishers; 2	2023.
<ol> <li>Thiel DV. R</li> <li>Ganesan R</li> <li>Agarwal C,</li> <li>Thody A. W</li> <li>Kothari CR</li> <li>Web Reference</li> <li>https://conje</li> <li>https://owl.p</li> </ol>	Sharma /riting ar . Resear <b>ces</b> ointly.co	d presenting research. 2 <sup>nd</sup> edition, L ch methodology – methods and tech	ondon: SAGE iniques. 5 <sup>th</sup> ed	Publica ition, Ne	ew Delhi: N	lew Age Inte		ublishers; 2	2023.
<ol> <li>Thiel DV. R</li> <li>Ganesan R</li> <li>Agarwal C,</li> <li>Thody A. M</li> <li>Kothari CR</li> <li>Web Reference</li> <li>https://conji</li> <li>https://owl.j</li> <li>https://files.</li> </ol>	Sharma /riting ar . Resear <b>ces</b> ointly.co ourdue.e .eric.ed.g	d presenting research. 2 <sup>nd</sup> edition, L ch methodology – methods and tech m/kb/ du/owl/research_and_citation/condu	ondon: SAGE iniques. 5 <sup>th</sup> ed	Publica ition, Ne	ew Delhi: N	lew Age Inte		ublishers; 2	2023.

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	Academic Curriculum R-2023	
6.	https://www.scholastic.com /7-steps-to-successful-research-report.html	
7.	https://www.futurelearn.com/info/courses/business-research-methods- investigation.	
8.	https://articles.manupatra.com/article-details/Patent-Types-Laws-related-to-them-in-India	

COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)			
	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2	PSO3	
1	3	3	2	2	2	-	2	-	-	2	2	3	2	2	3	
2	3	1	1	3	1	-	2	-	-	1	2	-	2	3	3	
3	1	3	3	1	3	-	2	-	-	2	2	-	2	2	3	
4	-	-	1	2	-	-	2	3	2	2	-	2	2	3	3	
5	2	2	2	2	2	2	3	3	2	2	3	2	3	3	3	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

### **Evaluation Methods**

		Conti	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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Department	Com	outer Science and Engineering	Progra	amme :	B.Tech.				
Semester	V		Cours	e Categ	ory: <b>ES</b>	End S	emeste	er Exam Type	e: TE
Course	11230	STC03	Pe	riods/W	eek	Credit	M	laximum Mar	ks
Code	0230		L	Т	Р	С	CAM	ESE	ТМ
Course Name	DAT	STRUCTURES	3	0	0	3	25	75	100
		(Common to All Branc	hes exc	ept CSB	S and F	Г)	<u>.</u>		
Prerequisite	Basic	Programming Knowledge							
	On co	mpletion of the course, the student	ts will b	e able t	o			BT Ma (Highes	
	CO1	Compute time and space complexity for	given pr	oblems				K	2
Course	CO2	Demonstrate stack, queue and its opera	ation.					к	2
Outcome	CO3	Illustrate the various operations of linked	d list.					ĸ	3
	CO4	Use the concepts of tree for various app	olications					K	3
	CO5	Outline the various Tables, Graphs and	Sets tec	hniques.				K	3
UNIT - I	Basic	Terminologies of Data Structures						Periods: 9	
Introduction: B	asic Ter	minologies – Asymptotic Notations: Com	plexity a	nalysis. A	Array and	its operatior	ns - Sea	rching: Linear	
Search and B	inary Se	arch Techniques. Sorting: Bubble Sort -		-	-			-	CO1
Performance a	ind Com	parison among the sorting methods.							001
UNIT - II	Stack	and Queue Operations						Periods: 9	
		DT Stack and its operations. Applications of Queue: Simple Queue – Circular Q		-			valuatio	n. ADT Queue	CO2
UNIT - III	l inke	d List Operations						Periods: 9	<u>.</u>
		ed list: Representation in memory. Algorit	hms of si	everal on	erations.	Fraversing -	Search		
		esentation of Stack and Queue. Doubly li				-		-	CO3
UNIT - IV	Trees							Periods: 9	
		ninologies. Different types of Trees: Binary Tree- Red Black Tree.	y Tree – <sup>-</sup>	Threaded	d Binary T	ree – Binary	Search	Tree – Binary	CO4
UNIT - V	Graph	s, Tables and Sets						Periods: 9	
•		ogies and Representations – Graph traver plications. Sets: Representation of Sets-	•			••	of tables	– Hash Table	CO5
Lecture Peric	ods: 45	Tutorial Periods:	Practica	al Perio	ds: -			Total Perio	ds: 45
Text Books							<u>l</u>		
1. Ellis Horowi	tz, Sarta	j Sahni," Fundamentals of Data Structure	s", Illustr	ated Edit	tion, Comp	outer Scienc	e Press	, 2018.	
2. Thomas H. 2010.		n, Charles E. Leiserson, Ronald L. Rivest				-		, PHI, Third Ed	ition,
3 Alfrod 1/ AL		y D. Ullman, John E. Hopcroft, "Data Stru	actures a	nu Aigor	uiiiis , 4"'		າອ.		
	<u>nke</u>								
Reference Bo		sic Data Structures" Prentice-Hall of Indi	a Secon	d Edition	2012				
Reference Bo 1. D. Saman	ta, "Clas	sic Data Structures", Prentice-Hall of India . Tondo and Bruce Leung, "Data Structu				c" Prentice	-Hall of	India, Second	Edition
Reference Bo1.D. Samani2.Robert Kru2007.	ta, "Clas use, C.L		res and I	Program	Design in				Edition
<ul> <li>Reference Bo</li> <li>1. D. Saman</li> <li>2. Robert Kru 2007.</li> <li>3. Mark Aller</li> <li>4. Mark Aller Wesley P</li> </ul>	ta, "Clas use, C.L n Weiss, en Wei ublishing	. Tondo and Bruce Leung, "Data Structur "Data Structures and Algorithm Analysis ss," Algorithms, Data Structures ar J Company, 1995.	res and l in C", Pe nd Prob	Program arson Ed Iem So	Design in lucation, S lving wit	Second. Edit h C++", I	ion, 200 Ilustrate	6. ed Edition, /	Addison
Reference Bo1.D. Samani2.Robert Kru2007.3.3.Mark Aller4.Mark AllerWesley Pi5.Mark Aller	ta, "Clas use, C.L i Weiss, en Wei ublishing i Weiss,'	. Tondo and Bruce Leung, "Data Structu "Data Structures and Algorithm Analysis ss," Algorithms, Data Structures ar	res and l in C", Pe nd Prob	Program arson Ed Iem So	Design in lucation, S lving wit	Second. Edit h C++", I	ion, 200 Ilustrate	6. ed Edition, /	Addison
<ol> <li>Reference Bo</li> <li>D. Samani</li> <li>Robert Kru 2007.</li> <li>Mark Aller</li> <li>Mark Aller Wesley P</li> <li>Mark Aller Edition, 19</li> </ol>	ta, "Clas use, C.L i Weiss, en Wei ublishing i Weiss,' 995.	. Tondo and Bruce Leung, "Data Structur "Data Structures and Algorithm Analysis ss," Algorithms, Data Structures ar J Company, 1995.	res and l in C", Pe nd Prob	Program arson Ed Iem So	Design in lucation, S lving wit	Second. Edit h C++", I	ion, 200 Ilustrate	6. ed Edition, /	Addison
Reference Bo1.D. Samani2.Robert Kru 2007.3.Mark Aller4.Mark AllerWesley PS.5.Mark Aller Edition, 19Web Reference	ta, "Clas use, C.L weiss, weiss, ublishing weiss, 995. <b>:es</b>	. Tondo and Bruce Leung, "Data Structur "Data Structures and Algorithm Analysis ss," Algorithms, Data Structures ar J Company, 1995. Algorithms, Data Structures and Problen	res and l in C", Pe nd Prob	Program arson Ed Iem So	Design in lucation, S lving wit	Second. Edit h C++", I	ion, 200 Ilustrate	6. ed Edition, /	Addison
Reference Bo1.D. Saman2.Robert Kru 2007.3.Mark Aller4.Mark Aller4.Mark Aller5.Mark Aller Edition, 19Web Reference1.1.https://ww	ta, "Clas use, C.L weiss, on Wei ublishing weiss, wes w.geeks	. Tondo and Bruce Leung, "Data Structur "Data Structures and Algorithm Analysis ss," Algorithms, Data Structures ar J Company, 1995. Algorithms, Data Structures and Problen	res and l in C", Pe nd Prob	Program arson Ed Iem So	Design in lucation, S lving wit	Second. Edit h C++", I	ion, 200 Ilustrate	6. ed Edition, /	Addison
Reference Bo1.D. Samani2.Robert Kru2007.3.3.Mark Aller4.Mark Aller5.Mark AllerEdition, 19Web Reference1.https://www2.https://www	ta, "Clas use, C.L u Weiss, en Wei ublishins, Weiss," 95. <b>:es</b> w.geeks w.javatp	. Tondo and Bruce Leung, "Data Structur "Data Structures and Algorithm Analysis ss," Algorithms, Data Structures ar J Company, 1995. Algorithms, Data Structures and Problen	res and l in C", Pe nd Prob	Program arson Ed Iem So	Design in lucation, S lving wit	Second. Edit h C++", I	ion, 200 Ilustrate	6. ed Edition, /	Addison
Reference Bo1.D. Samani2.Robert Kru 2007.3.Mark Aller4.Mark Aller4.Mark Aller5.Mark AllerEdition, 19Web Reference1.https://ww2.https://ww3.https://ww	ta, "Clas use, C.L Weiss, wen Wei ublishing Weiss," 95. <b>:es</b> w.geeks w.javatp w.studyt	Tondo and Bruce Leung, "Data Structur "Data Structures and Algorithm Analysis ss," Algorithms, Data Structures an Company, 1995. Algorithms, Data Structures and Problen forgeeks.org/data-structures/ pint.com/data-structure-tutorial/	res and l in C", Pe nd Prob	Program arson Ed Iem So	Design in lucation, S lving wit	Second. Edit h C++", I	ion, 200 Ilustrate	6. ed Edition, /	Addison

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COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3		
2	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3		
3	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3		
4	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3		
5	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	essment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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Semester	wech	anical E	Ingineering		Progr	amme :	B.Tech.				
201100101	V				Cours	e Categ	ory: <b>PC</b>	End S	emester	Exam Type	: TE
Course	1100M				Pe	riods/We	eek	Credit	Ma	ximum Marl	٢S
Code	UZSIVI	IET508			L	Т	Р	С	CAM	ESE	ТМ
Course Name	DYNA	MICS C	OF MACHINE	۲Y	2	1	0	3	25	75	100
					MECH		£				
Prerequisite	Engin	eering N	Nechanics								
	On co	mpletio	on of the cour	se, the stude	ents will b	e able t	0			BT Ma (Highest	
	CO1		ut static and dyr ne flywheel para		-		-	-	gine and	to Ka	8
Course	CO2	Comput	te the frequency	of free vibration	on in single	degree o	of freedom	systems		K4	ŀ
Outcome	CO3	Comput	te the frequency	of forced vibra	ation in dar	nped and	undampe	ed systems		K4	ŀ
	CO4		te the speed, lift nd airplanes.	of the governo	or, and estir	nate the g	gyroscopic	effect on a	utomobile	s, <b>K</b> 4	ŀ
	CO5	Calculat	te the balancing	) masses and t	their locatio	ns of reci	procating	and rotating	) masses.	K	8
UNIT - I	Dynai	mic For	ce Analysis						F	Periods: 9	
Dynamic force a – Inertia effect o	-			-			-	-	reciproca	ting engines	CO1
UNIT - II	Vibra	tion – S	ingle Degree	of Freedom	Systems				F	Periods: 9	.1
Introduction to v of freedom syst and Transmissi	tems – \						-				CO2
UNIT - III	Trans	verse a	nd Torsional	Vibration Sy	ystems				F	Periods: 9	.1
Transverse vibr Single rotor, two					-		– Whirling	g of shafts.	Torsional	vibrations –	CO3
UNIT - IV	Mech	anism f	or Control						F	Periods: 9	000
Governors – Ty – Effect of friction ships and airpla	/pes – C on. Gyro	Centrifuga	al governors – G	•		•		•••			CO4
UNIT - V	Balan	cing									
	mic bala								F	Periods: 9	
Static and dyna inline and radia	l engine	-	Balancing of rota al balancing in e	-	- Balancing	a single c	sylinder en	gine – Balaı			CO5
	-	es – Partia	-	engines	-	a single c al Perioc	-	gine – Balaı	ncing of M		
inline and radial Lecture Perio Text Books	ods: 30	es – Partia	al balancing in e Tutorial Peri	engines iods: 15	Practic	al Perio	ds: -	gine – Balaı	ncing of M	ulti cylinder-	
inline and radia Lecture Perio Text Books 1. S.S.Rattan,	ods: 30 Theory	es – Partia	al balancing in e <b>Tutorial Peri</b> ines,3 <sup>rd</sup> edition,	engines iods: 15 Tata McGraw-	Practica Hill Educat	al Perio	<b>ds: -</b> 2019	-	ncing of M	ulti cylinder-	
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Hr. H. Sola

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	3	3	2	1	-	-	-	-	-	-	-	-	2	2	-		
2	3	3	2	1	1	-	-	-	-	-	-	-	2	2	-		
3	3	3	2	1	1	-	-	-	-	-	-	-	2	2	-		
4	3	2	2	1	1	-	-	-	-	-	-	-	2	2	-		
5	3	2	3	1	1	-	-	-	-	-	-	-	2	2	-		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

dr. d. 800

Department	Mech	anical l	Engineering	Progr	amme :	B.Tech.				
Semester	V			Cours	e Categ	ory: <b>PC</b>	End S	emester E	xam Type	e: TE
Course	1123M	ET509		Pe	riods/W	eek	Credit	Maxi	mum Mar	ks
Code	UZJIV	E1309		L	Т	Р	С	CAM	ESE	ТМ
Course Name	DESI	GN OF	MACHINE ELEMENTS	2	1	0	3	25	75	100
				MECH	.å	.i		i		
Prerequisite	Engin	eering I	Mechanics, Strength of M	laterials						
•	On co	mpletic	on of the course, the stu	udents will I	be able t	to			BT Ma (Highes	••••
	CO1		strate recalling and applyir e elements	ng basics to	understar	nd design	procedures	of various	····••••••••••••••••••••••••••••••••••	
	CO2	Compu	te the dimensions of the spr	rings for spec	fic applic	ations			К	4
Course Outcome	CO3		ehend power screws and w ngth when different loads.	elded joints a	nd able t	o apply its	s knowledge	to analyze		
Catoonio	CO4	Examir	e and solve design problem	ns involving di	fferent co	ouplings ar	nd keys		ĸ	4
	CO5		te the dimensions and stre load conditions and writ	•			•			4
UNIT - I	Introc	<b>.</b>	to Machine Design					De	riods: 9	
			Standards – form and shape	dooign omb	dimont d	logian and	dooign for r	L		
loads -Stresse	es – Stat	tic, varyiı	ng, thermal, impact and resident of the second second second second second second second second second second s	dual. Factors	of safety	– Theorie	s of failure -	- Stress cor	centration	
UNIT - II	Desig	n of Sp	orings					Pe	eriods: 9	
Stresses and	deflectio	ons of he	elical springs-extension con	mpression sp	inas - sc	orina for s	tatic and fa	tique loadir	na- natural	
frequency of h	elical sp	rings-en	ergy storage capacity-helica	al torsion sprir		-		-		CO2
UNIT - III			owerscrews and Welde						eriods: 9	
• .			gn of bolts with pre-stresses ads-circular fillet welds-benc	•••		eccentric	loading - bo	lts of unifor	m strength	CO3
UNIT - IV	Desig	n of Ke	eys and Couplings					Pe	eriods: 9	<u>1</u>
Design of Keys coupling.	s - Stres	sses in k	eys. Rigid couplings – Muff	f, Split muff, a	nd Flang	je coupling	gs. Flexible	couplings -	- Pin-Bush	CO4
UNIT - V	Desig	in of Sh	afts, Knuckle Joints an	nd Simple P	rograms	5		Pe	riods: 9	
			afts for strength and rigidity	-	-		loads- Des	L		
•			ogramming language to des	•				•		CO5
Lecture Peric	ods: 30		Tutorial Periods:15	Practic	al Perio	ds: -		Тс	otal Perio	ds: 45
Text Books										
			R., "Mechanical Engineerin			, McGraw	-Hill, 2022.			
		•	achine Elements", McGraw-	-						
•		chard G.	Budynas and J. Keith Nisbe	ett "Mechanica	al Engine	ering Desi	gn",10th Ed	ition, Tata M	/ICGraw-HI	II, 2019
Reference Bo		< Cunto	, "A Text Book of Machine I	Dogian" S Ch	and Dubli	ootiona 2	010			
		-	The Elements of Machine De	-				7		
			M. Marshek, "Fundamentals	•					7	
			ponent Design", 2nd Jaico F		•		,			
			rry E. Shoup, and Lee Emrev	•		of Machin	e Elements"	8 <sup>th</sup> Edition.	Printice Ha	all, 200
Web Reference	•	-, - 3	, <u>, , , , , , , , , , , , , , , , , , </u>					,		,
1. https://nptel		ourses/1	12105124/5							
			arn/machine-design1							
3. https://www	.course	ra.org/co	ourses?query=machine%20c	design						
0. mapo.// www										
-	mit.edu/	courses/	2-72-elements-of-mechanic	al-design-spr	ng-2009/	1				

H. H. Sola

COs		Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	01 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO										PO12	PSO1	PSO2	PSO3	
1	3	2	2	2	-	-	-	-	-	-	-	1	-	-	-	
2	3	3	3	3	-	-	-	-	-	-	-	1	2	-	-	
3	3	3 3 3 3 1									1	2	-	-		
4	3	3 3 3 3										1	2	-	-	
5	3	3     3     3     -     -     -     -     1											2	-	1	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

### **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

dr. d. 800

Department	V Course Category: ES End Semester Exam Type:									
Semester	V		Cours	e Categ	ory: <b>ES</b>	Enc	Semeste	er Exam	Type: LE	
Course			Pe	riods/W	eek	Credit	Max	kimum M	arks	
Code	U23C	SPC02	L	Т	Р	С	CAM	ESE	ТМ	
Course Name	DAT	A STRUCTURES LABORATORY	0	0	2	1	50	50	100	
	••••	(Common to all Brar	nches Exc	ept CSE	BS and F	T)				
Prerequisite	Basic	Programming Knowledge							lapping	
	On completion of the course, the students will be able toCO1Analyse the algorithm's / program's efficiency in terms of time and space complexity.									
Course										
Outcome										
	CO3         Solve the problems of searching and sorting techniques.           CO4         Solve problems in linear Data Structures.								K4	
	CO5									
List of Exp	eriment	S								
<ul> <li>6. Write</li> <li>7. Write</li> <li>a)</li> <li>b)</li> <li>c)</li> <li>8. Write</li> <li>a)</li> <li>9. Write</li> <li>10. Write</li> <li>11. Write</li> </ul>	a C prog a C prog Insert a Delete a Search a C prog Preorde a C prog a C prog	ram to implement the following using a s ram to implement the dequeue (double e ram to perform the following operations: n element into a binary search tree. an element from a binary search tree for a key element in a binary search tree ram that use recursive functions to travel er b) Inorder c) Postorder. ram to perform the AVL tree operations. ram to implement Graph Traversal Techr ram to implement the Set operations. b) Intersection c) Difference.	ended queu rse the give	ie) ADT i	using a do	-		array.		
Lecture Pe	riods: -	Tutorial Periods: -	Practio	al Peri	ods: 30		Tota	I Periods	s: 30	
Reference	Books									
1. Yashav	ant Kane	tkar, "Data Structures through C", BPB F	Publications	, 3rd Edi	ition, 2019	•				
		n M, "Data Structures using C', Pearson I								
-		nya M and Srinivas Subramiam, "C Prog	-			", Cengage	India 1st E	dition, 20	17.	
		"Data structures using C", Oxford Univer	-							
•		Structures and Algorithms", McGraw-Hill I	ndia, 1st E	aition, 20	J13.					
Web Refere										
-		alspoint.com/data_structures_algorithms/ hools.in/data-structures-tutorial/intro/								
		/courses/106103069/								
	-									
		ov.in/nd1_noc20_cs70/preview /courses/106103069								

dr. dr. 8000

COs		Program Outcomes (POs) D1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO												ram Spe omes (P	
	PO1													PSO2	PSO3
1	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
2	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
3	3	2	1	1	-	-	-	-	-	-	-	-	3	2	3
4	3	3 2 1 1											3	2	3
5	3	2	1	1	-	-	-	3	2	3					

Correlation Level: 1 - Low, 2 - Medium, 3 - High

		Continuous	Assessme	ent Marks (CAM)		End	
Assessment	Performance i	in practical	classes	Model		Semester	Total
Assessment	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15 5		5	15	10	50	100

dr. dr. 8000

Department	LI23MEP506 Periods/Week Credit										
Semester	V         Course Category: PC         End Semester           U23MEP506         Periods/Week         Credit         Max									Гуре: <b>LE</b>	
Course				Pe	riods/W	eek	Credit	Max	kimum Ma	arks	
Code	U23N	IEP506	CAM	ESE	ТМ						
Course Name	Periods/Week       Credit       M         U23MEP506       L       T       P       C       CAN         ANALYSIS AND SIMULATION LABORATORY       0       0       2       1       50         MECH       MECH       MECH       Colspan="3">Colspan="3"Colspan="3">Colspan="3"Colspan="3									100	
				MECH							
Prerequisite	Streng	th of Mate	rials, CAD								
	On co	mpletion	of the course, the st	udents will be	e able to	D			BT Mapping (Highest Leve		
	CO1	Calculate	the deflection and stres	s occurring on tl	ne mecha	anical com	nponents.			К3	
Course	CO2	Perform st	ructural analysis on 2D	ts					K2		
Outcome	CO3					nd 3D ele	ments using	g Ansys		K3	
Outcome	CO4									K2	
	CO5				onents.					K3	
List of Evo		i									
<ol> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Structu</li> <li>Structu</li> </ol>	analysis analysis analysis ral Analy analysis	of cantilevel of fixed bea of a truss of an axi-sy sis of a 3D of a plate w	r beam m mmetric component Cantilever Beam and Va ith a circular hole	lidating the res	ults with	1D and 2[	D options in	ANSYS			
<ol> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Structu</li> <li>Stress</li> <li>Stress</li> <li>Therma</li> <li>Conduct</li> <li>Convect</li> <li>Program</li> <li>Program</li> <li>Program</li> <li>Simulat</li> </ol>	analysis analysis ral Analy analysis al stress a ctive heat ctive heat mming ar mming ar mming ar tion of Sp	of cantilevel of fixed bea of a truss of an axi-sy sis of a 3D of a plate w analysis of a transfer an transfer an d simulatio nd simulatio nd machinin oring-mass s	r beam m mmetric component Cantilever Beam and Va th a circular hole a 2D component alysis of a 2D compone alysis of a 2D compone n of given component u g of given component u system using MAT LAB	nt nt sing CAM softw sing CAM softw sing Universal N	are (Lath are (Milli	ie). ng).	D options in	ANSYS			
<ol> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Structu</li> <li>Stress</li> <li>Stress</li> <li>Therma</li> <li>Conduct</li> <li>Convect</li> <li>Program</li> <li>Program</li> <li>Program</li> <li>Simulat</li> </ol>	analysis analysis analysis ral Analy analysis al stress a ctive heat ctive heat mming ar mming ar mming ar tion of Sp tion of ca	of cantilevel of fixed bea of a truss of an axi-sy sis of a 3D of a plate w analysis of a transfer an transfer an d simulatio nd simulatio nd machinin oring-mass s m and follow	r beam m mctric component Cantilever Beam and Va ith a circular hole a 2D component alysis of a 2D compone alysis of a 2D compone n of given component u n of given component u g of given component u	nt nt sing CAM softw sing CAM softw sing Universal M ATLAB	are (Lath are (Milli	e). ng). achine.	D options in		I Periods	:: 30	
<ol> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Stress</li> <li>Structu</li> <li>Stress</li> <li>Therma</li> <li>Conduct</li> <li>Convect</li> <li>Program</li> <li>Program</li> <li>Program</li> <li>Simulat</li> <li>Simulat</li> <li>Lecture Per</li> </ol>	analysis analysis ral Analy analysis al stress a ctive heat mming ar mming ar mming ar tion of Sp tion of ca	of cantilevel of fixed bea of a truss of an axi-sy sis of a 3D of a plate w analysis of a transfer an transfer an d simulatio nd simulatio nd machinin oring-mass s m and follow	beam m m Cantilever Beam and Va ith a circular hole a 2D component alysis of a 2D compone alysis of a 2D compone n of given component u n of given component u g of given component u system using MAT LAB wer mechanism using M	nt nt sing CAM softw sing CAM softw sing Universal M ATLAB	are (Lath are (Millin Milling Ma	e). ng). achine.	D options in		I Periods	:: 30	
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dr. dr. 8000

COs					Prog	ram O	utcom	es (PO	s)				Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO12	PSO1	PSO2	PSO3							
1	3	I         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         Po11           2         2         1         1         - </th <th>2</th> <th>1</th>												2	1
2	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
3	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
4	3	3 2 2 1 1											2	2	1
5	3	2	2	1	-	1	2	2	1						

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	0	Continuous	Assessme	ent Marks (CAM)		End	
Assessment	Performance i	n practical	classes	Model		Semester	Total
Assessment	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

dr. A. 800

Department	Mech	Mechanical Engineering       Programme : B.Tech.         V       Course Category: PC       End Semester Exam Type: LE         Periods/Week       Credit       Maximum Marks										
Semester	V				Cours	e Categ	ory: PC	En	d Semeste	r Exam	Гуре: <b>LE</b>	
Course					Pe	riods/W	eek	Credit	Max	imum M	arks	
Code	U23N	L       T       P       C       CAM         DYNAMICS OF MACHINERY ABORATORY       0       0       2       1       50         MECH       MECH       MECH       Source       Sou										
Course Name				,	0	0		1		ESE 50	100	
				Ν	/FCH	<u>i</u>	.1		İ		l	
Prerequisite	Basio	: Knowled	dae of Science	•								
				, the student	s will be	able to	D				lapping est Level)	
	principles									2	K3	
0	CO2 Perform different modes of balancing and cam analysis										K3	
	Course CO3 Identify and analysis different modes of vibration										K4	
Outcome	CO3       Identify and analysis different modes of vibration         CO4       Analyse and understand the critical speed of shafts and whirling phenomena with and with rotors.									t	K4	
											K4	
List of Expe	eriment	S										
<ol> <li>Resona a) T</li> <li>Determining</li> <li>Static and</li> <li>Whirling</li> <li>Gyroscome</li> </ol>	nce freq o plot ar nation o nd Dyna o of shaft ppic coup bearing	uency of ed nplitude Vs f character mic balanc s/ determir ble verificat – pressure	nation of critical	mass system – h for different c 'att, Porter, Pro speed with and	undampe lamping ell and sp without R	ed and da ring load totors	amped co	ondition				
Lecture Per		119313	Tutorial Peri	ods: -	Practic	al Perio	ods: 30		Total	Periods	s: 30	
Reference E					1				1			
1. R.L. Nort	on, Desi	ign of Mac ation, 2019	hinery: An Intro 9.	duction to the	Synthesis	s and Ar	nalysis of	Mechanism	ns and Mac	hines, 6t	h edition,	
			nes,3 <sup>rd</sup> edition, 7	Tata McGraw-H	lill Educat	ion India	, 2019					
3. Sadhu Sii	ngh, The	ory of Mac	hines: Kinematio	cs and Dynamic	cs, 3 <sup>rd</sup> Edit	ion, Publ	lisher: Pe	arson Educ	ation India,	2014		
4. Thomas E	Bevan, T	heory of M	achines: An Intro	oductory Text,	3rd editior	n, CBS P	Publishers	& Distributo	ors, 2012.			
-	-		Jr., Theory of Ma						-			
6. J.S. Rao	and R.V.	Dukkipati,	Mechanism and	d Machine Theo	ory, 2nd e	dition, Ne	ew Age Ir	nternational	Publishers,	2007		
	tel.ac.in/ /w.cours	courses/11 era.org/bro	2/105/11210526									

dr. dr. 8000

COs					Prog	ram O	utcom	es (PO	s)				Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO12	PSO1	PSO2	PSO3							
1	3	11         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO           2         2         -         -         -         -         3         -         -         -												2	3
2	3	2	3	-	-	-	-	-	3	-	-	-	3	2	3
3	3	2	3	-	-	-	-	-	3	-	-	-	3	2	3
4	3	3 2 3 3 3											3	2	3
5	3	2	3	3	-	1	3	2	3						

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	0	Continuous	Assessme	ent Marks (CAM)		End	
Assessment	Performance i	in practical	classes	Model		Semester	Total
Assessment	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

dr. dr. 8000

Academic Curriculum R-2023

Department	Mecha	anical Engineering	Prog	ramme:	B. Tec	h.							
Semester	V		Cour	se Cate	egory Co	ode: PA	*End Se	emeste	r Exam Type: -				
Course	1100M	EW501	Pe	riods / \		Maximum Mark							
Code	UZSIVI	20001	L	Т	Р	С	CAM	ESE	ТМ				
Course Name	MICRO	D PROJECT	0	0	2	1	100	0	100				
Prerequisite	Mecha	nical Engineering											
	On co	On completion of the course, the students will be able to BT Mapping (Highest Level)											
Course	CO1	Identify the problem stateme survey	nt for the mic	cro proje	ect work	through	the litera	ture	K2				
Outcomes	CO2	Choose the proper compone	nts as per the	e require	ements	of the des	sign/ syst	em.	K2				
	CO3	Apply the acquainted skills to	o develop fina	ıl model	/system				K3				

There shall be a Micro Project, which the student shall pursue as a team consists of maximum 4 students during the third year, fifth semester. The aim of the micro project is that the student has to understand the real time hardware / software applications. The student should gain a thorough knowledge in the problem he/she has selected and in the hardware / software he/she using in the Project. The Micro-project is an application that should be formally initiated and should be developed and also to be implemented by the respective team.

The Micro Project shall be submitted in a report form along with the hardware model / software developed, duly approved by the department internal evaluation committee. It shall be evaluated for 100 marks as Continuous Assessment. The department internal evaluation committee shall consist of faculty coordinator, supervisor of the project and a senior faculty member of the department. There shall be two reviews that will be considered for assessing a Micro Project work with weightage as indicated evaluation Methods.

	Lecture Periods: - Tutorial P		
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### **COs/POs/PSOs Mapping**

COs					Prog	jram O	utcome	es (POs	5)				Program Specific Outcomes (PSOs)		
	P01	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	3	3	-	-	-	3	2	2	2	2	2	3
2	3	2	3	3	3	-	-	-	3	2	2	2	2	2	3
3	3	2	3	3	3	-	-	-	3	2	2	2	3	3	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

### **Evaluation Methods**

		Review 1			Review 2			
Assessment	Novelty	Presentation	Viva	Presentation	Demonstration	Viva	Report	Total Marks
Marks	10	20	10	20	20	10	10	100

fr. fr. 800

Department	Mechanical Engineering	Programme : <b>B.Tech.</b>										
Semester	ν	Cours	e Categ	ory: AEC	: En	d Semeste	er Exam	Туре: <b>-</b>				
Course		Pe	Periods/Week			Max	Maximum Ma					
Code	U23MEC5XX	L	Т	Р	С	CAM	ESE	ТМ				
Course Name	<b>CERTIFICATION COURSE – V</b>	0	0	4	0	100	0	100				

Students shall choose an International / Reputed organization certification course of 40-50 hours duration specified in the curriculum (It is mandatory to do a minimum of six courses) which will be offered through the Centre of Excellence. These courses have no credit and will not be considered for CGPA calculation.

- (i) Certification Courses are required to be completed to fulfil the degree requirements. All Certification courses are assessed internally for 100 marks.
- (ii) The Course coordinator handling the course will assess the student through attendance and MCQ test, and declare the student as "pass" on satisfactory completion. A letter grade "P" is awarded to declare pass.
- (iii) The marks scored in these courses will not be taken into consideration for the SGPA / CGPA calculations in the grade sheet.

#### **Evaluation Methods**

Assessment	Continuous Ass	essment Marks (CAM)	Total Marks
Assessment	Attendance	MCQ Test	
Marks	10	90	100

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Engineering	Progra	amme :	B.Tech.				
	Cours	e Categ	ory: AEC	End S	Semester	Exam Type	<b>: -</b>
	Pe	riods/W	eek	Credit	Ma	ximum Mar	ks
	L	Т	Р	С	CAM	ESE	ТМ
F INDIAN TRADITIONAL	2	0	0	0	100	0	100
(Common t	o ALL Bra	nches)					
on of the course, the stude	ents will b	e able t	to			BT Ma (Highes	••••
arize with the philosophy of Ind	ian culture					(Flighes K	
guish the Indian languages and	literature					K	
ibe the philosophy of ancient, m	nedieval an	d moderi	n India			ĸ	
ate the information about the fin	e arts in Ind	dia				ĸ	
ibe the contribution of scientists	of differen	t eras				ĸ	
To Culture					F	Periods:06	
d heritage, general characterist al India, Modern India	tics of cultu	re, impo	rtance of	culture in hu	uman liter	ature, Indian	CO1
uages, Culture and Literati	ure				1	Periods:06	
re - I: the role of Sanskrit, signifi south India Indian Languages a I Philosophy cient India, Religion and Philoso	and Literatu	ure-II: No	orthern Inc	lian languag	ies & litera	ature Periods:06	CO2
ly)			,				CO3
India (Art, Technology and	-				I	Periods:06	
afts, Music, divisions of Indian c I and modern), Science and Te							
ystem in India					I	Periods:06	
l and modern India, aims of edu of Medieval India, Scientists of N		•	nguages,	Science and	d Scientis	ts of Ancient	CO5
Tutorial Periods:	Pi	ractical	Periods	: -	-	Fotal Perio	ds: 30
erpretation: The India Tradition"	•		-				
skrita Bharti Publisher, ISBN 13 Arts, Music, Dance and Theatr				)			
ancient India", Arya Book Depo		1-7450 4	94-7, 200	)			
Indian Philosophy", Motilal Bar		ublisher	s, ISBN 1	3: 978 - 812	0810990.	2014	
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09/104/109104102/							
01/104/101104065/							
09/108/109108158/							
09/106/109106059/							
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COs	Program Outcomes (POs)										Program Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	-	-	-	-	-	-	-	3	-	1	1	2	2
2	3	2	-	-	-	-	-	-	-	3	-	1	1	2	2
3	3	2	-	-	-	-	-	-	-	3	-	1	1	3	3
4	3	2	-	-	-	-	-	-	-	3	-	1	1	3	3
5	3	2	-	-	-	-	-	-	-	3	-	1	1	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

Assessment	Cor	ntinuous Assessment	t Marks (CAM)	Total Marks
Assessment	Attendance	MCQ Test	Presentation / Activity / Assignment	
Marks	10	30	60	100

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A. A. Sola

N. A. 800

	Mech	anical E	Engineering	Progra	amme :	B.Tech.				
Semester	VI			Cours	e Categ	ory: <b>PC</b>	Enc	I Semeste	r Exam Ty	pe: TE
Course	1123M	IET610		Pe	riods/We	eek	Credit	Maxi	mum Marl	s
Code	UZJIV			L	Т	Р	С	CAM	ESE	ТМ
Course Name	METF	ROLOG	Y AND MEASUREMENT	3	0	0	3	25	75	100
				MECH						
Prerequisite	Basic	Physics								
1	On cor	mpletio	n of the course, the stude	nts will be	e able to	D			BT Maj (Highest	
	CO1	Explain	the measurement concepts th	at are used	with diff	erent meti	rological dev	vices.	K2	2
Course	CO2	Outline applica	the principles of linear and tions.	d angular	measure	ement too	ls used fo	r industrial	K2	2
Outcome	CO3	Describ	e the steps involved in carrying	g out comp	uter-aide	d inspecti	on.		K2	
	CO4	Demon	strate the techniques of form m	neasureme	nt used fo	or industri	al compone	nts.	K	}
	CO5		arious measuring techniques c						K4	
UNIT - I	Basic	L	etrology		•				ods: 9	
and Accuracy-	Limits,	Fits and	ed – Elements – Work piece, Ir Tolerances - concepts of interc of Measurements - Types.							C01
UNIT - II	Linea	r and A	ngular Measurements					Peri	ods: 9	•
- Comparators	- types	s – Angu	– Evolution – Types – Classifica lar measuring instruments – Ty scope – Autocollimator – Appli	ypes – Bev			-			CO2
UNIT - III	Adva	nces in	Metrology					Peri	ods: 9	
<ul> <li>Straightness</li> </ul>	– Align	ment. Ba	ages of lasers – laser Interferom asic concept of CMM – Types c concepts of Machine Vision S	of CMM -	Constru	ctional fea	atures – Pro			CO3
UNIT - IV	Form	Measu	rement					Peri	ods: 9	<b>.</b>
•			ightness – Flatness measurem asurement – Applications.	ent – Threa	ad meas	urement, g	gear measu	rement, sur	face finish	CO4
										:
UNIT - V	Meas	uremen	t of Power, Flow and Tem	perature				Peri	ods: 9	
Force, torque, p	power - t tube	mechani – Tempe	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm	Electrical ty	-			urimeter, Or	ificemeter,	CO5
Force, torque, protameter, pito	power - t tube eadabil	mechani – Tempe	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm	Electrical ty	electrical	resistanc		urimeter, Or eter – Reli	ificemeter,	
Force, torque, p rotameter, pito Calibration – R Lecture Perio	power - t tube eadabil	mechani – Tempe	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm eliability.	Electrical ty ocouples,	electrical	resistanc		urimeter, Or eter – Reli	ificemeter, ability and	
Force, torque, p rotameter, pito Calibration – R Lecture Perio Text Books 1. R.K.Rajput,	oower - t tube eadabil <b>ds:45</b> "Measu	mechani – Tempe ity and R ity and R	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm teliability. <b>Tutorial Periods:</b> & Metrology", S.K. Kataria and	Electrical ty ocouples, o <b>Practica</b> Sons Pub	al <b>Perio</b> lishers, 2	resistanc ds: - 2023.		urimeter, Or eter – Reli	ificemeter, ability and	
Force, torque, p rotameter, pito Calibration – R Lecture Perio Text Books 1. R.K.Rajput, 2. Samir Mekio	oower - t tube eadabil <b>ds:45</b> "Measu	mechani – Tempe ity and R urements ology an	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm teliability. <b>Tutorial Periods:</b> & Metrology", S.K. Kataria and d Instrumentation", Wiley Publi	Electrical ty ocouples, o Practica Sons Pub shers, 25 <sup>th</sup>	al <b>Perio</b> lishers, 2 Edition 2	resistanc ds: - 2023. 022.	e thermom	urimeter, Or eter – Reli <b>Tota</b>	ificemeter, ability and	
Force, torque, p rotameter, pito Calibration – R Lecture Perio Text Books 1. R.K.Rajput, 2. Samir Mekio 3. J.P.Hadiya,	power - t tube eadabil <b>ds:45</b> "Measu d, "Metri H.G.Ka	mechani – Tempe ity and R urements ology an	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm teliability. <b>Tutorial Periods:</b> & Metrology", S.K. Kataria and	Electrical ty ocouples, o Practica Sons Pub shers, 25 <sup>th</sup>	al <b>Perio</b> lishers, 2 Edition 2	resistanc ds: - 2023. 022.	e thermom	urimeter, Or eter – Reli <b>Tota</b>	ificemeter, ability and	
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Force, torque, p rotameter, pito Calibration – R Lecture Perio Text Books 1. R.K.Rajput, 2. Samir Mekio 3. J.P.Hadiya, Reference Book 1. I.C Gupta, "A	power - t tube eadabil <b>ds:45</b> "Measu d, "Metru H.G.Ka <b>cs</b> A Textb	mechani – Tempe ity and R urements ology and taria," M	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm teliability. <b>Tutorial Periods:</b> & Metrology", S.K. Kataria and d Instrumentation", Wiley Publi	Electrical ty ocouples, o <b>Practica</b> d Sons Pub shers, 25 <sup>th</sup> Metrology",	al <b>Perio</b> lishers, 2 Edition 2 Books Ir t Rai Pul	resistanc ds: - 2023. 022. ndia Public plications,	cations, 201	urimeter, Or eter – Reli <b>Tota</b>	ificemeter, ability and	
Force, torque, p rotameter, pito Calibration – R Lecture Perio Text Books 1. R.K.Rajput, 2. Samir Mekio 3. J.P.Hadiya, Reference Book 1. I.C Gupta, "/ 2. A.Bewoor a	power - t tube eadabil <b>ds:45</b> "Measu d, "Metro H.G.Ka <b>(s</b> A Textb nd Vina	mechani – Tempe ity and R urements ology and taria," M pook of E y Kulkari	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm teliability. <b>Tutorial Periods:</b> & Metrology", S.K. Kataria and d Instrumentation", Wiley Publi- echanical Measurements and I ngineering Metrology" Paperba	Electrical ty ocouples, o Practica d Sons Pub shers, 25 <sup>th</sup> Metrology", nck Dhanpa	al <b>Perio</b> lishers, 2 Edition 2 Books Ir t Rai Pul Hill Educa	resistanc ds: - 2023. 022. India Public plications, ation, 201	cations, 201 2019. 7.	arimeter, Or eter – Reli <b>Tota</b> 8	ificemeter, ability and	
Force, torque, p rotameter, pito Calibration – R Lecture Perio Text Books 1. R.K.Rajput, 2. Samir Mekic 3. J.P.Hadiya, Reference Book 1. I.C Gupta, " 2. A.Bewoor au 3. Krishnamurt 4. Backwith, M	power - t tube eadabil <b>ds:45</b> "Measu d, "Metru H.G.Ka <b>(s</b> A Textb nd Vina thy Rag larango	mechani – Tempe ity and R urements ology and taria," M book of E y Kulkari havendra ni, Lienh	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm teliability. <b>Tutorial Periods:</b> & Metrology", S.K. Kataria and d Instrumentation", Wiley Public echanical Measurements and I ngineering Metrology" Paperba ni, "Metrology & Measurement" a, "Engineering Metrology and ard, "Mechanical Measurement"	Electrical ty ocouples, o <b>Practica</b> d Sons Pub shers, 25 <sup>th</sup> Metrology", ack Dhanpa ' McGraw H Measuremo ts", Pearso	al Period lishers, 2 Edition 2 Books Ir t Rai Put Hill Educa ents" Oxf n Educat	resistance ds: - 2023. 022. ndia Public plications, ation, 201 ford Unive ion, 2013.	cations, 201 2019. 7. rsity Press,	arimeter, Or eter – Reli <b>Tota</b> 8	ificemeter, ability and	
Force, torque, p rotameter, pito Calibration – R Lecture Perio Text Books 1. R.K.Rajput, 2. Samir Mekic 3. J.P.Hadiya, Reference Book 1. I.C Gupta, ", 2. A.Bewoor an 3. Krishnamurt 4. Backwith, M 5. Rega Rajen	power - t tube eadabil <b>ds:45</b> "Measu d, "Metro H.G.Ka <b>(s</b> A Textb nd Vina thy Rag larango dira,"Pr	mechani – Tempe ity and R urements ology and taria," M book of E y Kulkari havendra ni, Lienh	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm teliability. <b>Tutorial Periods:</b> & Metrology", S.K. Kataria and d Instrumentation", Wiley Public echanical Measurements and I ngineering Metrology" Paperba ni, "Metrology & Measurement" a, "Engineering Metrology and	Electrical ty ocouples, o <b>Practica</b> d Sons Pub shers, 25 <sup>th</sup> Metrology", ack Dhanpa ' McGraw H Measuremo ts", Pearso	al Period lishers, 2 Edition 2 Books Ir t Rai Put Hill Educa ents" Oxf n Educat	resistance ds: - 2023. 022. ndia Public plications, ation, 201 ford Unive ion, 2013.	cations, 201 2019. 7. rsity Press,	arimeter, Or eter – Reli <b>Tota</b> 8	ificemeter, ability and	
Force, torque, p rotameter, pito Calibration – R Lecture Perio Text Books 1. R.K.Rajput, 2. Samir Mekic 3. J.P.Hadiya, Reference Book 1. I.C Gupta, "/ 2. A.Bewoor an 3. Krishnamurt 4. Backwith, M 5. Rega Rajen	power - t tube eadabil <b>ds:45</b> "Measu d, "Metro H.G.Ka <b>s</b> A Textb nd Vina thy Rag larango dira,"Pr <b>s</b>	mechani – Tempe ity and R urements ology and taria," M pook of E y Kulkari havendra ni, Lienh inciples o	ical, Pneumatic, Hydraulic and erature: bimetallic strip, therm teliability. <b>Tutorial Periods:</b> & Metrology", S.K. Kataria and d Instrumentation", Wiley Publi- echanical Measurements and I ngineering Metrology" Paperba- ni, "Metrology & Measurement" a, "Engineering Metrology and ard, "Mechanical Measurement of Engineering Metrology", Jaic	Electrical ty ocouples, o <b>Practica</b> d Sons Pub shers, 25 <sup>th</sup> Metrology", ack Dhanpa ' McGraw H Measuremo ts", Pearso	al Period lishers, 2 Edition 2 Books Ir t Rai Put Hill Educa ents" Oxf n Educat	resistance ds: - 2023. 022. ndia Public plications, ation, 201 ford Unive ion, 2013.	cations, 201 2019. 7. rsity Press,	arimeter, Or eter – Reli <b>Tota</b> 8	ificemeter, ability and	
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#### 4. https://ndl.iitkgp.ac.in/homestudy/engineering

5. https://www.nist.gov/dimensional-metrology

#### COs/POs/PSOs Mapping

COs					Prog	gram O	utcome	es (POs	)				Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	2	-	1	-	-	-	-	1	-	1	2	1	2
2	3	1	1	-	1	-	-	-	-	1	-	1	2	1	2
3	3	1	1	-	1	-	-	-	-	1	-	1	2	1	2
4	3	1	1	-	1	-	-	-	-	1	-	1	2	1	2
5	3	1	1	-	1	-	-	-	-	1	-	1	2	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Conti	inuous Asse	ssment Marks (CA	M)	End Semester	Total	
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100	

fr. fr. 300

Department	1	anical Er	ngineering				B.Tech.						
Semester	VI						ory: PC		End Semester Exam Ty				
Course	U23M	ET611			Pe	riods/W	eek	Credit	Max	imum Ma	arks		
Code					L	T	Р	С	CAM	ESE	TM		
Course Name	THER		GINEERING		2	1	0	3	25	75	100		
	·				MECH								
Prerequisite	Applie	d thermo	dynamics										
	On coi	npletion	of the cours	se, the stude	ents will b	e able t	ο				apping st Level		
	On completion of the course, the students will be able to         CO1       Recognize the components and compute the performance of internal combustion engines												
Course	CO2	Illustrate efficiency	the working of	f Brayton and	steam powe	er cycles	in T-S dia	agram and f	ormulate it	\$	<b>₹2</b> <b>₹2</b>		
Outcome	CO3		the problems i	nvolving stean	n nozzles ar	nd steam	turbines				<b>≺</b> 3		
	CO4	Compare	the working a	ind performance	ce of recipro	ocating a	nd rotary	compressor	S		<b>&lt;</b> 3		
	CO5	Estimate	the capacity o	of refrigeration	and air con	ditioning	system	-			<u>.</u>		
UNIT - I	IC En	<u>.</u>	assification	<u> </u>					Per	iods: 9			
Classification of - port and valve its types – lubr	e timing	diagram -	fuel supply sys	•			•	•••	-	•			
UNIT - II	Gas a	nd Stear	n Power Cyc	cles					Per	iods: 9	<b>i</b>		
Gas power cyc power cycles-f							-			ncy, Stear	n <b>CO</b> 2		
UNIT - III	Stean	n Nozzle	s and Turbin							iods: 9			
••••				ies					Per	iuus. <i>3</i>			
Types and sh	apes of	nozzles			zles effect (	of friction	n – Nozzl	e efficiency			n		
Types and sha between area, compounding,	velocity	and press	Flow of steam sure in nozzle f	through nozz low. Critical pr	essure ratio	o – Types	s of turbin	-	- General	relationshi	S,		
between area, compounding,	velocity and vel	and press	Flow of steam sure in nozzle f ams for simple	through nozz low. Critical pr	essure ratio	o – Types	s of turbin	-	- General Ind reaction	relationshi	S,		
between area,	velocity and vel Air Co Recipro r and int	and press ocity diagr ompress ocating Air ter cooling	Flow of steam sure in nozzle f ams for simple <b>or</b> Compressor - (Descriptive ti	through nozz low. Critical pr turbines, spe working princi reatment only)	ed regulatio	o – Types ons – gov compre	s of turbing vernors. ssion with	e -Impulse a	- General and reaction Per	relationshi n principles iods: 9 . Multistag	<sup>6,</sup> CO3		
between area, compounding, <b>UNIT - IV</b> Classification - air compressor compressor (D	velocity and vel Air Co Recipro r and int Description	and press ocity diagr ompress ocating Air ter cooling we treatme	Flow of steam sure in nozzle f ams for simple <b>or</b> Compressor - (Descriptive ti	through nozz low. Critical pr turbines, spe working princi reatment only) v Compressors	ed regulatio	o – Types ons – gov compre	s of turbing vernors. ssion with	e -Impulse a	- General nd reaction Per clearance pressor an	relationshi n principles iods: 9 . Multistag	<sup>6,</sup> CO3		
between area, compounding, UNIT - IV Classification - air compresso	Air Co Air Co Recipro r and int Description Refrig of refrig b coolin	and press ocity diagr ompress ocating Air cer cooling ve treatme geration ar geration ar g-: - Vapo	Flow of steam sure in nozzle f ams for simple or Compressor - (Descriptive to ent only), Screv and Air-Con and air condition	a through nozz flow. Critical pr e turbines, spe working princi reatment only) v Compressors <b>ditioning</b> hing –Types of	essure ratio ed regulatio iple, work of , Rotary Co s f Air-conditio	o – Types ins – gov compresso impresso	s of turbing vernors. ssion with prs – Cent em Vapou	and without rifugal Com	- General and reaction Per clearance pressor an Per on refriger	relationshi n principles iods: 9 . Multistag d axial flow iods: 9 ation cycle	e V CO4		
between area, compounding, UNIT - IV Classification - air compressor compressor (D UNIT - V Fundamentals super heat, su	Air Co Air Co Recipro r and int Description <b>Refrig</b> of refrig b coolin g system	and press ocity diagr ompress ocating Air ser cooling ve treatme geration ar geration ar g-: - Vapo n	Flow of steam sure in nozzle f ams for simple or Compressor - (Descriptive to ent only), Screv and Air-Con and air condition	a through nozz low. Critical pr e turbines, spe working princi reatment only) v Compressors <b>ditioning</b> hing –Types of refrigeration s	essure ratio ed regulatio iple, work of , Rotary Co s f Air-conditio	o – Types ons – gov compress ompresso ons syste	s of turbing vernors. ssion with ors – Cent em Vapou ir condition	and without rifugal Com	- General and reaction Per clearance pressor an Per on refriger s- summer	relationshi n principles iods: 9 . Multistag d axial flow iods: 9 ation cycle	e W CO4		
between area, compounding, UNIT - IV Classification - air compressor compressor (D UNIT - V Fundamentals super heat, su Air conditioning	Air Co Air Co Recipro r and int Description <b>Refrig</b> of refrig b coolin g system	and press ocity diagr ompress ocating Air ser cooling ve treatme geration ar geration ar g-: - Vapo n	Flow of steam sure in nozzle f ams for simple or Compressor - (Descriptive tr ent only), Screv and Air-Com and air condition our absorption	a through nozz low. Critical pr e turbines, spe working princi reatment only) v Compressors <b>ditioning</b> hing –Types of refrigeration s	ed regulation iple, work of I, Rotary Co S f Air-condition ystem – Typ	o – Types ons – gov compress ompresso ons syste	s of turbing vernors. ssion with ors – Cent em Vapou ir condition	and without rifugal Com	- General and reaction Per clearance pressor an Per on refriger s- summer	relationshi n principles iods: 9 Multistag d axial flow iods: 9 ation cycle and winte	e W CO4		
between area, compounding, UNIT - IV Classification - air compressor compressor (D UNIT - V Fundamentals super heat, su Air conditioning Lecture Peric Text Books	Air Co Air Co Recipro r and int Description <b>Refrig</b> of refrig b coolin g system ods: 30	and press ocity diagr ompress ocating Air eer cooling ve treatme geration ar geration ar g-: - Vapo n	Flow of steam sure in nozzle f ams for simple or Compressor - (Descriptive tr ent only), Screv and Air-Com and air condition our absorption	a through nozz low. Critical pr e turbines, spe working princi reatment only) v Compressors <b>ditioning</b> hing –Types of refrigeration sy	ed regulation iple, work of , Rotary Co s f Air-condition ystem – Typ <b>Practica</b>	o – Types ons – gov compress ompresso ons syste oes of Ai	s of turbing vernors. ssion with ors – Cent em Vapou ir condition ds: -	and without rifugal Com	- General and reaction Per clearance pressor an Per on refriger s- summer	relationshi n principles iods: 9 Multistag d axial flow iods: 9 ation cycle and winte	e CO4 CO4		
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N. A. 800



COs	Program Outcomes (POs)											Program Specific Outcomes (PSOs)			
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	-	-	-	1	-	-	3	3	3	3
2	3	3	3	3	-	-	-	-	1	-	-	1	3	1	2
3	3	3	3	3	-	-	-	-	1	-	-	1	3	1	2
4	3	3	3	3	-	-	-	-	1	-	-	1	3	1	2
5	3	3	3	3	-	-	-	-	1	-	-	2	3	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Conti	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

A. A. 800

	wech	anical		Progra	amme :	B.Tech.				
Semester								er Exam T	ype: TE	
Course	U23M	ET612		Pe	riods/W	eek	Credit	Ma	kimum Ma	rks
Code	02011			L	Т	Р	С	CAM	ESE	ТМ
Course Name	:	JFACTUR MATION		3	0	0	3	25	75	100
<b></b>	Fnaina	oring Mat		/ECH						
Prerequisite	Engine	ening met	allurgy, Manufacturing Proc	ess					BT M	apping
	On co	mpletion	of the course, the student	s will be	e able to	0			(Highes	
	CO1	Understa	nd the principles of unconvention	onal mach	nining pro	ocess and	advantage	3.	<del>-</del>	2
Course	CO2	Gain kno solutions.	wledge about micro machining	and sim	ulation o	f atomic s	scale level f	or industri	al <b>k</b>	3
Outcome	CO3		the importance of modern ons in industries.	micro fat	orication	processe	s and wid	e range (	of K	3
	CO4	Develop	programs related to manufactur	ring using	codes.				K	4
	CO5	Design, a	nalyse and optimize automated	d flow line	s and Al	in manuf	acturing sys	tem.	K	3
UNIT- I	Intro	duction t	o Non-Traditional Machi	ning				Per	iods: 9	
non-traditiona	I machin	ing. Selecti	achining, Need for Non-traditio ion of non-traditional machining esses. Introduction, equipment	g process	es, Spec	ific advan	tages, limita	tions and a	applications	
UNIT- II	Micro	Machinir	ng Process					Per	iods: 9	i
Micromachini	ng – defi	nition - prin	nciple of mechanical micromac	hining - (	Classifica	ation of m	icromachinir	ng and Na	no finishing	
-		-	simulations of machining at atc aterial removal mechanism – m					TM) - con	nponents of	CO2
•										
UNIT- III	Micro	Fabricat	ion					Per	iods: 9	
UNIT- III Materials for I Photolithogra	Microsys phy base	tems manu d micro fat	ion facture - Substrates and Wafe prication processes - Photo resi - resists removal. Large aspec	rs, active ist develo	pment. A	dditive ar	d subtractiv	d silicon c e techniqu	omponents es – CVD -	
UNIT- III Materials for I Photolithogra	Microsys phy base g - chemi	tems manu d micro fat cal, plasma	facture - Substrates and Wafe prication processes - Photo resi	rs, active ist develo	pment. A	dditive ar	d subtractiv	d silicon c e techniqu Reactive	omponents es – CVD -	
UNIT- III Materials for I Photolithograp PVD – etching UNIT- IV N.C. machine and Machinin	Microsys phy base g - chemin Nume s – Intro ng centre languag	tems manu d micro fat cal, plasma erical Con duction. Ty es– Descri es, APT pro	facture - Substrates and Wafe prication processes - Photo resi - resists removal. Large aspec t <b>trol Machines</b> pes, Economics advantages a ption and Types of ATC, ap pogramming, Examples on CNC	rs, active ist develo t ratio mic ind applic plications.	pment. A ro manuf ations, C .NC part	dditive ar facturing - CNC, DNC	d subtractiv LIGA, Deep (Direct and ming – Ty	d silicon c e techniqu Reactive Per I Distribute pes – Intr	omponents es – CVD – lon Etching <b>iods: 9</b> ed). Turning oduction to	CO3
UNIT- III Materials for I Photolithograp PVD – etching UNIT- IV N.C. machine and Machinir programming on simulation	Microsys phy base g - chemin Nume s – Intro ng centre languag of CAD I	tems manu d micro fat cal, plasma erical Con duction. Ty es– Descri es, APT pro based NC p	facture - Substrates and Wafe prication processes - Photo resi - resists removal. Large aspec t <b>trol Machines</b> pes, Economics advantages a ption and Types of ATC, ap pogramming, Examples on CNC	rs, active ist develo t ratio mic ind applic plications.	pment. A ro manuf ations, C .NC part	dditive ar facturing - CNC, DNC	d subtractiv LIGA, Deep (Direct and ming – Ty	d silicon c e techniqu Reactive Per I Distribute bes – Intr ons, Prelim	omponents es – CVD – lon Etching iods: 9 ed). Turning oduction to inary study	CO3
UNIT- III Materials for I Photolithograp PVD – etching UNIT- IV N.C. machine and Machinin programming on simulation UNIT- V Manufacturing mathematical	Microsys phy base g - chemin s – Intro ng centre language of CAD I Manu g System models,	tems manu ad micro fak cal, plasma erical Con duction. Ty es- Descri es, APT pro based NC p facturing ns- Compo costs. Sing	facture - Substrates and Wafe prication processes - Photo resi - resists removal. Large aspec t <b>trol Machines</b> pes, Economics advantages a ption and Types of ATC, ap ogramming, Examples on CNC programming	rs, active ist develop t ratio mic ind applic plications. Turning, nation in Automate	pment. A ro manuf ations, C .NC part Milling & manufac ed flow lir	Additive an facturing - CNC, DNC program & Dri & Dri cturing sy nes: Meth	d subtractiv LIGA, Deep (Direct and ming – Typ ling operation stems, primods or work	d silicon c e techniqu Reactive I Distribute bes – Intr ons, Prelim Per ciples and part transp	iods: 9 iods: 9 iods: 9 ioduction to inary study iods: 9 strategies	CO3
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N. A. Sola

2.	https://www.youtube.com/watch?v=PN_tGm5Gip4	
3.	https://youtu.be/YjcC_IUtMqw?si=BbSy7Zco9JjFdDpO	1
4.	https://www.youtube.com/watch?v=-NINgz6KQTA	
5.	https://www.youtube.com/watch?v=4ZmdHWGF9pg	

COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	1	2	1	-	-	-	-	-	2	2	2	3
2	3	1	1	1	2	2	-	-	-	-	-	2	3	2	3
3	3	2	2	2	3	2	-	-	-	-	-	2	3	3	3
4	3	2	2	1	3	1	-	-	-	-	-	2	3	3	3
5	3	3	2	1	3	2	-	-	-	2	-	3	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

			Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Asses	ssment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
М	larks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

dr. d. 800

	Mecr	anical Engineering	Progra	amme :	B.Tech.				
Semester	VI		Cours	e Categ	ory: <b>PC</b>	End S	emester I	Exam Type	: TE
Course	11231	IEB603	Pe	riods/W	eek	Credit	Max	kimum Mar	ks
Code	UZJN		L	Т	Р	С	CAM	ESE	ТМ
Course Name	AUTC	MOBILE ENGINEERING	2	0	2	3	50	50	100
			MECH						
Prerequisite	Basics	of Mechanical Engineering							
	On cor	npletion of the course, the students	will be able	to				BT Ma (Highest	
	CO1	Demonstrate the function of chassis	, body and fr	ame.				K	3
Course	CO2	Interrupt the knowledge on the types	s of transmiss	sion syste	ems.			K	3
Outcome	CO3	Establish the different suspension a	nd braking sy	stems.				K	3
0 0.0000000	CO4	Dismantle and assemble the compo	nents of cluto	h and tra	ansmissio	n systems		K	4
	CO5	Dismantle and assemble the compo	nents of susp	ension a	and transm	nission syste	ems	K	4
UNIT- I	Introc	luction to Automobiles	•				T	iods: 10	
Classificatior	n of Autor	nobiles – Types of Drive – Chassis –	Frames – R	esistance	es to a mo	oving vehicle	e – Injectio	on system –	
		nagement system – Supercharging – T				-	-	-	C01
UNIT- II	Clutc	h and Transmission Systems					Per	iods: 10	
		lutches – Gear box – Types of Gear Bo sion – Differential – Drive line system			sion – Flui	id Flywheel	and Torqu	e Converter	CO2
UNIT- III		ension and Braking Systems					Per	iods: 10	
-		Springs – Torsion bar – Shock Absorb	er - Types of	Suspens	sion – Air S	Suspension			
		/heel Alignment - Braking system – Cla				Buoponoion	Clooning		CO3
UNIT- IV	Autor	nobile Engineering Practice I					Per	iods:15	
1. Case stu		ssis and body.					L		
		semble of Single plate clutch.							
									COA
		semble of Two Wheeler Gearbox.							CO4
4. Dismantle	e and ass	semble of Differential.							CO4
4. Dismantle 5. Dismantle	e and ass e and ass	semble of Differential. semble of Steering Gearbox.					Bor	iode:15	CO4
<ol> <li>Dismantle</li> <li>Dismantle</li> <li>UNIT- V</li> </ol>	e and ass e and ass Autor	semble of Differential. semble of Steering Gearbox. nobile Engineering Practice II	passenger ve	hicle.			Per	iods:15	<b>CO</b> 4
<ol> <li>Dismantle</li> <li>Dismantle</li> <li>Dismantle</li> <li>UNIT- V</li> <li>Identify v</li> </ol>	e and ass e and ass <b>Autor</b> arious sp	semble of Differential. semble of Steering Gearbox.	passenger ve	hicle.			Per	iods:15	
<ol> <li>Dismantle</li> <li>Dismantle</li> <li>Dismantle</li> <li>UNIT- V</li> <li>Identify v</li> <li>Tyre chair</li> <li>Study on</li> </ol>	e and ass e and ass <b>Autor</b> arious sp nge and i the hydr	semble of Differential. semble of Steering Gearbox. <b>nobile Engineering Practice II</b> recifications of Wheels and Tyres in a prepair (with tube and tubeless). aulic brake system.	passenger ve	hicle.			Per	iods:15	
<ol> <li>Dismantle</li> <li>Dismantle</li> <li>Dismantle</li> <li>UNIT- V</li> <li>Identify v</li> <li>Tyre chair</li> <li>Study on</li> <li>Dismantle</li> </ol>	e and ass e and ass <b>Autor</b> arious sp nge and i the hydra e and ass	semble of Differential. semble of Steering Gearbox. <b>nobile Engineering Practice II</b> ecifications of Wheels and Tyres in a prepair (with tube and tubeless). aulic brake system. semble of a braking system.	passenger ve	hicle.			Per	iods:15	
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COs		Program Outcomes (POs)												ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2	-	-	-	-	-	-	-	-	2	2	2	2
2	2	2	2	-	-	-	-	-	-	-	-	2	2	2	2
3	2	2	2	-	-	-	I	-	-	-	•	2	2	2	2
4	3	3	3	3	-	3	3	-	3	-	3	3	3	3	3
5	3	3	3	3	-	3	3	-	3	-	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

## Assessment method for theory cum practical courses

			Conti	nuous Ass	sessm	ent Marks (C	AM)			End		
		Continu (T	ious sse Theory)	ssment	Continuous ssessment (Practical)				Semester Examination (ESE)	End Semester Examination		
Assessment	CAT 1	CAT 2	Model	Attendan ce	Total	Conduction of Practical	Report	Viva	Total	Marks (Practical – Internal Evaluation)	(ESE) Marks (Theory)	Total Marks
Marks	5	5	5	5	20*	15	10	5	30*		75**	-
*To be	be weighted for 10 Marks					20         15         10         5         30           10         *To be weighted for 10 Marks         10         10			10	30	*To be weighted for 50 Marks	100

dr. d. 800

Department	Mecha	inical Engineering	Progra	amme :	B.Tech.							
Semester	VI		Course	e Categ	ory: <b>PC</b>	Enc	I Semeste	r Exam 🛛	Гуре: <b>LE</b>			
Course	1100M	FRCOS	Maxi	mum Ma	arks							
Code	UZ3IV	U23MEP608         L         T         P         C         CAN           THERMAL ENGINEERING LABORATORY         0         0         2         1         50										
Course Name	THER	MAL ENGINEERING LABORATORY	0	0	2	1	50	50	100			
	•••••	Μ	ECH									
Prerequisite	Basic	Knowledge of Science										
	On co	mpletion of the course, the students	s will be	able to	)				lapping est Level			
	CO1	Sketch the valve timing diagram and port t engine and two stroke petrol engine.	timing dia	agram fo	r single cyl	inder four s	troke diese		K5			
Course Outcome	CO2	Design and conduct experiments, as well Combustion Engines	as to ana	alyze and	d interpret	data for inte	ernal		K5			
Gutoome	CO3	Calculate the mechanical efficiency of fou	r stroke	SI engine	e by Morse	e test			K3			
	CO4	Evaluate the performance of four stroke s	ingle cyli	nder CI	engine & F	Predict actua	al diagram.		K5			
	CO5	Evaluate the performance of steam gener	ator and	steam tu	urbines				K2			
List of Exp												
<ol> <li>Heat base</li> <li>Retarda</li> </ol>	alance tes ation and	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine	-									
<ol> <li>Heat base</li> <li>Retardation</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Engine</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Determ</li> </ol>	alance tes ation and nance tes nance tes nance tes exhaust nance tes nance tes nance tes nance tes	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration sys t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus	ngines stem m	tion in ar	n engine							
<ol> <li>Heat basis</li> <li>Retarda</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Engine</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Determ</li> </ol>	alance tes ation and nance tes nance tes nance tes exhaust nance tes nance tes nance tes nance tes nance tes nance tes nance tes	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter	ngines stem m		-		Total	Periods	5: 30			
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<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Engine</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Assemt</li> <li>Assemt</li> <li>Lecture Per</li> <li>Reference I</li> <li>Willard W</li> </ol>	alance tes ation and nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes <b>nance tes</b> <b>nance b>	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter intling of Engines to identify the parts and t <b>Tutorial Periods: -</b>	ngines stem m heir posi <b>Practic</b>	al Perio	ods: 30		Total	Periods	3: 30			
<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Engine</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Determ</li> <li>Determ</li> <li>Determe</li> <li>Assemble</li> </ol> Lecture Per Reference I <ol> <li>Willard W</li> <li>J.B. Heyw</li> </ol>	alance tes ation and nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes <b>nance tes</b> <b>nance	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter ntling of Engines to identify the parts and t <b>Tutorial Periods: -</b> ek– Internal Combustion Engines, Prenticer ernal Combustion Engines – fundamentals	ngines stem m heir posir <b>Practic</b> e Hall of I	al Perio India, 20 w Hill, 19	ods: 30 03. 988.		Total	Periods	s: 30			
<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> /ol>	alance tes ation and nance tes nance tes nance tes nance tes nance tes nance tes nination of bly/Disma <b>riods: -</b> <b>Books</b> V. Pulkrat wood– Int porthy R,	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter intling of Engines to identify the parts and t <b>Tutorial Periods: -</b> ek– Internal Combustion Engines, Prentice ernal Combustion Engines – fundamentals Thermal Engineering", Tata McGraw Hill P	ngines stem m heir posi <b>Practic</b> e Hall of I s, McGrav	al Perio India, 20 w Hill, 19 s Co. Ltd	ods: 30 03. 988.	lhi, 2016.	Total	Periods	5: 30			
<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Engine</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Reference I</li> <li>Willard W</li> <li>J.B. Heyw</li> <li>Rudramo</li> <li>Rajput R.</li> </ol>	alance tes ation and nance tes nance	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter intling of Engines to identify the parts and t <b>Tutorial Periods: -</b> ek– Internal Combustion Engines, Prentice ernal Combustion Engines – fundamentals Thermal Engineering", Tata McGraw Hill P nal Engineering, 10th edition, Lakshmi Publ	ngines stem m heir posi <b>Practic</b> e Hall of I s, McGrav Publishers lications,	al Perio India, 20 w Hill, 19 s Co. Ltd 2018	ods: 30 03. 988. I., New De				5: 30			
<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> <li>Reference I</li> <li>Willard W</li> <li>J.B. Heyw</li> <li>Rudramo</li> <li>Rajput R.</li> <li>Yunus A.</li> </ol>	alance tes ation and nance tes nance tes nance tes nance tes nance tes nance tes nance tes nination of bly/Disma <b>riods: -</b> <b>Books</b> V. Pulkrat wood– Int porthy R, .K, Therm . Cengel,	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter intling of Engines to identify the parts and t <b>Tutorial Periods: -</b> ek– Internal Combustion Engines, Prentice ernal Combustion Engines – fundamentals Thermal Engineering", Tata McGraw Hill P	ngines stem m heir posi <b>Practic</b> e Hall of I s, McGrav Publishers lications,	al Perio India, 20 w Hill, 19 s Co. Ltd 2018	ods: 30 03. 988. I., New De				\$: 30			
<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Engine</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Reference I</li> <li>Willard W</li> <li>J.B. Heyw</li> <li>Rudramo</li> <li>Rajput R.</li> <li>Yunus A.</li> <li>Web Reference</li> </ol>	alance tes ation and nance tes nance krat Wood- Info porthy R, .K, Therm . Cengel,	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter intling of Engines to identify the parts and t <b>Tutorial Periods: -</b> ek– Internal Combustion Engines, Prentice ernal Combustion Engines – fundamentals Thermal Engineering", Tata McGraw Hill P nal Engine ing, 10th edition, Lakshmi Publ Robert H. Turner, John M. Cimbala,Fundar	ngines stem m heir posi <b>Practic</b> e Hall of I s, McGrav Publishers lications,	al Perio India, 20 w Hill, 19 s Co. Ltd 2018	ods: 30 03. 988. I., New De				5: 30			
<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Engine</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Perform</li> <li>Reference I</li> <li>Willard W</li> <li>J.B. Heyv</li> <li>Rudramo</li> <li>Rajput R.</li> <li>Yunus A.</li> <li>Web Reference</li> <li>https://n</li> </ol>	alance tes ation and nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes <b>nance tes</b> <b>NANCE</b> <b>BOOKS</b> V. Pulkrat wood– Into orthy R, .K, Therm . Cengel, ptel.ac.in	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter ntling of Engines to identify the parts and t <b>Tutorial Periods: -</b> ek– Internal Combustion Engines, Prentice ernal Combustion Engines – fundamentals Thermal Engineering", Tata McGraw Hill P ial Engineering, 10th edition, Lakshmi Publ Robert H. Turner, John M. Cimbala,Fundar	ngines stem m heir posi <b>Practic</b> e Hall of I s, McGrav Publishers lications,	al Perio India, 20 w Hill, 19 s Co. Ltd 2018	ods: 30 03. 988. I., New De				30			
<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> <li>Reference I</li> <li>Willard W</li> <li>J.B. Heyw</li> <li>Rudramo</li> <li>Rajput R.</li> <li>Yunus A.</li> <li>Web Refere</li> <li>https://n</li> <li>https://n</li> </ol>	alance tes ation and nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes nance tes <b>nance tes</b> <b>nance b>	t on Single/multi cylinder 4-stroke Diesel er at on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter intling of Engines to identify the parts and t <b>Tutorial Periods: -</b> ek– Internal Combustion Engines, Prentice ernal Combustion Engines – fundamentals Thermal Engineering", Tata McGraw Hill P hal Engineering, 10th edition, Lakshmi Publ Robert H. Turner, John M. Cimbala,Fundar h/courses/112/103/112103262/ h/courses/112/103/112103262/	ngines stem m heir posi <b>Practic</b> e Hall of I s, McGrav Publishers lications,	al Perio India, 20 w Hill, 19 s Co. Ltd 2018	ods: 30 03. 988. I., New De				\$: 30			
<ol> <li>Heat ba</li> <li>Retarda</li> <li>Perform</li> <li>Determ</li> <li>Determ</li> <li>Assemb</li> </ol> Lecture Per Reference I 1. Willard W 2. J.B. Heyw 3. Rudramo 4. Rajput R. 5. Yunus A. Web Refere 1. https://n 3. https://n 3. https://n	alance tes ation and nance tes nance krat wood– Inf porthy R, .K, Therm . Cengel, ptel.ac.in ptel.ac.in	t on Single/multi cylinder 4-stroke Diesel er st on IC engines motoring test on 4-stroke engine t on Vapour compression Refrigeration syst t on Air-conditioning system t on cooling system t on Vapour absorption Refrigeration syste gas analysis using Orsat apparatus t on a boiler t on steam turbine dryness fraction of steam using calorimeter ntling of Engines to identify the parts and t <b>Tutorial Periods: -</b> ek– Internal Combustion Engines, Prentice ernal Combustion Engines – fundamentals Thermal Engineering", Tata McGraw Hill P ial Engineering, 10th edition, Lakshmi Publ Robert H. Turner, John M. Cimbala,Fundar	ngines stem m heir posi <b>Practic</b> e Hall of I s, McGrav Publishers lications,	al Perio India, 20 w Hill, 19 s Co. Ltd 2018	ods: 30 03. 988. I., New De				5: 30			

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COs		Program Outcomes (POs)												ram Spe omes (P	
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	3	-	-	-	3	3	1	3	3	3	1
2	-	-	-	-	3	-	-	-	3	3	1	3	3	3	1
3	-	-	-	-	3	-	-	-	3	3	1	3	3	3	1
4	-	-	-	-	3	-	-	-	3	3	1	3	3	3	1
5	-	-	-	-	3	-	-	-	3	3	1	3	3	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	C	ontinuous /	Assessi	ment Marks (CAN	1)		
Assessment		ce in practio asses	cal	Model		End Semester Examination	Total Marks
	Conduction of practical	Record work	viva	Practical Examination	Attendance	(ESE) Marks	
Marks	15	5	5	15	10	50	100

dr. A. 800

	Mech	anical Engineering	Progra	amme: I	B.Tech.				
Semester	VI		Cours	e Categ	ory: PC	End S	emester E	xam Typ	e: LE
Course			Pe	riods/W	eek	Credit	Maxi	imum Ma	arks
Code	U23M	EP609	CAM	ESE	ТМ				
Course Name		OLOGY AND MEASUREMENTS	0	0	2	1	50	50	100
	Deelel		MECH						
Prerequisite		Physics mpletion of the course, the studer	nts will be	able to	)				lapping
	CO1	Explain the basics knowledge of me	easuremer	its. meti	rology and	d measurir	na devices.		est Level <b>K1</b>
Course	CO2	Recognize the fundamentals of line					0		K1
Course Outcome	CO3	Demonstrate measurements using		-	-		nents.		K3
Outcome	CO4	Interpret the error and correction fac		-		-			K4
	CO5	Analyze the findings of measureme	ents obtain	ed usin	g differen	t instrume	ents.		K4
List of Expe	eriment	S						1	
9. Charac	teristics o	Pressure using Strain Gauges.							
<ol> <li>10. Charact</li> <li>11. Charact</li> <li>12. Measur</li> <li>13. Inspect</li> </ol>	teristics of rement of ion of gea	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors.							
<ol> <li>Charac</li> <li>Charac</li> <li>Charac</li> <li>Measur</li> <li>Inspecti</li> <li>Measur</li> </ol>	teristics of ement of ion of gea ement of	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors. straightness of the surface using autoco							
<ol> <li>Charact</li> <li>Charact</li> <li>Charact</li> <li>Measur</li> <li>Inspection</li> <li>Measur</li> <li>Measur</li> </ol>	teristics of rement of ion of gea rement of r <b>iods: -</b>	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors.		al Perio	ods: 30		Total	Periods	5: 30
<ol> <li>Charact</li> <li>Charact</li> <li>Charact</li> <li>Measur</li> <li>Inspection</li> <li>Measur</li> <li>Measur</li> <li>Measur</li> <li>Measur</li> <li>Reference I</li> </ol>	teristics c ement of ion of gea rement of riods: - Books	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors. straightness of the surface using autoco <b>Tutorial Periods: -</b>	Practic				Total	Periods	5: 30
<ol> <li>Charact</li> <li>Charact</li> <li>Charact</li> <li>Measur</li> <li>Inspection</li> <li>Measur</li> <li>Measur</li> <li>Measur</li> <li>Reference I</li> <li>R.K.Rajp</li> </ol>	teristics c rement of ion of gea rement of riods: - Books ut, "Meas	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors. straightness of the surface using autoco <b>Tutorial Periods: -</b> surements & Metrology", S.K. Kataria an	Practic	lishers, i			Total	Periods	s: 30
<ol> <li>Charact</li> <li>Charact</li> <li>Charact</li> <li>Measur</li> <li>Inspection</li> <li>Measur</li> <li>Measur</li> <li>Measur</li> <li>Reference I</li> <li>R.K.Rajp</li> <li>R.K.Jain,</li> </ol>	teristics of rement of rement of riods: - Books ut, "Meas Enginee	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors. straightness of the surface using autoco <b>Tutorial Periods: -</b> surements & Metrology", S.K. Kataria an ring Metrology, Khanna publications, Ne	Practic d Sons Pub ew Delhi, 20	lishers, 2 22.	2023	3	Total	Periods	5: 30
<ol> <li>Charact</li> <li>Charact</li> <li>Charact</li> <li>Measur</li> <li>Inspection</li> <li>Measur</li> <li>Measur</li> <li>Measur</li> <li>Reference I</li> <li>R.K.Rajp</li> <li>R.K.Jain,</li> <li>Backwith</li> </ol>	teristics of rement of ion of gea ement of <b>riods: -</b> <b>Books</b> ut, "Meas Enginee , Marang	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors. straightness of the surface using autoco <b>Tutorial Periods: -</b> surements & Metrology", S.K. Kataria an ring Metrology, Khanna publications, Ne oni, Lienhard, "Mechanical Measuremer	d Sons Pub ew Delhi, 20 nts", Pearso	lishers, ∷ 22. n Educa	2023 ition , 2013		Total	Periods	s: 30
<ol> <li>Charact</li> <li>Charact</li> <li>Charact</li> <li>Measur</li> <li>Inspection</li> <li>Measur</li> <li>Measur</li> <li>Measur</li> <li>Reference I</li> <li>R.K.Rajp</li> <li>R.K.Jain,</li> <li>Backwith</li> <li>R.V.Jalga</li> </ol>	teristics of rement of rement of riods: - Books ut, "Meas Enginee , Marang aonkar, N	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors. straightness of the surface using autoco <b>Tutorial Periods: -</b> surements & Metrology", S.K. Kataria an ring Metrology, Khanna publications, Ne	d Sons Pub d Sons Pub ew Delhi, 20 nts", Pearso Everest pub	lishers, : 22. n Educa lications	2023 ition , 2013 , New Dell		Total	Periods	5: 30
<ol> <li>Charact</li> <li>Charact</li> <li>Charact</li> <li>Measur</li> <li>Inspection</li> <li>Inspection</li> <li>Measur</li> <li>Measur</li> <li>Measur</li> <li>Reference I</li> <li>R.K.Rajp</li> <li>R.K.Jain,</li> <li>Backwith</li> <li>R.V.Jalga</li> <li>Rega Raj</li> <li>Meb Reference</li> <li>https://ww</li> <li>https://ww</li> <li>https://ww</li> <li>https://wite</li> </ol>	teristics of rement of ion of gea ement of <b>riods: -</b> <b>Books</b> ut, "Meas Enginee , Marang aonkar, M jendira ," <b>nces</b> vw.vlab.co vw.youtul es.google	of Thermocouple. of Load cell. of LVDT. speed using stroboscope. ar tooth using profile projectors. straightness of the surface using autoco <b>Tutorial Periods: -</b> surements & Metrology", S.K. Kataria an ring Metrology, Khanna publications, Ne oni, Lienhard, "Mechanical Measuremer lechanical measurements and Control, B	Practic d Sons Pub ew Delhi, 20 nts", Pearso Everest pub ico Publishi	lishers, : 22. n Educa lications ng Hous	2023 ition , 2013 , New Dell		Total	Periods	s: 30

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COs		Program Outcomes (POs)												ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	1	-	-	-	-	-	1	2	3	2	2
2	3	1	2	2	1	-	-	-	-	-	1	2	2	3	2
3	3	1	2	2	3	-	-	-	-	-	1	2	3	2	2
4	3	2	3	2	1	-	-	-	-	-	1	1	3	3	2
5	3	2 2 2 2 1											3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

	C	Continuous	Assessme	ent Marks (CAM)		End	
Assessment	Performance i	n practical	classes	Model		Semester	Total
	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

dr. A. 800

Department	Mech	anical Er	ngineering	Progr	amme :	B.Tech.	•			
Semester	VI			Cours	e Categ	gory: <b>PC</b>	Enc	Semeste	er Exam	Type: LE
Course				Pe	riods/W	'eek	Credit	Max	kimum Ma	arks
Code	U23N	IEP610		L	Т	Р	С	CAM	ESE	ТМ
Course Name	1	ANCED M	ANUFACTURING (	0	0	2	1	50	50	100
	<b>.</b>			MECH						
Prerequisite	Manu	facturing	Process							
	On co	mpletion	of the course, the stu	dents will be	e able to	0				lapping est Leve
	CO1	Demonst	trate the various milling ope	erations.						K2
Course	CO2	Demonst	trate the gear generation p	rofile.						K3
Outcome	CO3	Understa	and the function and application	ations of tool c	utter grir	nder.				K3
	CO4	Distingui	sh different measuring dev	ices according	to the w	vork.				K3
	CO5	Apply G-	code programs to CNC lath	nes and milling	1.					K4
<ol> <li>Helical 0</li> <li>Demons</li> <li>Gear ge</li> <li>Study o</li> <li>Tool grii</li> <li>Introduct</li> <li>Writing</li> <li>Writing</li> <li>Writing</li> </ol>	Gear Cu strate of eneratior f Tool gr nding in ction to C and exe and exe and exe	Gear hobb in Hobbin inding mac tool and C CNC Machi cution of S cution of F cution of F	ling machine bing machine g machine chine. utter Grinder	CNC Lathe Ma Machine	chine					
Lecture Peric			Tutorial Periods: -	-	al Perio	de: 30		Total	Periods:	30
Reference Bo								1.0.01		
		omputer Co	ontrol of Manufacturing Sys	stems", McGra	w-Hill, 20	005.				
2. P.N. Rao,	"Manuf	acturing Te	echnology – Metal Cutting a	and Machine T	ools"-Ta	ata Mc Gra	aw Hill Publis	shing Com	pany Ltd,	2008.
			h D.N, Girish Chitoshiya, ''	-					14.	
			anufacturing Engineering a				tion, 7th edit	ion, 2018.		
		ugrul Ozel,	"Modern Manufacturing P	rocesses", Wi	ey, 2019	9.				
2. https://np	h.sliet.a tel.ac.in/ tel.ac.in/	courses/11	ce-machining-lab/ 12/107/112107219/ orage2/courses/112105127							

- $\label{eq:linear} 4. \quad http://electron.mit.edu/~gsteele/mirrors/www.nmis.org/EducationTraining/machineshop/mill/intro.html.$
- 5. http://web.mit.edu/2.810/www/files/lectures/lec5-machining-2018.pdf.

COs		Program Outcomes (POs)												ogram Specific tcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
2	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
3	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
4	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
5	3	2	2	1	1	-	-	-	-	-	-	1	2	2	1
c	orrelat	ion Lev	/el: 1 -	Low, 2	- Mediu	m, 3 –	Hiah	•						•	•

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	C	continuous	Assessi	ment Marks (CAN	1)		
Assessment		ce in practio asses	cal	Model		End Semester Examination	Total Marks
	Conduction of practical	Record work	viva	Practical Examination	Attendance	(ESE) Marks	indirio
Marks	15	5	5	15	10	50	100

dr. dr. 8000

Department	Mecha	anical Engineering	Prog	ramme:	B. Tec	h.			
Semester	VI		Cour	se Cate	gory: P	A End	d Semes	ter Exam	Туре: -
Course	1100M	EW602	Pe	riods / V	Veek	Credit	M	aximum I	Marks
Code	UZSIVI	EVV602	L	Т	Р	С	CAM	ESE	ТМ
Course Name	MINI F	PROJECT	0	2	1	100	0	100	
			MECH						
Prerequisite	Mecha	anical Engineering							
Course		mpletion of the course, the s							「Mapping (Highest Level)
Outcomes	CO1	Identify the problem statement for	or the mini proj	ect work	through	the literatu	ire survey	'	K2
	CO2	Choose the proper components	as per the req	uirement	s of the	design/ sys	stem.		K2
	CO3	Apply the acquainted skills to de	velop final mo	del/syste	m				K3
fifth semester. student should	. The aim d gain a tl ⁄lini-projec	Mini Project, which the student sha of the mini project is that the stude norough knowledge in the problem ct is an application that should be fo	ent has to unde he/she has se	erstand the	he real ti and in the	me hardwa e hardware	ire / softw / softwar	are applic e he/she u	ations. The using in the

by the department internal evaluation committee. It shall be evaluated for 100 marks as Continuous Assessment. The department internal evaluation committee shall consist of faculty coordinator, supervisor of the project and a senior faculty member of the department. There shall be two reviews that will be considered for assessing a Mini Project work with weightage as indicated evaluation Methods.

	Lecture Periods: -	Tutorial Periods: -		Practical Periods: 30	Total Periods: 30
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## COs/POs/PSOs Mapping

COs					Program Specific Outcomes (PSOs										
	P01	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	3	3	-	-	-	3	2	2	2	2	2	3
2	3	2	3	3	3	-	-	-	3	2	2	2	2	2	3
3	3	2	3	3	3	-	-	-	3	2	2	2	3	3	3

Correlation Level: 1 – Low, 2 – Medium, 3 – High

•		Review 1						
Assessment	Novelty Presentation Vi		Viva	Presentation	Demonstration	Viva	Report	Total Marks
Marks	10	20	10	20	20	10	10	100

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Department	Mechanical Engineering	Progr	amme :	B.Tech.						
Semester	VI	Cours	se Cateç	gory: AE	C	End	Semester Exam Typ			
Course		Pe	riods/W	eek	Cre	ədit	Semester Exam Ty Maximum Mark		ırks	
Code	U23MEC6XX	L	Т	P	(	2		ТМ		
Course Name	<b>CERTIFICATION COURSE – VI</b>	0	0	4		0	100	0	100	
		MECH								

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass / Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree Students shall choose an International / Reputed organization certification course of 40-50 hours duration specified in the

curriculum (It is mandatory to do a minimum of six courses) which will be offered through the Centre of Excellence. These courses have no credit and will not be considered for CGPA calculation.

- (i) Certification Courses are required to be completed to fulfil the degree requirements. All Certification courses are assessed internally for 100 marks.
- (ii) The Course coordinator handling the course will assess the student through attendance and MCQ test, and declare the student as "pass" on satisfactory completion. A letter grade "P" is awarded to declare pass.
- (iii) The marks scored in these courses will not be taken into consideration for the SGPA / CGPA calculations in the grade sheet.

Assessment	Continuous Ass	Total Marks	
Assessment	Attendance	MCQ Test	
Marks	10	90	100

fr. fr. cola

-	Mecha	anical E	ingineering	Progra	amme :	B.Tech.	•			
Semester	VI			Cours	e Categ	ory: <b>MC</b>	End	Semeste	r Exam Ty	pe: <b>TE</b>
Course				Pe	riods/W	eek	Credit	Max	imum Marl	ks
Code	U23M	EM606		L	Т	Р	С	CAM	ESE	ТМ
Course Name	GEND	ER EQU		2	0	0	0	100	0	100
			Comn	non to All Bra	nches					
Prerequisite	-									
	On co	mpletior	n of the course, the stu	dents will be	able to	)			BT Ma (Highest	
	CO1	Describe	e the general identity, socia	l construction	of gende	r roles.			K	2
Course	CO2	Illustrate	e the causes and issues of g	gender discrim	ination ir	Indian so	ciety.		K	2
Course	CO3	Describe	e the workplace discriminat	ion, media influ	iences o	n gender a	nd culture.		K	2
Outcome	CO4	Familiar	ize with international and In	ndian framewoi	ks on ge	nder equa	lity.		K	2
	CO5		e the current challenges in g		•	•		the role of	f Ka	2
UNIT- I	Introd	luction t	o Gender Equality					Peri	ods:06	
	-		der identity and expression,	, Understandin	g the soc	ial constru	ction of gen	i.		
			er roles, Analyzing key miles		-		-		,	CO
UNIT- II	Gend	er Inequ	ality and Its Manifestat	ions				Peri	ods:06	
peliefs, practi	ce and c	ustom –	society – causes of gender Issues of gender discrimin							со
	1		in workplace.							
UNIT-III		er and C		d culture. Cor	dar and	nowor du	amiaa in a		ods:06	
			a influences on gender an cultural understanding.	ia culture, Ger	ider and	power dy	iamics in s	ociety. Stra	alegies for	со
UNIT- IV	1	-	ender Equality					Dori	ods:06	
Gender Equa	lity and I	Human R	ights – International frame				• •	<ul> <li>Equality</li> </ul>	under the	CO
			ia miliarives for genuer ma	instreaming –	Strategie		ioting Gena			00
contexts.	Conte	emporary	y Challenges and Futur	-	-		ioung Gena			00
contexts. <b>UNIT- V</b> Current challe	enges an	d emergir	-	r <b>e Directions</b> y – Glass ceili	ng – role	of techno	logy in cont	Peri	ods:06	CO
contexts. <b>UNIT- V</b> Current challe gender inequa	enges an ality – Ex	d emergir ploring po	y Challenges and Futur	re Directions y – Glass ceili e change and e	ng – role	of techno	logy in cont	Peri inuing or c ire.	ods:06	CO
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dr. dr. 8000

COs		Program Outcomes (POs)												ram Specific omes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	-	-	-	-	-	-	3	-	3	-	1	1	2	3
2	2	-	-	-	-	-	-	3	-	3	-	1	1	3	3
3	2	-	-	-	-	-	-	3	-	3	-	1	1	3	3
4	2	-	-	-	-	-	-	3	-	3	-	1	1	3	3
5	2	-	-	-	-	-	-	3	-	3	-	1	1	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment	Сог	Continuous Assessment Marks (CAM)						
Assessment	Attendance	MCQ Test	Presentation / Activity / Assignment	Total Marks				
Marks	10	30	60	100				

dr. A. 800

# **SEMESTER VII**

A. A. 300

B.Tech. Mechanical Engineering

N. A. 800

Department	Mech	anical Engineering	Progr	amme :	B.Tech.				
Semester	VII		Cours	e Categ	ory: <b>PC</b>	End S	Semester E	Exam Type	e: <b>TE</b>
Course	1100M		Pe	riods/W	eek	Credit	Max	imum Maı	'ks
Code	UZƏIVI	EDC01	L	Т	Р	С	CAM	ESE	ТМ
Course Name		DUCTION PLANNING AND COST	3	0	0	3	25	75	100
		N	/IECH						
Prerequisite	Comp	uter-Aided Design(CAD), Manufactu	ring Proo	cesses					
	On coi	npletion of the course, the studen	ts will b	e able t	to			BT Ma (Highes	
	CO1	Differentiate standard/ non-standard we	orking me	ethodolog	gies to enh	ance produ	ctivity.	K	2
	CO2	Develop operational procedures to perform	form proc	ess plan	ning in ind	ustrial set u	р	к	2
Course Outcome	CO3	Identify the costing methods and esti- elements, distribute over heads and ca	•			, ,		t K	3
	CO4	Ability to estimate cost for various pr processes for a given product.	oduction	process	es like fo	rging, weld	ing, casting	, к	3
	CO5	Estimate the machining times and cost	s for vario	ous conv	entional m	achining pr	ocesses.	ĸ	3
UNIT - I	Work	Study and Ergonomics					Pe	eriods: 9	
measurements	- purpos	nition – Objectives - Motion economy- e – use – procedure – tools and technic tudy and Ergonomics	•			•	••		1
UNIT - II	Introd	untion to Dronoco Dionning					P	eriods: 9	
processes – sta parameters Eq	cess pla andardiz juipment	uction to Process Planning nning - Drawing interpretation- materia ation, simplification - Process planning a & Tool Selection; Tool material evalua	ictivities - ition – Se	operatin election o	g sequend of Jigs and	es - machir d fixtures -	ne selection Set of doc	<ul> <li>Process</li> <li>uments for</li> </ul>	CO2
processes – sta parameters Eq process planni Generative CA UNIT - III Importance of	cess pla andardiz uipment ng – Ec PP – ca Introd	nning - Drawing interpretation- materia ation, simplification - Process planning a	activities - ition – Se ter Aidec elements	operatin election of Process of cost e	g sequenc of Jigs and s planning estimation-	es - machir d fixtures - – Manual, Types of e	ne selection Set of doc Retrieval Pestimates –	– Process uments for CAPP and eriods: 9 Estimating	CO2
processes – sta parameters Eq process planni Generative CA UNIT - III Importance of procedure.– all – Calculation o	cess pla andardiz uipment ng – Ec PP – ca Introd costing a owance f deprec	nning - Drawing interpretation- materia ation, simplification - Process planning a & Tool Selection; Tool material evalua conomics of process planning - Compu- se study in Process Planning. <b>uction to Cost Estimation</b> and estimation – methods of costing – e s in estimation - Estimation labor cost, m iation cost.	activities - ition – Se ter Aidec elements	operatin election of Process of cost e	g sequenc of Jigs and s planning estimation-	es - machir d fixtures - – Manual, Types of e	ne selection Set of doc Retrieval Peterstimates – n of overhea	– Process uments for CAPP and eriods: 9 Estimating ad charges	CO2
processes – sta parameters Eq process planni Generative CA UNIT - III Importance of procedure.– all – Calculation o UNIT - IV	cess pla andardiz uipment ng – Ec PP – ca Introd costing a owance f deprec	nning - Drawing interpretation- materia ation, simplification - Process planning a & Tool Selection; Tool material evalua conomics of process planning - Compu- se study in Process Planning. <b>uction to Cost Estimation</b> and estimation – methods of costing – e s in estimation - Estimation labor cost, m iation cost. <b>ction Cost Estimation</b>	ictivities - ition – Se ter Aidec elements naterial co	operatin election of Process of cost e ost – Lad	g sequenc of Jigs and s planning estimation- der of cos	es - machir d fixtures - – Manual Types of e t - allocation	ne selection Set of doc Retrieval Pestimates – n of overhea	<ul> <li>Process</li> <li>uments for</li> <li>CAPP and</li> <li>eriods: 9</li> <li>Estimating</li> <li>ad charges</li> <li>eriods: 9</li> </ul>	CO2
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Hr. H. Sola

4. https://www.youtube.com/watch?v=9qBZyzjoqAo

5. https://www.youtube.com/watch?v=UUZ3EV2Qn70

## COs/POs/PSOs Mapping

COs					Program Outcomes (POs)								ram Spe omes (P		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	-	-	-	-	-	1	-	1	2	2	1	1
2	3	3	2	1	1	-	-	-	1	-	1	2	2	1	1
3	3	3	2	2	1	-	-	-	1	-	1	2	2	1	1
4	3	3	2	2	1	-	-	-	1	-	1	2	2	1	1
5	3	3	2	2	1	-	-	-	1	-	1	2	2	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

Assessment		Cor	ntinuous Assess	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

fr. fr. 800

	Mech	anical I	Engineering	Progra	amme :	B.Tech.				
Semester	VII			Cours	e Categ	ory: <b>PC</b>	End S	emest	er Exam Typ	e: TE
Course	11221/	IET713		Pe	riods/We	eek	Credit	Ν	/laximum Mai	ks
Code	UZJIV			L	Т	Р	С	CAN	1 ESE	ТМ
Course Name	INDU: ROBC	-	AUTOMATION AND	3 MECH	0	0	3	25	75	100
Prerequisite	Kinem	atics of	Machinery, Fluid Power Au							
Terequisite			on of the course, the stud		e able t	0			BT Ma	
	CO1	Under	stand the concepts industri	al automat	ion.				(Highes) K	
Course	CO2	Under	stand the concepts of indus	strial senso	rs and t	neir appli	cations.		к	2
	CO3	Analvz	e and select a suitable PLO	C svstem fo	or the aiv	en appli	cation.		ĸ	
Outcome	CO4	-	stand the development of r	-	-					
			the various applications of			•		a	K	
	CO5		•••		ateriari	lanuling		y.	K	3
UNIT - I			Automation						Periods: 9	
			mation and Control, Archited valuation of automation, type of				-		of automation,	<b>CO</b> 1
UNIT - II	Sens	ors							Periods: 9	<b>i</b>
			ices, Selections of sensors, Encoders, Ultrasonic Need for							
UNIT - III	Prog	rammak	ole Logic Controller						Periods: 9	
Introduction to and Basic Desi			C in Designing, Architecture on ming.	of PLC, App	lication a	nd Advan	tage of PLC	, Autom	nation Concept	co:
UNIT - IV	Intro	duction	to Robotics						Periods: 9	
	ot anator	ny, Type	d need of robotics Definition o s and applications of robot, ove			-				
UNIT - V	Robo	t Applic	cations						Periods: 9	<b>i</b>
Industrial Appl			al Transfer, material handling			• •	cessing, spo	ot and o	continuous arc	COS
	punning	, ymuun	g, Assembly and Inspection a							<u>i</u>
		_	g, Assembly and Inspection at Tutorial Periods: -	Practica	al Perio	ds: -			Total Perio	ds: 45
welding, spray		_		ī	al Perio	ds: -			Total Perio	ds: 45
welding, spray Lecture Peric Text Books	ods: 45			Practica			olishing Hou	ise, 202		ds: 45
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welding, spray Lecture Peric Text Books 1. A. B. Bhatta 2. Jean Riesc 3. R. K.Rajput	ods: 45 acharya her Wes t ,''Robo	, Debasis stcott, A.I	Tutorial Periods: -	Practica tics & Autom	nation" Kl on and R	nanna Pul	-		25	
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N. A. 800

COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	-	1	-	-	-	-	1	-	1	-	1	1	2	1
2	3	-	2	-	-	1	-	1	-	1	-	1	2	1	2
3	3	1	2	-	1	-	-	1	-	1	-	1	2	2	1
4	3	-	2	-	1	1	-	1	-	1	-	2	2	1	2
5	3	-	2	-	-	2	-	1	-	1	-	3	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

A. A. 800

Department	Mech	nanical	Engineering	Progr	amme :	B.Tech.					
Semester	VII			Cours	se Categ	ory: <b>PC</b>	End S	emest	er Ex	am Typ	e: TE
Course	1100M	CT74 4		Pe	riods/W	eek	Credit	Ν	/laxin	num Mai	'ks
Code	UZSIVI	ET714		L	Т	Р	С	CAN	1	ESE	ТМ
Course Name	DESIG	SN OF 1	RANSMISSION SYSTEI	M 2	1	0	3	25		75	100
				MECH					i		
Prerequisite	Engine	ering N	lechanics, Strength of Ma	aterials							
·	<b>0</b>					4 -				BT Ma	pping
	Un co	•	on of the course, the stu							(Highes	t Level
	CO1	-	n bearings for various mec ements	hanical appli	cations t	based on	load and p	erforma	ance	к	3
Course	CO2	-	n and analyze belt drive systems and wire ropes.	tems like flat	and V be	elts with t	heir pulleys,	chain c	drive	к	3
Outcome	CO3		te beam strength and effect	ive load on g	ear teeth	for both s	pur and heli	cal gea	rs	ĸ	3
	CO4		ate beam strength and effect	•			•	•		ĸ	
			stand the concept of speed	•				•			_
	CO5	applica	• •		- gea					K	3
UNIT - I	Beari	ngs							Per	riods: 9	•
	als and		ng –design of journal bearin ts. Rolling contact bearings	-	-		-	-		-	:
UNIT - II	Relt (	Chain a	Ind Ropes						Per	riods: 9	
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B.Tech. Mechanical Engineering

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	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	2	2	2	2	1	-	-	1	3	2	1
2	3	3	3	2	2	2	2	2	1	-	-	1	3	2	1
3	3	3	3	2	2	2	2	2	1	-	-	1	3	2	1
4	3	3	3	2	2	2	2	2	1	-	-	1	3	2	1
5	3	3	3	2	2	2	2	2	1	-	-	1	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

dr. d. 800

Department	Mecha	anical Engineer	ing	Progra	amme :	B.Tech.				
Semester	VII			Cours	e Categ	gory: <b>PC</b>	End	d Semeste	er Exam	Type: LE
Course				Pe	riods/W	eek	Credit	Max	kimum M	arks
Code	U23M	IEP711		L	Т	Р	С	CAM	ESE	ТМ
Course Name	:	STRIAL AUTOM		0	0	2	1	50	50	100
				MECH						
Prerequisite	Kinen	natics of Machin	ery							
	On co	mpletion of the	course, the stud	ents will be	able to	D				/lapping est Leve
	CO1	Understand the t	ype of robot and var	ious motions						K2
Course	CO2	Generate part pr	ogram for Robots to	performing v	arious ta	asks.				K3
Outcome	CO3	Understand the	robot forward and re	verse kinema	tics.					K2
	CO4	Solve direct and	inverse kinematics a	and choose a	ppropria	te Robot fo	or given app	olication.		K3
	CO5	Perform robot pr	ogramming for a give	en applicatior	۱.					K3
<ol> <li>Progran</li> <li>Progran</li> <li>Combinion</li> <li>Progran</li> <li>Progran</li> <li>Progran</li> <li>Progran</li> <li>Progran</li> <li>Progran</li> </ol>	nming a nming a ing an in nming a nming a nming a nming a	robot for performin robot for performin dustrial robot with robot to perform p robot for material robot for processin robot for a sorting advanced industria	ick and place operat handling application. ng application. operation using a se al applications of rob	tion of the ma notion of the r tion. ensing system ots.	manipula n.	ator arm.				
Lecture Per	iods: -	Tutor	ial Periods: -	Practic	al Peri	ods: 30		Tota	I Periods	s: 30
Reference E 1. Rex Mille 2017.		२. Miller "Robots a	nd Robotics: Princip	les, Systems,	and Ind	lustrial App	olications "N	/IcGraw Hil	l Professio	onal,
			pringer Handbook o		-					
			lern Robotics" Camb	•	-	s, 2017.				
			utomation Handboo I. Vidyasagar "Robo			ol" John \//	ilov & Sona	2020		
			n. viuyasayai Robo	t modeling at				o, 2020.		
2. https://op	chive.npt entextbo /w.instru	oks.clemson.edu/	12/104/112104298/ wangrobotics/chapte rammed-Robot-Arm/		ematics/	1				

5. https://www.visualcomponents.com/blog/offline-robot-programming-olp-the-complete-guide-with-examples/

## **COs/POs/PSOs Mapping**

COs		Program Outcomes (POs)											Program Speci Outcomes (PSC		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	2	1	2	-	-	-	1	-	-	2	3	2	2
2	3	1	2	1	2	-	-	-	1	-	-	2	2	3	2
3	3	1	1	1	3	-	-	-	1	-	-	2	3	2	2
4	3	2	3	1	2	-	-	-	1	•	-	1	3	3	2
5	3	2	3	1	3	-	-	-	1	-	-	2	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

A. A. 800

	0	Continuous	Assessme	ent Marks (CAM)		End	
Assessment	Performance i	in practical	classes	Model		Semester	Total
Assessment	Conduction of practical	Record work	viva	Practical Examination	Attendance	Examination (ESE) Marks	Marks
Marks	15	5	5	15	10	50	100

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Academic Curriculum R-2023

Department	Mechanical E	ngineering	Progr	amme :	B.Tech.				
Semester	VII		Cours	e Categ	jory: <b>PC</b>	Enc	d Semeste	er Exam <sup>-</sup>	Гуре: <b>LE</b>
Course			Pe	riods/W	eek	Credit	Max	kimum Ma	arks
Code	U23MEP712		L	Т	Р	С	CAM	ESE	ТМ
Course Name	SEMINAR		0	0	2	1	100	-	100
			MECH						
Course	O1 - Review, pre	epare and present techno	logical deve	lopmen	ts.				
Outcome	O2 - Face the pl	acement interviews.							
Method of	Evaluation:								
20 minute In a sessive Each stude At the end A Faculty	s. on of three periods p lent is expected to p d of the semester, he guide is to be allotte	ach student is expected to pr per week, 8 to 10 students a resent atleast twice during the e / she can submit a report c ed and he / she will guide an the marks attained for this co	re expected t he semester on his / her to id monitor the	o presen and the s pic of ser progres	t the semi student is e minar and s of the st	nar. evaluated b marks are g udent and n	ased on th given base naintain at	at. d on the re	eport.
Lecture Pe	eriods: -	Tutorial Periods: -	Practio	cal Peri	ods: 30		Tota	l Periods	s: 30

## **Evaluation Methods**

Accomment	Continuous As	sessment Marks (CAM)	Total Marks
Assessment	Report	Presentation	
Marks	50	50	100

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Academic Curriculum R-2023

VII		*****	-	B.Tech.						
		Cours	e Categ	ory: <b>PA</b>	Enc	Semeste	er Exam <sup>-</sup>	Гуре: <b>LE</b>		
		Pe	riods/We	eek	Credit	Max	kimum Ma	arks		
U23M	EW703	L	Т	P	С	CAM	ESE	ТМ		
PRO	JECT PHASE – I	0 0 4 2 50 50								
		MECH								
Micro	and Mini Project									
On co	mpletion of the course, the stude	ents will be	able to	)				lapping est Level)		
CO1	Identify an innovative or creative id	dea/concep	ot/solutio	on to a pi	oblem.			K2		
CO2	Work independently to lead the pro-	oject along	with tea	am mem	bers.		КЗ			
CO3	Interpret the results and document	t the report	•				К3			
CO4	Communicate effectively through p	presentatio	n.					K3		
CO5	Design and Develop the working n	nodel.						K4		
	C	ONTENTS	5							
is a the	oretical study/analysis/prototype design	n/modeling a	nd simula	ation or a	combination	of these.				
				d final viva	a-voce exam	ination.				
						<b>L</b> .				
	Micro On co CO1 CO2 CO3 CO4 CO5 is a the one as s of the	CO1Identify an innovative or creative inCO2Work independently to lead the prCO3Interpret the results and documentCO4Communicate effectively throughCO5Design and Develop the working rCis a theoretical study/analysis/prototype designcone as group (preferably four students) projects of the project is evaluated based on a minimeport is required to be submitted in the standard	PROJECT PHASE – I       0         MECH         Micro and Mini Project         On completion of the course, the students will be         CO1       Identify an innovative or creative idea/concept         CO2       Work independently to lead the project along         CO3       Interpret the results and document the report         CO4       Communicate effectively through presentation         CO5       Design and Develop the working model.         CONTENTS         is a theoretical study/analysis/prototype design/modeling a one as group (preferably four students) project.         s of the project is evaluated based on a minimum three revort is required to be submitted in the standard prescribed for the standard	PROJECT PHASE – I       0       0         MECH       MECH         Micro and Mini Project       MECH         On completion of the course, the students will be able to       able to         C01       Identify an innovative or creative idea/concept/solution         C02       Work independently to lead the project along with teat         C03       Interpret the results and document the report.         C04       Communicate effectively through presentation.         C05       Design and Develop the working model.         CONTENTS         is a theoretical study/analysis/prototype design/modeling and simulatione as group (preferably four students) project.         s of the project is evaluated based on a minimum three reviews and port is required to be submitted in the standard prescribed format.	PROJECT PHASE – I       0       0       4         MECH       MECH	PROJECT PHASE – I       0       0       4       2         MECH         MECH         Micro and Mini Project         On completion of the course, the students will be able to         C01       Identify an innovative or creative idea/concept/solution to a problem.         C02         Work independently to lead the project along with team members.         C03         Interpret the results and document the report.         COMTENTS         CONTENTS         CONTENTS         Soft he project is evaluated based on a minimum three reviews and final viva-voce examples to required to be submitted in the standard prescribed format.	PROJECT PHASE – I       0       0       4       2       50         MECH         Micro and Mini Project         On completion of the course, the students will be able to         CO1       Identify an innovative or creative idea/concept/solution to a problem.         CO2         Work independently to lead the project along with team members.         CO3         Interpret the results and document the report.         CO4         Communicate effectively through presentation.         CONTENTS         SONTENTS         is a theoretical study/analysis/prototype design/modeling and simulation or a combination of these.         one as group (preferably four students) project.         s of the project is evaluated based on a minimum three reviews and final viva-voce examination.         ore tis required to be submitted in the standard prescribed format.	PROJECT PHASE – I       0       0       4       2       50       50         MECH         Micro and Mini Project         On completion of the course, the students will be able to       BT M (Highe         CO1       Identify an innovative or creative idea/concept/solution to a problem.       BT M (Highe         CO1       Identify an innovative or creative idea/concept/solution to a problem.       BT M (Highe         CO2       Work independently to lead the project along with team members.       CO3         CO3       Interpret the results and document the report.       CO4         CO4       Communicate effectively through presentation.         CO5       Design and Develop the working model.       Image: Contents         CONTENTS         s a theoretical study/analysis/prototype design/modeling and simulation or a combination of these.         s of the project is evaluated based on a minimum three reviews and final viva-voce examination.         s of the project is evaluated based on a minimum three reviews and final viva-voce examination.         s of the project is evaluated based on a minimum three reviews and final viva-voce examination.         s of the project is evaluated based on a minimum three reviews and final viva-voce examination.		

## COs/POs/PSOs Mapping

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	1	2	2	2	3	2	3	3	3	3	3
2	3	2	2	2	1	2	2	2	3	2	3	3	3	3	3
3	3	2	2	2	1	2	2	2	3	2	3	3	3	3	3
4	3	2	3	3	1	3	3	3	3	3	3	3	3	3	3
5	3	2	3	3	1	3	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

SI.No		Description		Weightage
1	Continuous Asses	ssment Marks		
а	Review1	Review Committee	10	
		Supervisor	5	15
b	Review2	Review Committee	10	
U		Supervisor	5	15
С	Review3	Review Committee	15	
U	i i concesso	Supervisor	5	20
		Total CAM		50

2	End Semester Marks			
	Evaluation of Phase	Report	15	
	Report and Viva-voce	Presentation and Viva	20	50
		Demonstration	15	
			Total ESM	50
			Total Marks	100

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B.Tech. Mechanical Engineering

Academic Curriculum R-2023

Department	Mech	nanical Engineering	Progra	mme : <b>B</b>	.Tech.								
Semester	VII		Course	e Catego	ry: <b>PA</b>	End	Semester	Exam T	ype: LE				
Course Code	U23M	EW704	Period L	s/Week T	Р	Credit C	Max CAM	imum Ma ESE	arks TM				
Course Name	INTER	NSHIP / INPLANT TRAINING	-	-	2	1	100	-	100				
	<u>.</u>		MECH	- <u>-</u>	<u>.</u>		<u>-</u>						
Prerequisite	-												
	On co	mpletion of the course, the stude						(Highe	lapping est Level)				
	CO1	Exposure to the industrial environmer cope up with the industrial scenario.	nt and Reco	gnize the	e requiren	nent of the ir	ndustry and	1	K1				
Course	CO2	Identify career paths taking into account their individual strengths and antitude and Prepare											
Outcome	CO3												
	CO4	Enhancing the employability skills and long learning.	start-up sk	ills to incr	ease his	ability to eng	age in, life	-	K4				
	CO5	Develop individual confidence to ha themselves to acquire life skills to meet		•	•	signments a	nd expose	)	K5				
		C	ONTENTS	5									
approva the indiv	al of princ vidual stu	ted by the department head have liber ipal of the institute. Structured training t ident, to full fill their term work.	o be arrang	ed by gu	ide and re	eport of the s	ame shall						
a. Publio b. State	c sector ( governn	engineering students can take in plant t enterprises nent undertaking companies	raining in a	ny one of	the follov	ving industrie	es.						
d. Privat	te limitec	l companies hership organisations.											
Lecture Per	iods: -	Tutorial Periods: -	Practic	al Period	ds: 30		Total	Periods	s: 30				

## **Evaluation Methods**

Assessment	Continuous Asse	essment Marks (CAM)	Total Marks
Assessment	Report	Presentation	
Marks	50	50	100

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N. A. 800

# **SEMESTER VIII**

A. A. 300

B.Tech. Mechanical Engineering



N. A. 800

Department	Mech	anical Engineering	Progr	amme :	B.Tech.				
Semester	VIII		Cours	e Categ	ory: <b>PA</b>	Enc	I Semeste	r Exam	Type: <b>LE</b>
Course			Pe	riods/W	eek	Credit	Max	imum M	arks
Code	U23M	EW805	L	Т	Р	С	CAM	ESE	ТМ
Course Name	PRO	JECT PHASE – II	0	0	16	8	50	100	150
			MECH						
Prerequisite	Micro	and Mini Project							
	On co	mpletion of the course, the	students will be	e able to	)				lapping est Level)
	CO1	Demonstrate and practice engineering principles in add	dressing a real ti	me and	real life si	tuation.			К3
Course	CO2	Enhance the financial managed by working as a team.	-	-					К3
Outcome	CO3	Familiarize in technical writi completion.	-	•		•	report or	1	K4
	CO4	Develop a model comprising				-			K4
	CO5	Challenge and Achieve the problems.	real time soluti	ons for	industry a	and societ	y oriented	1	K5
Guidelines	For Ca	rying Out Project Work							
<ul> <li>Analyze da</li> <li>The continu</li> <li>The review</li> <li>The progress</li> <li>Each stude project world</li> </ul>	ta, evalu uous ass committ ss of the ent shall k details	ricate a model/conduct experime ate the results and conclude the essment shall be made as presc ee may be constituted by the He project is evaluated based on a finally produce a comprehensive and conclusion. Il be typewritten form as specifie	appropriate solution with the regulation of the Departm minimum of three e report covering b	on, sugge tions. ent. reviews. ackgrour	estion for f	eature work			
Lecture Per	iods: -	Tutorial Periods:	- Practie	cal Perio	ods: 30		Total	Periods	s: 30

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	3	2	2	2	3	2	3	3	3	3	3
2	3	2	2	2	3	2	2	2	3	2	3	3	3	3	3
3	3	2	2	2	3	2	2	2	3	2	3	3	3	3	3
4	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
5	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

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SI. No	Descr	iption		Weightage
1	Continu	ous Assessment Marks		
		Review Committee <sup>#</sup>	10	45
а	Review 1	Supervisor	5	15
		Review Committee <sup>#</sup>	10	
b	Review 2	Supervisor	5	15
	Daview 2	Review Committee <sup>#</sup>	15	00
С	Review 3	Supervisor	5	20
	Total	САМ		50
2	En	d Semester Marks		
		Report	20	
а	Evaluation of final report and Viva-voce	Presentation and Viva	40	80
		Demonstration	20	
b	Expected Outcome from the project ##	Publication / communication / prototypes/ patents		20
	Total	ESM		100
	Total Mari	KS		150**

174

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B.Tech. Mechanical Engineering

N. A. 800

Department	Mecha	anical Engineering	Progra	amme :	B.Tech.				
Semester	IV		Cours	e Categ	ory: PE	End	Semeste	er Exam T	ype: TE
Course	U23M	EE401	Pe	riods/W	eek	Credit	Max	imum Ma	rks
Code	UZJIVI		L	Т	Р	С	CAM	ESE	ТМ
Course Name	GAS D	YNAMICS AND JET PROPULSION	3	0	0	3	25	75	100
D			ECH						
Prerequisite		lechanics						DT M	apping
	On co	mpletion of the course, the students	will be	able to	)				st Level)
	CO1	Explain the basic concepts of compre	ssible fl	uid flow	s.				2
Course	CO2	Describe the behaviour of fluid flow in	consta	nt area	ducts.			ĸ	2
Outcome	CO3	Interpret the equations governing nor	mal sho	ck.				K	3
Outcome	CO4	Define the performance metrics of tur	bo jet, r	am jet a	ind pulse	jet engines	S.	к	3
	CO5	Explain the basics of rocket propulsion	n syster	ns.					(3
UNIT- I	Basic	Concepts and Isentropic Flows					Per	iods: 09	
state, velocity	of sound	n equations for Concept of compressible flue d, Critical properties, types of waves, Mach on variable ducts – Nozzle and Diffusers Use	cone, Ma	ach angle					
UNIT- II		Through Ducts						iods: 09	
variation of M	ach num	ducts with friction (Fanno flow) - Fanno co ber with duct length. Flow in constant area n, variation of flow properties, maximum he	a ducts v	vith heat	transfer (				
UNIT - III	Norm	al Shock					Per	iods: 09	
		Rankine Hugonist Relation, Various of flo	-				-		
Use of tables	-	r equation, impossibility of shock in subson rts.	ic flows,	flow in c	onvergent	and diverge	ent nozzle	with shock-	CO3
UNIT - IV		opulsion		_				iods: 09	
turbojet engin	e compo	on – types of jet engines – ram jet, Turboje onents – diffuser, compressor, combustion t power, propulsive and overall efficiencies	chambe						
UNIT - V	Space	Propulsion					Per	iods: 09	
thrust equatio	n – effec	Ision -types of rocket engines – Propellants tive jet velocity specific impulse – rocket e – space flights.	-	-	-			-	
Lecture Pe	riods: 4	45 Tutorial Periods:	Practic	al Peri	ods: -		Tot	al Periods	s: 45
Text Books				_					
	a, "Fund	Rogers and Saravanamutto, "Gas Turbine T amentals of Compressible Flow with aircr				, New Age I	nternation	al Publishe	er, New
		odern Compressible flow: With historical pe	rspective	e", 3rd Eo	dition, Mc	Graw Hill, 20	17.		
Reference B									
		Turbines", Tata McGraw Hill, 2010.	rocciblo	fluid flou	" CPC n	roop 2012			
		Villiam E.Carscallen, "Introduction of Comp "Gas Dynamics", Prentice Hall of India,			-		n and svll	ahi R-2020	) B Tech
Mechanica		-			. / loudon				
4. V.Babu "F	undame	ntals of Gas Dynamics", Wiley, 2015.							
		Fundamentals of compressible fluid dynam	ics", PH	Learnin	g Private	Ltd, 2009.			
Web Referen									
		courses/112106166/							
		ourses/101101002/ ourses/112103021/							
	.infocob	uild.com/education/audio-video-courses/m	echanica	ıl engin	eering/Ga	sDynamics I	Propulsion	- IIT-Madra	IS/

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B.Tech. Mechanical Engineering

#### 5. Jet Propulsion https://www.youtube.com/watch?v=cOk4-nKRhr8- nptl

#### COs/POs/PSOs Mapping

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	1	-	-	-	-	-	-	1	1	1	2	1
2	3	2	1	1	-	-	-	-	-	-	1	1	1	2	1
3	3	2	1	1	-	-	-	-	-	-	1	1	1	2	1
4	3	2	1	1	-	-	-	-	-	-	1	1	1	2	1
5	3	2	1	1	-	-	-	-	-	-	1	1	1	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

Accessment		Cor	ntinuous Assess	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Mech		J J	1.091	annie.	B.Tech.	<b>.</b>			
Semester	IV			Cours	se Categ	ory: PE	Enc	Semeste	er Exam T	ype: TE
Course	1100M	FF 400		Pe	riods/W	eek	Credit	Max	kimum Ma	rks
Code	UZSIVI	EE402		L	T	Р	С	CAM	ESE	ТМ
Course Name		ETRIC T	OLERANCE AND	3	0	0	3	25	75	100
	<u>.</u>			MECH	.1	<u>I</u>	1			.[
Prerequisite	Basic	awarene	ess on Engineering D		owledge	of makin	q 2D draw	inas.		
			of the course, the s						BT Ma (Highes	apping st Leve
	CO1	Explain t	he geometrical requiren	nents on enginee	ring draw	ings			· · · · ·	(2
Course	CO2	Interpret	and specify dimensions	and tolerance in	professio	onal mann	er		k	(3
Outcome	CO3	Explain o	eometric symbols and i	ules	-					(3
Outcome	CO4		straightness, circularity a		lerance					(3
	CO5		e orientation and profile	· · · ·						(3
UNIT- I	000				-			Por	riods: 09	
Geometric pr Geometric To	olerance,	Coordina	rinciples, Geometric c te tolerance, Geometric	dimensioning, ,	Allowand	e and Cle	arance, GT	sheet, intr & D Tern	oduction to	
•	ots, valu	e of Tolera	ince, flat tolerance, strai	gnt tolerance, cir	cularity a	na cylinari	city tolerand	1		
UNIT- II	Durauda	Dulas II				<b>.</b>	- 0		riods: 09	
Interpreting	Dimensio	onal Limit	Inits of Linear Measure s, Specifying Angular					-		
roloranoing r		JAIVI Dalai	base Models.							
UNIT - III			base Models.					Per	iods: 09	
UNIT - III			base Models. stic Symbols, Datum Fe	eature Symbol, F	eature C	ontrol Frar	me, Readin		riods: 09 ture Contro	1
<b>UNIT - III</b> Symbols, Ge Frame, Othe	ometric ( r Symbo	Characteris		ncing, Terms, Ru	ules, Lim			g the Feat	ture Contro	
<b>UNIT - III</b> Symbols, Ge Frame, Othe	ometric ( r Symbo	Characteris	stic Symbols, Datum Fe with Geometric Tolerar	ncing, Terms, Ru	ules, Lim			g the Feat Variation	ture Contro	
UNIT - III Symbols, Ge Frame, Othe Applicability o UNIT - IV Definition, Sp	ometric ( r Symbo of Modifie	Characteris ols Used v ers in Feat	stic Symbols, Datum Fe with Geometric Tolerar	ncing, Terms, Ru ch Diameter Rule nce, Specifying S	ules, Lim Straightne	its of Size	e Prescribe dian Line, (	g the Feat Variation <b>Per</b> Circularity:	ture Contro is of Form fiods: 09	CO:
UNIT - III Symbols, Ge Frame, Othe Applicability o UNIT - IV Definition, Sp Specifying Ci	ometric ( r Symbo of Modifie	Characteris ols Used v ers in Feat	stic Symbols, Datum Fe with Geometric Tolerar ure Control Frames, Pitu ess of Surface Tolerar	ncing, Terms, Ru ch Diameter Rule nce, Specifying S	ules, Lim Straightne	its of Size	e Prescribe dian Line, (	g the Feat Variation Per Circularity: ariation- P	ture Contro s of Form riods: 09 : Definition roblems.	CO:
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4. https://www.youtube.com/watch?v=aS9OgYadjpY

5. https://www.youtube.com/watch?v=fXoWTHwElvo

## **COs/POs/PSOs Mapping**

COs	Program Outcomes (POs)										Program Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	2	1	2	2	1	1	3	-	1	3	2	2
2	3	2	3	2	1	2	2	1	1	3	-	1	3	2	2
3	3	2	3	2	1	2	2	1	1	3	-	1	3	2	2
4	3	2	3	2	1	2	2	1	1	3	-	1	3	2	2
5	3	2	3	2	1	2	2	1	1	3	-	1	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

Accessment		Con	ntinuous Assess	End Semester Examination	Total			
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	(ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100	

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

fr. fr. 300

Department	Mecha	anical Er	ngineering	Progra	amme :	B.Tech.				
Semester	IV			Cours	e Cateo	gory: <b>PE</b>	Enc	Semeste	er Exam Ty	pe: <b>TE</b>
Course					riods/W		Credit		kimum Mar	•
Code	U23M	EDC02		L	Т	P	С	CAM	ESE	ТМ
Course Name	PROD	JCT DES	SIGN AND DEVELOPMENT	3	0	0	3	25	75	100
	<u> </u>		Common to MEC	CH and N	Mechatr	ronics			LL.	
Prerequisite	Comp	uter Aide	d Design, Engineering Desig	In						
	On co	mpletion	of the course, the student	s will be	e able to	0			BT Ma (Highest	•••
	CO1	Explain o	conceptual product design techn	iques.					K	2
Course	CO2	Identify (	Customer needs and products de	esign spe	cificatior	าร.			K	2
Course	CO3	Use diffe	rent systematic concept generation	tion techn	iques in	product d	esign.		K	3
Outcome	CO4	Use emb	odiment design principles in late	est manuf	acturing	methods.			K	3
	CO5	Illustrate processe	the concepts relating to simulations	ing produ	ct perfor	mance an	d manufacti	uring	K	
UNIT- I	Introd	uction o	of Product Design					Per	iods: 09	
cycles, Organ	nizations heories,	for Produ	d, Need for new designs, Cons ct Design, Technological Innova norphology- pioneer design pha	ation and	Busines	s Strategi	es, Modern	Product de	evelopment	C01
UNIT- II	Navy	)roduot I						Per	iods: 09	
•••••	i new r	Product	dea							
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4. https://cosmolearning.org/video-lectures/mod-4-lec-14-product-design-development-8953/

5. https://www.udemy.com/course/product-design/

# COs/POs/PSOs Mapping

COs		Program Outcomes (POs)													am Specific mes (PSOs)	
	PO1	01 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 F											PSO1	PSO2	PSO3	
1	3	3	1	2	1	-	1	-	1	-	-	-	1	1	2	
2	2	2	2	2	2	2	1	-	1	-	-	-	1	3	2	
3	3	3	2	1	1	1	-	-	1	-	-	-	2	2	2	
4	3	3	1	2	2	-	3	1	1	-	-	2	1	2	2	
5	3	3	3	2	2	3	2	1	2	-	-	2	3	3	3	

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

Accessment		Cor	ntinuous Assessi	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Attendance	(ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100

fr. fr. 300

Department	Mech	anical Engineering	Progra	amme :	B.Tech.				
Semester	IV		Cours	e Categ	ory: PE	Enc	Semest	er Exam Ty	/pe: <b>TE</b>
Course	1123M	IEE403	Pe	riods/We	eek	Credit	Ma	ximum Mar	ks
Code	02011		L	Т	Р	С	CAM	ESE	ТМ
Course Name	INDU	STRIAL CASTING TECHNOLOGY	3	0	0	3	25	75	100
		N	1ECH						
Prerequisite	Manu	acturing Processes							
	On co	mpletion of the course, the students	s will be	able to	)			BT Ma (Highes	
	CO1	Identify the basic requirements of the prin	nciples of	metal ca	asting.			K	2
Course	CO2	Acquired knowledge of various melting p	ractices.					K	2
Outcome	CO3	Understand and explain the various spec	ial castin	g technic	lues.			к	2
Outcome	CO4	Design the gating and riser systems and	concepts	of solidi	fication.			ĸ	
	CO5	Analyze the casting defects and testing o	•					ĸ	
UNIT- I		luction to Casting Process	- caeg				Po	riods: 09	. <b>L</b>
	<u>1</u>	and Foundry industry, Basic principles o	f casting	nrocess	- Sequen	ce in found	L		
	-	wances – Core and its types, Core sand a	-		-				CO
UNIT- II	1	ng Furnaces						riods: 09	
		Types of Furnaces used in Foundry – Cu	•					· ·	
		ace, Open hearth furnace – Refractories melting and casting.	for reiting	j units, e	salety con	siderations-	Energy c	onservation	CO
UNIT - III	Speci	al Casting Techniques					Per	riods: 09	
	-	hell mould casting, Pressure Die casting, asting, Full mould casting, Evaporative pat	-	-	g – Centrif	ugal casting	g – Types	, CO2 mold	co
UNIT - IV	Solidi	fication of Castings					Pe	riods: 09	i
Solidification of		netals and alloys – Factors , Nucleation - R	ate of so	idification	n - Directio	nal solidific	ation – Ga	ating system	
		<ul><li>ication - types of gates - Factors Controllir</li><li>- Design of casting.</li></ul>	ng Gating	Design.	Riser - Ty	pes, Roles	and Locat	ion of riser -	CO
UNIT - V	Defec	ts and Inspection of Casting					Pe	riods: 09	<b>.</b>
	•	d its remedies - Fettling and Cleaning of bundry - Plant site location layout.	Casting	- Inspec	tion of cas	sting – Fou	ndry mech	nanization –	cos
Lecture Pe	riods:	45 Tutorial Periods: -	Practio	al Perio	ods: -		То	tal Periods	: 45
Text Books									
1. A.K. Chak	rabarti, '	Casting Technology and Cast Alloy" PHI L	earning	Pvt. Ltd.,	Second e	dition, 2022	<u>&gt;</u> .		
2. S.Kalpakji	an and F	R.Schmid, "Manufacturing Processes for E	ngineerir	g Materia	als", Pears	son Educati	on India E	dition, 2018	•
3. PL Jain, "	Principle	s of Foundry Technology", Tata McGraw-I	Hill, First	Edition, 2	2017.				
Reference B									
		ta Sharma, "Manufacturing Processes", W		-					
•		"Manufacturing Processes", Dhanpat Rai	·····	· · · · · · · · · · · · · · · · · · ·	-				
		cturing Technology, Volume I & II", Tata M				any, New D	Delhi, Fifth	Edition, 201	18.
		Casting and Joining" PHI Learning Pvt. Ltd				ation T''		04.4	
		Sahu, Sudhari Sahu, "Principles of Metal (	Jasting",	wcGraw		ation, Third	⊨aition, 2	U14.	
Web Referen		4404074404070407040							
		courses/112/107/112107219/#							
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3. https://ww		era.org/courses?query=manufacturing%20	-	~					
<ol> <li>https://ww</li> <li>https://ww</li> </ol>	w.edx.or	era.org/courses?query=manufacturing%20 g/course/fundamentals-of-manufacturing- es.nptel.ac.in/noc19_me20/	-	S					

N. A. 800

COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
	PO1	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO										PO12	PSO1	PSO2	PSO3
1	3	1	2	1	-	-	2	2	-	-	-	1	2	1	2
2	3	1	1	1	-	-	2	2	-	-	-	1	2	1	2
3	3	1	2	1	-	-	2	2	-	-	-	1	2	1	2
4	3	1	3	3	-	-	2	2	-	-	-	1	2	1	2
5	3	1	1	1	-	-	2	2	-	-	-	1	2	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

Accessment		Con	ntinuous Assess	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	(ESE) Marks	Marks		
Marks	5	5	5	5	5	75	100

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Department	Mech	nanical Engineering	Progr	amme :	B.Tech.				
Semester	IV			e Categ		Enc	Semeste	er Exam T	pe: TE
Course	11000		Pe	riods/W	eek	Credit	Max	imum Mai	ks
Code	UZ3N	1EE404	L	Т	Р	С	CAM	ESE	ТМ
Course Name	-	-CONVENTIONAL ENERGY RCES	3	0	0	3	25	75	100
			MECH		.i			L	
Prerequisite	Basics	of Mechanical Engineering							
	0n	mpletion of the course, the studen	te will be	abla ta				BT Ma	apping
		-						(Highes	t Level
	CO1	Understands the environmental aspects limitations.	of renewa	able ener	gy resour	ces their pro	spects and	<sup>a</sup> K	1
Course	CO2	Describes the concepts of the solar ene	rgy and its	s convers	sion syster	ms.		ĸ	2
Outcome	CO3	Describes the conversion principles of w	vind and b	iomass e	energy.				2
Cateonie	CO4	Understand the conversion principles of	tidal and	ocean th	nermal en	ergy conve	rsion	ĸ	
	CO5	Acquire the basic knowledge of fuel cell	and its ut	lizations.				ĸ	
UNIT- I		tics on Conventional Energy Sour	CAS				Per	iods: 09	
	1	onal energy sources and supply world w		India, D	efinition (	Concepts of			
		ssing the potential of NCES. Classificatio							1
mass, Ocean	Energy	Sources, comparison of these energy sou	urces						
UNIT- II	Solar	Energy					Per	iods: 09	
		available form Sun, Solar radiation data				-		-	
		olar Thermal systems: Flat plate collector;			•		•		
		nciple of Solar cell, Photovoltaic system f hotovoltaic system.	or electric	power g	eneration	, advantage:	s, disadva	ntages and	
UNIT - III	Wind	Energy and Biomass Energy					Per	iods: 09	
	-	ties of wind, availability of wind energy i					-		
	-	oower, Basic components of wind energy c nd muliblade system. Vertical axis- Savon		-		Classificatior	n of WECS	- Horizontal	
-		duction; Photosynthesis Process; Biofuels		-	-	ass conversi	ion technol	onies-fived	CO3
		energy conversion; Biomass gasification						logies-lixed	
UNIT - IV	1	Energy and Ocean Energy		,			Por	iods: 09	
		d waves as energy suppliers and their med	chanics: fu	Indamen	tal charac	teristics of tid	L		
		jes and limitations.	, -				, ,	5	CO4
Ocean Therm	al Energ	y Conversion: Principle of working, OTEC	C power st	ations in	the world,	problems a	ssociated	with OTEC.	
UNIT - V	Greer	n Energy					Per	iods: 09	
	<u>1</u>	uction, Fuel cells: Classification of fuel c	ells – H2;	Operatir	ng principl	es, Benefits	L		
		technologies (electrolysis method only), ith hydrogen energy.	hydrogen	energy	storage,	applications	of hydrog	en energy,	CO5
Lecture Pe			Practio	cal Peri	ods: -		Tot	al Periods	s: 45
Text Books									
1. G.D. Rai ,	"Non-C	onventional Energy Sources", Khanna Pu	blishers, 6	oth edition	n, 2017				
2. Khan," No	on-Conv	entional Energy Resources", McGraw H	lill Educat	tion India	a Private	Limited; Th	rd edition,	2017	
3. N.K.Bans	al, "Non-	Conventional Energy Resources", Vikas I	Publishing	House,	2014				
Reference B									
	-	, "Non-Convention EnergyResources", P							
		ainable Energy Conversion for Electricity	-		-				
		on-Conventional Energy, Wiley Eastern L					0004		
		U.Kumar, Renewable Energy Technologie			ing House	, new Delhi	, 2004		
-		er Engineering", Tata McGraw Hill, 2005.	•						
Web Referer		vo com/pop conventional access access	0100000	71 html					
-	-	ve.com/non-conventional-energy-sources ve.com/non-conventional-energy-systems			html				
	-	ve.com/renewable-energy-sources-and-th	-			ntml			
5. mps.//ww	w.pului	งจ.ออกการกระงอมระระกราชบาวธระสิปใน-แ		au0113- 3	0720082.1				

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4. https://nptel.ac.in/courses/121/106/121106014/

5. https://onlinecourses.nptel.ac.in/noc18\_ge09/preview

#### **COs/POs/PSOs Mapping**

COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	-	1	-	-	-	2	-	1	1	1	1	1	1	1
2	2	2 1 1 2 - 1 1 1										1	1	1	1
3	2	1	1	-	-	-	2	-	1	1	1	1	1	1	1
4	2	-	1	-	-	-	2	-	1	1	1	1	1	1	1
5	2	1	1	-	-	-	2	-	1	1	1	1	1	1	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

Assessment		Cor	ntinuous Assess	ment Marks (CAM)		End Semester Examination	Total
Assessment	CAT 1	CAT 2	Model Exam	Attendance	(ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100

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N. A. 800

Department	Mech	anical	Engineering		Progra	amme :	B.Tech.				
Semester	V				Cours	e Categ	ory: PE	Enc	d Semeste	er Exam T	ype: TE
Course	11001				Pe	riods/W	eek	Credit	Max	kimum Ma	rks
Code	UZSIVI	EE505			L	Т	Р	С	CAM	ESE	ТМ
Course Name	TURE	BO MAG	CHINERY		3	0	0	3	25	75	100
					MECH	1	<u>.</u>	.1	<u>i</u>		4
Prerequisite	Applie	ed Ther	modynamics, Fluid M	lechanio	cs and Hy	draulic l	Machines	5			
-	On cor	npletio	n of the course, the	e studer	nts will be	e able to	D			BT Ma (Highes	apping st Level
	CO1	Fynlai	n the energy transfer	in rotor	and state	or narts	of the tur	ho machin	<b>es</b>		2
0	CO2		n the function of varie							ĸ	2
Course	CO3								)		3
Outcome			ate the working and p			Ŭ	•				
	CO4		ze flow behavior and				······				4
	CO5	Explai	n the types and work	ing of a	xial and ra	adial flov	w turbine	S		K	2
UNIT - I		-	nciples							iods: 9	
rotor - Euler e	quation	and its	f Turbomachines. Inco Interpretation. Velocity neters for Turbomachine	v triangle							
UNIT - II	Centr	ifugal	Fans and Blowers						Per	iods: 9	
			g. Flow analysis in impe s. Performance charac						-		CO2
UNIT - III	Centr	ifuqal	Compressor						Per	iods: 9	
Components -			elocity triangles - h-s d	liagram,	stage work	. Slip fa	ctor and D	Degree of R			
characteristics	and var	rious los	ses. Geometry and per	formance	e calculatio	on.		-			CO3
UNIT - IV	Axial	Flow C	compressor						Per	iods: 9	
			one factor. Velocity tri stage losses – Stalling	-	-		-		e factor. P	erformance	CO4
UNIT - V	Axial	And R	adial Flow Turbines	;					Per	iods: 9	i
Compounding	of turbi	nes. Pe	Elements - Stage veloc rformance coefficients work Performance coe	and loss	ses. Radia	I flow tu	-	-		-	:
Lecture Peric	-		Tutorial Periods:		Practica		ds: -		Tot	al Periods	s: 45
Text Books							-				
	ubey, B	VSSS F	rasad, Archana Nema,	Turboma	achinery, T	ata McG	raw Hill C	o. Ltd., 201	8.		
2. Ganesan, V	/., "Gas	Turbine	s", 3rd Edition, Tata Mo	Graw Hil	ll, 2017.						
3. Yahya, S.M	., "Turb	ines, Co	mpressor and Fans", 4	th Edition	, Tata McC	Graw Hill,	2011.				
Reference Bo	oks										
1. R. K. Turtor	n, Princi	ples of 7	urbomachinery, Spring	ger Nethe	erlands, 20	12.					
2. B.K.Venkar	nna, Fur	ndament	als of Turbo machinery	, Phi Lea	rning Priva	ate Limite	ed, 2009.				
3. M. S. Govir	degoud	la and A	. M. Nagaraj, Text Bool	k of Turb	o machine	s, M. M.	Publicatio	ns, 4 <sup>th</sup> Edit	ion, 2008		
4. S. L. Dixon	Fluid M	lechanic	s and Thermodynamic	s of Turb	o machine	s, Elsevi	er, 2005				
-		incipals	of Turbo machines, The	e Macmil	llan Compa	any, 1964	1.				
Web Reference											
A latter a . //.aa.t.a			01/101/101101058/								
• • •		ourses/1	12/103/112103249/								
2. https://npte											
2. https://npte 3. https://www	.youtub	e.com/w	atch?v=473XQrJjDZE								
<ol> <li>https://npte</li> <li>https://www</li> <li>https://www</li> </ol>	youtub yyoutub	e.com/w e.com/w									

N. A. 800

COs		Program Outcomes (POs)												ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	1	-	-	-	-	-	-	-	-	1	2	-
2	3	2	2	2	-	-	-	-	-	-	-	-	-	-	-
3	3	3	1	2	-	-	-	-	-	-	-	-	-	2	-
4	3	2	2	3	-	-	-	-	-	-	-	-	-	-	-
5	3	3	2	3	-	-	-	-	-	-	-	-	1	1	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	essment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100

A. A. 800

Department	Mechanical Engineering     Programme : B.Tech.										
Semester	V				Cours	e Categ	ory: <b>PE</b>	End S	Semester E	xam Type	: TE
Course						iods/W		Credit	1	mum Marl	
Code	0231	MEE506	j		L	Т	Р	С	CAM	ESE	ТМ
Course Name			ETALLURGY AN OATING	ID	3	0	0	3	25	75	100
				١	MECH						
Prerequisite	Engin	eering N	/letallurgy								
	On co	mpletic	on of the course,	, the studer	nts will b	e able t	to			BT Ma (Highest	
	CO1	Acquire methoo	the knowledge of s.	Powder Met	allurgy Hi	story, Ap	oplications	and its ma	nufacturing	K	I
Course	CO2	Gain kr	owledge about pov	wder characte	erizing tec	hniques.				K	2
Outcome	CO3	Classify	/ the metal powder	compaction I	methods,	adhesive	s and Sur	face coating	js.	K	3
	CO4	Exemp	ify the suitable sint	ering techniq	ues for po	wder me	etallurgy.			K	
	CO5     Appraise the suitable material for different applications.									K4	
UNIT - I	Characteristics and Testing of Metal Powders									eriods: 9	•
-			purity, surface cor			size an	d its meas	urement Pr	i		
of sieve analys	is, micro classific	scopic a ations, r	nalysis: sedimenta	tion, elutriatio	on, perme	ability. A	dsorption	methods ar	nd resistivity	methods:	CO1
UNIT - II	Produ	uction o	of Powders and	Conditionin	ng				Pe	eriods: 9	
from aqueous s - Water atomiz processes. pow	olution a zation, /der con  h-tempe	and fuse Gas ato ditioning erature s	sition, carbonyl Re d salts, hydrometal mization, Centrifug , heat treatment, bl ynthesis (SHS), so	lurgical meth gal atomizati ending and n	od. Physic on, Vacu nixing, typ	al metho um aton	ods: Electr	olysis and a Shotting-fa	atomisation actors affecting and bler	processes ting these	CO2
Powder Compa	action M	ethods -	Pressure less con	npaction: slip	casting a	nd slurrv	casting.	Pressure co	mpaction-	ubrication.	
single ended a	nd dout usion of	ole ende loose p	d compaction, Vibrowder, Cold pressi	atory compa	ction ,isos	static pre	essing, pov	wder rolling	, forging ar	nd Powder	CO3
UNIT - IV	Sinte	ring							Pe	eriods: 9	
pressing and H	ot isosta tions – s	atic Pres	nges, mechanisms sing (HIP), vacuun vining, repressing a	n sintering, si	intering fu	rnaces-b	atch and	continuous-	sintering at	mosphere,	CO4
UNIT - V	Appli	cations							Pe	eriods: 9	-
Methods of proc	duction,	Properti	, Nuclear and Auto es, Applications. Si nets- Dispersion str	ntered Frictio	n Material	-				• •	CO5
Lecture Peric	ods: 45		Tutorial Period	s:	Practica	l Perio	ds: -		Тс	tal Period	ds: 45
Text Books											-
1. Anish Upad	hya and	G.S.Up	adhaya, "Powder M	letallurgy: Sc	ience, Teo	chnology	and Mate	rials, Unive	rsities Pres	s, 2018	
-	-		allurgy: principles a	-		-					
		Coating	and Modification o	f Metallic Bior	material" V	Voodhea	ad Publish	ing, 2015.			
Reference Bo					•	ond = ···					
			gy: principles and p		-				~		
			Advances in Powde nian., "Powder Met					-		8	
3. P.C.Angelo	anu R.S	oupraina	man., Powder Met	anurgy. Scier	ice, rechi	lology al	na Applica	non Prenti	Je ⊓ali, 200	υ	

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4.

5.

1. 2.

3.

4.

5.

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	1	2	1	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
3	3	2	-	1	-	-	-	-	-	-	-	-	-	2	-
4	3	3	1	2	1	-	-	-	-	-	-	-	-	-	-
5	3	3     1     2     1     -     -     -     -     -       3     2     3     2     -     -     -     -     -     -											-	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

fr. fr. 300

	Mech								
Semester	V		Cours	e Catego	ory: <b>PE</b>	End S	emester	Exam Typ	e: TE
Course	U23M	EE507	Pe	riods/We	ek	Credit	Ma	kimum Ma	rks
Code	02011		L	Т	Р	С	CAM	ESE	ТМ
Course Name	GREE	EN MANUFACTURING	3	0	0	3	25	75	100
			MECH						
Prerequisite	-								
	On co	mpletion of the course, the st	udents will k	be able t	0				apping st Level)
	CO1	Understand the basics of green m	•						2
	CO2	Obtain knowledge on the metric to meet the needs of a particular li			ze the lea	arned gener	ic concep <sup>-</sup>	s K	2
Course Outcome	Outcome Set of given sustainable green manufacturing requirements.								
	CO4	Understand the nanotechnologies	in real time ap	plications	i.			ĸ	2
		Apply the rules and processes to				-		-	
	CO5	requirements by selecting and management and supply chain ma	-		echnical,	manageria	ı / proje	ct K	(3
UNIT - I	Basic	s of Green Manufacturing					F	eriods: 9	
Introduction to Manufacturing	o Gree , Strate	n Manufacturing: Motivations and gies for Green Manufacturing, Su				-			:
		n Manufacturing							001
UNIT - II		cs and Principles of Green Ma	-					eriods: 9	
Motivation and	l Introdu	ufacturing Introduction, Overview of ction, Definition, Issues in Green So anufacturing: Introduction, Backgrou	upply Chains (			-			
		analactaring. Introduction, Backgrot	inu.						
UNIT - III	Close	ed-Loop Production Systems					F	eriods: 9	
Closed-Loop F	Producti hine To	ed-Loop Production Systems on Systems: Life Cycle of Product pols and Energy Consumption, LC	tion Systems,			•	nefits of C	losed Loop	r
Closed-Loop F Systems, Mac Sustainable Fa	Production whine To actory D	ed-Loop Production Systems on Systems: Life Cycle of Product pols and Energy Consumption, LC	tion Systems, CA of Machine	e Tools, I		•	nefits of C euse, App	losed Loop	r
Closed-Loop F Systems, Mac Sustainable Fa <b>UNIT - IV</b> Environmental Environmental	Production whine To actory D Nano Implic Impact	ed-Loop Production Systems on Systems: Life Cycle of Product ools and Energy Consumption, LC esign.	tion Systems, CA of Machine ergy Techno Introduction, entional Envir	e Tools, I Iogies Nano-ma ronmental	Remanufa Inufacturir Impacts	ncturing, Re	nefits of C euse, App <b>F</b> logies, C	losed Loop roaches fo <b>Periods: 9</b> onventiona	r <b>CO3</b>
Closed-Loop F Systems, Mac Sustainable Fa <b>UNIT - IV</b> Environmental Environmental	Production Infine Totactory D Nano Implico Impactor Throug	ed-Loop Production Systems on Systems: Life Cycle of Product bols and Energy Consumption, LC esign. -Manufacturing and Clean Energy ations of Nano-manufacturing: t of Nano-manufacturing, Unconv	tion Systems, CA of Machine ergy Techno Introduction, entional Envir	e Tools, I Iogies Nano-ma ronmental	Remanufa Inufacturir Impacts	ncturing, Re	hefits of C buse, App buse, C logies, C nanufactu	losed Loop roaches fo <b>Periods: 9</b> onventiona	r <b>CO3</b>
Closed-Loop F Systems, Mac Sustainable Fa UNIT - IV Environmental Environmental Manufacturing UNIT - V Packaging an	Productii hine Tc actory D Nano Implic Impact Throug Packa d the S	ed-Loop Production Systems on Systems: Life Cycle of Product bols and Energy Consumption, LC esign. -Manufacturing and Clean Energy ations of Nano-manufacturing: t of Nano-manufacturing, Unconv h Clean Energy Supply Introduction	tion Systems, CA of Machine ergy Techno Introduction, rentional Envir , Clean Energy	e Tools, F logies Nano-ma onmental y Technol	Remanufa nufacturir Impacts ogies.	ncturing, Re ng Techno of Nano-r	hefits of C buse, App logies, C nanufactu	losed Loop roaches fo Periods: 9 onventiona ring. Greer Periods: 9	CO3
Closed-Loop F Systems, Mac Sustainable Fa UNIT - IV Environmental Environmental Manufacturing UNIT - V Packaging an	Productii hine Tc actory D Implic Impact Throug Packa d the S : Motiva	ed-Loop Production Systems on Systems: Life Cycle of Product bols and Energy Consumption, LC esign. -Manufacturing and Clean Energy ations of Nano-manufacturing: t of Nano-manufacturing, Unconv h Clean Energy Supply Introduction aging and the Supply Chain Supply Chain: A Look at Transpo tion, Process Monitoring System.	tion Systems, CA of Machine ergy Techno Introduction, entional Envir , Clean Energy ortation Introdu	e Tools, F logies Nano-ma onmental y Technol	Remanufa nufacturir Impacts ogies. nabling Te	ncturing, Re ng Techno of Nano-r	efits of C buse, App logies, C nanufactu for Assu	losed Loop roaches fo Periods: 9 onventiona ring. Greer Periods: 9	CO3 CO4
Closed-Loop F Systems, Mac Sustainable Fa UNIT - IV Environmental Environmental Manufacturing UNIT - V Packaging an Manufacturing Lecture Perio	Productii hine Tc actory D Implic Impact Throug Packa d the S : Motiva	ed-Loop Production Systems on Systems: Life Cycle of Product bols and Energy Consumption, LC esign. -Manufacturing and Clean Energy ations of Nano-manufacturing: t of Nano-manufacturing, Unconv h Clean Energy Supply Introduction aging and the Supply Chain Supply Chain: A Look at Transpo tion, Process Monitoring System.	tion Systems, CA of Machine ergy Techno Introduction, entional Envir , Clean Energy ortation Introdu	e Tools, I Iogies Nano-ma ronmental y Technolo uction, Er	Remanufa nufacturir Impacts ogies. nabling Te	ncturing, Re ng Techno of Nano-r	efits of C buse, App logies, C nanufactu for Assu	losed Loop roaches fo Periods: 9 onventiona ring. Greer Periods: 9 ring Greer	CO3 CO4
Closed-Loop F Systems, Mac Sustainable Fa UNIT - IV Environmental Environmental Manufacturing UNIT - V Packaging an Manufacturing Lecture Peric Text Books	Productii hine Tc actory D Nano Implic Impact Throug Packa d the S : Motiva	ed-Loop Production Systems on Systems: Life Cycle of Product bols and Energy Consumption, LC esign. -Manufacturing and Clean Energy ations of Nano-manufacturing: t of Nano-manufacturing, Unconv h Clean Energy Supply Introduction aging and the Supply Chain Supply Chain: A Look at Transpo tion, Process Monitoring System.	tion Systems, CA of Machine ergy Techno Introduction, rentional Envir , Clean Energy ortation Introdu	e Tools, I logies Nano-ma onmental y Technolo uction, Er al Perioc	Remanufa nufacturir Impacts ogies. nabling Te <b>ds: -</b>	ncturing, Re	efits of C buse, App logies, C nanufactu for Assu	losed Loop roaches fo Periods: 9 onventiona ring. Greer Periods: 9 ring Greer	CO3
Closed-Loop F Systems, Mac Sustainable Fa UNIT - IV Environmental Environmental Manufacturing UNIT - V Packaging an Manufacturing Lecture Perior Text Books 1. Ame,Green 2. Mrityunjay S	Productii hine To actory D Implic Impact Throug Packa d the S : Motiva ods: 45 Manufa Singh, T	ed-Loop Production Systems on Systems: Life Cycle of Product bols and Energy Consumption, LC esign. -Manufacturing and Clean Energy ations of Nano-manufacturing: t of Nano-manufacturing, Unconv h Clean Energy Supply Introduction aging and the Supply Chain Supply Chain: A Look at Transpo- tion, Process Monitoring System. Tutorial Periods: atsukiOhji, Rajiv Asthana, Green ar	tion Systems, CA of Machine ergy Techno Introduction, entional Envir , Clean Energy ortation Introdu Practic Sustainability, nd Sustainable	e Tools, I Iogies Nano-ma onmental y Technol y Technol uction, Er al Perioc Productiv Manufact	Remanufa unufacturir Impacts ogies. habling Te ds: - ity Press, turing of A	echnologies 2017 dvanced M	hefits of C buse, App logies, C nanufactu for Assu for Assu 1 aterial, Els	losed Loop roaches fo Periods: 9 onventiona ring. Greer Periods: 9 Iring Greer	CO3 CO4 CO5 ods: 45
Closed-Loop F Systems, Mac Sustainable Fa UNIT - IV Environmental Environmental Manufacturing UNIT - V Packaging an Manufacturing Lecture Peric Text Books 1. Ame,Green 2. Mrityunjay S 3. Ade Asefes	Productii hine Tc actory D Implic Impact Throug Packa d the S Motiva ods: 45 Manufa Singh, T o, Gree	ed-Loop Production Systems on Systems: Life Cycle of Product bols and Energy Consumption, LC esign. -Manufacturing and Clean Energy ations of Nano-manufacturing: t of Nano-manufacturing, Unconv h Clean Energy Supply Introduction aging and the Supply Chain Supply Chain: A Look at Transpo- tion, Process Monitoring System. Tutorial Periods: acturing: Case Studies in Lean and S	tion Systems, CA of Machine ergy Techno Introduction, entional Envir , Clean Energy ortation Introdu Practic Sustainability, nd Sustainable	e Tools, I Iogies Nano-ma onmental y Technol y Technol uction, Er al Perioc Productiv Manufact	Remanufa unufacturir Impacts ogies. habling Te ds: - ity Press, turing of A	echnologies 2017 dvanced M	hefits of C buse, App logies, C nanufactu for Assu for Assu 1 aterial, Els	losed Loop roaches fo Periods: 9 onventiona ring. Greer Periods: 9 Iring Greer	CO3 CO4 CO5 ods: 45
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3. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mg24/

4. https://www.youtube.com/watch?v=16vobnhafVw

5. https://www.youtube.com/watch?v=NSzvttpHdWY

# **COs/POs/PSOs Mapping**

COs		Program Outcomes (POs)												ram Spe omes (P	
	P01	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO											PSO1	PSO2	PSO3
1	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
2	3	1	1	1	-	-	-	-	-	-	-	-	-	-	-
3	3	1	1	1	-	-	-	-	-	-	-	-	-	-	-
4	3	3 2 1 2									-	2	-	-	
5	3	2 1 2											-	1	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Mech	anical E	ngineering		Progr	amme :	B.Tech.				
Semester	v				Cours	e Categ	gory: <b>PE</b>	End S	Semester	Exam Type	e: <b>TE</b>
Course	1122M	EE508			Pe	riods/W	eek	Credit	Ma	aximum Mar	rks
Code	UZSIVI	EE300			L	Т	Р	С	CAM	ESE	ТМ
Course Name	FLUID	POWEF	RAUTOMATION		3	0	0	3	25	75	100
	.,				MECH						
Prerequisite	Fluid	Mechanio	cs and Hydraulic M	lachines	;						
	On co	mpletior	n of the course, th	he stude	ents will b	be able	to			BT Ma	
		-								(Highes	
	CO1		posure to the basic			-		al laws affe	ecting flu	id K	2
Course	CO2		rds and symbols u knowledge on fluid					nts.		к	'n
Outcome	CO3		hydraulic compor	•							
	CO4	-	of hydraulic and p				strial auto	mation		K	
	CO4	-	and develop electr						tions	K	
	-		•	o pricuri			automat				4
UNIT - I			to Fluid Power	•	·· • •				i	Periods: 9	I
			ols – Hydraulics and smission and multip								
			principle and constru							properties	CO1
UNIT - II	Eluid	Dowor A	Actuators							Periods: 9	
	.1						una air dia	tribution of	I		
:	d specif	ication, d	motors, Pneumatic cylinders, mounting	-		-					
UNIT - III	Fluid	Power C	ontrol Elements							Periods: 9	
	-		direction – working tion and actuation m					-		-	
UNIT - IV	Desig	n of Hyc	Iraulic and Pneur	matic Ci	rcuits					Periods: 9	
-	-		d synchronizing circu onents, sequencing				-			on, selection	CO4
UNIT - V	Electi	ro Pneur	natics and PLC C	Circuits						Periods: 9	
Use of electr	ical time	rs, switch	es, solenoid, relays	and proxi	mity senso	ors electro	o pneumat	ic sequenci	ng – PLC	- elements,	
functions and	selection	n – PLC p	programming – Lado tomotive application	der diagra	-		-		-		
Lecture Peri	ods: 45		Tutorial Periods:		Practic	al Perio	ds: -			Total Perio	ds: 45
Text Books		L			.1				k		
1. James R. I	Daines a	nd Daniel	W. Sielaff, "Fluid Po	wer-Hydr	aulics and	Pneuma	itics", Goo	dheart-Willo	cox 3 rd E	dition, 2022.	
Edition, 20	19.		ocher, "Fluid Power						ion", CRC	Press LLC,	2nd
3. R Srinivasa	an, ⊓vu	aunoari	leumatic Controls v			,					
Reference Bo											
Reference Bo	oks		with Hydraulics and I		•	ternation	al Publish	ing House 1	st Editio	n 2023.	
Reference Bo	ooks a T, "Au	tomation		Pneumati	cs", I.K. In						
Reference Bo1.Jagadeesh2.Frank H. S3.ShanmugaEdition 202	a T, "Au imons, "l Sundara 20.	tomation v Fluid Pow am, ''Hydr	with Hydraulics and I er Automation: Func aulic and Pneumatic	Pneumation lamentals c Control-I	cs", I.K. In and Appli Design, Mo	cations", odelling, a	McGraw- and Autom	Hill Education nation", S. C	on 2 nd E	dition 2021.	Ltd 2nd
Reference Bo1.Jagadeesh2.Frank H. S3.ShanmugaEdition 2024.Ilango Siva	ooks a T, "Au imons, "I Sundara 20. iraman, "	tomation v Fluid Pow am, "Hydr Introducti	with Hydraulics and I er Automation: Func aulic and Pneumatic on to Hydraulics and	Pneumati Jamentals control-I l Pneuma	cs", I.K. In and Appli Design, Mo tics", PHI I	cations", odelling, a _earning	McGraw- and Autom Pvt. Ltd, 2	Hill Education nation'', S. C	on 2 nd E Chand &C	dition 2021. ompany Pvt.	Ltd 2nd
Reference Bc1.Jagadeesh2.Frank H. S3.ShanmugaEdition 2024.Ilango Siva5.M. Winstor	ooks a T, "Au imons, "I Sundara 20. iraman, "	tomation v Fluid Pow am, "Hydr Introducti	with Hydraulics and I er Automation: Func aulic and Pneumatic	Pneumati Jamentals control-I l Pneuma	cs", I.K. In and Appli Design, Mo tics", PHI I	cations", odelling, a _earning	McGraw- and Autom Pvt. Ltd, 2	Hill Education nation'', S. C	on 2 nd E Chand &C	dition 2021. ompany Pvt.	Ltd 2nd
Reference Bo1.Jagadeesh2.Frank H. S3.Shanmuga Edition 2024.Ilango Siva5.M. WinstorWeb Reference	ooks a T, "Au imons, "I Sundara 20. irraman, " n, "Essen <b>Ces</b>	tomation v Fluid Pow am, "Hydr Introducti tial Hydra	with Hydraulics and I er Automation: Func aulic and Pneumatic on to Hydraulics and ulics: Fluid Power: V	Pneumati Jamentals control-I l Pneuma	cs", I.K. In and Appli Design, Mo tics", PHI I	cations", odelling, a _earning	McGraw- and Autom Pvt. Ltd, 2	Hill Education nation'', S. C	on 2 nd E Chand &C	dition 2021. ompany Pvt.	Ltd 2nd
Reference Bo1.Jagadeesh2.Frank H. S3.ShanmugaEdition 2024.Ilango Siva5.M. WinstorWeb Reference1.https://npte	a T, "Au imons, "I Sundara 0. iraman, " a, "Essen <b>ces</b> il.ac.in/co	tomation v Fluid Pow am, "Hydr Introducti tial Hydra purses/11:	with Hydraulics and I er Automation: Func aulic and Pneumatic on to Hydraulics and	Pneumati Jamentals control-I l Pneuma	cs", I.K. In and Appli Design, Mo tics", PHI I	cations", odelling, a _earning	McGraw- and Autom Pvt. Ltd, 2	Hill Education nation'', S. C	on 2 nd E Chand &C	dition 2021. ompany Pvt.	Ltd 2nd

A. A. 300

4. https://www.youtube.com/watch?v=S\_4anj7GpRo

5. https://www.youtube.com/watch?v=clVwKynHpB0

## COs/POs/PSOs Mapping

COs		Program Outcomes (POs) O1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO												ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	2	2	2	2	-	1	-	-	-	1	3	1	2
2	3	2	2	1	1	2	-	-	-	-	-	1	1	2	2
3	3	2	2	2	2	1	-	-	-	-	-	2	2	2	2
4	3	2	3	1	1	3	-	-	-	-	2	1	3	2	2
5	3	2     3     1     1     3     -     -     -     2       2     3     2     2     2     -     -     -     2										2	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

fr. fr. 300

**Mechanical Engineering** 

Department

Semester											
	V			Cours	e Categ	ory: PE		End Sei	neste	r Exam Ty	pe: <b>TE</b>
Course	U23N	IEE509		Pe	riods/W	eek	Cred			imum Mar	ks
Code				L	Т	Р	C	C	٩M	ESE	ТМ
Course Name	, IOT A	ND SM	ART MANUFACTURING	3	0	0	3	8 2	5	75	100
	T			MECH							
Prerequisite	Basics	s of Elec	tronics, Mechanical Manufa	acturing Pr	ocess, a	and Introd	duction	to Auto	matio		
	On coi	mpletio	n of the course, the stude	ents will b	e able t	0				BT Ma (Highest	••••
	CO1	Unders	tand the fundamentals and ap	plications o	f loT in s	mart manu	ufacturin	g		K	2
Course	CO2	Analyze	e various IoT architectures and	d communic	ation pro	tocols use	ed in ind	ustry		ĸ	2
Outcome	CO3	Apply lo	oT sensors, actuators, and dat	ta analytics	tools in s	smart man	ufacturir	ng.		K	3
	CO4	Evaluat	te the impact of cloud computi	ng and big o	data anal	ytics				K	3
	CO5	Design	and implement basic IoT-enal	bled system	s for rea	I-time mor	nitoring a	and cont	rol	K	3
UNIT - I	Introd	duction	······				J			ods: 9	
IoT Overview:	Definitio	on, Chara	acteristics, and Applications. Io	T Architect	ure: Laye	ers and Pro	otocols (	Percepti	on, Ne	etwork, and	
Application La Manufacturing		Role of	IoT in Mechanical and Indu	ıstrial Engi	neering.	Challenge	es and	Opportu	nities	in IoT for	CO1
UNIT - II	Sens	ors, Act	tuators, and IoT Commun	ication					Per	ods: 9	
	, LoRa,	Bluetoot	s, Working Principles, and Ap h, and MQTT. Wireless Sens			-					CO2
UNIT - III	Smar	t Manuf	acturing Systems						Per	ods: 9	
Manufacturing	. Cyber	-Physical	turing: Key Concepts and Tec Systems (CPS) in Manufactu of IoT-enabled Manufacturing	uring: Integ	-					-	CO3
UNIT - IV	loT D	ata Ana	lytics and Cloud Comput	ing					Per	ods: 9	
Introduction to	Big Dat	ta Analyti	ics: Collection, Processing, an	d Analysis	Cloud C		in IoT: S	Storage,	Data F		
and Managem	nent. Ed		outing and Fog Computing in S g IoT Analytics.			g. Predicti		tenance		Detection,	CO4
and Managem	nent. Ed Optimiza	tion using		Smart Man		g. Predicti		tenance	, Fault	Detection,	CO4
and Managem and Process C UNIT - V Design of IoT Microcontrolle	nent. Ed Optimiza IoT S T Syster ers (e.g.,	tion using <b>ystem [</b> ms for N Arduino	g IoT Analytics.	Smart Man cturing anufacturin I Privacy Is	ufacturing g Proces	sses. Inte	ve Main rfacing	Sensors	, Fault <b>Per</b> i , Actu	ods: 9	
and Managem and Process C UNIT - V Design of IoT Microcontrolle	IoT S IoT System IoT System In System I	tion using ystem [ ms for M Arduino of a Sm	g IoT Analytics. <b>Design for Smart Manufac</b> <i>N</i> onitoring and Controlling Ma , Raspberry Pi). Security and	Smart Man cturing anufacturin I Privacy Is	ufacturing g Proces sues in l	sses. Inte	ve Main rfacing	Sensors	, Fault <b>Per</b> i , Actu g Syst	ods: 9	CO5
and Managem and Process C UNIT - V Design of IoT Microcontrolle Study: Implem	IoT S IoT System IoT System In System I	tion using ystem [ ms for M Arduino of a Sm	g IoT Analytics. Design for Smart Manufac Aonitoring and Controlling Ma , Raspberry Pi). Security and art Manufacturing System usir	Smart Man cturing anufacturing I Privacy Is ng IoT.	ufacturing g Proces sues in l	sses. Inte	ve Main rfacing	Sensors	, Fault <b>Per</b> i , Actu g Syst	ods: 9 lators, and ems. Case	CO5
and Managem and Process C UNIT - V Design of IoT Microcontrolle Study: Implem Lecture Perio Text Books	nent. Ed Dptimiza IoT S T System rs (e.g., nentation ods: 45	tion using ystem I ms for N Arduino of a Sm	g IoT Analytics. Design for Smart Manufac Aonitoring and Controlling Ma , Raspberry Pi). Security and art Manufacturing System usir	Smart Man cturing anufacturing I Privacy Is ng IoT. Practica	ufacturing g Proces sues in I al <b>Perio</b>	sses. Inte oT-enable ds: -	ve Main rfacing ed Manu	Sensors Ifacturino	Fault Peri Actu Syst	ods: 9 lators, and ems. Case	CO5
and Managem and Process C UNIT - V Design of IoT Microcontrolle Study: Implem Lecture Perio Text Books 1. Industrial Io	nent. Ed Dptimiza IoT S System ors (e.g., nentation ods: 45	tion using ystem [ ms for N Arduino of a Sm lenges, [	g IoT Analytics. Design for Smart Manufac Aonitoring and Controlling Ma , Raspberry Pi). Security and art Manufacturing System usir Tutorial Periods:	Smart Man <b>cturing</b> anufacturing I Privacy Is ng IoT. <b>Practica</b> , and Secur	ufacturing g Proces sues in l <b>al Perio</b> ity by Isr	sses. Inte oT-enable <b>ds: -</b> nail Butun	ve Main rfacing ed Manu , Spring	Sensors Ifacturino	Fault Peri Actu Syst	ods: 9 lators, and ems. Case	CO5
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Programme : B.Tech.

fr. fr. cola

B.Tech. Mechanical Engineering

4. https://ieeexplore.ieee.org/Xplore/home.jsp

5. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-883-pervasive-human-centric-computing-sensing-ioand-machine-learning-fall-2020/

#### COs/POs/PSOs Mapping

COs					Proç	gram O	utcome	es (POs	)					jram Spe omes (P	
	PO1	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 F											PSO1	PSO2	PSO3
1	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2
2	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2
3	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2
4	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2
5	3	2	2	3	-	-	-	-	-	-	-	1	2	-	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

Hr. H. 800



A. A. 800

N. A. 800

Department	Mech	anical	Engineering		Progra	amme :	B.Tech.					
Semester	VI				Cours	e Categ	ory: PE	E	Ind Se	mester	Exam T	ype: <b>TE</b>
Course	1122M	IEE610			Pei	iods/We	eek	Credi	t	Maxir	num Ma	rks
Code	UZSIV				L	Т	Р	С	С	AM	ESE	ТМ
Course Name			IENT ANALYSI AL ENGINEERS		3	0	0	3	2	25	75	100
Drozoniciaito	Engin	ooring	Vathematics		MECH							
Prerequisite			n of the course	. the stude	nts will be	e able to	0					apping
		-									(Highe	st Level)
	CO1	Discus FEM.	ss the concepts	behind vario	ous metho	ds and	weighted	d residua	al meth	ods in	ł	(2
Course	CO2	Descr	be the discretize	ation concep	ots.						ŀ	<b>(</b> 2
Outcome	CO3		y the application and isoperimetri					such as	bars, b	eams,	ł	<b>{</b> 4
	CO4	Comp	are the iso-para	metric and is	so-perimet	ric elem	nents.				ł	<b>{</b> 4
	CO5		y how the finite ms involving in s			-				ain, for	ł	<b>(</b> 4
UNIT - I	Intro	duction				Jat trant			••	Peric	ods: 9	
			and equilibrium, st	rain - displace	oment relat	ons stre	sec – etrai	n relation	e nland			<u> </u>
1			idual methods, co	-			55 – Strai	Intelation	s, plane			CO1
UNIT - II	One I	Dimens	ional							Peric	ods: 9	
	inctions	, and loc	n procedures, ass al and global coo	-					-	-		
UNIT - III	Analy	sis of	Trusses							Peric	ods: 9	
equations, sim	nple pro	blems o	inates and shape on beams. Modeli ns, formulation of	ing of two di	mensional							
UNIT - IV	Highe	er Orde	r and Isoparam	etric Eleme	ents					Peric	ods: 9	
One dimensior and numerical	-		d cubic elements	in natural coo	ordinates, tv	vo dimer	nsional fo	ur nodde	d isope	rimetric	element	s CO4
UNIT - V	Stead	y State	Heat Transfer	Analysis						Peric	ods: 9	
Dynamic Analy	/sis: Fo	rmulatio	fin and two dimer of finite element vibration analysis	model, eleme	-		-			-		
Lecture Peric	ods: 45	;	<b>Tutorial Perio</b>	ds:	Practica	I Perio	ds: -			Tota	l Period	s: 45
Text Books			L		.i					<u>i</u>		
2. Tirupathi R.	Chand	rupatla,	Element Methods Ashok D. Belegun	du, "Introduct	ion to Finite	Elemen	nts in Eng	ineering"				II, 2012.
3. Reddy. J.N. Reference Bool		troductio	on to the Finite Ele	ment Method	, 3 <sup>rd</sup> Editio	n, rata N	/icGraw-F	IIII, 2005.				
		el, Parme	shwar Patil, N. I.	Jamader, "Fin	nite Elemen	t Analysi	s", Techn	ical publi	cations.	2019.		
2. G.Ramamu	rthy, "A	pplied Fi	nite Element Anal	ysis", 2 <sup>nd</sup> Edit	ion, Wiley I	Publicatio	on, 2010.	-				
			te Element Analys								1:01	
4. Robert D C Wiley and S			Ikus, Michael E P	iesna, "Conce	epts and Ap	plication	is of Finite	Elemen	t Analys	sis", 4th	ealtion, .	ionn
-			Element Analysis"	, Tata McGra	w-Hill, 2000	).						
Web Reference												
1. https://nptel			12104193/									
2. https://www	.course	ra.org										

dr. dr. 8000

- 3. https://www.featutorials.com
- 4. https://www.sciencedirect.com/topics/engineering/finite-element-analysis
- 5. https://www.comsol.co.in/multiphysics/finite-element-method

COs					Prog	gram O	utcome	es (POs	)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	2	1	-	-	-	-	-	1	3	2	1
2	3	2	2	2	2	1	-	-	-	-	-	1	3	2	1
3	3	2	2	2	2	1	-	-	-	-	-	1	3	2	1
4	3	2	3	2	2	1	-	-	-	-	-	1	3	2	1
5	3	2	2	2	2	1	-	-	-	-	-	1	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

fr. fr. 800

Semester	meen	anical Engineering	Progr	amme :	B.Tech.				
	VI		Cours	e Categ	gory: <b>PE</b>	Enc	Semeste	er Exam 1	ype: <b>TE</b>
Course	U23M	EE611	Pe	riods/W	eek	Credit	Max	kimum Ma	arks
Code			L	Т	Р	С	CAM	ESE	ТМ
Course Name	СОМ	PUTATIONAL FLUID DYNAMICS	3	0	0	3	25	75	100
Des es es d'alta			MECH						
Prerequisite		lechanics and Machinery						BTM	apping
	On co	mpletion of the course, the studen	ts will be	e able to	D				st Level
	CO1	Solve numerically the governing equation	ons for flui	d flow				****	<b>{</b> 3
Course	CO2	Analyze the numerical integration the lin	near algeb	ra metho	ods in vari	ous methods	3		<b>∢</b> 4
Outcome	CO3	Apply grid generation principles for vari	ous proble	ms in CA	AD interfa	се			<b>&lt;</b> 3
Outcome	CO4	Solve numerically a heat transfer and fl	uid flow pr	oblem					<b>K</b> 3
	CO5	Acquire FEM problems in fluid flow and	heat trans	fer by va	arious cas	e studies			<b>K</b> 3
UNIT- I	Equa	ions of Fluid Dynamics					Per	iods: 9	
Classification	of equat	ow equations, Bernoulli's equation and ion of motions – hyperbolic, parabolic, ell ematical Preliminaries	-	ransport	equation	. Initial and	-		<sup>5.</sup> CO1
UNIT- II		Review of linear algebra, solution of simu	iltaneous	inear alo	ebraic ec	uations – ma		iods: 9	c .
	-	ination methods, ill conditioned systems;		-					CO2
UNIT- III		Generation	-					iods: 9	
		dinates. General principles of grid generation; Elli		-				-	:
				eneratior		n Grid cluste	erina Grid	refinemen	t i
block methods	-	grids. Algorithms, CAD interfaces to grid			-		-		
block methods	s. Finite	grids. Algorithms, CAD interfaces to grid Difference Discretization	generatio	n. Techn	iques for	complex and	large prot	olems: Mul iods: 9	ti CO3
block methods UNIT- IV Elementary fi errors and st	s. Finite inite diffe ability ar wind sch	Difference Discretization rence coefficients, basic aspects of finite of nalysis. Stability of elliptic and hyperbolic eme, transporting property, higher order	l generatio difference equations	n. Techn equation s. Fundar	s, consist	complex and ency, explicit f fluid flow m	Per and implie	iods: 9 iods: 9 bit methods	ti CO3
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block methods UNIT- IV Elementary fi errors and st property, up conduction, o	s. Finite inite diffe ability ar wind sch convectio Finite	Difference Discretization rence coefficients, basic aspects of finite on alysis. Stability of elliptic and hyperbolic eme, transporting property, higher order on.	l generatio difference equations er unwindii	n. Techn equation s. Fundar ng. Finite	iques for s, consist mentals o e differen	complex and ency, explicit f fluid flow m ce applicatic	Per and implie odelling-c ons in hea	iods: 9 iods: 9 cit methods onservativ t transfer iods: 9	ti CO3
block methods UNIT- IV Elementary fi errors and st property, up conduction, of UNIT- V Introduction, algorithm. Soc implicit scher	s. Finite ability ar wind sch convectio Finite Application of mes. Fin	Difference Discretization rence coefficients, basic aspects of finite of alysis. Stability of elliptic and hyperbolic eme, transporting property, higher order on. Volume Method	difference equations or unwindin blems, NS te volume ted residu	n. Techn equation 5. Fundar ng. Finite equation methods al and va	s, consist mentals o e differen ms – stagg s for unste ariational	complex and ency, explicit f fluid flow m ce applicatio gered grid, co pady problem formulations	Per and impliced and iods: 9 iods: 9 cit methods onservativ t transfer iods: 9 rid, SIMPLI it schemes tion in one	ti CO3	
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2.	https://nptel.ac.in/courses/112/105/112105045/	
3.	https://nptel.ac.in/courses/112/104/112104030/	
4.	https://nptel.ac.in/courses/112/103/112103289/	
5.	https://www.youtube.com/watch?v=E9_kyXjtRHc	

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	2	-	-	-	-	-	-	-	1	3	3	3
2	3	3	3	3	-	-	-	-	-	-	-	1	3	3	3
3	2	2	2	3	2	-	-	-	-	-	-	1	2	1	2
4	2	2	2	2	1	-	-	-	-	-	-	1	2	1	2
5	3	2	2	2	1	-	-	-	-	-	-	1	3	3	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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	wech	anical Engineering	Progra	amme :	B.Tech.				
Semester	VI		Cours	e Cateç	gory: <b>PE</b>	Enc	I Semeste	er Exam	Туре: <b>ТЕ</b>
Course	1123M	EE612	Pe	riods/W	eek	Credit	Max	imum M	arks
Code	UZJIVI	LL012	L	Т	Р	С	CAM	ESE	ТМ
Course Name	QUALI	TY CONTROL AND IMPROVEMENT	3 ECH	0	0	3	25	75	100
	-	IVI	ECH						
Prerequisite	-							BTI	/lapping
	On co CO1	mpletion of the course, the students						(Highe	est Level
	CO2	Evaluate the basic statistical concepts an					I 44 11 4 -		K2
Course		Demonstrate the ability to design, use, and	-						K3
Outcome	CO3	Determine the process capability indices t		-			-		K2
	CO4	Design a sampling plan to construct OC process.						ו	K4
	CO5	Implement the philosophy of Taguchi's Do	OE and o	other pro	ocess imp	rovement me	ethod		K3
Quality Contro SQC - Service	ality Cont ol Tools	<b>Iuction to Statistical Quality Control</b> rol - Statistical Quality Control and Statistica - Quality costs and Quality loss – Quality	al Proces				Concepts		
UNIT- II		ol Charts For Variables					i	iods: 9	
		iables - Control Charts for X <sup>−</sup> and R - proc idual Measurements - Applications of Cont				ion- Control	Charts for	X <sup>−</sup> and S	5 - CO2
UNIT- III	Contr	ol Charts for Attributes					Per	iods: 9	
the OC function	on and A	tion-Nonconforming (OC curve of the contro RL calculation); Control Charts for Nonconf			-		-		:
	1	ine for Implementing Control charts.				es Between			CO3
UNIT- IV Cumulative-S CUSUM desig	Proce um (CUS gn param	ine for Implementing Control charts. <b>ess Capability Analysis and six sigm</b> SUM) Control Charts - CUSUM Control Ch heters, CUSUM for large shifts - Exponentia pring process mean, design of an EWMA c	<b>a</b> art basic ally Weig	principle	es for mo	nitoring the s	Per shift in proc	iods: 9 cess mea	<b>CO3</b>
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COs					Prog	gram O	utcome	es (POs	)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	-	-	-	-	-	-	2	-	1	3	2	1
2	3	3	2	-	-	-	-	-	-	2	-	1	3	2	1
3	2	3	2	-	-	-	-	-	-	2	-	1	2	2	1
4	2	2	2	-	-	-	-	-	-	2	-	1	2	2	1
5	3	2	2	-	-	-	-	-	-	2	-	1	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

dr. d. 800

Department	Mech	anical Engineering	Progra	amme :	B.Tech.				
Semester	VI				jory: PE	End	Semester	· Exam Ty	/pe: <b>TE</b>
Course	1100M	EE613		riods/W		Credit	Maxi	mum Mar	ks
Code	UZSIVI	EE013	L	Т	Р	С	CAM	ESE	ТМ
Course Name	ADDI	TIVE MANUFACTURING	3	0	0	3	25	75	100
			ECH						
Prerequisite	Engi	neering Physics						BT Ma	nnina
	On co	mpletion of the course, the students	s will be	able to	0			(Highest	
	CO1	Understand the fundamentals and signific	ance of a	additive r	manufactu	ring (AM) te	chnologies.	K	
0	CO2	Identify and select appropriate AM proces	sses for o	different a	applicatior	าร.		K	3
Course	CO3	Analyze material properties and post-pro	cessing t	echnique	es used in	AM.		K	4
Outcome	CO4	Design and evaluate components produc	ed by AN	1 using C	CAD mode	ls and simu	lation tools.	K	4
	CO5	Explore the emerging trends and futur	e potent	ial of ac	dditive ma	anufacturing	in various	ĸ	4
		industries.							•
UNIT- I	<b>i</b>	Iuction to Additive Manufacturing	ional ma	nufa atur	ina Fu	olution and	k	ods: 9	
		manufacturing – Comparison with tradit s, challenges, and applications of AM – Ge							
manufacturing									CO1
UNIT- II	Addit	ive Manufacturing Processes					Peri	ods: 9	
Classification	of AM pr	ocesses – Material extrusion processes – I	Powder b	ed fusio	n – Vat po	lymerization	1		
binder jetting	processe	es – Directed energy deposition.							CO2
UNIT- III	Mater	ials for Additive Manufacturing					Peri	ods: 9	
		polymers, metals, ceramics, and composit							
material char techniques fo		s on AM process – Recycling and sustanponents.	linability	consider	rations in	AM materia	als – Post-p	processing	CO3
UNIT- IV		n for Additive Manufacturing (DFAN						ods: 9	
-	Use of (	for additive manufacturing – Design freed CAD tools and software in AM – Simulation 1.			-	·			CO4
UNIT- V	Appli	cations and Future Trends in Additiv	ve Mani	ufacturi	ng		Peri	ods: 9	
		n aerospace, automotive, biomedical, ar			-	tries – Cus			
-	-	nanufacturing and Industry 4.0 – Future tre lenges and future research directions.	nds in A	M techno	ologies: 4[	D printing, bi	io-printing, a	and hybrid	CO5
Lecture Per	iods: 4	5 Tutorial Periods: -	Practic	al Perio	ods: -		Total	Periods:	45
Text Books			·						
		Rosen, Brent Stucker, "Additive Manufactu	-	-		-	-	and Denid	Taaliaa
<ol><li>Pham, D. Springer,</li></ol>		ov, S.S. – Rapid Manufacturing: The Tech	nologies	s and Ap	plications	of Rapid P	rototyping a	and Rapid	rooing
		Dell K. Allen, Leo Alting – Manufacturing P	rocesses	Referen	nce Guide	Industrial P	Press Inc., 1	994.	
Reference B	Books								
		Design for Additive Manufacturing: Advance	ces, Tren	ds, and	Technolog	jies, Elsevie	r, 2020.		
		Rosen, Brent Stucker - Additive Manufact	uring Te	chnologie	es: Rapid	Prototyping	to Direct Di	gital	
Manufact	-	d edition, Springer, 2015.			<b>1</b> 5				
Manufact 3. Amit Ban	dyopadh	yay, Susmita Bose – Additive Manufacturin	-			'th edition P	Pearson 201	14	
Manufact 3. Amit Ban 4. Kalpakjia	dyopadh n, Serop	yay, Susmita Bose – Additive Manufacturin e, Schmid, Steven R. – Manufacturing Eng	ineering	and Tecl	hnology, 7				ser
Manufact 3. Amit Ban 4. Kalpakjia	dyopadh n, Serop Gebhard	yay, Susmita Bose – Additive Manufacturin	ineering	and Tecl	hnology, 7				ser
Manufact 3. Amit Ban 4. Kalpakjia 5. Andreas Publisher Web Reference	dyopadh n, Serop Gebhard s, 2012. <b>ces</b>	yay, Susmita Bose – Additive Manufacturin e, Schmid, Steven R. – Manufacturing Eng t – Understanding Additive Manufacturing:	ineering	and Tecl	hnology, 7				ser
Manufact 3. Amit Ban 4. Kalpakjia 5. Andreas Publisher <b>Web Referen</b> 1. https://np	dyopadh n, Serop Gebhard s, 2012. <b>ces</b> tel.ac.in/	yay, Susmita Bose – Additive Manufacturin e, Schmid, Steven R. – Manufacturing Eng	ineering	and Tecl	hnology, 7				ser

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3. https://additivemanufacturing.mit.edu/

- 4. https://www.learnengineering.org/
- 5. https://www.khanacademy.org/science/additive-manufacturing

#### **COs/POs/PSOs Mapping**

COs					Proç	gram O	utcome	es (POs	)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	-	-	-	-	-	-	-	-	-	2	2	-
2	3	3	2	1	-	-	-	-	-	-	-	-	2	2	-
3	3	3	2	1	1	-	-	-	-	-	-	-	2	2	-
4	3	3	3	2	2	1	-	-	-	-	-	-	2	2	-
5	3	2	3	2	1	1	-	-	-	-	-	-	2	2	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	M)	End Semester	Total		
Assessment	CAT 1	CAT 1 CAT 2 Model Assignment* Attendar		Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Mech	anical Engineering	Programme : <b>B.Tech.</b>							
Semester	VI		Cours	e Categ	ory: PE	Enc	I Semeste	nester Exam Type: <b>T</b> l		
Course	U23M	EE614	Pe	riods/We	eek	Credit	Maxi	mum Marks		
Code	02011		L	Т	Р	С	CAM	ESE	ТМ	
Course Name	ENER	GY AND CLIMATE CHANGE	3	0	0	3	25	75	100	
	01		MECH							
Prerequisite	Climat	e Change								
	On co	mpletion of the course, the studer	nts will be	able to	)			(Highes	apping	
		An insight into corbon sude, physical	hadia of the	notural	aroophou	aa affaat in	oluding the			
	CO1	An insight into carbon cycle, physical meaning of the term radioactive forcing			-		-	۲ (	(3	
Course										
_		woll as the		(2						
Outcome	CO3	Understand the growing scientific cons complexities and uncertainties	5611303 6316	ablisheu	unough u			P	(3	
	CO4	Plan climate change mitigation and ada	antation nro	niects				k	(2	
	CO5	Use of alternate fuels and renewable e		,00010					<u>.</u> (2	
UNIT- I		luction	nergy				Peri	ods: 9	~~	
-		and Climate – climate parameters – Te	emperature,	Rainfall,	, Humidity	, Wind – Gl			۱	
- El Nino and	its effect	– Carbon cycle							СО	
UNIT- II	<u>.</u>	ents Related to Climate						ods: 9		
		Total carbon dioxide emissions by energy hydrology, green space – Causes of g								
-		ion and sea level rise – Greenhouse effe	-	regional	cimate c	nange – Ci	langes in p	Jallenns O	t CO	
							ſ			
UNI I - III	Impac	rs of Climate Change					Peri	ods: 9		
	<u>.</u>	ets of Climate Change	alnutrition	human r	migration	socioecono	i	ods: 9 s- tourism		
Effects of Clim ndustry and b	nate Cha	nges on living things – health effects, m , vulnerability assessment- infrastructure			-		mic impact	s- tourism		
Effects of Clim ndustry and b coastal areas	nate Cha pusiness	nges on living things – health effects, m			-		mic impact restry, hum	s- tourism		
Effects of Clim ndustry and b coastal areas UNIT- IV PCC Technic	nate Cha business <b>Mitiga</b> al Guide	nges on living things – health effects, m , vulnerability assessment- infrastructure nting Climate Change elines for Assessing Climate Change Im	e, population	on and se	ector – Ag n -Identify	ing adaption	mic impact restry, hum Peri n options –	s- tourism ian health ods: 9 designing	, <b>co</b>	
Effects of Clim ndustry and b coastal areas <b>UNIT- IV</b> IPCC Technic and implemen	nate Cha business <b>Mitiga</b> al Guide ting ada	nges on living things – health effects, m , vulnerability assessment- infrastructure a <b>ting Climate Change</b> lines for Assessing Climate Change Im ption measures – surface albedo enviro	e, populatic ppact and A pnment refle	on and se adaptation	ector – Ag n -Identify pfing and i	riculture, fo ing adaption reflective pa	mic impacts restry, hum Peri n options – aving enhar	s- tourism han health ods: 9 designing hcement o	, co	
Effects of Clim industry and b coastal areas <b>UNIT- IV</b> IPCC Technic and implement evapotranspira	Mitiga al Guide ting ada	nges on living things – health effects, m , vulnerability assessment- infrastructure a <b>ting Climate Change</b> lines for Assessing Climate Change Im ption measures – surface albedo enviro tree planting programme – green roof	e, populatic ppact and A pnment refle	on and se adaptation	ector – Ag n -Identify pfing and i	riculture, fo ing adaption reflective pa	mic impacts restry, hum Peri n options – aving enhar	s- tourism han health ods: 9 designing hcement o	, co	
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industry and b coastal areas UNIT- IV IPCC Technic and implement evapotranspirat efficiencies – of UNIT- V Energy source Energy - Geop Lecture Per Text Books 1. Twidell and 2. Dash Sus 3. Velma. I. of Reference B 1. Thomas E 2. Jan C. val 2011. 3. David Col 4. IPCC Fou 5. Tiwari and Neb Reference 1. https://npt 2. https://swa	Mitiga al Guide ting ada ation – carbon s Up-Sc e - Biofue oolitics - iods: 49 d wier" F hil Kuma Grover "f ooks c, Lovejo n Dam, I ey "Ener rth Asse d Ghosal ces el.ac.in/c ayam.go	Anges on living things – health effects, m yulnerability assessment- infrastructure ating Climate Change lines for Assessing Climate Change Im ption measures – surface albedo environ tree planting programme – green roof equestration caling Renewable Energy: Policy I els – Energy policies for a cool future – E Energy Security - Energy Production - E Energy Security - Energy Production - E S Tutorial Periods: - Renewable energy resources", CRC present ar, "Climate Change – An Indian Perspect Global Warming and Climate" Change and mpacts of "Climate Change and Climate gy and Lee Hannah "Climate Change and mpacts of "Climate Change: Creating a Sus ssment Report, Cambridge University P " Renewable energy resources" Narosa courses/119/106/119106008/	e, population pact and A poment refle- ing strateg <b>ncentives</b> Energy Audi nergy Cons <b>Practic</b> ss (Taylor a ctive", Caml /ol. I and II. d Biodiversi Variability tainable Fu ress, Camb	an and se adaptation ective roc jies – er it - Energ sumption cal Peric bridge Ur Science ty", TERI on Hydro ture" Will oridge, Uf	ector – Ag n -Identify ofing and i nergy con gy and clim - Energy <b>ods: -</b> cis), 2015. niversity P Publisher Publisher ological Re	riculture, fo ing adaption reflective pa servation in nate governa Markets - E ress India F rs, 2005 rs, 2018. egimes", Ca	mic impact: restry, hum Peri n options – aving enhar n buildings Peri ance, Globa nergy Polic Total	s- tourism lan health ods: 9 designing icement o – energy ods: 9 al Energy y Periods	, co , co , co : 45	
Effects of Clim ndustry and b coastal areas UNIT- IV PCC Technic and implement evapotranspirate efficiencies – of UNIT- V Energy source Energy - Geop Lecture Per Fext Books 1. Twidell and 2. Dash Sus 3. Velma. I. of Reference B 1. Thomas E 2. Jan C. val 2011. 3. David Col 4. IPCC Fou 5. Tiwari and Veb Reference 1. https://npt 2. https://npt 4. https://oc	Mitiga al Guide ting ada ation – carbon s Up-Sc bolitics - iods: 4 d wier" f hil Kuma Grover "f ooks t, Lovejo n Dam, I ey "Ener rth Asse d Ghosal el.ac.in/c ayam.go el.ac.in/c	Inges on living things – health effects, m vulnerability assessment- infrastructure <b>ating Climate Change</b> Hines for Assessing Climate Change Imption measures – surface albedo environ tree planting programme – green roof equestration <b>caling Renewable Energy: Policy I</b> els – Energy policies for a cool future – E Energy Security - Energy Production - E <b>5 Tutorial Periods: -</b> Renewable energy resources", CRC present, "Climate Change – An Indian Perspect Global Warming and Climate" Change And y and Lee Hannah "Climate Change and mpacts of "Climate Change: Creating a Sus ssment Report, Cambridge University P " Renewable energy resources" Narosa courses/119/106/119106008/ v.in/nd2_arp19_ap55/preview	e, population pact and A porment refle- ing strateg <b>ncentives</b> Energy Audi nergy Cons Practic ss (Taylor a ctive", Camil /ol. I and II. d Biodiversi Variability tainable Fu ress, Camb publication	an and se adaptation ective roc jies – er it - Energ sumption cal Peric bridge Ur Science ty", TERI on Hydro ture" Will oridge, Uf	ector – Ag n -Identify ofing and i nergy con gy and clim - Energy <b>ods: -</b> cis), 2015. niversity P Publisher Publisher ological Re	riculture, fo ing adaption reflective pa servation in nate governa Markets - E ress India F rs, 2005 rs, 2018. egimes", Ca	mic impact: restry, hum Peri n options – aving enhar n buildings Peri ance, Globa nergy Polic Total	s- tourism lan health ods: 9 designing icement o – energy ods: 9 al Energy y Periods	, co , co , co : 45	

dr. dr. Soll

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12										PO12	PSO1	PSO2	PSO3	
1	3	2	2	1	-	2	1	1	-	-	-	2	1	2	2
2	3	1	1	2	-	1	2	1	-	-	-	2	2	1	2
3	3	2	2	1	-	2	1	1	-	-	-	1	1	1	2
4	3	2	1	2	-	2	2	1	-	-	-	1	1	2	1
5	3	2	2	1	-	1	2	1	-	-	-	2	2	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

# **Evaluation Methods**

		Cont	inuous Asse	M)	End Semester	Total	
Assessment	CAT 1	CAT 1 CAT 2 Model Assignment* A		Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100

A. A. 800

# **PROFESSIONAL ELECTIVE – IV**

dr. dr. 800

B.Tech. Mechanical Engineering

N. A. 800

Department	Mech	anical	Engineering	Programme : <b>B.Tech.</b>									
Semester	VII			Cours	se Categ	ory: PE	End S	emeste	nester Exam Type: <b>TE</b>				
Course				Pe	riods/We	eek	Credit N		laximum M	arks			
Code	U23W	EE715		L	Т	Р	С	CAM	I ESE	ТМ			
Course Name	INDU	STRIAL	TRIBOLOGY	3	0	0	3	25	75	100			
Course maine				MECH									
Prerequisite	Fluid	Mechar	nics and Material Science	Э.									
	On co	mpletio	on of the course, the st	udents will b	be able t	O				lapping st Level			
	CO1	Explai	n the friction characterist	ics of differe	nt surfac	es				K1			
0	CO2	-	be the different wear situ						K1				
Course	CO3												
Outcome	CO4		ss on the different types of the the film lubrication with			and Son	porfield dia	aram		K2			
	, , , , , , , , , , , , , , , , , , , ,									K3			
· · · · · ·	CO5	•		e mouilleu wi	ui suitab	ie maten				K3			
UNIT - I			d Friction						Periods: 9				
			Irfaces- Contact between s In Characteristics of metals										
			Friction Source of Rolling							° CO1			
UNIT - II	Wear				-				Periods:	•			
Types of wear	Simple	theory o	f Sliding Wear, Mechanism	of sliding wea	r of metal	s Abrasive	wear Mate	rials for	Adhesive ar	d			
• •	situatio	ons Cor	rosive wear Surface Fatig	-						:			
UNIT - III	Lubri	cants a	nd Lubrication Types						Periods:	)			
	-		ants Testing methods Hydi Hydrostatic Lubrication	rodynamic Lub	prication E	Elasto- hyo	drodynamic	lubricat	ion- Bounda	<sup>гу</sup> СОЗ			
UNIT - IV	Film l	ubrica	tion Theory						Periods:	•			
Fluid film in sin	nple she	ar - Vis	cous flow between very clos	se parallel plat	es - Shea	r stress va	ariation Rey	nolds					
Equation for fi bearings - Virtu			High speed unloaded jour	nal bearings -	· Loaded	journal be	earings – R	eaction	torque on th	e CO4			
-			of Tribology						Periods:	•			
	ribology	in man	ufacturing processes, Meta	I machining, N	letal cutti	ng, Tool v	vear, Action	of lubri		Ī			
Lecture Perio	-		Tutorial Periods:-	Practic	al Perio	ds: -			Total Peri	ods: 45			
Text Books	us. +0			Tractic		uj				0u3. +5			
	gs, Phili	p Shipw	ay, Tribology: Friction and V	Vear of Engine	ering Ma	terials, Els	sevier, 2017						
			, Thorsten Bartels, Industria	al Tribology: Tr	ibosysten	ns, Friction	n, Wear and	Surfac	e Engineerin	g, Wiley -			
VCH Verlag			11 , and Thorsten Bartels, Indu	etrial Tribolog	v: Tribocy	etome Er	iction Moor	and Si	urfaco Engina	oring			
			ig Gmbh, 2010.	ISUIAI TIDOIOY	y. Thoosy	Sleins, Fi	iction, wear	anu Su	mace Engine	enng,			
Reference Bo													
1. Shizhu Wer	n, Ping H	luang, F	Principles of Tribology, Wile	y, 2017.									
2. Williams Jo			g Tribology", Cambridge Un	-	2005								
			ation theory ", Longman, L										
3. A.Cameron			n Machine Design ", Indus										
<ol> <li>A.Cameron</li> <li>T.A. Stolars</li> </ol>			"Eriotion and Lubrication	", Heinemann	Educatio	onal Book	s Ltd., 2004	1					
<ol> <li>A.Cameron</li> <li>T.A. Stolars</li> <li>E.P.Bowde</li> </ol>	n and T	abor.D.	"Friction and Lubrication										
<ol> <li>A.Cameron</li> <li>T.A. Stolars</li> <li>E.P.Bowde</li> <li>Web Reference</li> </ol>	n and T <b>:es</b>												
<ol> <li>A.Cameron</li> <li>T.A. Stolars</li> <li>E.P.Bowde</li> <li>Web Reference</li> <li>https://nptel</li> </ol>	n and T <b>es</b> .ac.in/co	ourses/1	12/102/112102015/#	002									
<ol> <li>A.Cameron</li> <li>T.A. Stolars</li> <li>E.P.Bowde</li> <li>Web Reference</li> <li>https://nptel</li> <li>https://core.</li> </ol>	n and T <b>:es</b> .ac.in/co ac.uk/so	ourses/1 earch?q	12/102/112102015/# =INDUSTRIAL%20TRIBOL	OGY									
<ol> <li>A.Cameron</li> <li>T.A. Stolars</li> <li>E.P.Bowde</li> <li>Web Reference</li> <li>https://nptel</li> <li>https://core.</li> <li>https://onlin</li> </ol>	n and T : <b>es</b> .ac.in/co ac.uk/so ecourse	ourses/1 earch?q s.nptel.a	12/102/112102015/#			inciple of	d oppo attra	ioc					

N. A. 800

COs		Program Outcomes (POs)											Program Specific Outcomes (PSOs)		
	PO1	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12										PO12	PSO1	PSO2	PSO3
1	3	1	1	-	-	1	-	-	-	1	-	1	1	1	1
2	3	1	1	-	-	1	-	-	-	1	-	2	1	1	1
3	3	1	1	-	-	1	-	-	-	1	-	2	1	1	1
4	3	1	1	-	-	1	-	-	-	1	-	2	1	1	1
5	3	1	1	-	-	1	-	-	-	1	-	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	M)	End Semester	Total		
Assessment	CAT 1	CAT 1 CAT 2 Model Exam Assignment* Atte		Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100

dr. d. 800

Department	Mech	anical Engineering		Progr	amme :	B.Tech.				
Semester	VII			Cours	e Categ	jory: PE	End S	emester	Exam Typ	e: TE
Course	U23M	EE716		Pe	riods/W	eek	Credit	Ma	ximum Ma	rks
Code				L	Т	Р	С	CAM	ESE	ТМ
Course Name	, ADVA	NCED WELDING TEC		3	0	0	3	25	75	100
Prerequisite	Manuf	acturing Process		ЛЕСН						
Terequisite		<u> </u>							BT M	apping
	On co	mpletion of the cours	-						······¥····	st Level
	C01	Demonstrate an unde	•		•	elding ar	nd its chara	acteristics	<sup>3</sup> k	(2
Course	CO2	Understand the theory	-						۲ ۲	(2
Outcome	CO3	Explain the various ac		•	•	•••				(2
	CO4	Understand the proc plastics.	esses of plas	sma arc	, resista	ance wel	ding and v	welding	of <b>k</b>	(2
	CO5	Apply the knowledge	of testing of w	eld joints	s and ar	alyses th	e causes f	ailure	k	(3
UNIT - I	Introc	luction to Welding						F	Periods: 9	
		tion of welding processe			-					:
•	•	ition of welds, application ding, Resistance welding.	•				•.		welding, Are	° <b>CO</b> 1
UNIT - II	Weldi	ng Metallurgy						F	Periods: 9	<b>.</b>
Fundamentals	s of phys	ical metallurgy: Need, ph	ase diagrams:	Fe-C, Al-	-Cu, Cu-Z	Zn system	, Effect of I	neat in va	rious zones	,
HAZ, effect of metal, modes	-	parameters on weld struc ication.	ture, grain refin	ement pri	nciple of	weld meta	I, Principle o	of solidifica	ation of weld	d CO2
UNIT - III	Mode	rn Welding Technique	es and its Ap	plicatio	ns			F	Periods: 9	i
-		bonding, Explosive weld	-	-	Friction w	elding, Fo	rge welding	, Roll weld	ding and Ho	t
pressure weld	ling proc	esses - advantages, limita	ations and appli	ications.						CO3
	-	ic hydrogen welding, Ele ce, robotic welding, nucle		-		-	, Under Wa	ater weldi	ng, Welding	
UNIT - IV	-	nd Resistance Weldin		-		•			Periods: 9	
	i	d their applications, plasr				ions Resi	stance Weld			1
Applications.	Welding	of Plastics: Ultrasonic – F ner Applications	-	-						
UNIT - V	Weld	Quality Testing and I	nspection					F	Periods: 9	
Weld quality	parame	ers, weldability, weld fa	aults, Destructi	ive testin	g: Aggre	essive en	vironment,	Corrosion	, hardness	,
	nic (UT), I	ess measurement, fatigue Radiography (RT), Eddy ( )					-		-	
Lecture Peri		Tutorial Peric	de	Practic	al Porio	de: -		-	Total Perio	nde: 15
Text Books	-uj. <del>T</del> J					40				-u3. <del>T</del> J
	. P, A Te	xtbook of Welding Techn	ology, Dhanpat	rai and S	ons, 201	5.				
		ing Engineering And Tecl					13.			
		vance Welding Technolog	gy, Rajson's Pu	blication	pvt Ltd, 2	2006.				
Reference Bo		ing and Welding Technol	an Ma Crowb		on India	n Edition	2017			
<ol> <li>Richard Lit</li> </ol>		6, welding Brazing & Sol			on, mula	ar Ealuon,	2017.			
	2001 101		-	Iniversity		000				
2. ASM Hand	Croft, We	elding Process Technolog	iy, Cambridde I	Juiversitv	Press. 1	983.				
2. ASM Hand 3. P.T.Hould		elding Process Technolog g Procedures and Applica		-		983.				
<ol> <li>ASM Hand</li> <li>P.T.Hould</li> <li>L.Carl Love</li> </ol>	e, Weldin		ations, Prentice	Hall Inc.,	1993.					
<ol> <li>ASM Hand</li> <li>P.T.Hould</li> <li>L.Carl Love</li> </ol>	e, Weldin on, Joinin	g Procedures and Applica	ations, Prentice	Hall Inc.,	1993.					

Hr. H. 800

4. 5. https://www.tws.edu/blog/welding/advanced-welding-techniques/

# **COs/POs/PSOs Mapping**

2.

3.

COs	Program Outcomes (POs)										Program Specific Outcomes (PSOs)				
	PO1	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO1										PO12	PSO1	PSO2	PSO3
1	3	1	1	1	-	-	-	-	-	-	-	1	1	2	2
2	3	1	1	1	-	-	-	-	-	-	-	1	1	2	2
3	3	1	1	1	-	-	-	-	-	-	-	1	1	2	2
4	3	2	2	2	-	-	-	-	-	-	-	1	1	2	2
5	3	3	3	3	1	-	1	1	1	1	-	1	1	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Conti	M)	End Semester	Total			
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	ment* Attendance (ES		Marks	
Marks	5	5	5	5	5	75	100	

fr. fr. 300

Department	Mech	anical Engineering		Progra	amme :	B.Tech.					
Semester	VII			Cours	e Categ	gory: <b>PE</b>	End S	Semeste	r Exan	n Type	: TE
Course	U23M	EE717		Pe	riods/W	eek	Credit	Ма	aximur	m Mark	S
Code				L	Т	Р	С	CAM	ES	SE	ТМ
Course Name	POW	ER PLANT ENGINEERING	6	3	0	0	3	25	7	5	100
Prerequisite	Therm	odynamics, Heat and Mass	s Transf	MECH fer							
Terequisite		-			bl-	4 -			E	BT Map	ping
	Un co	mpletion of the course, t	ne stua	ients will d	e able	το			(H	lighest	Level
	C01	The students will be able to			-		-			K2	
Course	CO2	Compare the functions of production.							/er	K2	
Outcome	CO3	Students will gain knowledge		-	-	-		ctor.		K2	
	CO4	Illustrate the working of rene			•					K3	
	CO5	Apply the knowledge of ener environmental impact of pow	•••		calculat	ing the tari	fs, and ana	alysis on t	he	K3	
UNIT - I	Therr	nal Power Plants	or plana						Perio	ds: 9	
		selection power plant - types	, system	and compor	nents –.S	Super Critic	al Boilers, I	i			
Condensers -	Steam g	enerators – modern high pres ters, Super heaters.	-	-		-					C01
UNIT - II	Powe	r Plant Handling System	and Eq	uipments					Perio	ds: 9	i
Air handling sy	otomo foi					id fuele – fl	ue ace peth	n: method	of prod	ducing	
	/stem. ioi	ced draught fans, primary and	lseconda	ary air syster	m for sol	10 10013 - 11	ue gas pau			-	
		ced draught fans, primary and ed draughts – induced drau							-	ns and	
draught: natur pollutants - cy	ral, induc clone sep	ed draughts – induced drau parator, electro-static precipita	ght fans tor – chir	s – flue gas mney - Botto	treatme m ash h	ent for poll andling sys	ution: parti stem. Cooli	culate er	nission , Feed	d water	CO2
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2.	https://npti.gov.in/post-graduate-certificate-course-thermal-power-plant-engineering
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4.	https://powermin.gov.in/en/content/national-power-training-institute.
5.	https://www.tpctraining.com/collections/power-plant-operations-training

COs					Prog	ram Oi	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	-	-	-	-	-	-	-	1	1	2	2
2	3	2	2	2	-	-	-	-	-	-	-	1	1	2	2
3	3	2	2	2	-	-	-	-	-	-	-	1	1	2	2
4	3	3	3	3	-	-	-	-	-	-	-	1	1	2	2
5	3	3	3	3	1	-	1	1	1	1	-	2	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assess	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Mech	anical Engineering	Progr	amme :	B.Tech.				
Semester	VII		Cours	e Categ	gory: <b>PE</b>	End S	emester E	xam Typ	e: <b>TE</b>
Course	1122M	EE718	Pe	riods/W	eek	Credit	Maxi	mum Mai	ks
Code			L	Т	Р	С	CAM	ESE	ТМ
Course Name		TECHNOLOGY IN MATERIALS	3 MECH	0	0	3	25	75	100
Prerequisite	Advan	ced Manufacturing Technology							
•	On co	mpletion of the course, the stude	ents will k	e able	to			BT Ma	
	CO1	Understand various types of bondi				atoriale		(Highes	
		Apply mechanical, Magnetic, Optic	•				naterial for	K	
	CO2	potential applications.		indi pro		amoronen		K	3
Course Outcome	CO3	Identify and understand various nanomaterial synthesis.	s top-dov	wn and	bottom-	-up appro	aches for	ĸ	2
	CO4	Be familiar with various morpholog	gical and s	spectros	copic tec	hniques.		к	3
	CO5	Use nanostructured materials for medical applications.	design a	and dev	veloping	nano sens	ors, nano	к	4
UNIT - I	Introc	luction to Nano Technology					Pe	eriods: 9	
structure of t	the nano	aterials and nanotechnologies, Features materials, Predicting the Type of Bon vires, Ultra-thin films, Challenges in Nar	iding in a	Substan	-			-	
UNIT - II	Nano	scale Dimensions and Properties	;				Pe	eriods: 9	
Effect of Nar electronic pro		imensions on various properties - str	uctural, the	ermal, ch	nemical, m	echanical,	magnetic, c	ptical and	CO2
UNIT - III	Synth	esis of Nanomaterials					Pe	riods: 9	
pulsed laser	methods	Top down and bottom up approaches- , Spray Pyrolysis- Bottom up proces sisted deposition process, MBE, chemic	ses: Vapo	ur phase	e depositio	on methods	, PVD, CV		:
UNIT - IV	Nano	structured Materials Characteriza	ation Tec	hniques	5		Pe	eriods: 9	<b>i</b>
(TEM), Atom	ic Force	D), RAMAN Spectroscope, Scanning E Microscopy (AFM), Scanning Tunnell be (3DAP), Nano indentation.							
UNIT - V	Appli	cations of Nanomaterials					Pe	eriods: 9	
		osensors, Cosmetic and Consumer G Textiles, Paints, Nanomaterials as elect			-	-		-	CO5
Lecture Peri	iods: 45	Tutorial Periods:-	Practic	al Perio	ds: -		Тс	tal Perio	ds: 45
San Intern	ational S	A. Johnny Varghese , Mr. N. Manikanda cientific Publications,2024. n, Recent Advances in Nanomaterials,		-	nthesis Ar	nd Characte	rization Teo	chniques	
		Mrityunjay Singh, Nanostructured Mate	rials and N	lanotech	nology – 2	nd, Edition.	Willey, 200	8.	
Reference Be			v.a. D '		L: 0000				
		Rempel, Nanocrystalline Materials, Vi otechnology, Springer-Verlag, 2009.	va Books,	New Del	ni, 2008.				
• •	•	Ying Wang, Nanostructures and Nanon	naterials: S	ynthesis	, Propertie	s, and Appli	cations, Wo	rld Scienti	fic Serie
4. Rongming	-	huhui Sun, Advanced Nanomaterials fo				nversion and	d Storage, N	/IDPI, 2022	2.
	-	oduction to Nanomaterials and Nanosc	cience, CB	S Publish	ners,2024.				
Web Referen		NUTROON/102/107/102107050/							
1. https://npte 2. www.azon		ourses/102/107/102107058/							
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3.	https://nptel.ac.in/courses/118/107/118107015/	
4.	https://nptel.ac.in/courses/118/102/118102003/	
5.	https://nptel.ac.in/courses/118/106/118106021/	

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	-	-	1	2	-	1	-	1	2	1	2	1
2	3	1	2	1	-	2	-	-	1	-	2	1	1	2	2
3	3	2	2	-	2	2	2	-	1	-	2	2	1	2	2
4	3	2	2	1	2	2	1	-	2	-	2	2	2	2	2
5	3	2	2	2	2	2	1	-	1	-	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assess	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Mech	anical E	Engineering	Progr	amme :	B.Tech.				
Semester	VII			Cours	e Categ	jory: <b>PE</b>	End S	emester	Exam Type	: TE
Course	11001			Pe	riods/W	eek	Credit	Мах	imum Mar	ks
Code	UZSIVI	EDC05		L	Т	Р	С	CAM	ESE	ТМ
Course Name			MODELING OF RING SYSTEM	3	0	0	3	25	75	100
				MECH	.1	.1		<u>i</u>	LL.	
Prerequisite	Manu	facturing	]							
	On co	mpletio	n of the course, the stu	dents will b	e able	to			BT Ma (Highest	
	CO1	Explain	discrete, continuous, and hy	/brid simulati	on metho	ods.			K	
Course	CO2		re legacy simulation tools platforms.	(FORTRAN,	GPSS,	SIMAN, S	SLAM, MO	DSIM) wit	h K:	2
Outcome	CO3		imulation techniques in man	ufacturing sy	stem cas	e studies,	including di	gital twins.	K	3
	CO4	Analyze	simulation data using adva	nced analytic	:S.		-	-	K	
	CO5	Recoan	ize the growing role of simul	ation in mod	ern enair	eerina.			K	
UNIT - I		<u> </u>	to Modern Simulation		5	0		P	eriods: 9	
			try 4.0 – basic concepts of di	screte contir		d hybrid s	imulation -	I		
			l vs. modern simulation softv		iuous, ai				technology	CO1
UNIT - II	Mathe	ematica	I, Statistical & Computa	tional Mod	els			P	eriods: 9	•
-	•		and statistical concepts – of manual and computational			t scheduli	ng and sin	nulation pr	ogramming	CO2
UNIT - III	Simu	ation o	f Manufacturing System	S				Р	eriods: 9	
-			r manufacturing systems – Y II.5, ProModel) with upda				-		-	
UNIT - IV	Analy	sis and	<b>Optimization of Simula</b>	tion Data				P	eriods: 9	
			n, statistical distribution, and machine learning tools for d	-		<ul> <li>updated</li> </ul>	techniques	s for model	verification	CO4
UNIT - V	Appli	cations	and Emerging Trends					Р	eriods: 9	
	manufa	acturing,	material handling, and comp ission on future innovations	-		ging trends	s such as cl	oud simula	ation, digital	CO5
Lecture Peric	ods: 45		Tutorial Periods:-	Practic	al Perio	ds		Т	otal Perio	ds: 45
Text Books	/u3. +0			Traotio		uj.		•		и <b>с</b> . то
	aw & W.	David K	elton – Simulation Modeling	and Analysis	s, 5th Edi	tion, McGr	aw Hill, 201	8		
<ol> <li>Averill M. La</li> </ol>	-Smith -	- Testing	and Validation of Computer	Simulation N	lodels: P	rinciples, l	Methods an	d Applicati	ons, Springe	er, 201
2. D.J. Murray		ez – Mod	eling and Simulation, Spring	er, 2013						
2. D.J. Murray 3. L.G. Birta & <b>Reference Bo</b>	G. Arbe <b>oks</b>									
<ol> <li>D.J. Murray</li> <li>L.G. Birta &amp;</li> <li>Reference Bo</li> <li>A. Muzy &amp; E</li> </ol>	G. Arbe <b>oks</b> E. Kofma	an, <i>Theo</i>	ry of Modeling and Simulatio	n, 3rd Edition						
<ol> <li>D.J. Murray</li> <li>L.G. Birta &amp;</li> <li>Reference Bo</li> <li>A. Muzy &amp; E</li> <li>Averill M. La</li> </ol>	G. Arbe <b>oks</b> E. Kofma aw & W.	an, <i>Theol</i> D. Kelto	ry of Modeling and Simulation	on, 3rd Edition Analysis, 3rd	Edition,	McGraw H	lill, 2000.			
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<ol> <li>D.J. Murray</li> <li>L.G. Birta &amp;</li> <li>Reference Bo</li> <li>A. Muzy &amp; E</li> <li>Averill M. La</li> <li>W. D. Kelto</li> <li>G. L. Curry</li> <li>ByoungKyu</li> </ol>	G. Arbe oks E. Kofma aw & W. n, R. P. & R. M. Choi &	an, <i>Theol</i> D. Kelto Sadowsk Feldmar	ry of Modeling and Simulation n, Simulation Modeling and ki & D. A. Sasowski, Simulat	n, 3rd Edition Analysis, 3rd ion with ARE deling and A	Edition, NA, McG nalysis, S	McGraw H Fraw Hill, 2 Springer, 2	Hill, 2000. 2002. 008.	y & Sons, ź	2013.	
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COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	-	1	1	-	-	1	1	1	2	1	1	1
2	3	2	1	-	1	2	-	-	1	1	2	2	1	1	1
3	3	2	2	-	1	2	I	-	1	1	2	2	1	2	1
4	3	2	2	-	1	2	-	-	1	1	2	2	1	2	1
5	3	2	2	-	1	2	-	-	1	1	2	3	1	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assessi	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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A. A. Sola

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		nanical Engineerir	ng	Programme					
Semester	VIII			Course Cate	gory: <b>PE</b>	End	Semeste	r Exam Ty	pe: <b>TE</b>
Course	11231	<b>IEE819</b>		Periods/W	/eek	Credit	Max	imum Mar	ks
Code				L T	P	С	CAM	ESE	ТМ
Course Name	e <b>LEAN</b>		IG	3 0	0	3	25	75	100
				MECH					
Prerequisite	Manuf	acturing Processes	3						
	On co	mpletion of the co	ourse. the stud	ents will be able t	to			BT Ma	••••
		-						(Highest	
	CUI	Highlighting the lear	-		•			K'	1
Course	CO2	digital environment.		anufacturing and thu	is acquire t	ne capability	to work in	K	2
Outcome	CO3	Examining the conc		technology.				K	3
	CO4	Integrate lean manu	Ifacturing with qua	ality management sy	stems			K	3
	CO5	Apply the knowledg	e of data driven le	an culture in real-tin	ne industria	l environme	nt.	K	3
UNIT - I	Intr	oduction to Lean	Manufacturing				Peri	ods: 9	
		nd Digital Factory Sin						-	
•		ditional and contemp for elimination – Ove				•			CO1
Integration wi	-		erview of Learn prin	icipies, concepts, ai	iu 10015 – L	ean beyond	SIUCKIESS		
UNIT - II	1	Manufacturing M	ethodologies,	Tools & Six Sigm	а		Peri	ods: 9	
	anufactu	ring tools and techni	ques – Lean asse	essments and imple	mentation				
		– – Error-proofing (			eatures, C	Goals, ISO	Standard,	Six Sigma	CO2
		ational Excellence, B	ERIS & ROLES OF BE	RIS			Dort	a da . 0	
UNIT - III	i	ess Mapping					Peri	ods: 9	
		am Manning (V/SM)	- Current vs Eut	ure state manning .	- Applicati	n to smart	factory sin	nulations -	
Process minii	ng and d	ligital twin technology	/ for mapping and	ture state mapping optimization – Step			-		CO3
Process minii – Practical gu	ng and d uidelines	ligital twin technology for effective implement	I for mapping and entation.	optimization - Step	-by-step ap		reamlining		COS
Process minin – Practical gu <b>UNIT - IV</b> Lean implem	ng and d uidelines Imple entation	ligital twin technology for effective implementation of Lea roadmap – Role of	/ for mapping and entation. I <b>n and Just in T</b> senior leadership	optimization – Step ime Manufacturi o in sustaining Lear	-by-step ap ng n culture –	proach to st	reamlining Peri of Lean w	workflows ods: 9 vith Quality	CO
Process minin – Practical gu UNIT - IV Lean implem Management Time (JIT) ele	ng and d uidelines Imple entation Systems ements a	ligital twin technology for effective implement ementation of Lea roadmap – Role of s (ISO 9001:2015, IA and benefits – Pull vs	/ for mapping and entation. I <b>n and Just in T</b> senior leadership (TF 16949) – Toyo . Push production	optimization – Step <b>ime Manufacturi</b> o in sustaining Lear ota Production Syste models – Kanban 2	-by-step ap ng n culture – em (TPS) in .0 and digi	proach to st Integration In the era of al Kanban s	reamlining Peri of Lean w automatior	ods: 9 vith Quality - Just-In-	
Process minin – Practical gu <b>UNIT - IV</b> Lean implem Management Time (JIT) ele improvement	ng and d uidelines Imple entation Systems ements a strategie	ligital twin technology for effective implement ementation of Lea roadmap – Role of s (ISO 9001:2015, IA and benefits – Pull vs es – Al and IoT in Lea	/ for mapping and entation. I <b>n and Just in T</b> senior leadership \TF 16949) – Toyo . Push production an implementation	optimization – Step <b>ime Manufacturi</b> o in sustaining Lear ota Production Syste models – Kanban 2 n – Case studies from	-by-step ap ng n culture – em (TPS) ir .0 and digi n leading ir	proach to st Integration In the era of al Kanban s	reamlining Peri of Lean w automatior ystems – (	workflows ods: 9 vith Quality n – Just-In- Continuous	
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Hr. H. 800

5. https://www.mjvinnovation.com/blog/10-lean-tools-for-continuous-improvement

### am Outcomes (POs) Program Specifi Outcomes (PSOs

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	1	-	-	-	-	-	-	-	-	2	3	1	1
2	2	2	3	-	-	-	-	-	-	-	-	1	1	1	2
3	3	3	3	-	-	-	-	-	-	-	-	2	3	2	2
4	2	2	2	-	-	-	-	-	-	-	-	1	2	1	1
5	2	2	2	-	-	-	-	-	-	-	-	2	2	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assessi	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

fr. fr. 800

On completion of the course, the students will be able to         BT Mapping (Highest Leve Course           Course         C01         Demonstrate the concept of Cryogenics technology and its working cycles operations.         K1           Course         C02         Describe various properties of cryogenic fluids and its production processes.         K2           C03         Acquire knowledge in various cryogenic fluids.         K2           C04         Identity the various measuring techniques involved to quantify the cryogenic fluids.         K2           C05         Apply the knowledge of cryogenics and Properties.         Periods: 9           Definition and history of cryogenics. Low Temperature Properties of Engineering Materials (Mechanical properties. superconductivity         Periods: 9           UNIT - II         Liquefaction Systems         Periods: 9           Ideal system. Joule Thomson expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and angon.         Periods: 9           Cryogenic insulations, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenic transfer lines, frost phenomena         Periods: 9           UNIT - IV         Instrumentation in Cryogenics         Periods: 9           Cryogenic insulations, storage and transfer of cryogenic in engineering, space technology, liquid fleel rockets, space simulation chambers, cryogenics applications         P	Department	Mechanical Engineering	Progr	amme :	B.Tech.				
Code         U23MEE820         L         T         P         C         CAM         ESE         TM           Course Name         CRVOGENIC ENGINEERING         3         0         0         3         25         75         100           MECH         Thermodynamics, Heat and Mass transfer         MECH         BT Mapping         [Highest Leve         CO1         Demonstrate the concept of Cryogenics technology and its working cycles operations.         K1           Courses         CO2         Describe various properties of cryogenics technology and its working cycles operations.         K2           Outcome         CO3         Acquire knowledge in various cryogenic fluedection storage and handling systems.         K2           CO3         Acquire knowledge in various cryogenic fluedection storage and handling systems.         K2           CO3         Acquire knowledge in various cryogenic fluedection storage and handling systems.         K2           CO4         Identify the knowledge of cryogenics techniques in various applications.         K3           UNIT - II         Liquefaction to Cryogenics. Low Temperature Properties. Properties of Engineering Materials (Mechanical properties.         Periods: 9           UNIT - III         Liquefaction Adjubatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of all separation, production of gase like oxigen, inclingo and no.         Co      <	Semester	VIII	Cours	e Categ	jory: <b>PE</b>	End S	Semester	Exam Ty	oe: <b>TE</b>
Code         L         T         P         C         CAM         ESE         TM           Course Name         CRYOGENIC ENGINEERING         3         0         0         3         25         75         100           MECH         Thermodynamics, Heat and Mass transfer         BT Mapping (Highest Leve         CO         Demonstrate the course, the students will be able to         BT Mapping (Highest Leve         CO         CO         Demonstrate the course, the students will be able to         K1           Course         CO         Demonstrate the course, the students will be able to         K1         K2           Course         CO         Acquire knowledge of cryogenics taids and its production processes.         K2           CO         Acquire knowledge of cryogenics taids and the production processes.         K3           UNIT - I         Introduction to Cryogenics and Properties         Periods: 9           Definition and history of cryogenics. Low Temperature Properties of Engineering Materials (Mechanical properties, signeronductivity         Periods: 9           UNIT - II         Liquefaction Systems         Periods: 9         Periods: 9           Ortice and transfer inse, for the phenomena         Periods: 9         Periods: 9           UNIT - II         Liquefaction systems, thermodynamics of gas liquefaction, liquefaction, cycle, cycle, cluude & Cascaded	Course	1122MEE020	Pe	riods/W	eek	Credit	Max	kimum Ma	arks
MECH           Prerequisite         Thermodynamics, Heat and Mass transfer         BT Mapping (Highest Levs (Course         BT Mapping (Highest Levs (Coll Description of the course, the students will be able to (Course         BT Mapping (Highest Levs (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description of the course, the students will be able to (Coll Description and fistory of cycogenics. Low Temperature Properties - Properties of Engineering Materials (Mechanical properties, superconductivity         Virt - II           UNIT - II         Liquefaction Nystems         Periods: 9           VIIT - III         Coll opering Figuration and argon. Cas-Liquefaction and engineering. National and argon. Cas-Liquefaction and engineering. Storage, Insulation and Transfer         Periods: 9           VIIT - III         Cryogenic Fluids : Storage, Insulation and Transfer         Periods: 9           Cryogenic insulations, storage and transfer of cryogenics in engineering, space technology, Rud dewal, Bow task, 2013. <th>Code</th> <th>UZ3MEE02U</th> <th>L</th> <th>Т</th> <th>Р</th> <th>С</th> <th>CAM</th> <th>ESE</th> <th>ТМ</th>	Code	UZ3MEE02U	L	Т	Р	С	CAM	ESE	ТМ
Prerequisite Thermodynamics, Heat and Mass transfer           Prerequisite         Intermodynamics, Heat and Mass transfer         BT Mapping           Course         On completion of the course, the students will be able to         (Highest Leve           Course         CO2         Describe various properties of cryogenics fluids and its production processes.         K1           Course         CO3         Acquire Knowledge in various cryogenic fluideation storage and handling systems.         K2           CO4         Identify the various measuring techniques in various applications.         K3           UNIT -1         Introduction to Cryogenics techniques in various applications.         K3           UNIT -1         Introduction to Cryogenics. Low Temperature Properties. Properties of Engineering Materials (Mechanical properties, apperonductivity         Periods: 9           Ideal system, Joule Thomson expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and argon.         CO           Gos Liquefaction and refrigerator and adiabatic demagnetization.         Periods: 9         CO           UNIT -1I         Intermodynamics. Storage, Insulation and Transfer         Periods: 9         CO           Cryogenic transfer lines, frost phenomena         Cryogenics and transfer of cryogenics in engineering, space technology, load dyne dyne and argon.         CO           Coygenic transfer lines, frost phenomena	Course Name	CRYOGENIC ENGINEERING	3	0	0	3	25	75	100
On completion of the course, the students will be able to         BT Mapping (Highest Leve Course           Course         C01         Demonstrate the concept of Cryogenics fluids and its production processes.         K1           Course         C02         Describe various properties of cryogenic fluids and its production processes.         K2           C04         Identify the various measuring techniques involved to quantify the cryogenic fluids.         K2           C05         Apptite knowledge of cryogenics cand Properties         Periods: 9           Definition and history of cryogenics. Low Temperature Properties of Engineering Materials (Mechanical properties, superconductivity         Periods: 9           UNIT - II         Liquefaction Systems         Periods: 9           UNIT - II         Liquefaction Systems         Periods: 9           UNIT - II         Liquefaction Rystems, hermodynamics of gas ilquidaction cycles, Claude & Cascaded System. Principle of air separation, production of gase like oxygenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenic insulations, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenic transfer lines, first phenomena         CO           UNIT - V         Instrumentation in Cryogenics         Periods: 9           Cryogenic insulations, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenics and its applications         CO           UNIT -		Ν	ЛЕСН						
Course         Conspletion of the Course, the students will be able to         (Highest Leve           Course         CO1         Demonstrate the concept of Cryogenics technology and its working cycles operations.         K1           Course         CO2         Describe various properties of cryogenics fluids and its production processes.         K2           Course         CO3         Acquire knowledge in various cryogenic liquefaction storage and handling systems.         K2           CO4         Identify the various measuring techniques in various applications.         K3           UNIT - I         Introduction to Cryogenics and Properties.         Periods: 9           Definition and history of cryogenics, Low Temperature Properties.         Properties.         Periods: 9           UNIT - II         Liquefaction Systems         Periods: 9         Periods: 9           UNIT - II         Liquefaction sepansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and argon.         Res.Lquefaction and transfer         Periods: 9           UNIT - II         Liquefaction and transfer of cryogenic liquids, cryostats, introduction to vacuum technology. cool down of cryogenic transfer incryogenic liquids, cryostats, introduction to vacuum technology. cool down of cryogenic transfer incryogenic market, speceric second its applications - applications of cryogenic and applications of cryogenic and applications of cryogeneric and adiabatic demamperizeria. <td< td=""><td>Prerequisite</td><td>Thermodynamics, Heat and Mass transfer</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	Prerequisite	Thermodynamics, Heat and Mass transfer							
Course Outcome         Course Course Course         Course Course Coorse		On completion of the course, the studen	ts will k	e able	to				
Cutoms         CO3         Acquire knowledge in various cryogenic liquefaction storage and handling systems.         K2           Outcome         CO4         Identify the various measuring techniques involved to quantify the cryogenic fluids.         K2           CO4         Identify the various measuring techniques involved to quantify the cryogenic fluids.         K2           CO5         Apply the knowledge of cryogenics techniques in various applications.         K3           UNIT - II         Introduction to Cryogenics. Low Temperature Properties.         Periods: 9           Definition and bistory of cryogenics, Low Temperature Properties of gas liquefaction cryoles, cryogenic temperatures, superconductivity         VIIT - II         Introduction of gases like oxygen, nitrogen and argon.         Co           Cas-Liquefaction and refigeration any stems, thermodynamics of gas liquefaction, ilquefaction cryoles, cryogenic refigeration and capacity in thermodynamics of gas liquefaction, ilquefaction cryoles, cryogenic refigeration or cryogenic insulations, storage and transfer of cryogenic fluids, cryostats, introduction to vacuum technology, col down of thermomentation in Cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor thermodynamics cryosenic, spectrascopy, cryo pumping, food processing, biology, medica applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, 2000.         Co           UNIT + IV         Instrumentation: cryogenics A Textbook, Narosa,		CO1 Demonstrate the concept of Cryogenics	technolo	gy and i	ts working	cycles oper	rations.		K1
Outcome         CO3         Acquire knowledge in various cryogenic liquefaction storage and handling systems.         K2           CO4         Identify the various measuring techniques in various applications.         K2           CO5         Apply the knowledge of cryogenics and Properties         Periods: 9           Definition and history of cryogenics, Low Temperature Properties of Engineering Materials (Mechanical properties, superconduction to Cryogenics, Low Temperature Properties, Properties of solids at cryogenic temperatures, superconduction of gases like oxygen, nitrogen and argon.         Co           UNIT - II         Liquefaction systems, hermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration and refigeration systems, hermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems, hermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems, hermodynamics of gas liquefaction, site serveration and refrigeration system, hermodynamics of gas liquefaction, site serveration and refrigeration systems, hermodynamics of gas liquefaction, site serveration and refrigeration systems and transfer of cryogenic liquids, cryostats, introduction to vacuum technology. Cool down of cryogenic insultions in cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor functionaries in cryogenics applications: periods: 9         Co           UNIT - V         Cryogenics Applications of cryogenics in engineering, space technology, liquid tevel, flow rate, quality         Co           UNIT - V         Cryogenics Applications of cryogenics in engineering, space technology flow processing, co         Co	Course	CO2 Describe various properties of cryogenia	cs fluids a	and its pr	roduction p	processes.			K2
CO4         Identify the various measuring techniques involved to quantify the cryogenic fluids.         K2           VNT -1         Introduction to Cryogenics techniques in various applications.         K3           UNT -1         Introduction to Cryogenics and Properties         Periods: 9           Definition and history of cryogenics, Low Temperature Properties of solids at cryogenic temperatures, superconductivity         Veriods: 9           UNT -1I         Liquefaction Systems         Periods: 9           Ideal system, Joule Thomson expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle di ar separation, production of gases like oxygen, nitrogen and argon.         Co           Gas Liquefaction and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems down to milli Kelvin range. Dilution Refrigerator and adiabatic demagnetization.         Periods: 9           Cryogenic insulations, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenic transferior in Cryogenics: measurement temperature, thermocouples, platinum resistance and seniconductor thermometry-liquid level, flow rate, quality         Periods: 9           UNT - V         Cryogenics Applications         Periods: 9           Cryogenics and its applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, 2000, medicine and LNG technologies Principles and Applications,		CO3 Acquire knowledge in various cryogenic	liquefact	ion stora	ige and ha	ndling syste	ems.		
COS         Apply the knowledge of cryogenics techniques in various applications.         K3           UNIT -1         Introduction to Cryogenics and Properties         Periods: 9           Definition and history of cryogenics. Low Temperature Properties: Properties of Engineering Materials (Mechanical properties, superconductivity         Periods: 9           UNIT -1         Liquefaction Systems         Periods: 9           UNIT -11         Liquefaction systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems, thermodynamics of gas liquefaction, liquefaction to vacuum technology. col down of cryogenic fluids : Storage, Insulation and Transfer         Periods: 9           UNIT -11         Cryogenic Fluids : Storage, Insulation and Transfer         Periods: 9           Cryogenic insulations, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology. col down of cryogenics measurement temperature, thermocouples, platinum resistance and semiconductor to thermometry-liquid level, flow rate, quality         Co           UNIT -1V         Instrumentation in Cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor subility, model: and LNB technology, Cryo Metallurgy, Medical applications, cryocooler and its applications         Co           UNIT -1V         Instrumentation in Cryogenics: A Textbook, Narcea, 2013.         A.R. Jha, Cryogenic Engineering and Technologies Pri	Catoonio	CO4 Identify the various measuring technique	es involv	ed to qua	antify the c	ryogenic flu	ids.		
UNIT - 1       Introduction to Cryogenics and Properties       Properties of Engineering Materials (Machanical properties, Thermal properties, Electrical and Magnetic properties), super fluidity, properties of solids at cryogenic temperatures, superconductivity       CO         UNIT - II       Liquefaction Systems       Periods: 9       Ideal system, Joule Thomson expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and argon.       Co         Gas-Liquefaction and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems, thermodynamics of gas liquefaction.       Periods: 9       Co         UNIT - III       Cryogenic Fluids : Storage, Insulation and Transfer       Periods: 9       Co         UNIT - III       Cryogenics insulations, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, col down of cryogenic transfer lines, frost phenomena       Periods: 9       Co         UNIT - V       Instrumentation in Cryogenics       Periods: 9       Co         UNIT - V       Cryogenics applications       Periods: 9       Co         UNIT - V       Cryogenics measurement temperature, thermocouples, platinum resistance and semiconductor thermometry-liquid level, flow rate, quality       Co         UNIT - V       Cryogenics applications of cryogenics in engineering, space technology, liqud processing, biology, medicine and LNG technology, Cryo Metallurgy, Medical applications, cryopcoler and its ap		CO5 Apply the knowledge of cryogenics tech	niques ir	various	applicatio	ns.			
Definition and history of cryogenics, Low Temperature Properties: Properties of Engineering Materials (Mechanical properties, Thermal properties, Electrical and Magnetic properties), super fluidity, properties of solids at cryogenic temperatures, superconductivity       CO         UNIT - II       Liquefaction Systems       Periods: 9         Ideal system, Joule Thomson expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and argon.       Periods: 9         Gas-Liquefaction and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems down to mili Kelvin range, Dilution Refrigerator and adiabatic demagnetization.       Periods: 9         Cryogenic transfer lines, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenics measurement temperature, thermocouples, platinum resistance and semiconductor thermometry-liquid level, flow rate, quality       Periods: 9         UNIT - IV       Instrumentation in Cryogenics in engineering, space technology, iquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, flood processing, bubble chambers, spectroscopy, cryo pumping, flood processing, bubble chambers, cryogenic rand its applications.       CO         UNIT - V       Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.       CO         S.S. Thipse, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.       S.S.	UNIT - I		-				F		
Thermal properties, Electrical and Magnetic properties), super fluidity, properties of solids at cryogenic temperatures, superconductivity       Periods: 9         UNIT -II       Liquefaction Systems, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and argon.       Periods: 9         Gase Liquefaction and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems down to mill Kelvin range. Dilution Refrigerator and adiabatic demagnetization.       Periods: 9         UNIT -III       Cryogenic Fluids : Storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenic transfer of cryogenics.       Periods: 9         UNIT -IV       Instrumentation in Cryogenics:       Periods: 9         Instrumentation in Cryogenics:       Periods: 9         UNIT -IV       Cryogenic Applications       Periods: 9         UNIT -IV       Instrumentation:       In Cryogenics: applications of cryogenics.       Periods: 9         UNIT -IV       Instrumentation:       In Cryogenics applications.       specifications.       Co         UNIT -IV       Instrumentation:       In Cryogenics.       Periods: 9       Co         UNIT -IV       Instrumentation:       In Cryogenics.       Periods: 9       Co         UNIT -IV				ies of Fr	naineerina	Materials (N	i		
UNIT - II       Liquefaction Systems       Periods: 9         Ideal system, Joule Thomson expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and argon.       CO         Gas-Liquefaction and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration systems down to mill Kelvin range, Dilution Refrigerator and adiabatic demagnetization.       Periods: 9         Cryogenic Isulations, production in Cryogenic Fluids : Storage, Insulation and Transfer       Periods: 9         Cryogenic insulations, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenic transfer lines, frost phenomena       CO         UNIT - IV       Instrumentation in Cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor thermometry- liquid level, flow rate, quality       Periods: 9         UNIT - V       Cryogenic Applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, biology, medicine and LNG technology. Cryo Metallurgy, Medical applications, cryocooler and is applications: 2020.       Co         2. S. Thipse, Cryogenic Engineering and Technologies Principles and Applications of Cryogenic Free Systems, Taylor and Francis, 2020.       Co         2. S. Thipse, Cryogenic Engineering and Technologies Principles and Applications of Cryogenic Free Systems, Taylor and Francis, 2020.       S. Thipse/// Cryogenic Eng			•		0 0	•			S,
Ideal system, Joule Thomson expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and argon.       Co         Gas-Liquefaction and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration to milli Kelvin range, Dilution Refrigerator and adiabatic demagnetization.       Periods: 9         UNIT - IV       Instrumentation in Cryogenics (Insulation and Transfer Cycles, cryogenic transfer lines, frost phenomena       Periods: 9         UNIT - IV       Instrumentation in Cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor thermometry-liquid level, flow rate, quality       Periods: 9         Cryogenics and its applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation ead LNG technology, Cryo Medialurgy, Medical applications, cryocooler and its applications.       Co         UNIT - V       Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.       Co         2. S.S. Thipse, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.       S.S. Thipse, Cryogenic Fundamentals, Academic Press 1975.       Salhama Zohuri, Physics of Cryogenics, Nacademic Press 1975.         2. Baily C.A. Advanced cryogenics Nutration Terpogenics in engineering, CERN, 2003.       Go       Go         3. A.R. Jha, Cryogenics Fundamental	superconducti	vity							CO1
Ideal system, Joule Thomson expansion, Adiabatic expansion, Linde Hampson Cycle, Claude & Cascaded System. Principle of air separation, production of gases like oxygen, nitrogen and argon.       Co         Gas-Liquefaction and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration and refrigeration systems, thermodynamics of gas liquefaction, liquefaction cycles, cryogenic refrigeration to milli Kelvin range, Dilution Refrigerator and adiabatic demagnetization.       Periods: 9         UNIT - IV       Instrumentation in Cryogenics (Insulation and Transfer Cycles, cryogenic transfer lines, frost phenomena       Periods: 9         UNIT - IV       Instrumentation in Cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor thermometry-liquid level, flow rate, quality       Periods: 9         Cryogenics and its applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation ead LNG technology, Cryo Medialurgy, Medical applications, cryocooler and its applications.       Co         UNIT - V       Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.       Co         2. S.S. Thipse, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.       S.S. Thipse, Cryogenic Fundamentals, Academic Press 1975.       Salhama Zohuri, Physics of Cryogenics, Nacademic Press 1975.         2. Baily C.A. Advanced cryogenics Nutration Terpogenics in engineering, CERN, 2003.       Go       Go         3. A.R. Jha, Cryogenics Fundamental	UNIT - II	Liquefaction Systems					F	Periods: 9	
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UNIT - III       Cryogenic Fluids : Storage, Insulation and Transfer       Periods: 9         Cryogenic insulations, storage and transfer of cryogenic liquids, cryostats, introduction to vacuum technology, cool down of cryogenic transfer lines, frost phenomena       Co         UNIT - IV       Instrumentation in Cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor thermometry-liquid level, flow rate, quality       Periods: 9         UNIT - V       Cryogenic shuld level, flow rate, quality       Periods: 9         UNIT - V       Cryogenics and its applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, biology, medicine and LNG technologies Principles and Applications, cryocooler and its applications       CO         Lecture Periods: 45       Tutorial Periods:       Practical Periods: -       Total Periods: 45         Text Books       1       Zhao Z, Cryogenics: A Textbook, Narosa, 2013.       A. R. Jaa, Cryogenic Technology and Applications, Academic Press Inc. (London) Ltd, 2011.       Reference Books         1       Haselden C.J. (Ed) Cryogenics: Neutron Press 1975.       Bahman Zohuri, Physics of Cryogenics, Natora, Academic Press 1975.       Bahman Zohuri, Physics of Cryogenics, Discovery Publishing House, 2003       Go         5       G. Perinic, G. Vandoni, T. Niinikoski, Introduction to Cryogenics, Discovery Publishing House, 2003       Go	-					on cycles, c	cryogenic	refrigeratio	n <b>CO2</b>
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UNIT - IV       Instrumentation in Cryogenics       Periods: 9         Instrumentation       in Cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor thermometry-liquid level, flow rate, quality       CO         UNIT - V       Cryogenics Applications       Periods: 9         Cryogenics and its applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, biology, medicine and LNG technology. Cryo Metallurgy, Medical applications, cryocooler and its applications.       Co         Lecture Periods: 45       Tutorial Periods:       Practical Periods: -       Total Periods: 44         Text Books       1       Zhao Z, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.       S         2. S.S. Thipse, Cryogenics: A Textbook, Narosa, 2013.       A.R. Jha, Cryogenic Technology and Applications, Academic Press Inc.(London) Ltd, 2011.       Reference Books         1. Haselden C.J. (Ed) Cryogenics. Plenum Press 1971.       Bahman Zohuri, Physics of Cryogenics. Discovery Publishing House, 2003       G         3. G. Perinić, G. Vandoni, T. Ninikoski, Introduction to Cryogenic Engineering, CERN, 2005.       Web References       I         1. https://www.digimat.in/nptel/courses/video/112101004/L33.html       I       Instrumentation in Cryogenics.html         3. https://home.cerr/science/engineer			, cryosta	s, introd	uction to v	acuum tecl	nnology, c	ool down d	
Instrumentation in Cryogenics: measurement temperature, thermocouples, platinum resistance and semiconductor thermometry-liquid level, flow rate, quality UNIT - V Cryogenics Applications Cryogenics and its applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, biology, medicine and LNG technology, Cryo Metallurgy, Medical applications, cryocooler and its applications Lecture Periods: 45 Tutorial Periods: Tutorial Periods: Tutorial Periods: Co Co Co Co Co Co Co Co Co Co Co Co Co		•					F	Periods: 9	<u>.</u>
UNIT - V       Cryogenics Applications       Periods: 9         Cryogenics and its applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, biology, medicine and LNG technology, Cryo Metallurgy, Medical applications, cryocooler and its applications       Co         Lecture Periods: 45       Tutorial Periods:       Practical Periods: -       Total Periods: 43         1.       Zhao Z, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.       2.         2.       S.S. Thipse, Cryogenic Technology and Applications, Academic Press Inc.(London) Ltd, 2011.       Reference Books         1.       Haselden C.J. (Ed) Cryogenic Fundamentals, Academic Press 1975.       2.         2.       Baily C.A. Advanced cryogenics. Plenum Press 1971.       3.         3.       Bality C.A. Advanced Cryogenics An Ultralow Temperature Phenomenon, Elseivier, 2017.       4.         Valery V. Kostionk, A Text Book Of Cryogenics, Discovery Publishing House, 2003       5.       G. Perinić, G. Vandoni, T. Niinikoski, Introduction to Cryogenic Engineering, CERN, 2005.         Web References       1.       https://trc.nist.gov/cryogenics/aboutCryogenics-low-temperatures-high-performance       4.         1.       https://www.thoughtco.com/cryogenics-definition-4142815       htttps://www.thoughtco.com/cryogenics-definition-4142815 </td <td>Instrumentatio</td> <td>n in Cryogenics: measurement temperature,</td> <td>thermod</td> <td>ouples,</td> <td>platinum</td> <td>resistance</td> <td>I</td> <td></td> <td>T</td>	Instrumentatio	n in Cryogenics: measurement temperature,	thermod	ouples,	platinum	resistance	I		T
Cryogenics and its applications: applications of cryogenics in engineering, space technology, liquid fuel rockets, space simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, biology, medicine and LNG technology, Cryo Metallurgy, Medical applications, cryocooler and its applications Lecture Periods: 45 Tutorial Periods: Practical Periods: - Total Periods: 44 Text Books 1. Zhao Z, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020. 2. S.S. Thipse, Cryogenics: A Textbook, Narosa, 2013. 3. A.R. Jha, Cryogenic Technology and Applications, Academic Press Inc.(London) Ltd, 2011. Reference Books 1. Haselden C.J. (Ed) Cryogenics. Plenum Press 1971. 3. Bahman Zohuri, Physics of Cryogenics, Discovery Publishing House, 2003 5. G. Perinić, G. Vandoni, T. Niinikoski, Introduction to Cryogenic Engineering, CERN, 2005. Web References 1. https://www.digimat.in/nptel/courses/video/112101004/L33.html 2. https://trc.nist.gov/cryogenics/aboutCryogenics.html 3. https://home.cern/science/engineering/cryogenics-low-temperatures-high-performance 4. https://www.thoughtco.com/cryogenics.definition-4142815		T					F	Periods: 0	<u> </u>
simulation chambers, cryogenic heat pipes, nuclear research, bubble chambers, spectroscopy, cryo pumping, food processing, biology, medicine and LNG technology, Cryo Metallurgy, Medical applications, cryocooler and its applications Lecture Periods: 45 Tutorial Periods: Practical Periods: - Total Periods: 48 Text Books 1. Zhao Z, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020. 2. S.S. Thipse, Cryogenics: A Textbook, Narosa, 2013. 3. A.R. Jha, Cryogenic Technology and Applications, Academic Press Inc.(London) Ltd, 2011. Reference Books 1. Haselden C.J. (Ed) Cryogenic Fundamentals, Academic Press 1975. 2. Baily C.A. Advanced cryogenics. Plenum Press 1971. 3. Bahman Zohuri, Physics of Cryogenics, Discovery Publishing House, 2003 5. G. Perinić, G. Vandoni, T. Niinikoski, Introduction to Cryogenic Engineering, CERN, 2005. Web References 1. https://www.digimat.in/nptel/courses/video/112101004/L33.html 2. https://trc.nist.gov/cryogenics/aboutCryogenics-low-temperatures-high-performance 4. https://home.cern/science/engineering/cryogenics-low-temperatures-high-performance 4. https://www.thoughtco.com/cryogenics-definition-4142815			engineg	rina sn	aca tachn	ology liqui			Ī
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Text Books         1. Zhao Z, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.         2. S.S. Thipse, Cryogenics: A Textbook, Narosa, 2013.         3. A.R. Jha, Cryogenic Technology and Applications, Academic Press Inc.(London) Ltd, 2011.         Reference Books         1. Haselden C.J. (Ed) Cryogenic Fundamentals, Academic Press 1975.         2. Baily C.A. Advanced cryogenics. Plenum Press 1971.         3. Bahman Zohuri, Physics of Cryogenics An Ultralow Temperature Phenomenon, Elseivier, 2017.         4. Valery V. Kostionk, A Text Book Of Cryogenics, Discovery Publishing House, 2003         5. G. Perinić, G. Vandoni, T. Niinikoski, Introduction to Cryogenic Engineering, CERN, 2005.         Web References         1. https://www.digimat.in/nptel/courses/video/112101004/L33.html         2. https://trc.nist.gov/cryogenics/aboutCryogenics-low-temperatures-high-performance         4. https://home.cern/science/engineering/cryogenics-low-temperatures-high-performance					•				
<ol> <li>Zhao Z, Cryogenic Engineering and Technologies Principles and Applications of Cryogen Free Systems, Taylor and Francis, 2020.</li> <li>S.S. Thipse, Cryogenics: A Textbook, Narosa, 2013.</li> <li>A.R. Jha, Cryogenic Technology and Applications, Academic Press Inc.(London) Ltd, 2011.</li> <li>Reference Books         <ol> <li>Haselden C.J. (Ed) Cryogenic Fundamentals, Academic Press 1975.</li> <li>Baily C.A. Advanced cryogenics. Plenum Press 1971.</li> <li>Bahman Zohuri, Physics of Cryogenics An Ultralow Temperature Phenomenon, Elseivier, 2017.</li> <li>Valery V. Kostionk, A Text Book Of Cryogenics, Discovery Publishing House, 2003</li> <li>G. Perinić, G. Vandoni, T. Niinikoski, Introduction to Cryogenic Engineering, CERN, 2005.</li> </ol> </li> <li>Web References         <ol> <li>https://www.digimat.in/nptel/courses/video/112101004/L33.html</li> <li>https://trc.nist.gov/cryogenics/aboutCryogenics-low-temperatures-high-performance</li> <li>https://home.cern/science/engineering/cryogenics-low-temperatures-high-performance</li> <li>https://www.thoughtco.com/cryogenics-definition-4142815</li> </ol></li></ol>	Lecture Peri	ods: 45 Tutorial Periods:	Practic	al Perio	ds: -		Т	otal Peri	ods: 45
<ol> <li>A.R. Jha, Cryogenic Technology and Applications, Academic Press Inc.(London) Ltd, 2011.</li> <li>Reference Books         <ol> <li>Haselden C.J. (Ed) Cryogenic Fundamentals, Academic Press 1975.</li> <li>Baily C.A. Advanced cryogenics. Plenum Press 1971.</li> <li>Bahman Zohuri, Physics of Cryogenics An Ultralow Temperature Phenomenon, Elseivier, 2017.</li> <li>Valery V. Kostionk, A Text Book Of Cryogenics, Discovery Publishing House, 2003</li> <li>G. Perinić, G. Vandoni, T. Niinikoski, Introduction to Cryogenic Engineering, CERN, 2005.</li> </ol> </li> <li>Web References         <ol> <li>https://www.digimat.in/nptel/courses/video/112101004/L33.html</li> <li>https://trc.nist.gov/cryogenics/aboutCryogenics.low-temperatures-high-performance</li> <li>https://www.thoughtco.com/cryogenics-definition-4142815</li> </ol></li> </ol>	1. Zhao Z, Cr 2020.	· · · · · · ·	and App	lications	of Cryoge	n Free Syst	ems, Tayl	or and Fra	ncis,
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2	3	2	2	2	-	-	-	-	-	-	-	1	1	2	2
3	3	2	2	1	-	-	-	-	-	-	-	1	1	2	2
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5	3	3	3	3	1	-	1	1	1	1	-	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assessi	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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Department	Mech	anical E	ngineering		Progra	amme :	B.Tech.					
Semester	VIII				Cours	e Categ	ory: <b>PE</b>	End S	emeste	er Exa	am Type	: TE
Course	1122M	EE821			Per	riods/We	eek	Credit	М	axim	um Marl	٨S
Code	UZJIVI				L	Т	Р	С	CAM	E	ESE	ТМ
Course Name	AUTC	TRONIC	CS		3	0	0	3	25		75	100
				Μ	IECH							
Prerequisite	Autom	obile En	gineering									
	On co	•	n of the course, the							(	BT Ma (Highest	
	CO1		and the basic knowled	-	-	-	ent Syster	n.			K	2
Course	CO2	•	knowledge about ignit	•							Kź	2
Outcome	CO3		rize the working of sen								K	2
	CO4	Acquire	knowledge about elec	ctrical syste	ems in au	utomobile	es.				K	3
F	CO5	Infer the	details of chassis and	d safety sys	stems in	automob	oiles.				K	3
UNIT - I	Introc	luction								Peri	ods: 9	
			ectronics: Microproces automobiles, compone									CO1
UNIT - II	lanitia	on and I	njection Systems							Peri	ods: 9	
battery coil ign	ition sys	stems, Pr	nentals - Electronic igr ogrammed Ignition – I Engine fuelling and exl	Distributior	n less igr	nition - D	irect igniti	on – Spark	Plugs. I	Electro	onic fuel	CO2
<ul> <li>Diesel fuel in</li> </ul>	jection.											
– Diesel fuel in UNIT - III	-	or and A	ctuators							Peri	ods: 9	
UNIT - III Sensors – type	Senso	ing and p	<b>Actuators</b> Dositioning. Study of fu pr, vacuum operated a	-			es and wo	orkings, exh	aust gas			CO3
UNIT - III Sensors – type	Senso es, work	ing and p or actuate	positioning. Study of fu	actuator.			es and wo	orkings, exh	aust ga	s recir		CO3
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COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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2	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2
3	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2
4	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2
5	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assess	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

dr. A. 800

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Department	Mecha	anical	Engineering		Progr	amme :	B.Tech.					
Semester	VIII				Cours	e Categ	ory: PE	End S	emes	ter Ex	am Type	e: TE
Course	11000	<b>FF</b> 000			Pe	riods/W	eek	Credit	ſ	Maxim	num Mar	ks
Code	UZSIVI	EE822			L	Т	Р	С	CAN	N	ESE	ТМ
Course Name			DN TECHNIQUES I IG DESIGN	N	3	0	0	3	25		75	100
Prerequisite	Numeri	cal Me	hods and Optimizat	tion								
	On co	mnleti	on of the course, tl	ha studan	ts will h	o able f	0				BT Ma	pping
		mpicus									(Highest	
	CO1		g of optimization.								K	2
Course	CO2	-	orizing the various op		-						K	2
Outcome	CO3	Choos	sing ideas on unconstr	rained optim	nization.						K	3
	CO4	Mashi	ng about constrained	optimizatior	n.						K	4
	CO5	Gradi	ng about Modern meth	nods of optir	mization	like Neur	al-Netwo	k			K	4
UNIT - I	Intro	oductio	on to Optimization							Per	iods: 9	
	n problei	m. Optir	mization – Statement num design concepts pal optimality									co
UNIT - II	Linea	r Prog	ramming Methods	for Optim	um Des	sign				Per	riods: 9	
			ning methods for opt and stochastic prog		gn – Post	t optimal	ity analys	is - Applicat	ion of	LPP r	models in	coa
UNIT - III	Unco	nstrain	ed Optimization							Per	iods: 9	
•••••			eu Optimization									
Optimization a	-	is for s	olving unconstrained thod, Conjugate gradi	-	-	ms – Gi	radient ba	ased metho	d. Cau		steepest	
Optimization a	od, Newt	is for s on's me	olving unconstrained	-	-	ms – Gi	radient ba	ased method	d. Cau	ichy's	steepest <b>·iods: 9</b>	
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B.Tech. Mechanical Engineering

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1	3	3	3	3	-	-	-	-	-	-	2	3	2	3	1
2	3	3	2	2	-	-	-	-	-	-	1	3	2	2	3
3	3	3	2	2	-	-	-	-	-	-	2	3	2	1	3
4	3	3	3	2	-	-	-	-	-	-	1	3	1	2	3
5	3	3	3	2	-	-	-	-	-	-	2	3	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assessi	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

Ar. A. 800

**Mechanical Engineering** 

Department

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Semester	VIII		Cours	se Categ	gory: <b>PE</b>	Enc	I Semes	ter Exam	Туре: <b>ТЕ</b>
Course	U23MEE823	8	Pe	riods/W	eek	Credit	Ma	aximum N	larks
Code	0201112020		L	Т	Р	С	CAM	ESE	ТМ
Course Name	TOTAL QUA	ALITY MANAGEMENT	3	0	0	3	25	75	100
			MECH						
Prerequisite	Metrology and	d Measurement							
	On completio	on of the course, the s	tudents will b	e able t	0				Mapping est Level
	CO1 Highlic	ghting the concept of qualit	V						K1
Course	CO2 Comm	nenting fundamentals of tot	al Quality Mana	aement					K2
Outcome	000	ining the concept of Total c							K3
		guishing service based ma			uality				K3
		the knowledge of quality s	<u> </u>						K3
UNIT - I	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	n to Concept of Quality			. <u>y</u>		Pe	eriods: 9	
		Concept and Features of 7		locks of T	OM Jura	Trilogy PC			n
Crosby's theor	ry on Quality M	lanagement, Quality Perfo ge National Quality Award.	ormance Excelle				•		
UNIT - II	Lean and Si	ix Sigma					Pe	eriods: 9	
	•	atures, Goals, ISO Standar nism Pareto, DMAIC and I	•	•				Belts & Rol	es CO2
				Ouccess		0			
UNIT - III	TQM Tools			Ouccess			Pe	eriods: 9	I
		PD), Quality Function Dep	loyment (QFD)		of Quality		l		chi
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Programme : B.Tech.

dr. A. 800

B.Tech. Mechanical Engineering

COs					Prog	gram O	utcome	es (POs	)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	1	1	-	-	-	-	-	-	1	1	2	1
2	3	2	2	1	1	-	-	-	-	-	-	1	2	3	2
3	3	1	2	2	1	-	-	-	-	-	-	-	3	2	2
4	3	2	2	2	-	-	-	-		-	-	1	2	3	2
5	3	2	2	2	1	-	-	-		-	-	1	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Conti	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

fr. fr. 800



## **PROFESSIONAL ELECTIVE - VI**

dr. dr. 8000

B.Tech. Mechanical Engineering

N. A. 800

Department	Mech	anical E	Engineering		Progra	amme :	B.Tech	I					
Semester	VIII				Cours	e Categ	ory: PE	Er	d Sei	nest	er Exam	Тур	e: <b>TE</b>
Course	U23N	IEE824			Pe	riods/W	eek	Credit		Ma	ximum M	arks	5
Code					L	Т	Р	С	C	٩M	ESE		ТМ
Course Name	COM	POSITE	S MATERIAL		3	0	0	3	2	5	75	1	100
				Μ	1ECH								
Prerequisite	Engine	ering M	etallurgy										
	On coi	npletio	n of the course, the	e student:	s will be	e able to	0				BT		
	CO1	•									(High		_evel
	COI		nowledge on the ne						• .			K2	
Course Outcome	CO2	Unders	stand different techi ons.	niques to	proces	s polym	er-matri	x compos	ites a	ind it	ts	K2	
Outcome	CO3	Gather	different techniques	s to proces	ss metal	l-matrix	compos	ites and its	limita	ations	s.	K3	
, i i i i i i i i i i i i i i i i i i i	CO4	Infer di	fferent techniques to	o process	ceramic	-matrix	compos	ites and its	limita	ations	s.	K3	
	CO5	Select	appropriate compos	sites for sp	pecific a	pplicatic	ons.					K4	
UNIT - I	Intro	duction	to Composites							Pei	riods: 9	······•	
		-	need for composites							-			
	-		MC), Metal matrix com Fibre reinforced comp							Rein	forcement	:	CO1
UNIT - II	Polyr	ner Mat	rix Composites							Pei	riods: 9	Ì.	
Polvmer matrix	resins	– Therm	osetting resins, thermo	oplastic res	sins – Rei	inforcem	ent fibres	– Rovinas	– Wo	ven fa	abrics – N	on	
						UD Droce	esses – S	bray up pro	cesse	s – C	compressi	on	
moulding – Re	einforce	d reactio	ypes of fibres. PMC p n injection moulding - tics (FRP). Glass fibre	- Resin tra	ansfer mo	oulding -					-	on	CO2
moulding – Re moulding. Fibre	einforce e reinfo	d reactio rced plas	n injection moulding - tics (FRP), Glass fibre	- Resin tra	ansfer mo	oulding -				nding	ı – İnjecti	on	CO2
moulding – Re moulding. Fibre UNIT - III	einforce e reinfo Metal	d reactio rced plas <b>Matrix</b>	n injection moulding tics (FRP), Glass fibre <b>Composites</b>	- Resin tra reinforced	ansfer mo	oulding – (GRP).	- Pultrusi	on – Filam	ent wi	nding <b>Pe</b> i	ı – İnjecti riods: 9		CO2
moulding – Re moulding. Fibre UNIT - III Characteristics Metal Matrix, R	einforce e reinfor <b>Metal</b> s of MM Reinforc	d reactio rced plas <b>Matrix</b> C, Variou ements –	n injection moulding - tics (FRP), Glass fibre	- Resin tra e reinforced x composit ect of reinfo	tes Alloy	vs. MMC t - Volum	- Pultrusi , Advant ne fraction	ages of MN	ent wi	nding <b>Pe</b> i nitatic	n – Injecti riods: 9 ns of MM	С,	
moulding – Re moulding. Fibre UNIT - III Characteristics Metal Matrix, R	einforce e reinfor <b>Metal</b> s of MM Reinforc MMC –	d reactio rced plas <b>Matrix</b> C, Variou ements – Powder r	n injection moulding - tics (FRP), Glass fibre <b>Composites</b> s types of Metal matri particles – fibres. Effe	- Resin tra e reinforced x composit ect of reinfo	tes Alloy	vs. MMC t - Volum	- Pultrusi , Advant ne fraction	ages of MN	ent wi	nding Per nitatic es, A	n – Injecti riods: 9 ns of MM	С,	
moulding – Re moulding. Fibre UNIT - III Characteristics Metal Matrix, R Processing of I UNIT - IV Engineering ce - Various types	einforce e reinfor <b>Metal</b> s of MM Reinforc MMC – <b>Cerar</b> eramic n s of Ce	d reactio rced plas <b>Matrix</b> C, Variou ements – Powder r <b>nic Mat</b> naterials - ramic Ma	n injection moulding - tics (FRP), Glass fibre <b>Composites</b> s types of Metal matrix particles – fibres. Effe netallurgy process - di	- Resin tra e reinforced x composit ect of reinfo iffusion bor ges – limita e ceramics	tes Alloy orcement nding – s ations – M s – non o	vs. MMC vs. MMC t - Volum tir casting Aonolithic xide cera	- Pultrusi c, Advant ne fraction g – sque c ceramic amics –	ages of MN n – Rule of eze casting s - Need for aluminium of	ent wi	nding Per nitatic es, A Per – Cer – silic	riods: 9 ons of MM spect Rat riods: 9 ramic mat	C, io.	CO3
moulding – Re moulding. Fibre UNIT - III Characteristics Metal Matrix, R Processing of R UNIT - IV Engineering ce - Various types reinforcements (HIPing).	einforce e reinfor <b>Metal</b> s of MMC Reinforc MMC – <b>Cerar</b> eramic n s of Ce s – partic	d reactio rced plas <b>Matrix</b> C, Variou ements – Powder r <b>nic Mat</b> naterials - ramic Ma cles- fibre	n injection moulding - tics (FRP), Glass fibre <b>Composites</b> s types of Metal matri- particles – fibres. Effe netallurgy process - di <b>rix Composites</b> - properties – advanta- trix composites- oxide s- whiskers. Sintering	- Resin tra e reinforced x composit ect of reinfo iffusion bor ges – limita e ceramics	tes Alloy orcement nding – s ations – M s – non o	vs. MMC vs. MMC t - Volum tir casting Aonolithic xide cera	- Pultrusi c, Advant ne fraction g – sque c ceramic amics –	ages of MN n – Rule of eze casting s - Need for aluminium of	ent wi	nding Per nitatic es, A Per – Cer – silic isosta	riods: 9 riods: 9 ons of MM spect Rat riods: 9 ramic mat con nitride atic pressi	C, io.	CO2 CO3 CO4
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N. A. 800

4. https://www.youtube.com/watch?v=VMH6qbED7pg

5. https://www.youtube.com/watch?v=PzdCymgyZ6c

#### COs/POs/PSOs Mapping

COs					Prog	gram O	utcome	es (POs	)				Prog Outc	jram Spe omes (P	ecific SOs)
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	-	-	-	3	3	-	-	-	2	3	3	3	3
2	3	3	-	-	-	-	3	-	-	-	2	3	3	2	3
3	3	3	-	-	-	-	2	3	-	-	3	3	3	3	3
4	3	3	-	-	-	-	2	3	-	-	2	3	3	2	3
5	3	3	-	-	-	-	2	3	-	-	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assessi	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

fr. fr. 300

Department	Mech	anical En	gineering	Progra	amme :	B.Tech.				
Semester	VIII			Cours	e Categ	jory: PE	Enc	Semester	Exam Ty	pe: <b>TE</b>
Course	110084				riods/W		Credit		mum Mar	
Code	UZSIVI	EE825		L	Т	Р	С	CAM	ESE	ТМ
Course Name	ENGI	NEERING	FAILURE ANALYSIS	3	0	0	3	25	75	100
	-			MECH						
Prerequisite	Streng	th of Mate	erials							
	On co	mpletion	of the course, the stude	nts will be	able to	D			BT Ma (Highest	
	C01		and various types of failure	-	-		•		K	2
Course	CO2		e fracture surfaces and m gression.	aterial mic	rostruct	ures to a	issess faili	ure origins	K	2
Outcome	CO3	Know th	e general approach to ana	alysis of fail	ure.				K	3
	CO4	Illustrate and failu	the role of environmental re.	factors wh	ich influ	ence the	material d	egradation	K	4
	CO5	Analysis	the failures related to corr	rosion and	wear.				K	4
UNIT- I	Introc	luction to	Failure Analysis					Perio	ods: 9	
		-	s. Engineering Disasters and facturing & Assembly. Tree d		-	e analysis	. Fundamen	tal sources o	of failures.	CO1
UNIT- II	Micro	structura	al Aspects					Perio	ods: 9	
			icrostructure in failure, applica and segregation, temper and	-		-		-		CO2
UNIT- III	Analy	sis of Fa	ilure					Perio	ods: 9	
	-		ach to analysis of failure; Fra and growth of cracks, frac	-	• •					
analytical tec	hniques	; determin	ation of mechanical propert n Standards, quality assurance	ties like ten					-	CO3
UNIT- IV	•7••••••		Assisted Failures					Perio	ods: 9	
corrosion cra characteristic	acking ( s of SCC fracture	SCC)- intr C, introduct mechanic	rrosion and high temperature oduction and history of SC ion to various models of SCC cs approach (crack growth r	CC, materia C mechanis	al/enviror m, evalu	nment cor ating SCC	mbinations ; rates usinę	where SC0 g time-to-fail	C occurs, lure (TTF)	CO4
UNIT- V	Failur	e Analys	is of corrosion and wear	ſ				Perio	ods: 9	
			ot corrosion and stress corro high temperature service; Fa		•	•	e to hydrog	en; Creep c	of metallic	CO5
Lecture Per	iods: 4	5	Tutorial Periods: -	Practio	al Peri	ods: -		Total	Periods:	45
Text Books										
			w W Batchelor, Engineering T							
-		•••	gineering Failure Analysis: Th	-	-	•		-		
3. Arthur J. I	wic⊏viiy,		ures: Mechanisms, Analysis,	Prevention,	Zha eait	ion, John		IS INC. USA,	2013.	
Reference B										
			Science and Engineering – A est Method for Measurement of				-		2005.	
			ehaviour of Materials, 2nd ec	_				,		
4. F.C. Cam	pbell, Fa	tigue and l	Fracture: Understanding the b	basic, 1st ec	lition, AS	M Interna	tional, 2012	•		
-		neering - N	letallurgical Failure Analysis,	PS Publish	ing, 2023	3.				
Web Reference										
-	-		urses/112/107/112107241							
-	-	BfKs5QjS	c s/video/112107241/L25							
	•		tch?v=WLOkuk2L8GQ							
	, sata									

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#### 5. https://www.youtube.com/watch?v=F6Gn1YS0PdY

#### COs/POs/PSOs Mapping

COs					Prog	gram O	utcome	es (POs	)					jram Spe omes (P	
	P01	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	1	2	2	-	-	-	-	1	2	2	3	3
2	3	2	2	2	3	1	-	1	1	-	1	2	2	3	3
3	3	2	2	2	2	1	-	1	2	-	1	2	3	3	3
4	3	2	2	3	3	1	1	2	2	2	2	3	3	3	3
5	3	2	2	3	3	2	2	2	2	2	2	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assessi	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

fr. fr. 300

Department										
•	Mecha	anical Er	ngineering	Progra	amme :	B.Tech.	······			
Semester	VIII			Cours	e Categ	ory: PE	Enc	Semeste	er Exam 7	Гуре: <b>ТЕ</b>
Course	1123M	EE826		Pe	riods/W	eek	Credit	Max	ximum Ma	arks
Code	02511	LLOZU		L	Т	Р	С	CAM	ESE	ТМ
Course Name		ENANCE	E AND SAFETY	3	0	0	3	25	75	100
	.1			MECH	L	1	4			<b>i</b>
Prerequisite	Manu	facturing	Technology and Automat	tion						
		_	of the course, the stud		e able to	)				lapping
	CO1	lala a titu			ما :بم : بم ما .	- tr'			······	est Level
	CO1		arious types of Maintenanc	-		sines				K2
Course		-	and apply the various faults	-	nines.					K3
Outcome	CO3		nt Trouble shooting of mach							K2
	CO4		rate different safety method	•	ive equip	oment's				K4
	CO5	Discuss	safety acts and legal provisi	ons					l	K3
UNIT- I			o Maintenance Enginee						iods: 9	
	ypes and	d application	ance engineering, Primary ons of tools used for mainter		-			-		
UNIT- II		Tracing						i	riods: 9	······
	for proble		ance, decision tree concept chine tools, hydraulic, pneu							
UNIT- III	1	dic and F	Preventive Maintenance					Der	riods: 9	
-			need, degreasing, cleaning		scheme	es, overha	uling of me	L		s.
-		-	common troubles and reme		-		-		-	
			steps and advantages. Prog s of preventive maintenance	-		-		ce of mec	hanical an	d <b>CO</b> 3
UNIT- IV		4					nance.			
Introduction to			ty and Prevention of Ac					<b>i</b>	riods: 9	l
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5. https://www.classcentral.com/course/swayam-industrial-safety-engineering-14124

COs		Program Outcomes (POs)												ram Spe omes (P	cific SOs)
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	-	-	-	-	-	-	-	-	2	3	2	3	2
2	3	3	-	-	-	-	-	-	-	-	3	3	3	3	3
3	3	3	-	-	-	-	-	-	-	-	3	3	3	3	3
4	3	3	-	-	-	-	-	-	-	-	3	3	3	3	3
5	3	3	-	-	-	-	-	-	-	-	3	3	3	3	3

#### COs/POs/PSOs Mapping

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Assess	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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Department	Mech	anical Engineering	Progr	amme :	B.Tech.				
Semester	VIII		Cours	e Categ	ory: PE	Enc	Semester	<sup>.</sup> Exam Ty	pe: <b>TE</b>
Course	U23M	EE827	Pe	riods/W	eek	Credit	Maxi	mum Marl	٢S
Code	02011		L	Т	Р	С	CAM	ESE	ТМ
Course Name	INTEG	RATED MATERIALS MANAGEMENT	3	0	0	3	25	75	100
Droroquiaita	Engine	eering Metallurgy	MECH						
Prerequisite	LIIGIII							BT Ma	opina
	On co	mpletion of the course, the student	ts will be	e able to	)			(Highest	• •
	CO1	Explain the concepts, processes, ar			ortance o	f integrated	l materials	KZ	)
		management in manufacturing and serv							_
	CO2	Analyse and compare various inventory applicability in different operational conte		iodels (E	UQ, JIT, 7	ABC analysi	s) and their	K	3
Course	CO3	Evaluate procurement strategies, suppli		on, and c	ontract m	anagement	methods to		
Outcome	003	optimize the supply chain				-		K	5
	CO4	Design logistics, warehousing, and mate	rials hand	lling syste	ems that i	mprove the e	efficiency of	Kź	2
		the materials flow Assess emerging trends and digital tech	nologies (	ERP RE	ID IoT) in	materials m	anagement		
	CO5	and their role in sustainable operations.	lologies (		10,101)11	materials m	anagement	K	3
UNIT- I	Introd	luction to Integrated Materials Man	agemen	t			Peri	ods: 9	
and distributio	on - Mate	of materials management - Evolution of m erials management framework - Role in t ry case studies		•	•	•			C01
UNIT- II	Inven	tory Management and Control Tech	nniques				Peri	ods: 9	
Fundamental		y concepts - Economic Order Quantity (E		afety Stoo	ck and Re	order Point	Calculation	ı - Just-in-	
Time (JIT) pra exercises	actices ·	Lean inventory management - ABC Ar	nalysis - I	Material I	Requirem	ent Planning	g (MRP) - 3	Simulation	CO2
UNIT- III	Procu	rement and Strategic Sourcing					Peri	ods: 9	
	•	overview - Supplier evaluation and sele Relationship Management (VRM) - Risk			•	•	•		CO3
UNIT- IV	Logis	tics, Distribution, and Materials Ha	ndling				Peri	ods: 9	
Transportatior	n manag	ement - Distribution network design - W utomated storage systems - Logistics opti	arehousi	-		out planning			CO4
UNIT- V	Emer	ging Trends and Technologies in M	laterials	Manage	ement		Peri	ods: 9	
		in materials management - ERP system on supply chain practices - Data analytics							CO5
			<b>D</b>		oder -		Total	Periods:	45
Lecture Per	iods: 4	5 Tutorial Periods: -	Praction	cal Perio	Jus		i otai		
Text Books			.1				I Viai		
<b>Fext Books</b> 1. Christoph	er, M. –	Logistics & Supply Chain Management, 5	th Edition	, Pearsor	n, 2016		Total		
<b>Fext Books</b> 1. Christoph 2. Hugos, M	er, M. – I.H. – Es	Logistics & Supply Chain Management, 5 sentials of Supply Chain Management, 4tl	th Edition h Edition,	, Pearsor Wiley, 20	n, 2016 )18	ο 74b Γ-1 <sup>:μ:</sup> -		2016	
<b>Fext Books</b> 1. Christoph 2. Hugos, M 3. Chopra, S	ier, M. – I.H. – Es S. & Meir	Logistics & Supply Chain Management, 5	th Edition h Edition,	, Pearsor Wiley, 20	n, 2016 )18	n, 7th Editic		. 2016	
Text Books         1.       Christoph         2.       Hugos, M         3.       Chopra, S         Reference B	ier, M. – I.H. – Es S. & Meir S <b>ooks</b>	Logistics & Supply Chain Management, 5 sentials of Supply Chain Management, 4tl rdl, P. – Supply Chain Management: Strat	th Edition n Edition, egy, Plan	, Pearsor Wiley, 20 ning, and	n, 2016 018 I Operatio		n, Pearson		10
Text Books 1. Christoph 2. Hugos, M 3. Chopra, S Reference B 1. Nigel Slac	ier, M. – I.H. – Esi S. & Meir S <b>ooks</b> ck, Alista	Logistics & Supply Chain Management, 5 sentials of Supply Chain Management, 4tl Idl, P. – Supply Chain Management: Strat ir Brandon-Jones & Robert Johnston – Es	th Edition, h Edition, egy, Plan ssentials c	, Pearsor Wiley, 20 ning, and of Operati	n, 2016 018 I Operatio ions Mana		n, Pearson		19
Text Books 1. Christoph 2. Hugos, M 3. Chopra, S Reference B 1. Nigel Slac 2. William J.	ler, M. – I.H. – Es S. & Meir <b>Gooks</b> ck, Alista Stevens	Logistics & Supply Chain Management, 5 sentials of Supply Chain Management, 4tl Idl, P. – Supply Chain Management: Strat ir Brandon-Jones & Robert Johnston – Es son – Operations Management, 13th Editi	th Edition, n Edition, egy, Plan ssentials c on, McGra	, Pearsor Wiley, 20 ning, and of Operati	n, 2016 018 I Operatio ions Mana 018		n, Pearson		19
Text Books1.Christoph2.Hugos, M3.Chopra, SReference B1.Nigel Slac2.William J.3.Nada R. S	ier, M. – I.H. – Es S. & Meir Books Ck, Alista Stevens Sanders	Logistics & Supply Chain Management, 5 sentials of Supply Chain Management, 4tl Idl, P. – Supply Chain Management: Strat ir Brandon-Jones & Robert Johnston – Es	th Edition, n Edition, egy, Plan ssentials c on, McGra Edition, V	, Pearsor Wiley, 20 ning, and of Operati aw-Hill, 2 Viley, 201	n, 2016 018 I Operatio ions Mana 018	agement, 2n	n, Pearson d Edition, P	earson, 20	
Text Books1.Christoph2.Hugos, M3.Chopra, SReference B1.Nigel Slad2.William J.3.Nada R. S4.Stanley EWesley, 2	ler, M. – I.H. – Es S. & Meir <b>Sooks</b> Ck, Alista Stevens Sanders Fawcel 2014	Logistics & Supply Chain Management, 5 sentials of Supply Chain Management, 4tl rdl, P. – Supply Chain Management: Strat ir Brandon-Jones & Robert Johnston – Es son – Operations Management, 13th Editi – Global Supply Chain Management, 3rd	th Edition n Edition, egy, Plan ssentials c on, McGra Edition, V pply Chai	, Pearsor Wiley, 20 ning, and of Operati aw-Hill, 2 Viley, 201 n Manag	n, 2016 018 I Operatio ions Mana 018 I7 ement: Fr	agement, 2n om Vision to	n, Pearson d Edition, P	earson, 20	

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Wel	o References
1.	https://www.apics.org
2.	https://www.ismworld.org
3.	https://www.scmworld.com
4.	https://www.supplychaindigital.com
5.	https://www.supplychainbrain.com

COs					Proç	gram O	utcome	es (POs	)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	3	1	1	-	1	1	-	-	1	1	1	2	1	1
2	2	3	2	1	-	1	2	-	-	1	1	2	2	1	1
3	3	3	2	2	-	1	2	-	-	1	1	2	2	1	2
4	4	3	2	2	-	1	2	-	-	1	1	2	2	1	2
5	5	3	2	2	-	1	2	-	-	1	1	2	3	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

_		Cont	inuous Assessi	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	75	100	

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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		anical En	<u>g</u> g	Piogi	amme :	B.Tech.				
Semester	VIII			Cours	se Categ	ory: PE	En	d Semeste	er Exam T	ype: <b>TE</b>
Course	1122M	EDC03		Pe	riods/W	eek	Credit	Max	ximum Ma	rks
Code	UZSIVI	EDC03		L	Т	Р	С	CAM	ESE	ТМ
Course Name	SUPPI		IMANAGEMENT	3	0	0	3	25	75	100
	-			MECH						
Prerequisite	Manu	facturing	Technology and Autom	nation						
	On co	mpletion	of the course, the st	udents will b	e able to	<b>,</b>				apping
						-			(Highes	
	CO1	Describe	the basics of supply cha	in management	-				K	(1
Course	CO2	Design ne	etwork in supply chain.						K	(3
Outcome	CO3	Explain tr	ansportation in supply ch	nain manageme	nt systen	n.			K	(1
	CO4	Design co	ollaboration, partnership	in supply chain.					K	(2
	CO5	Summariz	ze information technolog	y in supply chai	n system	-			k	2
UNIT- I		luction							riods: 9	
globalized eco	onomy – s – Com	Evolution	f Logistics and Supply Cl from traditional supply of adaptive SCM strategie kets.	chains to digita	I and AI-	driven SC	M – Decisi	on Phases	s in Modern	1
UNIT- II			Network Design						riods: 9	
distribution ne	etwork de /isibility,	sign for eff resilience,	lodern SCM – Factors inf iciency and sustainability and risk management – F	v – Al-driven opt	imization	in networ	k design – I	Role of net	work desigr in networks	• CO2
Digital transfo	rmation	in transpor	<b>Ipply Chain</b> tation logistics – Factors	-			-	– Green le	-	1
Digital transfo carbon footpri predictive ana optimization a <b>UNIT- IV</b> Strategic sour	int reduction int reduction ind efficient <b>Source</b> rcing and	in transpor tion – Desi oT and bloo ency. <b>ting and (</b> supplier re	tation logistics – Factors gn options for autonomo ckchain for real-time ship Coordination in Supp alationship management	bus, Al-driven tr ment tracking – D <b>ly Chain</b> – Al and big da	ansporta Advance ta in supp	tion netwo	rks – Tailo and schedu ion and per	– Green le red transpo ling algorith Per formance	ogistics and ortation with hms for cos riods: 9 assessmen	t CO3
carbon footpri predictive ana optimization a <b>UNIT- IV</b> Strategic sour – Smart contr. Chain Coordir	int reduction int reduction lytics – lo ind efficie <b>Sourc</b> cong and acts and nation – <sup>-</sup>	in transpor tion – Desi oT and bloc ency. <b>Sing and (</b> supplier re blockchair The Bullwh	tation logistics – Factors gn options for autonomo ckchain for real-time ship Coordination in Supp	ous, Al-driven tr ment tracking – <b>bly Chain</b> – Al and big da borative plannin chains – Impac	ansporta Advance ta in supp ng, foreca	tion netwo ed routing a plier select asting, and loud comp	rks – Tailo and schedu ion and per t replenishr uting, and a	– Green le red transpo ling algorith <b>Per</b> formance a nent (CPF automation	ogistics and ortation with hms for cos r <b>iods: 9</b> assessmen R) – Supply	
Digital transfo carbon footpri predictive ana optimization a <b>UNIT- IV</b> Strategic sour – Smart contri Chain Coordir inefficiencies – <b>UNIT- V</b>	Int reduct Int reduct Ind efficient Source Ind acts and Ination – Buildin	in transpor tion – Desi oT and bloc ency. <b>sing and (</b> supplier re blockchair The Bullwh g resilient a l <b>y Chain a</b>	tation logistics – Factors gn options for autonomo ckchain for real-time ship Coordination in Supp elationship management n in procurement – Colla ip Effect in digital supply and sustainable supply c and Information Tech	bus, Al-driven tr ment tracking – oly Chain – Al and big da borative planni chains – Impac hains through tr nology	ansporta Advance ta in supp ng, foreca ct of AI, cl rust and s	tion netwo ed routing a plier select asting, and loud comp strategic p	rks – Tailo and schedu ion and per I replenishr uting, and a artnerships	- Green le red transpo ling algorith Per formance a nent (CPF automation Per	ogistics and ortation with hms for cos riods: 9 assessmen R) – Supply i in reducing riods: 9	t CO3
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N. A. 800

#### 5. https://www.coursera.org/articles/supply-chain-trends

#### COs/POs/PSOs Mapping

COs					Prog	gram O	utcome	es (POs	)					ram Spe omes (P	
	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	1	1	-	-	-	-	-	-	1	1	2	1
2	3	2	3	1	1	-	-	-	-	-	-	1	2	3	1
3	3	1	2	2	1	-	-	-	-	-	-	-	3	2	2
4	2	2	3	1	-	-	-	-		-	-	1	3	3	2
5	3	2	2	2	1	-	-	-		-	-	1	2	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Conti	inuous Assessi	ment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	75	100	

fr. fr. 800

# **OPEN ELECTIVE - I**

dr. dr. 8000

B.Tech. Mechanical Engineering

N. A. 800

Course Name       RAPID PROTOTYPING       3       0       0       3       25       75       10         (Common to EEE, ECE, ICE, CIVIL, BME)         Prerequisite       Manufacturing Processes, CAD/CAM       BT Mappi (Highest Le         Course       On completion of the course, the students will be able to       BT Mappi (Highest Le         Course       On completion of the course, the students will be able to       K2         Course       CO2       Analyze the various rapid prototyping techniques and their suitability for different applications.       K3         Outcome       CO3       Apply knowledge of materials used in RP to optimize product design.       K3         CO4       Evaluate the limitations and benefits of rapid prototyping technologies in industry       K3         UNIT - I       Introduction to Rapid Prototyping       Basic Principles and Advantages of RP in Product Development.       K3         Overview of the RP process chain.       VIIT - II       Rapid Prototyping Technologies       Periods: 9       Periods: 9         Classification of RP processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes: Subtractification of RP processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes: Grifting and and Printing.       Periods: 9         UNIT - III       Materials for Rapid Prototyping (LOM), and 3D Printing.       <	Department	Mecha	anical Er	gineering		Progra	amme :	B.Tech.	••••••			
Code         U23MECC01         L         T         P         C         CAM         ESE         T           Course Name         RAPID PROTOTYPING         3         0         0         3         25         75         10           Course Name         Manufacturing Processes, CAD/CAM         Manufacturing Processes, CAD/CAM         BT Mappi (Highest Le           Course         Co         Analyze the various rapid prototyping techniques and their suitability for different         K2           Course         CO3         Apply knowledge of materials used in RP to optimize product design.         K3           CO4         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           CO5         Implement rapid prototyping in practical case studies for faster product development.         K3           CO5         Implement rapid prototyping in practical case studies for faster product development.         K3           CO4         Evaluate the limitations and benefits of rapid prototyping technologies         Periods: 9           Definition. Evolution, and Importance of Rapid Prototyping         Periods: 9         Periods: 9           Correlate of Material Evolution of NB Processes of table of Material Evolutions of Material Evolutions of Material Evolutions of Material Evolutions of NB Prototyping         Periods: 9           Coreview of Materials Foreapla Pr	Semester	V							End	I Semest	er Exam Ty	/pe: <b>TE</b>
Code         L         T         P         C         CAM         ESE         T           Course Name         RAPID PROTOTYPING         3         0         3         25         10           Course Name         Manufacturing Processes, CAD/CAM         BT Mappi         (Highest Le         COI         Understand the fundamentals and processes of rapid prototyping         K2           Course         CO2         Analyze the various rapid prototyping techniques and their suitability for different splications.         K2           Outcome         CO3         Apply knowledge of materials used in RP to optimize product design.         K3           CO4         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           CO4         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           CO4         Evaluate the limitations and benefits of rapid prototyping technologies         Periods: 9           Conview of the RP processes barin.         K3         VA         Periods: 9           CoMinition, and Importance of Rapid Prototyping         Periods: 9         VA           Comise RP Processes - Subtractive. Additive, and Formative. Detailed Study of Additive Manufacturing Processes:         Stread/Hamiltong Processes:         Stread/Hamiltong Processes:           Cominis D Printing.         <	Course	112284				Per	iods/We	eek	Credit	Ma	ximum Mar	ks
Image: Common to EEE, ECE, ICE, CIVIL, BME           Prerequisite         Manufacturing Processes, CAD/CAM           On completion of the course, the students will be able to         (Highest Le           Course         CO1         Understand the fundamentals and processes of rapid prototyping         K2           Course         CO2         Analyse the various rapid prototyping techniques and their suitability for different applications.         K3           Course         CO3         Apply knowledge of materials used in RP to optimize product design.         K3           CO4         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           CO5         implement rapid prototyping matchell case studies for faster product development.         K3           Overview of the RP processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing of Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing of Classification of Material Properties on RP Processes and Final Product.         Periods: 9           UNIT - II         Materials for Rapid Prototyping Technologies         Periods: 9           Cortena. Impact of Material Properties on RP Processes and Final Product.         Periods: 9           Overview of Material Properties on RP Processes and Final Product.         Case Studies on RP.           UNIT - II         Material Properties on RP Processes and Final Product.	Code	UZSIVI				L	Т	Р	С	CAM	ESE	ТМ
Prerequisite Manufacturing Processes, CAD/CAM           On completion of the course, the students will be able to         BT Mappi (Highest Le           Course         On completion of the course, the students will be able to         BT Mappi (Highest Le           Course         Col         Understand the fundamentals and processes of rapid prototyping         K2           Outcome         Col         Analyze the various rapid prototyping techniques and their suitability for different         K2           Course         Col         Apply knowledge of materials used in RP to optimize product design.         K3           Col         Lypit knowledge of materials used in RP to optimize product development.         K3           UNIT - I         Introduction to Rapid Prototyping. Basic Principles and Advantages of RP in Product Development.         Col           Vorview of the RP process for Rapid Prototyping.         Repriced: 9         Classification of RP Processes = Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes:         Col           VINT - II         Rapid Prototyping Applications         Periods: 9         Classification of RP Processes and Final Product.         Col           UNIT - II         Rapid Prototyping Applications         Periods: 9         Coverview of Material Properties on RP Processes and Final Product.         Col           UNIT - IV         Rapid Prototyping Applications         Periods: 9         Coverview of Material P	Course Name	RAPI	D PROTO	TYPING		3	0	0	3	25	75	100
On completion of the course, the students will be able to         BT Mappi (Highest Le Course           Course         C01         Understand the fundamentals and processes of rapid prototyping         K2           Outcome         C02         Analyze the various rapid prototyping techniques and their suitability for different applications.         K3           Cutcome         C03         Apply knowledge of materials used in RP to optimize product design.         K3           C04         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           C05         Implement rapid prototyping         Periods: 9           Definition, Evolution, and Importance of Rapid Prototyping.         Periods: 9           Cleasification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing (LOM), and 3D Printing.         Periods: 9           Our - 1I         Materials for Rapid Prototyping         Periods: 9           Cleasification of Material Properties on RP Processes and Final Product.         Periods: 9           Our - 1I         Materials for Rapid Prototyping         Periods: 9           Our - 1I         Materials used in RP: Photopolymers, Thermoplastics, Metals, and Ceramics. Material Properties and Selection (CoM), and 3D Printing.         Periods: 9           Our - V         Rapid Prototyping Applications         Periods: 9           Our - V         De		,		(Co	mmon to EEE	, ECE, ICI	E, CIVIL	., BME)				
Course         Col         (Highest Le         (Highest Le           Course         Col         Understand the fundamentals and processes of rapid prototyping         K2           Outcome         Col         Anply knowledge of materials used in RP to optimize product design.         K3           Cot         Col         Anply knowledge of materials used in RP to optimize product design.         K3           Cot         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           Cot         Introduction, and importance of Rapid Prototyping         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           Definition, Evolution, and importance of Rapid Prototyping         Beriods: 9         Evaluate the limitations and benefits of rapid prototyping technologies         Periods: 9           UNIT - II         Rapid Prototyping Technologies         Evaluate the limitations of Rapid Prototyping technologies         Periods: 9           UNIT - II         Rapid Prototyping Technologies         Periods: 9         Periods: 9           Overview of Materials used in RP: Photopolymers, Thermoplastics, Metals, and Ceramics, Material Properties and Selection         Col           UNIT - II         Rapid Prototyping Applications         Periods: 9           Applications for RP: CAD Model Preparation, STL File Generation and Checking. Design Optimization of RP.         Co	Prerequisite	Manuf	acturing	Processes, (	CAD/CAM							
Course         CO1         Understand the fundamentals and processes of rapid prototyping         K2           Course         CO2         Analyze the various rapid prototyping techniques and their suitability for different applications.         K2           Course         CO3         Apply knowledge of materials used in RP to optimize product design.         K3           CO4         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           UNIT - 1         Introduction to Rapid Prototyping         Periods: 9           Edinition, Evolution, and Importance of Rapid Prototyping, Basic Principles and Advantages of RP in Product Development.         K3           UNIT - 11         Rapid Prototyping Technologies         Periods: 9           Classification of RP Processes clain.         Periods: 9           UNIT - 111         Materials tor Rapid Prototyping Technologies         Periods: 9           Coreview of Material Properties on RP Processes and Final Product.         Periods: 9           UNIT - 111         Materials tor Rapid Prototyping Technologies.         Periods: 9           Overview of Material Properties on RP Processes and Final Product.         Periods: 9           Overview of Material Properties on RP Processes and Final Product.         Periods: 9           UNIT - V         Rapid Prototyping Applications         Periods: 9           Applications of		On con	npletion	of the cours	se. the stude	nts will be	e able to	D				
Course         Co2         Analyze the various rapid prototyping techniques and their suitability for different applications.         K2           Outcome         CO2         Apply knowledge of materials used in RP to optimize product design.         K3           CO3         Apply knowledge of materials used in RP to optimize product design.         K3           CO4         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           CO5         Implement rapid prototyping. Basic Principles and Advantages of RP in Product Development.         K3           Derivition. To Rapid Prototyping Technologies         Periods: 9         Periods: 9           Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes: Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes: Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing CLOM, and 3D Printing.         Periods: 9           VINT - II         Materials for Rapid Prototyping         Periods: 9         Periods: 9           Overview of Materials used in RP. Photopoymers, Thermoplastics, Metals, and Ceramics. Material Properties and Selection C         Common issues and Solutions in RP.         Periods: 9           UNIT - V         Rapid Prototyping Applications         Periods: 9         Periods: 9         Periods: 9           Design Considerations for RP: CAD Model Preparation, STL File Generation and Checking. Design Op			-								·····	
Course         Outcome         Course         Apply knowledge of materials used in RP to optimize product design.         K3           Outcome         Co3         Apply knowledge of materials used in RP to optimize product design.         K3           Co4         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           Definition, routlaute the limitations and benefits of rapid prototyping technologies in industry         Reriods: 9           Definition, Evolution, and Importance of Rapid Prototyping. Basic Principles and Advantages of RP in Product Development.         Co3           VNIT - I         Rapid Prototyping Technologies         Periods: 9           Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes:         Stereoithography (SLA). Selective Laser Sintering (SLS), Fused Deposition Modeling (FDM). Laminated Object Manufacturing (LOM), and 3D Printing.         Periods: 9           VINT - II         Rapid Prototyping Applications         Periods: 9           Overview of Materials used in RP: Photopolymers. Thermoplastics, Metals, and Censumer Products. Case Studies on Successful Implementation of RP.         Periods: 9           VINT - V         Rapid Prototyping Applications         Periods: 9           Design Considerations for RP: CAD Model Preparation, STL File Generation and Checking. Design Optimization for RP.         Coal Manufacturing Technologies: Rapid Prototyping.           UNIT - V		CO1									K	2
CO4         Evaluate the limitations and benefits of rapid prototyping technologies in industry         K3           UNIT -1         Introduction to Rapid Prototyping         Periods: 9           Definition, Evolution, and Importance of Rapid Prototyping, Basic Principles and Advantages of RP in Product Development.         Co           Overview of the RP processes chain.         Periods: 9         Periods: 9           Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes: Generolityping (SLS), Fused Deposition Modeling (FDM), Laminated Object Manufacturing (NUM), and 3D Printing.         Periods: 9           UNIT - II         Materials for Rapid Prototyping         Periods: 9           Overview of the RP: Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes: Generolity of Material Properties on RP Processes and Final Product.         Periods: 9           UNIT - III         Materials used in RP: Photopolymers, Thermoplastics. Metals, and Ceramics. Material Properties and Selection Criteria. Impact of Material Properties on RP Processes and Final Product.         Periods: 9           UNIT - IV         Rapid Prototyping Applications         Periods: 9           Ouccessful Implementation of RP.         Validov Propersion, STL File Generation and Checking. Design Optimization for RP.           UNIT - V         Design for Rapid Prototyping         Periods: 4           Text Boods         Total Periods: -         Total Perio					apid prototyping	techniques	s and the	eir suitabili	ty for differe	ent		
CO5         Implement rapid prototyping in practical case studies for faster product development.         K3           UNIT - 1         Introduction to Rapid Prototyping         Periods: 9           Definition, Evolution, and Importance of Rapid Prototyping, Basic Principles and Advantages of RP in Product Development.         Coverview of the RP processes chain.         Periods: 9           UNIT - II         Rapid Prototyping Technologies         Periods: 9         Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes: Stereolithography (SLA), Selective Laser Sintering (SLS), Fused Deposition Modeling (FDM), Laminated Object Manufacturing (CUM), and 3D Printing.         Periods: 9           Overview of Materials used in RP: Photopolymers, Thermoplastics, Metals, and Ceramics. Material Properties and Selection of RP in Various Industries: Aerospace, Automotive, Biomedical, and Consumer Products. Case Studies on Successful Implementation of RP.         Periods: 9           Outrit - IV         Rapid Prototyping Applications         Periods: 9           Design Considerations for RP: CAD Model Preparation, STL File Generation and Checking. Design Optimization for RP.         Common Issues and Solutions in RP.         Cotal Periods: 44           Text Books         Total Periods: -         Practical Periods: -         Total Periods: 44           Text Books         -         -         Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing by Ind Bioson, David W. Rosen, B Stucker, Springer, 2010.	Outcome		Apply kr	nowledge of m	aterials used in	RP to opti	mize pro	duct desig	gn.		K	3
UNIT - 1       Introduction to Rapid Prototyping       Periods: 9         Definition, Evolution, and Importance of Rapid Prototyping. Basic Principles and Advantages of RP in Product Development.       Periods: 9         Coverview of the RP processes chain.       Periods: 9         Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes:       Periods: 9         Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes:       Periods: 9         VINT - II       Materials for Rapid Prototyping       Periods: 9         Overview of Materials used in RP: Photopolymers, Thermoplastics, Metals, and Ceramics, Material Properties and Selection Criteria. Impact of Material Properties on RP Processes and Final Product.       Periods: 9         Applications of RP in Various Industries: Aerospace, Automotive, Biomedical, and Consumer Products. Case Studies on Successful Implementation of RP.       Periods: 9         Design Considerations for RP: CAD Model Preparation, STL File Generation and Checking. Design Optimization for RP.       C         Common Issues and Solutions in RP.       Practical Periods: -       Total Periods: 4         Text Books       Tutorial Periods: -       Practical Periods: -       Total Periods: 4         1. "Rapid Prototyping: Principles and Applications" by Chua Chee Kai, Leong Kah Fai, Lim Chu-Sing, World Scientific Publish Company, 2010.       Total Periods: 9         2. "Additive M		CO4	Evaluate	e the limitation	is and benefits	of rapid pro	totyping	technolog	jies in indus	try	K	3
Definition, Evolution, and Importance of Rapid Prototyping. Basic Principles and Advantages of RP in Product Development.       C         UNIT - II       Rapid Prototyping Technologies       Periods: 9         Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes:       Stereolithography (SLA), Selective Laser Sintering (SLS), Fused Deposition Modeling (FDM), Laminated Object Manufacturing Processes:       Periods: 9         UNIT - III       Materials for Rapid Prototyping       Periods: 9         Overview of Materials used in RP: Photopolymers, Thermoplastics, Metals, and Ceramics. Material Properties and Selection Criteria. Impact of Material Properties on RP Processes and Final Product.       Periods: 9         Overview of Materials for Rapid Prototyping       Periods: 9       Periods: 9         Outron of RP in Various Industries: Aerospace, Automotive, Biomedical, and Consumer Products. Case Studies on Successful Implementation of RP.       Periods: 9         UNIT - IV       Design for Rapid Prototyping       Periods: 9         Design Considerations for RP: CAD Model Preparation, STL File Generation and Checking. Design Optimization for RP.       C         Common Issues and Solutions in RP:       Partical Periods: -       Total Periods: 4         Text Books       Tutorial Periods: -       Practical Periods: -       Total Periods: 4         1. "Rapid Prototyping: Principles and Applications" by Chua Chee Kai, Leong Kah Fai, Lim Chu-Sing, World Scientific Publisl		CO5	Impleme	ent rapid proto	typing in praction	cal case stu	idies for	faster pro	duct develo	pment.	K	3
Overview of the RP process chain.       Periods: 9         VINT - II       Rapid Prototyping Technologies       Periods: 9         Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes:       Classification of RP Processes - Subtractive, Additive, and Formative. Detailed Study of Additive Manufacturing Processes:         VINT - III       Materials tor Rapid Prototyping       Periods: 9         Overview of Materials used in RP. Photopylomers. Thermoplastics. Metals, and Ceramics. Material Properties and Selection Criteria. Impact of Material Properties on RP Processes and Final Product.       Periods: 9         VINT - IV       Rapid Prototyping Applications       Periods: 9         Applications of RP in Various Industries: Aerospace, Automotive, Biomedical, and Consumer Products. Case Studies on Successful Implementation of RP.       Periods: 9         UNIT - V       Design for Rapid Prototyping       Periods: -       Periods: 9         Design Considerations for RP: CAD Model Preparation, STL File Generation and Checking. Design Optimization for RP.       Common Issues and Solutions in RP.       Classification of Criteria Periods: -       Total Periods: 4         Text Books       1. "Rapid Prototyping: Principles and Applications" by Chua Chee Kai, Leong Kah Fai, Lim Chu-Sing, World Scientific Publist Company, 2010.       .       Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing" by Lan Gibson, David W. Rosen, B Stucker, Springer, 2010.       .       .	UNIT - I	Introd	luction to	o Rapid Pro	totyping					Pe	riods: 9	
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Applications of RP in Various Industries: Aerospace, Automotive, Biomedical, and Consumer Products. Case Studies on Successful Implementation of RP.       Periods: 9         UNIT - V       Design for Rapid Prototyping       Periods: 9         Design Considerations for RP: CAD Model Preparation, STL File Generation and Checking. Design Optimization for RP. Common Issues and Solutions in RP.       Total Periods: 4         Lecture Periods: 45       Tutorial Periods: -       Practical Periods: -       Total Periods: 4         Text Books		1	-			nal Product	•					
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<ul> <li>Text Books</li> <li>"Rapid Prototyping: Principles and Applications" by Chua Chee Kai, Leong Kah Fai, Lim Chu-Sing, World Scientific Publish Company, 2010.</li> <li>"Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing" by Ian Gibson, David W. Rosen, B Stucker, Springer, 2010.</li> <li>"Rapid Prototyping: Theory and Practice" by Ali K. Kamrani and Emad Abouel Nasr, Springer, 2006.</li> <li>Reference Books</li> <li>Additive Manufacturing Handbook: Product Development for the Defense Industry" by James P. Wilczynski and David Ros CRC Press, 2017.</li> <li>"3D Printing and Additive Manufacturing: Principles and Applications (With Companion Media Pack) - Fourth Edition of Ra Prototyping" by C.K. Chua, K.F. Leong, C.S. Lim, World Scientific Publishing Company, 2014.</li> <li>"Fundamentals of Digital Manufacturing Science" by Zude Zhou, Shane (Sheng) Xie, Dejun Chen, Springer, 2012.</li> <li>Advances in Rapid Prototyping for Biomedical Applications" by Paulo Bartolo, Springer, 2008.</li> <li>"Rapid Manufacturing: An Industrial Revolution for the Digital Age" by N. Hopkinson, R.J.M. Hague, P.M. Dickens, John Wile Sons, 2006.</li> <li>Web References</li> <li>https://ocw.mit.edu/courses/mechanical-engineering/2-72-elements-of-mechanical-design-fall-2014/lecture-notes/</li> <li>https://nptel.ac.in/courses/112/104/112104236/</li> </ul>	Lecture Perio	ods: 45	-	Tutorial Per	iods: -	Practica	l Perio	ds: -		To	tal Periods	: 45
<ol> <li>"Rapid Prototyping: Principles and Applications" by Chua Chee Kai, Leong Kah Fai, Lim Chu-Sing, World Scientific Publish Company, 2010.</li> <li>"Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing" by Ian Gibson, David W. Rosen, B Stucker, Springer, 2010.</li> <li>"Rapid Prototyping: Theory and Practice" by Ali K. Kamrani and Emad Abouel Nasr, Springer, 2006.</li> <li>Reference Books</li> <li>Additive Manufacturing Handbook: Product Development for the Defense Industry" by James P. Wilczynski and David Ros CRC Press, 2017.</li> <li>"3D Printing and Additive Manufacturing: Principles and Applications (With Companion Media Pack) - Fourth Edition of Ra Prototyping" by C.K. Chua, K.F. Leong, C.S. Lim, World Scientific Publishing Company, 2014.</li> <li>"Fundamentals of Digital Manufacturing Science" by Zude Zhou, Shane (Sheng) Xie, Dejun Chen, Springer, 2012.</li> <li>Advances in Rapid Prototyping for Biomedical Applications" by Paulo Bartolo, Springer, 2008.</li> <li>"Rapid Manufacturing: An Industrial Revolution for the Digital Age" by N. Hopkinson, R.J.M. Hague, P.M. Dickens, John Wile Sons, 2006.</li> <li>Web References</li> <li>https://ocw.mit.edu/courses/mechanical-engineering/2-72-elements-of-mechanical-design-fall-2014/lecture-notes/</li> <li>https://nptel.ac.in/courses/112/104/112104236/</li> </ol>												
<ul> <li>Stucker, Springer, 2010.</li> <li>"Rapid Prototyping: Theory and Practice" by Ali K. Kamrani and Emad Abouel Nasr, Springer, 2006.</li> <li>Reference Books</li> <li>Additive Manufacturing Handbook: Product Development for the Defense Industry" by James P. Wilczynski and David Ros CRC Press, 2017.</li> <li>"3D Printing and Additive Manufacturing: Principles and Applications (With Companion Media Pack) - Fourth Edition of Ra Prototyping" by C.K. Chua, K.F. Leong, C.S. Lim, World Scientific Publishing Company, 2014.</li> <li>"Fundamentals of Digital Manufacturing Science" by Zude Zhou, Shane (Sheng) Xie, Dejun Chen, Springer, 2012.</li> <li>Advances in Rapid Prototyping for Biomedical Applications" by Paulo Bartolo, Springer, 2008.</li> <li>"Rapid Manufacturing: An Industrial Revolution for the Digital Age" by N. Hopkinson, R.J.M. Hague, P.M. Dickens, John Wile Sons, 2006.</li> <li>Web References</li> <li>https://ocw.mit.edu/courses/mechanical-engineering/2-72-elements-of-mechanical-design-fall-2014/lecture-notes/</li> <li>https://nptel.ac.in/courses/112/104/112104236/</li> </ul>	1. "Rapid Prot Company, 2	2010.	•		-		•					Ŭ
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<ul> <li>Prototyping" by C.K. Chua, K.F. Leong, C.S. Lim, World Scientific Publishing Company, 2014.</li> <li>"Fundamentals of Digital Manufacturing Science" by Zude Zhou, Shane (Sheng) Xie, Dejun Chen, Springer, 2012.</li> <li>Advances in Rapid Prototyping for Biomedical Applications" by Paulo Bartolo, Springer, 2008.</li> <li>"Rapid Manufacturing: An Industrial Revolution for the Digital Age" by N. Hopkinson, R.J.M. Hague, P.M. Dickens, John Wile Sons, 2006.</li> <li>Web References</li> <li>https://ocw.mit.edu/courses/mechanical-engineering/2-72-elements-of-mechanical-design-fall-2014/lecture-notes/</li> <li>https://www.coursera.org/learn/additive-manufacturing</li> <li>https://nptel.ac.in/courses/112/104/112104236/</li> </ul>										,,		
<ol> <li>Advances in Rapid Prototyping for Biomedical Applications" by Paulo Bartolo, Springer, 2008.</li> <li>"Rapid Manufacturing: An Industrial Revolution for the Digital Age" by N. Hopkinson, R.J.M. Hague, P.M. Dickens, John Wile Sons, 2006.</li> <li>Web References         <ul> <li>https://ocw.mit.edu/courses/mechanical-engineering/2-72-elements-of-mechanical-design-fall-2014/lecture-notes/</li> <li>https://www.coursera.org/learn/additive-manufacturing</li> <li>https://nptel.ac.in/courses/112/104/112104236/</li> </ul> </li> </ol>		-		-			-	-		ck) - Fou	rth Edition o	f Rapid
<ol> <li>"Rapid Manufacturing: An Industrial Revolution for the Digital Age" by N. Hopkinson, R.J.M. Hague, P.M. Dickens, John Wile Sons, 2006.</li> <li>Web References</li> <li>https://ocw.mit.edu/courses/mechanical-engineering/2-72-elements-of-mechanical-design-fall-2014/lecture-notes/</li> <li>https://www.coursera.org/learn/additive-manufacturing</li> <li>https://nptel.ac.in/courses/112/104/112104236/</li> </ol>			-	-	-		•		-	Springer, 2	2012.	
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<ol> <li>https://ocw.mit.edu/courses/mechanical-engineering/2-72-elements-of-mechanical-design-fall-2014/lecture-notes/</li> <li>https://www.coursera.org/learn/additive-manufacturing</li> <li>https://nptel.ac.in/courses/112/104/112104236/</li> </ol>	Sons, 2006	j.	ng: An Ind	ustrial Revolu	tion for the Dig	ital Age" by	N. Hop	kinson, R.	J.M. Hague	, P.M. Dic	kens, John	Wiley &
<ol> <li>https://www.coursera.org/learn/additive-manufacturing</li> <li>https://nptel.ac.in/courses/112/104/112104236/</li> </ol>												
3. https://nptel.ac.in/courses/112/104/112104236/	•				-	elements-of	-mechar	nical-desig	gn-fall-2014/	lecture-nc	otes/	
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2	3	3	3	2	3	-	-	-	-	-	-	-	3	3	-
3	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-
4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

dr. A. 800

Comesta-	wec	hanical	Engineering	P	rogra	mme :	B.Tech.				
Semester	V			С	ourse	e Categ	ory: <b>OE</b>	End S	emeste	r Exam Type	e: <b>TE</b>
Course	11001		0		Per	iods/We	eek	Credit	Ma	aximum Mar	ks
Code	UZƏI	MEOC02	2		L	Т	Р	С	CAM	ESE	ТМ
Course Name	MATE	ERIAL H	ANDLING SYSTEM		3	0	0	3	25	75	100
	L		(Common to EEE, I	ICE, CIVIL a	and M	echatro	onics Bra	nches)	<b>L</b>		
Prerequisite	Basic E	Engineeri	ing and Mechanical syst								
	On co	mpletio	on of the course, the	students v	vill b	e able t	0			BT Ma	
	CO1	Unders	tand various material ha	andling syster	ms.					(Highes K	
	CO2	Describ	be about the flexible hos	ting applianc	es.					к	2
Course	CO3		is about the different typ			llina ad	vantages	and disadv	antages	ĸ	_
Outcome	CO4		the selection procedure			_	_		_	ĸ	
		-	be the ergonomics rel			-	-	-			3
	CO5	equipm	-		ciiai	nanunny	g equiprite		Scenariec	K	3
UNIT - I	Mater	rial Han	dling Equipments							Periods: 9	
	of hoisti	ndling eo ing mach	ransporting facility, quipment, hoisting equ nines, surface and over	•	•	pe, hyd		d pneumatio	convey		CO1
UNIT - II		-								Periods: 9	
Flexible hoist	L	ppliances	<b>ting Appliances</b> s like ropes and	chains,	weld	ed loa	d chain	s, roller	chains		
	-		vire rope, selection of ro pulleys, different types	-	-		-				
UNIT - III	Mater	rial Han	dling Attachments							Periods: 9	
for unit and pied	ce loads	s, carrier	ndard forged hook, hool beams and clamps, loa , crane attachments for l	d platforms a	and si	de dump			-	-	CO3
UNIT - IV	Mater	rial Han	dling Systems							Periods: 9	k
	ng syst	ems: Se	election, Material Handl		path	Equipn	nent, func	tion oriente	ed syster	ms. Auxiliary	CO4
	Metho	ode to N									
UNIT - V		ບພຣ ເບ ທ	Minimize Cost of Ma	terial Hand	ling					Periods: 9	<b>i</b>
Methods to mini	imize co	ost of mat	Minimize Cost of Ma terial handling- Maintena Desian, Miscellaneous	ance of Mater		ndling E	quipments	s, Safety in	i		CO5
Methods to mini of Material Hand	imize co dling eq	ost of mat uipment.	terial handling- Maintena Design, Miscellaneous	ance of Mater equipment.	rial Ha			s, Safety in	handling	, Ergonomics	CO5
Methods to mini of Material Hand Lecture Peric	imize co dling eq	ost of mat uipment.	terial handling- Maintena	ance of Mater equipment.	rial Ha	ndling E I Period		s, Safety in	handling		CO5
Methods to mini of Material Hand Lecture Peric Text Books	imize co dling eq ods: 45	ost of mat uipment.	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b>	ance of Mater equipment. Pra	rial Ha	l Period	ds: -	s, Safety in	handling	, Ergonomics	CO5
Methods to mini of Material Hand <b>Lecture Peric</b> Text Books 1. Rudenko N	imize co dling eq ods: 45 , Materi	ost of mat uipment. ials Hanc	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee	ance of Mater equipment. Pra	rial Ha Ictica	I Period	ds: - 17.		handling	, Ergonomics	CO5
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, Johr	imize co dling eq ods: 45 , Materi n A., Per	ost of mat uipment. ials Hanc nce, Ira V	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling ar	ance of Mater equipment. Pra Publishers, N nd logistics, E	rial Ha Ictica New D	<b>I Perio</b> elhi, 201 Publishe	<b>ds: -</b> 17. ers, New D	Delhi, 2016.	handling	, Ergonomics	CO5
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, John 3. S.C. Sharm	imize co dling eq ods: 45 , Materi n A., Per na, Mate	ost of mat uipment. ials Hanc nce, Ira V	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee	ance of Mater equipment. Pra Publishers, N nd logistics, E	rial Ha Ictica New D	<b>I Perio</b> elhi, 201 Publishe	<b>ds: -</b> 17. ers, New D	Delhi, 2016.	handling	, Ergonomics	CO5
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, Johr 3. S.C. Sharm Reference Bo	imize co dling eq ods: 45 , Materi n A., Per na, Mate oks	ost of mat uipment. ials Hanc nce, Ira V rials Man	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling ar	ance of Mater equipment. Publishers, N nd logistics, E Handling, Kh	rial Ha actica New D invee nanna	<b>I Perio</b> elhi, 201 Publishe Publica	<b>ds: -</b> 7. ers, New E tions, 200	0elhi, 2016. 0.	handling	, Ergonomics	CO5
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, Johr 3. S.C. Sharm Reference Bo 1. Siddhartha	, Materi A., Per a, Materi M., Per a, Mate <b>oks</b> Ray, Int	est of mat uipment. ials Hanc nce, Ira V rials Man	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling an hagement and Materials	Ance of Mater equipment. Pra Publishers, N nd logistics, E Handling, Kh New Age Inte	rial Ha nctica New D invee nanna rnatio	I Period elhi, 201 Publishe Publica nal, Editi	ds: - 17. ers, New E tions, 200 ion: 2 <sup>nd</sup> ed	Delhi, 2016. 0. ition, 2017.	handling	, Ergonomics	CO5
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, John 3. S.C. Sharm Reference Bo 1. Siddhartha 2. Chowdary F 3. James A Ap	imize co dling eq ods: 45 , Materi n A., Per na, Mate ooks Ray, Int RB, G. F ople, Pla	est of mat uipment. ials Hanc nce, Ira V rials Man roductior R. N. Tag ant layout	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling ar hagement and Materials In to Material Handling, N gore,Plant Layout and M t and Material Handlin, N	Ance of Mater equipment. Publishers, N nd logistics, E Handling, Kh New Age Inte New Age Inte Material Handl Krieger Pub C	rial Ha octica New D invee nanna rnatio ling-,	I Period elhi, 201 Publishe Publica nal, Editi (hanna	ds: - 17. ers, New E tions, 200 ion: 2 <sup>nd</sup> ed	Delhi, 2016. 0. ition, 2017.	handling	, Ergonomics	COS
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, Johr 3. S.C. Sharm Reference Bo 1. Siddhartha 2. Chowdary F 3. James A Ap 4. Mahapatra	imize co dling eq ods: 45 , Materi n A., Per na, Mate ooks Ray, Int RB, G. F ople, Pla P.B, Op	est of mat uipment. ials Hanc nce, Ira V rials Man roductior R. N. Tag ant layout rerations	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling ar hagement and Materials In to Material Handling, N gore, Plant Layout and N t and Material Handlin, H Management, PHI, 201	ance of Mater equipment. Publishers, N nd logistics, E Handling, Kh New Age Inte faterial Handl Krieger Pub C 6	rial Ha <b>ctica</b> New D invee hanna rnatio ling-, Co, 20	l Period elhi, 201 Publishe Publica nal, Editi Khanna 16	ds: - 17. ers, New E tions, 200 ion: 2 <sup>nd</sup> ed Publishers	Delhi, 2016. 0. ition, 2017. s; 2 <sup>nd</sup> edition	handling	, Ergonomics	COS
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, John 3. S.C. Sharm Reference Bo 1. Siddhartha 2. Chowdary F 3. James A Ap 4. Mahapatra 5. Arora K.C. Y	, Materi ods: 45 , Materi o A., Per a, Mate ods Ray, Int RB, G. F ople, Pla P.B, Op Vikas V.	est of mat uipment. ials Hanc nce, Ira V rials Man roductior R. N. Tag ant layout rerations	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling ar hagement and Materials In to Material Handling, N gore,Plant Layout and M t and Material Handlin, N	ance of Mater equipment. Publishers, N nd logistics, E Handling, Kh New Age Inte faterial Handl Krieger Pub C 6	rial Ha <b>ctica</b> New D invee hanna rnatio ling-, Co, 20	l Period elhi, 201 Publishe Publica nal, Editi Khanna 16	ds: - 17. ers, New E tions, 200 ion: 2 <sup>nd</sup> ed Publishers	Delhi, 2016. 0. ition, 2017. s; 2 <sup>nd</sup> edition	handling	, Ergonomics	COS
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, Johr 3. S.C. Sharm Reference Bo 1. Siddhartha 2. Chowdary F 3. James A Ap 4. Mahapatra 5. Arora K.C, Y Web Reference	imize co dling eq ods: 45 , Materi n A., Per na, Mate ooks Ray, Int Ray, Int Ray, Int RB, G. I ople, Pla P.B, Op Vikas V. ces	est of mat uipment. ials Hanc nce, Ira V rials Man rials	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling ar hagement and Materials In to Material Handling, N gore, Plant Layout and N t and Material Handlin, N Management, PHI, 2011 Aspects of Material har	ance of Mater equipment. Publishers, N nd logistics, E Handling, Kh New Age Inte faterial Handl Krieger Pub C 6	rial Ha <b>ctica</b> New D invee hanna rnatio ling-, Co, 20	l Period elhi, 201 Publishe Publica nal, Editi Khanna 16	ds: - 17. ers, New E tions, 200 ion: 2 <sup>nd</sup> ed Publishers	Delhi, 2016. 0. ition, 2017. s; 2 <sup>nd</sup> edition	handling	, Ergonomics	COS
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, Johr 3. S.C. Sharm Reference Bo 1. Siddhartha 2. Chowdary F 3. James A Ap 4. Mahapatra 5. Arora K.C, Y Web Reference 1. https://nptel	imize co dling eq ods: 45 , Materi n A., Per na, Mate obs Ray, Int RB, G. I ople, Pla P.B, Op Vikas V. ces I.ac.in/co	est of mat uipment. ials Hanc nce, Ira V rials Man roductior R. N. Tag ant layout erations . Shinde,	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling ar hagement and Materials In to Material Handling, N gore, Plant Layout and M t and Material Handlin, H Management, PHI, 2011 Aspects of Material har 12/102/112102011/	ance of Mater equipment. Publishers, N nd logistics, E Handling, Kh New Age Inte faterial Handl Krieger Pub C 6	rial Ha <b>ctica</b> New D invee hanna rnatio ling-, Co, 20	l Period elhi, 201 Publishe Publica nal, Editi Khanna 16	ds: - 17. ers, New E tions, 200 ion: 2 <sup>nd</sup> ed Publishers	Delhi, 2016. 0. ition, 2017. s; 2 <sup>nd</sup> edition	handling	, Ergonomics	CO5
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, John 3. S.C. Sharm Reference Bo 1. Siddhartha 2. Chowdary F 3. James A Ap 4. Mahapatra 5. Arora K.C., Web Reference 1. https://nptel 2. https://nptel	, Materi ods: 45 , Materi o A., Per	est of mat uipment. ials Hanc nce, Ira V rials Man rroduction R. N. Tag ant layout erations . Shinde, ourses/1 <sup>-</sup>	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling an hagement and Materials In to Material Handling, N gore,Plant Layout and M t and Material Handlin, H Management, PHI, 2011 Aspects of Material har 12/102/112102011/ 12/107/112107142/	ance of Mater equipment. Publishers, N nd logistics, E Handling, Kh New Age Inte faterial Handl Krieger Pub C 6	rial Ha <b>ctica</b> New D invee hanna rnatio ling-, Co, 20	l Period elhi, 201 Publishe Publica nal, Editi Khanna 16	ds: - Prs, New E tions, 200 ion: 2 <sup>nd</sup> ed Publishers	Delhi, 2016. 0. ition, 2017. s; 2 <sup>nd</sup> edition	handling	, Ergonomics	CO5
Methods to mini of Material Hand Lecture Peric Text Books 1. Rudenko N 2. White, John 3. S.C. Sharm Reference Bo 1. Siddhartha 2. Chowdary F 3. James A Ap 4. Mahapatra 5. Arora K.C, V Web Reference 1. https://nptel 3. https://nptel 3. https://nptel	imize co dling eq ods: 45 , Materi n A., Per na, Mate oks Ray, Int RB, G. F ople, Pla P.B, Op Vikas V. Ces I.ac.in/co I.ac.in/co	est of mat uipment. ials Hanc ince, Ira V rials Man croduction R. N. Tag ant layout erations . Shinde, ourses/11 ourses/11	terial handling- Maintena Design, Miscellaneous <b>Tutorial Periods:</b> dling Equipment, Envee V, Materials handling ar hagement and Materials In to Material Handling, N gore, Plant Layout and M t and Material Handlin, H Management, PHI, 2011 Aspects of Material har 12/102/112102011/	ance of Mater equipment. Publishers, N nd logistics, E Handling, Kh New Age Inte Material Handl Krieger Pub C 6 ndling, Laxmi	rial Ha <b>ctica</b> New D invee hanna rnatio ling-, Co, 20	l Period elhi, 201 Publishe Publica nal, Editi Khanna 16	ds: - Prs, New E tions, 200 ion: 2 <sup>nd</sup> ed Publishers	Delhi, 2016. 0. ition, 2017. s; 2 <sup>nd</sup> edition	handling	, Ergonomics	CO5

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COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2	PSO3
1	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2
2	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2
3	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2
4	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2
5	3	2	1	-	-	-	-	-	-	-	-	1	2	1	2

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

A. A. 800



# **OPEN ELECTIVE - II**

dr. d. 800

B.Tech. Mechanical Engineering

N. A. 800

Department	MBA		Progra	amme :	B.Tech.	•••••			
Semester	V/ VI		Course	e Categ	ory: <b>OE</b>	End	Semeste	r Exam Ty	pe: TE
Course	U23H	SOC01	Per	riods/W	T	Credit	1	imum Marl	s
Code			L	Т	Р	С	CAM	ESE	ТМ
Course Name	INTEL	LECTUAL PROPERTY RIGHTS	3	0	0	3	25	75	100
		(Common to	o ALL Bra	anches)					
Prerequisite	-							DT Mo	onina
	On cor	npletion of the course, the student	ts will be	e able to	D			BT Ma (Highest	
	CO1	Describe the Concept and Importa	nce of In	tellectua	al Propei	rtv Rights (II	PR).	K	
	CO2	Describe the procedures for patent			·····				
	602	remedies for infringement.					5	K	•
Course Outcome	CO3	Apply copyright laws to hypothetica plagiarism.	al scenar	ios invo	lving aca	ademic integ	grity and	K	8
	CO4	Infer the different types of tradema and infringement issues.	rks and ι	understa	and the r	egistration p	process	K4	•
	CO5	Explain the legalities surrounding in and their protection mechanisms.	ndustrial	designs	s, geogra	aphical indic	ations,	K	2
UNIT - I		view of Intellectual Property						ods: 9	1
Mark, Design, G conventions an	eograpl d agree	ed for intellectual property right (IPR) - K hical Indication, Plant Varieties and Trad- ements: WTO/TRIPS Agreement, Paris vention, Madrid Agreement, Nice Agreen	e Secret - Convent	- Interna ion, The	tional pro Berne	tection of IPF Convention,	R- Major In	ternational	CO1
UNIT - II	Law c	of Patents					Peri	ods: 9	
- Process and p	oroduct	Patent - Subject matter of Patent - Regis Patent, Legal Requirements for Patents ttent rights - Infringement of Patents and	– Patent	docume	ent: Spec	ification and			CO2
UNIT - III	Law c	of Copyrights					Peri	ods: 9	
Registration Pro	ocedure, ghts - Re	Copyright - Subject matter of copyright - Assignment and Licensing of copyright elated Rights: Celebrity Rights, Academic tware.	- Infringe	ment of	Copyrigh	ts and Reme	dies - Eme	erging new	CO3
		of Trademarks					Peri	ods: 9	.4
Registration of Licensing of tra	Tradema demark	of Trademarks - Different kinds of Tra arks - Grounds for refusal of Registratio s - Infringement, Remedies and Penalti efenses - Emerging New trends in tradem	on: Absolu es - Offer	te Groui	nd and R	elative Grour	nd - Assig	nment and	CO4
UNIT - V	Other	Forms of IPR					Peri	ods: 9	.å
Remedies for In Secrets- Protec	fringem tion for s	ndustrial Design - Subject Matter - Proce ent - Trade secret Law-Determination of submission-Trade Secret litigation - Mea ment of Geographical indication - Reme	Trade Se	cret Stat Nature o	us - Liabi of Geogra	ility for misap	propriation	s of Trade	CO5
Lecture Perio	ds: 45	Tutorial Periods: -	Practica	l Perio	ds: -		Tota	al Periods	: 45
-	a, K. V.	Intellectual Property Rights: Protection a	nd Manag	ement, 2	2 <sup>nd</sup> editior	n, Cengage Lo	earning Inc	dia Private L	imited,
2019.		redeen D Intellectual Drag arts District O	nd			(oto I imite!	2010		
2. Neeraj, P., Reference Bo		sdeep, D. Intellectual Property Rights, 2	···· ealtion,	rhi rea	uning Priv	vate Limited,	2018.		
		elating to Intellectual Property Rights, 2 <sup>nd</sup>	<sup>1</sup> edition	exis Ne	kis. 2017				
	Deborał	E. Intellectual Property: The Law of Trad					Secrets, 4	<sup>th</sup> edition, Ce	engage
-		ual Property Rights: Unleashing the Know	-	-		Graw-Hill Pub	lishing Cor	mpany; 202	2.
-		ctual Property Rights, 2 <sup>nd</sup> edition, Bharat					0000		
		Sudeep Malik, Supreme Court on Intelle	ectual Pro	perty, Ea	astern Bo	ok Company,	2022.		
Web Reference		t/chout in/on/							
1. https://www	.wip0.in	t/about-ip/en/							

N. A. 800

COs		Program Outcomes (POs)												ram Spe omes (P	
	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	1	-	-	-	3	2	2	-	2	1	2	3	2	3
2	1	2	-	2	-	3	2	2	-	2	1	1	3	3	3
3	-	2	-	-	-	2	2	3	-	2	-	1	3	2	3
4	1	1	-	-	-	3	2	2	-	2	1	1	3	2	3
5	1	2	-	-	-	3	3	2	-	2	1	1	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Conti	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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Department	MBA		Prog	ramme :	B.Tech.	••••••			
Semester	V/ VI		Cour	se Categ	ory: <b>OE</b>	End	Semester	Exam T	/pe: <b>TE</b>
Course	11221	SOC02	Pe	eriods/We	eek	Credit	Maxi	mum Mai	ks
Code	UZJII	30002	L	Т	Р	С	CAM	ESE	ТМ
Course Name	NEW	PRODUCT DEVELOPMENT	3	0	0	3	25	75	100
		(Commo	n to ALL B	ranches)					
Prerequisite	-								
	On cor	npletion of the course, the stud	ents will b	e able to	D			BT Ma	
		-						(Highes	t Level)
	CO1	Explain the stages and importan business contexts.			-			K	2
Course	CO2	Apply market research to identify specifications.	y customer	needs a	nd transla	ate them inf	o product	K	3
Outcome	CO3	Illustrate the product concepts u the most viable option.	using scree	ening and	l scoring	techniques	to select	K	3
	CO4	Examine product prototype that and design for manufacturing.	t incorpora	ates princ	ciples of	product are	chitecture	K	3
	CO5	Analyze a business plan and ma product.	arket strate	egy for th	e succes	sful launch	of a new	K	4
UNIT - I	Introd	luction to New Product Develop	ment				Perio	ods: 9	
of Innovation ar	nd Creat	duct Development (NPD) - Product De tivity in NPD - Reverse Engineering a ew Product Development - Sustainabil	nd its Appli	cation in N	NPD - Bus	iness Mode	•		1
UNIT - II	Marke	et Research and Customer Need	ls				Perio	ods: 9	
		ortunities for New Products - Conducti	-			-			1
Tools for Under	standing	- Establishing and Refining Product S g Consumer Behaviour: Surveys, Focu	-	-		lysis and Be		-	CO2
UNIT - III		ept Generation and Evaluation		~				ods: 9	
Design Thinking	for Nev	ocess: Continuous and External Idea v Products - Techniques for Concept C pts - Concept Evaluation and Selectio	Generation ·	Systema	tic Explora	ation of Cond			
		uct Design and Development			3	•	Perio	ods: 9	
Product Archite		d its role in NPD - Modular vs. Integra	I Product A	chitecture	e - Design	for Sustaina			
	-	nizing Product Development Teams	-		-				CO4
		oduct Development - Tools for Effectiv		Jesign - A	gile Prodi	uct Developr			
UNIT - V		ch, Strategy and Commercializa duct Strategy - Building Market Dema		ny Strator	nios for N	w Producto		ods: 9	
Product Busine	ss Plar	<ul> <li>Preparing for Market Launch -</li> <li>Product Enhancements</li> </ul>							
Lecture Perio	ds: 45	<b>Tutorial Periods: -</b>	Practic	al Perio	ds: -		Tota	l Periods	s: 45
Text Books									
		r SD. Product design and developmer							
		enedetto A. New products manageme				-			
-		ng at new products: Creating value thr	ough innova	ation. 5 <sup>th</sup> e	edition. Ba	sic Books; 2	017.		
Reference Bo		management and new product develo	opmont 6th	adition Da		ucation 201	7		
-		mentation works: The surprising powe	•					Press 202	0
	-	f, B. The startup owner's manual: The		-					-
		by design: How design thinking transfe						-	09
	•	an, J. The ten faces of innovation: II	•		•		-		
-		ganization. Currency/Doubleday. 2006	3						
Neb Reference		mlthl							
<ol> <li>https://conjo</li> <li>https://www</li> </ol>	-	m/kb/ reneur.com/article/281999							
2. mps.//www	.enuepi	でいては、0011/attl0で/201933							

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COs		Program Outcomes (POs)												ram Spe omes (P	
	<b>PO1</b>	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2	PSO3
1	3	-	3	-	3	1	1	-	-	1	-	2	3	3	3
2	1	-	2	1	3	-	-	1	-	1	-	3	3	2	3
3	1	1	3	-	2	-	1	-	2	-	1	2	3	3	3
4	3	-	1	1	3	1	-	1	2	-	1	1	3	2	3
5	1	-	3	-	3	-	-	-	2	-	1	2	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	essment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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Department	MBA				B.Tech.				
Semester	V/ VI			······································	ory: <b>OE</b>		Semester		s
Course	U23H	SOC03	Pe	riods/W		Credit	1	mum Ma	T
Code			L	Т	P	C	CAM	ESE	TM
Course Name	FINA		3	0	0	3	25	75	100
Droroquioito	_	(Commo	on to ALL Br	anches)					
Prerequisite	-							BT M	apping
	On con	npletion of the course, the stud	lents will be	e able to	כ			(Highes	••••
	CO1	Explain the objectives, scope, a and differentiate between profit			-			ĸ	
	CO2	Apply the concepts of the time investment appraisal technique decision-making.		•	-	• • •		к	3
Course Outcome	CO3	Demonstrate the steps in the ca cost-benefit and sensitivity anal		• •			•	к	3
	CO4	Analyze financial statements, ir from an engineering perspecti financial performance of engine	ive, and eva	aluate fi				к	4
	CO5	Analyze different types of costs evaluate cost-benefit analysis a making.				-		к	4
UNIT - I	Introd	uction to Financial Manageme	nt				Peri	ods: 9	
Term and Long-	Term Pl	Aanagement: Objectives, Scope, and anning - Basic Concepts: Profit Maxi Aaking, Relationship between Financ	mization vs W	/ealth Ma	ximizatio	on - Role of E			
UNIT - II		Value of Money and Investmen						ods: 9	
		Concept, Importance and Applicat nt Appraisal Techniques: Payback F							
(Theory only) ar	nd Profit	ability Index (PI) - Risk Analysis in In	vestment Dec	cision Ma	king.				
UNIT - III		al Budgeting for Engineering P	-				i	ods: 9	
	•	cess: Steps and Key consideration Cost - Benefit Analysis in Engineeri	•		•	• •	•		
UNIT - IV		cial Statements and Ratio Anal	-					ods: 9	
Statement Inter	pretatio	al Statements: Balance Sheet, Inco n - Financial Ratios: Liquidity, Prof of Ratio Analysis in Engineering Proj	itability - Eng						
UNIT - V		Estimation and Engineering Ec		-			i	ods: 9	
Analysis in Eng	jineering	timation in Engineering - Types of ( Projects, Break-Even Analysis and placement Analysis.			•				
Lecture Perio	ds: 45	Tutorial Periods: -	Practica	al Perio	ds: -		Tota	I Period	s: 45
Fext Books							I		
		EM, Koelling CP. Engineering Econ	-						
-	-	SC, Allen F. Principles of Corporate							
•		on JF. Fundamentals of Financial Ma	anagement. 1	5 <sup>m</sup> editio	n. Cenga	ge Learning;	2019.		
Reference Bo		na KK. Financial Management for En	aineers 4 <sup>th</sup> e	dition Vi	(as Publi	shina House	2018		
•		ce for Engineers: Evaluation and Fun	•			•	, 2010.		
Veb Referenc		<u> </u>	3 -: • opti	100	8	, ,			
I. https://www	.netsuite	e.com/portal/resource/articles/financi	al-manageme	ent/financ	ial-mana	gement.shtm	l		
2. https://www	.investo	pedia.com/ask/answers/033015/why	-time-value-n	noney-tvr	n-importa	ant-concept-ii	nvestors.as	p	
•		ologs/capital-budgeting-24042024			-			•	

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COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	2	-	-	-	1	1	1	-	2	1	1	3	2	3
2	1	2	1	-	1	2	1	2	-	3	1	-	3	3	3
3	-	3	3	-	1	3	1	2	-	3	1	1	3	2	3
4	1	2	-	2	1	1	2	1	1	2	1	-	3	3	3
5	-	3	-	-	2	3	2	2	1	2	2	3	3	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	ssment Marks (CA	M)	End Semester	Total
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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Department			Droard	mme i	B Taab				
Semester	MBA V/ VI				B.Tech.	Era	Somostor	Evom T	
	V/ VI				ory: OE	1	Semester		s
Course	U23H	SOC04		riods/We	1	Credit		mum Ma	T
Code			L	T	P	С	CAM	ESE	TM
Course Name	ECON	IOMICS FOR ENGINEERS	3	0	0	3	25	75	100
	T	(Commor	n to ALL Bra	anches)					
Prerequisite	-								
	On cor	npletion of the course, the stude	ents will be	e able to	D			BT Ma (Highes	apping st Leve
	CO1	Interpret principles of manager demand analysis and forecasting			eal-world	l scenarios	, utilizing	к	2
	CO2	Discuss production functions and managerial decision-making and				iate their i	mpact on	К	2
Course Outcome	CO3	Examine various market structue offects on market behavior and offects on market behavior and offects of the structure of the	•	-	-	synthesi	<b>zing</b> their	к	3
	CO4	Apply macroeconomic policies investment decisions, and economic		•	ations o	n busines	s cycles,	к	3
	CO5	Analyze recent economic trend income inequality.	ds, such a	s techr	nological	advancem	ents and	к	4
UNIT - I	Introd	luction to Managerial Economic	S				Perio	ods: 9	
returns to scale	e - ISO Q	action Function and Cost Conce eaning, Types, Applications in Managuants - Producer Surplus: Price ceiling	gerial Decisi g and price fl	loor - Co	st concep	t: Types of C	proportion a Costs - Tota	l, average	
	7	enue Concepts: Total Revenue (TR) -	- Marginal Re	evenue (	MR) and A	Average Rev			
UNIT - III		et Structure					Peric		<u>i</u>
	Demand	ct Competition, Monopoly, Monopolist	tic Competiti			Durana I		ods: 9	
-	Pricing,	<ul> <li>Based Pricing, Competition - Based Price Discrimination, Premium Pricing</li> </ul>	d Pricing, Ps	ychologi			ricing polic	ies: Cost	
Pricing, Bundle	T	•	d Pricing, Ps	ychologi			Pricing polic ical Pricing,	ies: Cost	
Pricing, Bundle <b>UNIT - IV</b> Globalization at	Macro nd Econ	Price Discrimination, Premium Pricing <b>Deconomics</b> omic Policies - National Income Con-	d Pricing, Ps g and practic cepts: Metho	ychologi es. ods of m	cal Pricing easuring	, Geograph	Pricing polic ical Pricing, Peric ome - circul	ies: Cost Dynamic Ods: 9	CO
Pricing, Bundle <b>UNIT - IV</b> Globalization a income - Mone	Macro nd Econ tary poli	Price Discrimination, Premium Pricing peconomics	d Pricing, Ps g and practic cepts: Metho	ychologi es. ods of m	cal Pricing easuring	, Geograph	Pricing polic ical Pricing, Peric ome - circul	ies: Cost Dynamic Ods: 9	CO
Pricing, Bundle UNIT - IV Globalization a income - Mone Investment (FD UNIT - V	Macro nd Econ tary poli I) - Forei Recer	Price Discrimination, Premium Pricing <b>Deconomics</b> omic Policies - National Income Con- cy and Fiscal Policy - Business Cycl ign Institutional Investment (FII). <b>Int Trends in Economics</b>	d Pricing, Ps g and practic cepts: Metho es concepts	ychologi es. ods of m - Inflatio	cal Pricing easuring on, deflatio	g, Geograph national inco on and its t	Pricing polic ical Pricing, Peric ome - circul ypes - Fore Peric	ies: Cost , Dynamic ods: 9 lar flow of ign Direc ods: 9	
Pricing, Bundle UNIT - IV Globalization a income - Mone Investment (FD UNIT - V Digital Econom Automation in	Macro nd Econ tary poli I) - Forei Recer by : E-co Economi	Price Discrimination, Premium Pricing <b>Deconomics</b> omic Policies - National Income Con- cy and Fiscal Policy - Business Cycl ign Institutional Investment (FII).	d Pricing, Ps g and practic cepts: Metho les concepts ces - Role of Growth of	ychologi es. ods of m - Inflatio f Techno Freelanc	cal Pricing easuring on, deflatio	g, Geograph national inco on and its t	Pricing polic ical Pricing, Peric ome - circul /pes - Fore Peric icial Intellig	ies: Cost , Dynamic ods: 9 lar flow o ign Direc ods: 9 ence and	
Pricing, Bundle UNIT - IV Globalization a income - Mone Investment (FD UNIT - V Digital Econom Automation in	Macro nd Econ etary poli I) - Forei <b>Recer</b> ny : E-co Economi come In	Price Discrimination, Premium Pricing beconomics omic Policies - National Income Con- cy and Fiscal Policy - Business Cycl ign Institutional Investment (FII). Int Trends in Economics Immerce, Fintech, and Online Servic ic Decision-Making - Gig Economy :	d Pricing, Ps g and practic cepts: Metho les concepts ces - Role of Growth of	ychologi es. ods of m - Inflatio f Techno Freelanc npact	easuring on, deflation blogy : Big and Co	g, Geograph national inco on and its t	Pricing polic ical Pricing, Peric ome - circul ypes - Fore Peric icial Intellig c - Impact o	ies: Cost , Dynamic ods: 9 lar flow o ign Direc ods: 9 ence and	
Pricing, Bundle UNIT - IV Globalization al income - Mone Investment (FD UNIT - V Digital Econom Automation in Economies - Ind	Macro nd Econ etary poli I) - Forei <b>Recer</b> ny : E-co Economi come In	Price Discrimination, Premium Pricing <b>Deconomics</b> omic Policies - National Income Con- cy and Fiscal Policy - Business Cycl ign Institutional Investment (FII). <b>Int Trends in Economics</b> mmerce, Fintech, and Online Servic ic Decision-Making - Gig Economy : - equality : Causes, Effects, and Socio	d Pricing, Ps g and practic cepts: Metho les concepts es - Role of c Growth of p - political In	ychologi es. ods of m - Inflatio f Techno Freelanc npact	easuring on, deflation blogy : Big and Co	g, Geograph national inco on and its t	Pricing polic ical Pricing, Peric ome - circul ypes - Fore Peric icial Intellig c - Impact o	ies: Cost , Dynamic ods: 9 lar flow of ign Direc ods: 9 ence and on Globa	
Pricing, Bundle UNIT - IV Globalization al income - Mone Investment (FD UNIT - V Digital Econom Automation in Economies - Ind Lecture Peric	Macro nd Econ etary poli I) - Forei Recer by : E-co Economi come In ods: 45	Price Discrimination, Premium Pricing <b>Deconomics</b> omic Policies - National Income Con- cy and Fiscal Policy - Business Cycl ign Institutional Investment (FII). <b>Int Trends in Economics</b> mmerce, Fintech, and Online Servic ic Decision-Making - Gig Economy : - equality : Causes, Effects, and Socio	d Pricing, Ps g and practice cepts: Metho es concepts es - Role of Growth of p - political In Practica	ychologi es. ods of m - Inflatio f Techno Freelanc npact al Perioo	cal Pricing easuring on, deflatio blogy : Big ce and Co <b>ds: -</b>	g, Geograph national inco on and its t g Data, Artii ontract Work	Pricing polic ical Pricing, Peric ome - circul ypes - Fore Peric icial Intellig c - Impact of Tota	ies: Cost , Dynamic ods: 9 lar flow of ign Direc ods: 9 ence and on Globa	CO CO CO S: 45
Pricing, Bundle UNIT - IV Globalization a income - Mone Investment (FD UNIT - V Digital Econom Automation in Economies - In Lecture Peric Text Books 1. Samuelson 2. Ahuja, H. L	Macro nd Econ etary poli I) - Fore Recer by : E-co Economi come In ods: 45	Price Discrimination, Premium Pricing beconomics omic Policies - National Income Com- cy and Fiscal Policy - Business Cycli ign Institutional Investment (FII). Int Trends in Economics ommerce, Fintech, and Online Service ic Decision-Making - Gig Economy : - equality : Causes, Effects, and Socio Tutorial Periods: - In F., and Marks, Stephen G. Manageria les of Managerial Economics, 7 <sup>th</sup> edition	d Pricing, Ps g and practice cepts: Metho es concepts ces - Role of Growth of p - political In <b>Practica</b> al Economics on, Tata McC	ychologi es. - Inflatio f Techno Freelanc npact al <b>Perio</b> s: Theory Graw-Hill	cal Pricing easuring on, deflation blogy : Big ce and Co ds: -	g, Geograph national inco on and its t g Data, Artii ontract Work	Pricing polic ical Pricing, Peric ome - circul ypes - Fore Peric icial Intellig c - Impact of Tota	ies: Cost , Dynamic ods: 9 lar flow of ign Direc ods: 9 ence and on Globa	CO CO CO S: 45
Pricing, Bundle UNIT - IV Globalization a income - Mone Investment (FD UNIT - V Digital Econom Automation in Economies - In Lecture Peric Text Books 1. Samuelson 2. Ahuja, H. L	Macro nd Econ etary poli I) - Fore Recer by : E-co Economi come In ods: 45	Price Discrimination, Premium Pricing Deconomics omic Policies - National Income Con- cy and Fiscal Policy - Business Cycl ign Institutional Investment (FII). Int Trends in Economics ommerce, Fintech, and Online Servic ic Decision-Making - Gig Economy : - equality : Causes, Effects, and Socio Tutorial Periods: - In F., and Marks, Stephen G. Manageria	d Pricing, Ps g and practice cepts: Metho es concepts ces - Role of Growth of p - political In <b>Practica</b> al Economics on, Tata McC	ychologi es. - Inflatio f Techno Freelanc npact al <b>Perio</b> s: Theory Graw-Hill	cal Pricing easuring on, deflation blogy : Big ce and Co ds: -	g, Geograph national inco on and its t g Data, Artii ontract Work	Pricing polic ical Pricing, Peric ome - circul ypes - Fore Peric icial Intellig c - Impact of Tota	ies: Cost , Dynamic ods: 9 lar flow of ign Direc ods: 9 ence and on Globa	CO CO CO S: 45
Pricing, Bundle UNIT - IV Globalization au income - Mone Investment (FD UNIT - V Digital Econom Automation in Economies - Ind Lecture Peric Text Books 1. Samuelson 2. Ahuja, H. L 3. Mithani, D. Reference Bo	Macro nd Econ etary poli I) - Forei <b>Recer</b> by : E-co Economi come In <b>ods: 45</b> n, William Princip M. Mana <b>poks</b>	Price Discrimination, Premium Pricing Deconomics omic Policies - National Income Con- cy and Fiscal Policy - Business Cyclign ign Institutional Investment (FII). Int Trends in Economics ommerce, Fintech, and Online Service ic Decision-Making - Gig Economy : - equality : Causes, Effects, and Socio Tutorial Periods: - In F., and Marks, Stephen G. Manageria les of Managerial Economics, 3 <sup>rd</sup> edition., Himala	d Pricing, Ps g and practice cepts: Metho les concepts ces - Role of communication communication <b>Practica</b> al Economics on, Tata McC aya Publishir	ychologi es. ods of m - Inflatio f Techno Freelanc npact al <b>Perio</b> Sraw-Hill ng House	cal Pricing easuring on, deflatio blogy : Big ce and Co ds: - , Applicati I, 2017 2,2021.	g, Geograph national inco on and its ty g Data, Artii ontract Work	Pricing polic ical Pricing, Peric ome - circul /pes - Fore Peric icial Intellig c - Impact of Tota ses, 10 <sup>th</sup> ed	ies: Costi , Dynamic ods: 9 lar flow of ign Direc ods: 9 ence anc on Globa I Periods	CO CO CO S: 45
Pricing, Bundle UNIT - IV Globalization al income - Mone Investment (FD UNIT - V Digital Econom Automation in Economies - Ind Lecture Peric Text Books 1. Samuelson 2. Ahuja, H. L 3. Mithani, D. Reference Bo 1. Varian, Hal	Macro nd Econ etary poli I) - Forei Recer ay : E-co Economi come In ods: 45 n, William Princip M. Mana poks I R. Inter	Price Discrimination, Premium Pricing beconomics omic Policies - National Income Com- cy and Fiscal Policy - Business Cycli ign Institutional Investment (FII). Int Trends in Economics ommerce, Fintech, and Online Service ic Decision-Making - Gig Economy : - equality : Causes, Effects, and Socio Tutorial Periods: - In F., and Marks, Stephen G. Manageria les of Managerial Economics, 7 <sup>th</sup> edition	d Pricing, Ps g and practice cepts: Metho es concepts es - Role of co-political In <b>Practica</b> al Economics on, Tata McC aya Publishir	ychologi es. ods of m - Inflatio f Techno Freelanc npact al Perioo S: Theory Graw-Hill ng House	cal Pricing easuring on, deflation ology : Big ce and Co ds: - , Applicati I, 2017 e,2021. W.W. No	g, Geograph national inco on and its t g Data, Artif ontract Work ons, and Ca	Pricing polic ical Pricing, Peric ome - circul /pes - Fore Peric icial Intellig c - Impact of Tota ses, 10 <sup>th</sup> ed	ies: Cost , Dynamic ods: 9 lar flow of ign Direc ods: 9 ence and on Globa I Period	CO CO CO S: 45

3. Samuelson, Paul, and Nordhaus, William. Economics, 20th edition., McGraw-Hill Education, 2019.

Schiff, Peter, and Schotter, Andrew J. Introduction to Microeconomics, 3<sup>rd</sup> edition., Cengage Learning, 2012. 4.

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B.Tech. Mechanical Engineering

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3.	https://corporatefinanceinstitute.com/resources/economics/market-structure.	
4.	https://www.britannica.com/money/macroeconomics	
5.	https://www2.deloitte.com/us/en/insights/economy/global-economic-outlook/weekly-update.html	

COs					Prog	ram O	utcom	es (PO	s)					ram Spe omes (P	
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2	PSO3
1	1	1	1	-	1	1	-	-	-	2	2	-	2	2	2
2	1	1	1	2	2	2	2	-	-	3	3	3	2	2	3
3	1	1	1	2	-	2	2	-	-	3	-	3	2	2	3
4	1	1	-	2	2	2	2	2	-	3	3	3	2	2	3
5	1	1	1	2	2	-	2	2	-	3	3	3	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 - High

#### **Evaluation Methods**

		Conti	M)	End Semester	Total			
Assessment	CAT 1	CAT 1 CAT 2		Assignment*	Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100	

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	MBA				Programme : <b>B.Tech.</b>								
Semester	V/ VI Course Category: OE End Semester									ter Exan	n Typ	be: TE	
Course	112214	SOC05	1		Pei	riods/W	eek	Credit	Ma	aximum	mum Marks		
Code	UZSEN	50000			L	Т	Р	С	CAM	ESE		ТМ	
Course Name	MARK	ETING	G MANAGEM	ENT	3	0	0	3	25	75		100	
				(Commo	n to ALL Br	anches)	)						
Prerequisite	-												
	<b>0</b>						_			BT	Мар	ping	
	On con	npietio	on of the cours	se, the stud		e able t	0			(Hig	(Highest Le		
	CO1	Expla sellin	ain the importa g.	ance of mark	keting and	differen	tiate bet	ween mark	eting ar	nd	K2		
Cauraa	<b>CO2</b> Apply the consumer decision-making process and differentiate between industrial and consumer buying behavior.												
Course Outcome	<b>CO3</b> Examine product life cycle management strategies and demonstrate the steps involved in new product development.										K3		
	<b>CO4</b> Illustrate the role of distribution channels and design an effective channel distribution strategy for both consumer and industrial goods.										КЗ		
	CO5 Analyze emerging trends in marketing, including Customer Relationship Management and experiential marketing strategies.										K4		
UNIT - I	Introd	uction	to Marketing						Pe	eriods: 9	)		
Marketing - Imp	ortance	of Mar	keting - Differen	ce between N	Aarketing an	d Selling	- Market	ing Environr	nent: Th	e Macro	and		
			ortance of enviro	•	•		•.	•				CO	
_			nd Steps in strate			Social Re	sponsibili	ty of Marketi				<u> </u>	
UNIT - II			Behaviour and	-		ione O				eriods: 9		Ī	
			behavior - Facto n making Proces										
					tional huving	hehavio	ur Classi	fication of or	nanizatio	nal mark	ete		
		nce bet										co	
			ween Industrial oning and Comp	and Consum	er buying -							CO	
Significance – T	argeting	, Positi	ween Industrial	and Consum	er buying -				ds, Class		and	CO	
Significance – T <b>UNIT - III</b> Product classifi	argeting <b>Produ</b> cations	g, Position I <b>ct and</b> - Produ	ween Industrial oning and Comp I <b>Pricing Mix</b> uct Life cycle -	and Consum petitive Strateg Strategies for	ier buying - gies. r managing	Market Product	Segmenta	ation - Need e – Catego	ts, Class Pe ries of N	ification eriods: 9 lew prod	and ) uct,	CO	
Significance – T <b>UNIT - III</b> Product classifi Importance and	argeting <b>Produ</b> cations Steps ir	g, Position I <b>ct and</b> - Produ New P	ween Industrial oning and Comp I <b>Pricing Mix</b> uct Life cycle - Product Develop	and Consum betitive Strateg Strategies for ment – Packag	er buying - jies. r managing ging: Need fo	Market Product	Segmenta Life cycl ging, Esse	etion - Need e – Catego ential qualitie	ts, Class Pe ries of N es of pact	ification Friods: 9 Iew prod kaging, ki	and ) uct, nds		
Significance – T UNIT - III Product classifi Importance and of packaging a	argeting <b>Produ</b> cations Steps ir nd adva	g, Position Ict and - Produ New P ntages	ween Industrial oning and Comp I <b>Pricing Mix</b> uct Life cycle - Product Develop of packaging –	and Consum betitive Strateg Strategies for ment – Packag Labelling: Fu	er buying - jies. r managing ging: Need fo	Market Product	Segmenta Life cycl ging, Esse	etion - Need e – Catego ential qualitie	ts, Class Pe ries of N es of pact	ification Friods: 9 Iew prod kaging, ki	and ) uct, nds		
Significance – T UNIT - III Product classifi Importance and of packaging a labelling – Pricir	argeting <b>Produ</b> cations Steps ir nd adva ng object	g, Position <b>Ict and</b> - Produce New F ntages tives – I	ween Industrial oning and Comp I <b>Pricing Mix</b> uct Life cycle - Product Develop of packaging – Pricing strategie	and Consum betitive Strateg Strategies for ment – Packag Labelling: Fu	er buying - jies. r managing ging: Need fo	Market Product	Segmenta Life cycl ging, Esse	etion - Need e – Catego ential qualitie	ds, Class Pe ries of N es of pack and disac	ification <b>riods: 9</b> lew prod kaging, ki dvantages	and ) uct, nds s of		
Significance – T UNIT - III Product classifi Importance and of packaging a labelling – Pricir UNIT - IV	argeting Produ cations Steps ir nd adva ng objec Place	g, Position of the text of New P ntages tives – I and P	ween Industrial oning and Comp I <b>Pricing Mix</b> uct Life cycle - Product Develop of packaging – Pricing strategie romotion Mix	and Consum betitive Strateg Strategies for ment – Packag Labelling: Fu s	er buying - jies. r managing ging: Need fo inctions, Typ	Market Product or packag bes of la	Segmenta Life cycl ging, Esse belling, a	ation - Need e – Catego ential qualitie dvantages a	ds, Class Pe ries of N es of pacl and disac Pe	ification eriods: 9 lew prod (aging, ki dvantages eriods: 9	and uct, nds s of		
Significance – T UNIT - III Product classifi Importance and of packaging a labelling – Pricir UNIT - IV Distribution Cha	argeting <b>Produ</b> cations Steps ir nd adva ng object <b>Place</b> annel and	g, Position of the text of text of	ween Industrial oning and Comp I <b>Pricing Mix</b> uct Life cycle - Product Develop of packaging – Pricing strategie romotion Mix	and Consum betitive Strateg Strategies for ment – Packag Labelling: Fu s Meaning and	er buying - gies. r managing ging: Need fo unctions, Typ	Market Product or packag bes of la	Segmenta Life cycl ging, Esse belling, a ution char	ation - Need e – Catego ential qualitie dvantages a nel - Chann	ds, Class Pe ries of N es of pack and disac Pe el desigr	ification eriods: 9 lew prod kaging, ki dvantages eriods: 9 n decisior	and uct, nds s of ) ns –	CO3	
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Significance – T UNIT - III Product classifi Importance and of packaging a labelling – Pricir UNIT - IV Distribution Cha Channels of dis physical distribu – Introduction to UNIT - V Emerging trends Marketing: Mea Marketing: Mea Marketing Lecture Peric Text Books 1. Keller, Phili 2. V.S.Ramas Reference Bo 1. Prachi Gup 2. Arunkumar	argeting Produ cations Steps ir nd adva ng objec Place annel and tribution ution - Pr o Integra Trend s in Mark ning, stra of digit eting - Mark ods: 45 p and Ke wamy, S oks ta, Ashit , Meenal ena, "Mark	g, Positi <b>ict and</b> - Produ- n New P ntages tives – I <b>and P</b> d Physi- for cor- romotion ted Mar <b>s in M</b> . keting - ategies al markar arketing evin Lar S.Nama a Aggan kshi.N, rketing	ween Industrial oning and Comp I <b>Pricing Mix</b> uct Life cycle - Product Developp of packaging – Pricing strategie <b>romotion Mix</b> cal distribution: insumer and indu in: Objectives, Ty keting Commun <b>arketing</b> Customer Relati and benefits - N keting – Inboun g Analytics: Mean <b>Tutorial Per</b> ne Kotler "Marke kumari, 6th Editi rwal, et al. "Marke	and Consum petitive Strateg Strategies for ment – Packag Labelling: Fu s Meaning and I istrial goods – ypes of sales p ication ionship Manag Nobile Marketi d marketing: ning, importan <b>iods: -</b> ting Managem on, Sage Pub	er buying - jies. r managing ging: Need fo inctions, Typ Importance of - Physical Di promotion: C gement: Definition Meaning, fu ice, metrices Practica ment" 16th Ec lications Indian Edition, Vika	Market Product or packag bes of la of distribu- stribution consume nition, fea n and typ indamen of market al <b>Perio</b> dition, Pea a Pvt Lto a Cases" s Publish	Segmenta Life cycl ging, Esse belling, a ution char n: Meanin r, Salespe atures, Ty bes of mol tals and tals an	ation - Need e – Catego ential qualitie dvantages a nel - Chann g, Objective erson and Do pes and imp bile marketir difference b rtics – An ov	Is, Class Pe ries of N es of pack and disac Pe riel design s and co ealer sale Pe ortance ng - Digiti erview of Tc ted, 2022	ification eriods: 9 lew prod kaging, ki dvantages eriods: 9 n decisior mponent es promo eriods: 9 Experier al Market inbound f Sustaina	and ) uct, nds s of ) ns – s of tion ) ntial ing: and able	CO3	

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3.	https://indianjournalofmarketing.com/	
4.	http://www.publishingindia.com/ijamm/	
5.	https://onlinecourses.swayam2.ac.in/imb20_mg36/preview	

COs		Program Outcomes (POs)													Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	1	2	-	-	-	2	1	1	-	2	1	1	2	2	3		
2	1	2	1	-	1	2	1	2	-	2	1	1	2	2	3		
3	1	2	3	-	1	2	1	2	-	2	1	1	3	2	3		
4	1	1	3	-	2	1	2	1	1	2	2	1	2	2	3		
5	1	3	2	2	2	3	2	2	1	2	2	3	3	3	3		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

_		Cont	inuous Asse	M)	End Semester	Total		
Assessment	CAT 1	CAT 2	Model Exam	Assignment*	Attendance	Examination (ESE) Marks	Marks	
Marks	5	5	5	5	5	75	100	

\* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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Department	Mecha	nical l	Engineering	Progr	amme :	B.Tech.				
Semester	VII			Cours	e Categ	er Exam T	ype: TE			
Course				Pe	riods/W	eek	Credit	Credit Maximum M		
Code	U23MI	=OC03		L	Т	Р	С	C CAM E		ТМ
Course Name	-		INNOVATION AND NEW EVELOPMENT	3	0	0	3	25	75	100
			(Common to EEE, EC	CE, ICE, C	CIVIL, BI	ME, MCT	R)			
Prerequisite	Enginee	ering D	esign & CAD							
	On con	npletio	n of the course, the stude	nts will b	e able t	D			BT Ma (Highes	apping st Level)
	CO1	To un	derstand the need for creat	ivity and ir	nnovatio	n			ĸ	2
Course	CO2	To lea	arn about the project selection	on and ev	aluation				ĸ	3
Outcome	CO3		arn about the Patent and IPI						ĸ	2
Outcome	CO4	To un	derstand the quality standa	rds and ne	ew produ	uct planni	na		K	(4
	CO5		(5							
UNIT - I	Introd		arn model preparation and e	valuation				Por	iods: 9	U
-			novation - factors contributing	to success	ful techn	ological in	novation -			, [
		•	roblem solving -brainstorming -			•			•	
Tools in Creativ	ity & Inno	ovation.								
UNIT - II	Projec	t Sele	ction and Evaluation					Per	iods: 9	
			e of project - Selection criter s in Innovation Projects	ia - screer	ing ideas	s for new	products e	valuation	echniques-	CO2
UNIT - III	New P	roduc	t Development					Per	iods: 9	<u>i</u>
Research and r	new prod	uct dev	elopment - Patents - Patent se	earch - Pat	ent laws-	Internatio	nal code fo	r patents -	Intellectua	CO3
property rights (	IPR)- Ty	pes of I	Patents (Utility, Design, Provision	onal, and F	CT Appli	cations)				003
UNIT - IV	New P	roduc	t Planning					Per	iods: 9	
		-	quality standards - marketing ent - Customer-Centered Desi			-		stainability	and Green	CO4
UNIT - V	Model	Prepa	ration and Evaluation					Per	iods: 9	<u>i</u>
-			tion - Testing - Cost evaluation	– Patent ar	oplication	- Rapid Pr	ototvpina &			
Development.			and recting contentation		-price and -		etet)pg et		g	CO5
Lecture Perio	ds: 45		Tutorial Periods: -	Practic	al Perio	de· -		Tot	al Periods	s• 45
Fext Books	u3. <del>1</del> 0			Tractic		uj		100		J. TJ
	: Merle	and C	Anthony Di Benedetto. New Pr	roducts Ma	nademer	t McGrav	/-Hill Educa	ition 2019		
			luct Planning", Prentice Hall In		genie				-	
	-		ual Property: Patents, Copyrigh		arks, and	Allied Rig	hts. Pearso	on, 2018.		
Reference Bo			1 2 1 2							
1. Nystrom, H	arry "Cre	ativity a	and Innovation", John Wiley & S	Sons, 1979	•					
2. Dr Paul Tro	tt, Innova	ation Ma	anagement and New Product D	Developmei	nt, 6th Ed	lition, Pear	son Public	ation, 2017	,	
3. Khandwalla	i, N – "Fo	ourth Ey	e (Excellence through Creativi	ty) - Wheel	er Publis	hing", 199	2.			
4. Bulletins I.F	P.R, TIFA	C, New	Delhi, 1997.							
5. Jacob Gold	enberg,	Creativi	ty in Product Innovation, Camb	oridge Univ	ersity Pre	ess, 2002.				
Veb Referenc										
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			10/107/110107094/							
<ol><li>https://www</li></ol>	youtube	e.com/w	atch?v=H6OlyjLJf6k							
-		,	atch?v=CnKeVs9zs							

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COs		Program Outcomes (POs)													Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	3	2	2	1	2	-	-	-	-	-	-	-	3	2	-		
2	3	3	3	2	3	-	-	-	-	-	-	-	3	3	-		
3	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-		
4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-		
5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-		

Correlation Level: 1 - Low, 2 - Medium, 3 - High

## **Evaluation Methods**

		Cont	inuous Asse	M)	End Semester	Total	
Assessment	CAT 1	CAT 2	Model Exam			Examination (ESE) Marks	Marks
Marks	5	5	5	5	5	75	100

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