AL-AMEEN ENGINEERING COLLEGE

(Autonomous)

Accredited by NAAC with "A" Grade :: An ISO Certified Institution
(Affiliated to Anna University, Chennai & Approved by AICTE, New Delhi)
Karundevanpalayam, Nanjai Uthukkuli Post, Erode – 638 104, Tamilnadu, INDIA.

CURRICULUM & SYLLABI

SEMESTERS – I to VIII

(Regulations 2023)

CHOICE BASED CREDIT SYSTEM

B.E. Mechanical Engineering

Applicable to the Students admitted to B.E. / B.Tech. Programmes from the AY 2023-24 onwards

KNOWLEDGE LEVELS (BLOOM'S TAXONOMY)

Notation	Knowledge Levels
K1	Remembering
K2	Understanding
K3	Applying
K4	Analysing
K5	Evaluating
K6	Creating

VISION	
	To be a centre of excellence focusing on inventiveness for uplifting rural and the underprivileged with values, culture and high degree of trans-disciplinary expertise.

MISSION	
M1	To groom confident, wholesome mechanical engineers with good communication and entrepreneurial skills to transform the world of work in holism.
M2	To develop diverse experiences in students for enriching rural and under-privileged communities.
M3	To develop students focused on career in industries, engineering start-ups and management with awareness of social, economic and ethical impacts.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)	
PEO 1	Be successful in their careers as Mechanical Engineers in a globally competitive industrial area.
PEO 2	Pursue higher education, research and development and other creative and innovative efforts in mechanical engineering.
PEO 3	Demonstrate leadership qualities and professionalism in their chosen field of specialization.

PROGRAM OUTCOMES (POs)	
PO 1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3	**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.
PO 4	**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.
PO 5	**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.
PO 6	**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.
PO 7	**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.
PO 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**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.
PO 11	**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.
PO 12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES (PSOs)	
PSO 1	Apply interdisciplinary engineering knowledge and skills, specifically the embedded systems in order to fit into core mechanical engineering including algorithms.
PSO 2	Designing, commissioning, implementing and operating environmentally sustainable safe systems by harnessing renewable energy, related to mechanical and allied engineering tasks.

CURRICULUM

SEMESTER I

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSE									
1	23MA1T1	Calculus & Differential Equations	BS	50	50	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENTS									
2	23EN1LT2	Communicative English	HS	50	50	3	0	2	4
3	23PH1LT3	Engineering Physics	BS	50	50	3	1	2	5
4	23CY1LT4	Engineering Chemistry	BS	50	50	3	1	2	5
5	23CS1LT5	Problem Solving and C programming	ES	50	50	3	0	4	5
MANDATORY COURSES									
6		Universal Human Values 1 - Induction Programme	MC	-	-	-	-	-	-
7	23HS1T6	Heritage of Tamil	HS	-	-	1	0	0	1
Total						**16**	**3**	**10**	**24**

SEMESTER II

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23EN2T1	Technical English	HS	40	60	3	0	0	3
2	23HS2T2	Environmental Sciences	HS	100	-	3	0	0	0
3	23HS2T3	Tamils and Technology	HS	100	-	1	0	0	1
4	23ME2T4	Engineering Mechanics	ES	40	60	3	0	0	3
5	23MA2T5	Laplace Transforms and Complex Analysis	BS	40	60	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENT									
6	23ME2LT1	Engineering Graphics	ES	50	50	3	0	2	4
LABORATORY COURSE									
7	23EM2L1	Engineering Practices Laboratory	ES	60	40	0	0	4	2
Total						**16**	**1**	**6**	**17**

SEMESTER III

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23HS3T1	Constitution of India	MC	100	-	3	0	0	0
2	23ME3T2	Classical Thermodynamics	PC	40	60	3	1	0	4
3	23ME3T3	Manufacturing Processes I	PC	40	60	3	0	0	3
4	23MA3T5	Fourier Analysis And Statistics	BS	40	60	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENT									
5	23ME3LT1	Fluid Mechanics and Hydraulic Machines	PC	50	50	2	0	4	4
LABORATORY COURSES									
6	23EN3L1	Interpersonal Communication Skills Laboratory I	HS	60	40	0	0	3	1.5
7	23ME3L2	Manufacturing Processes Lab I	PC	60	40	0	0	3	1.5
Total						**14**	**2**	**10**	**18**

SEMESTER IV

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23HS4T1	Universal Human Values 2: Understanding Harmony	HS	100	-	2	1	0	3
2	23ME4T2	Manufacturing Processes II	PC	40	60	3	0	0	3
3	23ME4T3	Metallurgy and Materials Engineering	PC	40	60	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENT									
4	23ME4LT1	Mechanics of Materials	PC	50	50	2	0	4	4
5	23ME4LT2	Kinematics of Machinery	PC	50	50	2	0	4	4
LABORATORY COURSES									
6	23EN4L1	Interpersonal Communication Skills Laboratory II	HS	60	40	0	0	3	1.5
7	23ME4L2	Manufacturing Processes Lab II	PC	60	40	0	0	3	1.5
Total						**12**	**1**	**14**	**20**

SEMESTER V

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1		Machine Elements and System Design	PC	40	60	3	1	0	4
2		Thermal Engineering	PC	40	60	3	1	0	4
3		Professional Elective – I	PE	40	60	3	0	0	3
4		Professional Elective – II	PE	40	60	3	0	0	3
5		Professional Elective - III	PE	40	60	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENT									
6		Dynamics of Machinery	PC	50	50	2	0	4	4
LABORATORY COURSES									
7		Thermal Engineering Laboratory	PC	60	40	0	0	4	2
8		CAD / CAM Laboratory	PC	60	40	0	0	4	2
MANDATORY COURSE									
9		Career Competency Development	MC	100	-	1	0	0	0
Total						**18**	**2**	**12**	**25**

SEMESTER VI

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1		Design of Transmission Systems	PC	40	60	3	1	0	4
2		Professional Elective - IV	PE	40	60	3	0	0	3
3		Professional Elective - V	PE	40	60	3	0	0	3
4		Professional Elective - VI	PE	40	60	3	0	0	3
5		Professional Elective - VII	PE	40	60	3	0	0	3
6		Open Elective - I	OE	40	60	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENT									
7		Heat and Mass Transfer	PC	50	50	2	0	4	4
LABORATORY COURSES									
8	`	Simulation and Analysis Laboratory	PC	60	40	0	0	4	2
Total						**20**	**1**	**8**	**25**

SEMESTER VII

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1		Measurements and Metrology	PC	40	60	3	0	0	3
2		Industrial Management	HS	40	60	3	0	0	3
3		Open Elective – II	OE	40	60	3	0	0	3
4		Open Elective – III	OE	40	60	3	0	0	3
5		Open Elective – IV	OE	40	60	3	0	0	3
THEORY COURSE WITH LABORATORY COMPONENT									
6		Mechatronics and IoT	PC	50	50	2	0	4	4
LABORATORY COURSES									
7		Measurements and Metrology Lab	PC	60	40	0	0	4	2
8		Project work phase I	EEC	100	-	0	0	4	2
9		Summer Internship	EEC	-	-	2 Weeks			1
Total						**17**	**0**	**12**	**24**

SEMESTER VIII

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
LABORATORY COURSE									
1		Project Work Phase II	EEC	50	50	0	0	20	10
Total						**0**	**0**	**20**	**10**

Total Credits: 163

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT (HS)

S. No.	Course Code	Course Title	L	T	P	C
1	23EN1LT2	Communicative English	3	0	2	4
2	23HS1T6	Heritage of Tamil	1	0	0	1
3	23EN2T1	Technical English	3	0	0	3
4	23HS2T2	Environmental Sciences	3	0	0	0
5	23HS2T3	Tamil and Technology	1	0	0	1
6	23EN3L1	Interpersonal Communication Skills Laboratory I	0	0	3	1.5
7	23EN4L2	Interpersonal Communication Skills Laboratory II	0	0	3	1.5
8		Industrial Management	3	0	0	3

BASIC SCIENCES (BS)

Sl.No.	Course Code	Course Title	L	T	P	C
1	23MA1T1	Calculus & Differential Equations	3	1	0	4
2	23PH1LT3	Engineering Physics	3	1	2	5
3	23CY1LT4	Engineering Chemistry	3	1	2	5
4	23ME2T5	Laplace Transforms and Complex Analysis	3	1	0	4
5	23MA3T5	Fourier Analysis And Statistics	3	1	0	4

ENGINEERING SCIENCES (ES)

Sl.No.	Course Code	Course Title	L	T	P	C
1	23CS1LT5	Problem Solving and C programming	3	0	4	5
2	23ME2T4	Engineering Mechanics	3	0	2	4
3	23ME2LT1	Engineering Graphics	3	0	2	4
4	23EM2L1	Engineering Practices Laboratory	0	0	4	2

PROFESSIONAL CORE (PC)

Sl.No.	Course Code	Course Title	L	T	P	C
1	23ME3T2	Classical Thermodynamics	3	1	0	4
2	23ME3T3	Manufacturing Processes I	3	0	0	3
3	23ME3LT1	Fluid Mechanics and Hydraulic machines	2	0	4	4
4	23ME3L2	Manufacturing Processes Laboratory I	0	0	3	1.5
5	23ME4T2	Manufacturing Processes II	3	0	0	3
6	23ME4T3	Metallurgy and Materials Engineering	3	0	0	3
7	23ME4LT1	Mechanics of Materials	2	0	4	4
8	23ME4LT2	Kinematics of Machinery	2	0	4	4
9	23ME4L2	Manufacturing Processes Laboratory II	0	0	3	1.5
10		Machine Elements and System Design	3	1	0	4
11		Thermal Engineering	3	1	0	4
12		Thermal Engineering Laboratory	0	0	4	2
13		Dynamics of Machinery	2	0	4	4

14		CAD / CAM Laboratory	0	0	4	2
15		Design of Transmission System	3	1	0	4
16		Heat and Mass Transfer	2	0	4	4
17		Simulation and Analysis Laboratory	0	0	4	2
18		Measurements and Metrology	3	0	0	3
19		Mechatronics and IoT	2	0	4	4
20		Measurements and Metrology Lab	0	0	4	2

EMPLOYABILITY ENHANCEMENT COURSES (EEC)
PRACTICAL COURSES AND PROJECT WORK

Sl. No.	Course Code	Course Title	L	T	P	C
1		Project Work Phase I	0	0	4	2
2		Project Work Phase II	0	0	20	10
3		Summer Internship	2 Weeks			1

MANDATORY COURSES (MC)

Sl.No.	Course Code	Course Title	L	T	P	C
1	-	Universal Human Values 1 - Induction Programme	-	-	-	-
2	23HS3T1	Constitution of India	3	0	0	3
3	23HS4T1	Universal Human Values 2: Understanding Harmony	2	1	0	3
4		Career Competency Development	1	0	0	0

VALUE ADDED COURSES (VAC)

S.No.	Course Code	Course Title	Credit
1	23MEV01	Yoga for Youth Empowerment	1
2	23MEV02	Basics of Civil Engineering	1
3	23MEV03	Metallography	1
4	23MEV04	Micromachining	1
5	23MEV05	Wind Energy Management	1
6	23MEV06	Solar Energy Management	1
7	23MEV07	Project Management	1
8	23MEV08	Six Sigma	1
9	23MEV09	Professional Skills	1
10	23MEV10	Industrial Design Software	1
11	23MEV11	Industrial Analytical Software	1

CURRICULUM BREAKDOWN STRUCTURE

Subject	AICTE suggested breakdown of credits	Total number of credits	Curriculum Content (% of total number of credits of the program)
Humanities and Social Sciences including Management (HS)	15	18	11.04%
Basic Sciences (BS)	25	22	13.49%
Engineering Sciences (ES)	24	14	8.58%
Professional Core (PC)	48	63	38.65%
Program Electives (PE)	18	21	12.88%
Open Electives (OE)	18	12	7.36%
Employability Enhancement Courses (EEC) – Practical Courses and Project Work	15	13	7.97%
Mandatory Courses (MC)	0	-	0%
Total	**161**	**163**	**100%**

CREDIT SUMMARY

Sl. No.	Subject Area	Credits per Semester								Total Credits	AICTE Suggested Credits
		I	II	III	IV	V	VI	VII	VIII		
1	**HS**	5	4	1.5	4.5	-	-	3	-	**18**	12
2	**BS**	14	4	4	-	-	-	-	-	**22**	29
3	**ES**	5	9	-	-	-	-	-	-	**14**	27
4	**PC**	-	-	12.5	15.5	16	10	9	-	**63**	58
5	**PE**	-	-	-	-	9	12	-	-	**21**	9
6	**OE**	-	-	-	-	-	3	9	-	**12**	9
7	**EEC**	-	-	-	-	-	-	3	10	**13**	16
8	**MC**	-	-	-	-	-	-	-	-	**-**	0
TOTAL		**24**	**17**	**18**	**20**	**25**	**25**	**24**	**10**	**163**	**161**

HS – Humanities and Social Sciences including Management
BS – Basic Sciences
ES – Engineering Sciences
PC – Professional Core
PE – Professional Electives
OE – Open Electives
EEC – Employability Enhancement Courses
MC – Mandatory Courses

SYLLABUS

SEMESTER I

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSE									
1	23MA1T1	Calculus & Differential Equations	BS	50	50	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENTS									
2	23EN1LT2	Communicative English	HS	50	50	3	0	2	4
3	23PH1LT3	Engineering Physics	BS	50	50	3	1	2	5
4	23CY1LT4	Engineering Chemistry	BS	50	50	3	1	2	5
5	23CS1LT5	Problem Solving and C programming	ES	50	50	3	0	4	5
MANDATORY COURSES									
6		Universal Human Values 1 - Induction Programme	MC	-	-	-	-	-	-
7	23HS1T6	Heritage of Tamil	HS	-	-	1	0	0	1
Total						**16**	**3**	**10**	**24**

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23MA1T1	CALCULUS AND DIFFERENTIAL EQUATIONS	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Apply eigen values and eigenvectors to convert quadratic form to canonical form through orthogonal diagonalization.	K3	1
CO2	Understand the basic concepts of derivatives to estimate maxima and minima of multivariable functions.	K2	2
CO3	Identify appropriate integral techniques to find area and volume of the given region	K3	3
CO4	Apply various integral theorems for solving engineering problems involving cubes and parallelepipeds.	K3	4
CO5	Solve first order Ordinary Differential Equations and apply them to certain physical situations.	K3	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO2	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO3	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO4	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO5	3	3	3	3	-	-	-	1	3	2	-	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**MATRICES**	**9 + 3**
Eigen values and Eigen vectors – properties (without proof) – Cayley Hamilton theorem (Without proof) – Diagonalization using orthogonal transformation.		
Topic - 2	**FUNCTIONS OF SEVERAL VARIABLES**	**9 + 3**
Partial derivatives – Total derivative – Jacobians - Taylor's series expansion – Extreme values of functions of two variables – Lagrange's multipliers method.		
Topic - 3	**MULTIPLE INTEGRALS**	**9 + 3**
Double integrals – Change of order of integration – Triple integrals – Applications in area and volumes.		
Topic - 4	**LINE AND SURFACE INTEGRALS**	**9 + 3**
Gradient, Divergence and curl– Directional Derivative – Irrotational and solenoidal vector fields – Green's theorem – Green's theorem in a plane – Gauss divergence theorem – Stokes theorem (excluding proof).		
Topic - 5	**ORDINARY DIFFERENTIAL EQUATION**	**9 + 3**
Second and higher order linear differential equations with Constant coefficients – Variable coefficients – Euler Cauchy equation – Legendre's equation – Method of variation of Parameters – Simple Applications.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 5rd Edition, Narosa Publishing House, New Delhi, Reprint 2019.
2	Ramana B.V., "Higher Engineering Mathematics", Tata Mcgraw Hill Publishing Company, New Delhi, 2017.
3	Kreyszig E., "Advanced Engineering Mathematics", 10th Edition, John Wiley Sons, 2012.(E-BOOK)
4	Glyn James., "Advanced Modern Engineering Mathematics", Pearson Education Limited, 2018.
5	N P Bali, Manish Goyal, "A Text Book of Engineering Mathematics", 9rd Edition, Laxmi Publication Private Limited, 2010.
6	Grewal B.S., "Higher Engineering Mathematics", 43nd Edition,Khanna Publications New Delhi, 2015

OTHER REFERENCES	
1	https://www.slideshare.net/mailrenuka/matrices-and-application-of-matrices
2	https://testbook.com/maths/application-of-vector#:~:text=Application%20of%20Vector%20Calculus,gravitational%20fields%2C%20and%20fluid%20flow.&text=To%20find%20the%20rate%20of,mass%20of%20a%20fluid%20flows.
3	https://youtu.be/wtuq1oSButE

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23EN1LT2	COMMUNICATIVE ENGLISH	3	0	2	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Improve communication skills and language comprehension with error-free strategies.	K2	1
CO2	Analyze the effectiveness of soft skills in different scenarios.	K3	2
CO3	Explore the fascinating world of word-stress, sentence stress and intonation.	K4	3
CO4	Enhance reading and writing skills to excel in career.	K4	4
CO5	Develop strong public speaking abilities.	K2	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO2	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO3	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO4	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO5	-	-	-	-	-	-	-	1	3	3	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Model Practical Examinations and Laboratory Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**LANGUAGE INTROSPECTION**	**9**
GRAMMAR COMPONENTS: Vocabulary Building - Word Formation–Prefixes and Suffixes– 'Wh' questions and Yes or No questions. **LINGUISTIC FUNCTIONS:** Short comprehension Passages –Skimming and Scanning-Developing hints		
Topic – 2	**SOFT SKILLS**	**9**
GRAMMAR COMPONENTS: Sentence structures- Punctuation – Kinds of sentences - Subject-verb Agreement. **LINGUISTIC FUNCTIONS:** Introducing and Sharing Information from Newspaper including Dialogues and Conversations– Short Narrative Descriptions – Paragraph Writing – Greeting- Jumbled Sentences-		
Topic – 3	**CAREER GUIDANCE**	**9**
GRAMMAR COMPONENTS: Single-word substitutes –Pronouns – Degrees of Comparison **LINGUISTIC FUNCTIONS:** Reading Comprehension – Verbal and Non-verbal Communication –Public Speaking - Describing and Classification of Different Kinds of Innovation – Narration Act. (Language through Literature)- Negotiation Skills.		
Topic – 4	**TECHNICAL WRITING**	**9**
GRAMMAR COMPONENTS: Articles- Modal Verbs – Uses of Prepositions (of Time, Place, Direction and Spatial Relations) **LINGUISTIC FUNCTIONS:** Preparing Instructions and Manuals - Reporting Events and Research – Writing Recommendations – Interpreting Diagrammatic Representations, esp. Bar Graphs and Pie Charts.		
Topic – 5	**BUSINESS CORRESPONDENCE**	**9**
GRAMMAR COMPONENTS: Numerical Adjectives –Phrases and Clauses- Synonyms and Antonyms- Different Tense Forms of Verbs. **LINGUISTIC FUNCTIONS:** Writing short Essays- Dialogue Writing- Technical and Business Proposals – Role play – Narrating Incidents – Extempore and persuasive speech- Conversations - Telephonic Conversations.		

LIST OF EXPERIMENTS	
1	Self-introduction and introducing others
2	Negotiation Skills
3	Public Speaking
4	Body Language
5	Narrating incidents

6	Telephonic Conversation									
7	Representations									
8	Technical Proposals									
THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**75**

BOOK REFERENCES	
1	Technical English 1 Paperback – 15 December 2019 by Prof. Ravindra Nath Tiwari (Author)
2	Developing English Language Skills-I: (NEP 2020 for the University of Delhi) by Pooja Khanna
3	Sem-I Communication Skills I Edition/Reprint: 2022 Author(s): B.v.pathak Publisher: **NIRALI PRAKASHAN** Product ID: 591991
4	Sem-1 Communication Skills (English) ISBN: 9788119883493 Edition/Reprint: 2023-24 Author(s): Dr. Yogesh Malshette Publisher: **NIRALI PRAKASHAN** Product ID: 626280
5	English Language & Comprehension (Useful For Graduate Level) ISBN: 9789386791672 Edition/Reprint: 2022 Author(s): Editorial Board Publisher: UPKAR PRAKASHAN Product ID: 514358 Country of Origin: India
6	Communication Skills in English| AICTE Prescribed Textbook (English) DIP122EN Paperback – Big Book, 1 January 2022by Anjana Tiwari (Author)

OTHER REFERENCES	
1	https://youtu.be/x60GHpQ8gJk?list=PLWPirh4EWFpFIElSxplDlEhRDZHkBD-0n
2	https://youtu.be/BO7j-X87rM8
3	https://youtu.be/QMIQv7yPlkI
4	https://www.youtube.com/live/zb07Wo9_2Lc?si=nnPc83pP-gFHvRfD

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23PH1LT3	ENGINEERING PHYSICS	3	1	2	5

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Utilize the conceived concepts and techniques for synthesizing novel crystals.	K2	1
CO2	Classify the extensive properties of solid materials to use it in material fabrication field.	K2	2
CO3	Understand the principles of thermodynamics and apply it in real systems.	K2	3
CO4	Analyze the properties of the Laser beam and apply it in industrial and medical field.	K3	4
CO5	Apply advanced technical methods by assessing the fibre optics.	K3	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2	-	-	1	3	2	1	2	-	-
CO2	3	2	2	2	2	-	-	1	3	2	1	2	-	-
CO3	3	2	2	1	2	-	-	1	3	2	1	2	-	-
CO4	3	2	2	2	2	-	-	1	3	2	1	2	-	-
CO5	3	2	2	1	2	-	-	1	3	2	1	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Model Practical Examinations and Laboratory Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**CRYSTAL PHYSICS**	**9+3**
Unit cell-Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - growth of single crystals: solution and melt growth techniques.		
Topic - 2	**PROPERTIES OF MATTER**	**9+3**
Hooke's Law - Stress-Strain Diagram - Elastic moduli - Poisson's Ratio - Expression for bending moment of beam and depression of Cantilever - Expression for Young's modulus by Non-uniform bending and its experimental determination.		
Topic - 3	**THERMAL PHYSICS**	**9+3**
Transfer of heat energy - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Lee‘s disc method - theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.		
Topic - 4	**LASER TECHNOLOGY**	**9+3**
Laser characteristics -Spontaneous emission and stimulated emission-Einstein’s coefficients-Pumping methods- Components of a laser -CO_2 laser-Solid state laser(Nd:YAG)-Semiconductor diode lasers – Application of laser in science and technology.		
Topic - 5	**FIBER OPTICS**	**9+3**
Fiber optical communication system – Structure of an optical fiber- Numerical aperture and acceptance angle- Classification of optical fibers (Materials, modes and refractive index profile)- Displacement and temperature sensor- Medical Endoscopy.		
LIST OF EXPERIMENTS		
1. Determination of young’s modulus by non- uniform bending. 2. Determination of young’s modulus by uniform bending. 3. Torsional pendulum - determination of moment of inertia and rigidity modulus. 4. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer. 5. Determination of Wavelength, and particle size using Laser. 6. Determination of thermal conductivity of a bad conductor using Lee’s disc method. 7. Air wedge – determination of thickness of a thin wire. 8. Determination of acceptance angle and numerical aperture of an optical fiber.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**30**		**TOTAL**	**90**

BOOK REFERENCES	
1	Avadhanulu M N, Kshirsagar P G and Arun Murthy TVS, "A Text book of Engineering Physics", 2nd Edition, S Chand Publishing, New Delhi, 2022
2	Dr.G.Senthilkumar " Engineering Physics-1" Revised & Animated Version, VRB Publishers Pvt.Ltd.,2017
3	Dr.R.Suresh " A Text book of Engineering Physics", 2nd Edition, Sri Krishna Hi-tech Publishing Pvt, Ltd., Chennai,2019.
4.	Dr.P.Mani " A Text book of Engineering Physics",Dhanam Publications.,Chennai.,2022.
5.	Dr.M.Arumugam " A Text book of Engineering Physics", Anuradha Publications.,Chennai.,2020.
6.	Serway and Jewett, "Physics for Scientists and Engineers with Modern Physics", 6th Edition, Thomson Brooks Cole, 2008

OTHER REFERENCES	
1	https://nptel.ac.in/courses/115/105/115105099/
2	https://nptel.ac.in/courses/115/106/115106061/
3	https://www.youtube.com/watch?v=_JOchLyNO_w
4	https://www.journals.elsevier.com › Journals
5	https://nptel.ac.in/courses/118/104/118104008/
6	https://www.digimat.in/nptel/courses/video/122107035/L37.html

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23CY1LT4	ENGINEERING CHEMISTRY	3	1	2	5

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Apply the suitable water softening methods to avoid boiler troubles.	K3	1
CO2	Analyze the calorific value of different types of fuels.	K2	2
CO3	Choose suitable forms of energy sources for applying it in energy sectors.	K2	3
CO4	Understand the working process of spectroscopy to analyse the wavelength of electromagnetic radiations.	K3	4
CO5	Classify the types of polymers for fabrication.	K3	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	-	-	2	1	2	2	2	2	-	-
CO2	3	2	1	1	-	-	2	1	2	2	2	2	-	-
CO3	3	2	2	1	-	-	3	1	2	2	2	2	-	-
CO4	3	2	2	1	1	-	1	1	2	2	2	2	-	-
CO5	3	2	1	2	-	-	1	1	2	2	2	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Model Practical Examinations and Laboratory Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**WATER CHEMISTRY**	**9+3**
Hardness of water – Types – Units – Boiler troubles (Scale and Sludge, Priming and Foaming and Caustic Embrittlement) – Treatment of boiler feed water – Internal treatment (Phosphate, Colloidal and Calgon conditioning) and External treatment (Ion exchange process and Zeolite process) – Desalination of brackish water – Reverse Osmosis.		
Topic - 2	**FUELS**	**9+3**
Fuels: Introduction - Classification of fuels – Coal – Analysis of coal (Proximate and Ultimate Analysis) - Carbonization - Manufacture of metallurgical coke (Otto Hoffmann method) - Petroleum – Bergius Process - Knocking - Octane number - Diesel oil - Cetane number - Natural gas - Compressed natural gas (CNG) - Liquefied petroleum gases (LPG) - Power alcohol.		
Topic - 3	**BATTERIES AND FUEL CELLS**	**9+3**
Batteries - Types of batteries – primary battery - dry cell. Secondary battery - lead acid battery, Nickel-Cadmium battery - Lithium Batteries - Fuel cells – Hydrogen -Oxygen fuel cell. - Solar energy conversion - solar cells – Application.		
Topic - 4	**SPECTROSCOPY**	**9+3**
Introduction – Laws of spectroscopy - Block diagram, Instrumentation, Working and application of Visible spectroscopy and Ultra Violet spectroscopy – Infrared spectroscopy – Flame photometry – Atomic adsorption spectroscopy.		
Topic - 5	**ENGINEERING MATERIALS**	**9+3**
Polymer – Types of polymerization – Preparation, properties, uses of Nylon(6,6), Poly Vinyl Chloride (PVC). Plastics – Types - Rubbers – SBR – Nanomaterials – Synthesis and its applications of Nanomaterials. Abrasives – Classification, Properties - Manufacture of SiC.		

LIST OF EXPERIMENTS

1. Estimation of total hardness in water by EDTA method.
2. Determination of viscosity coefficient of a given oil / fuel / polymer using Ostwald's viscometer.
3. Estimation of Ferrous Ammonium Sulfate (FAS) using standard potassium Dichromate solution potentiometrically.
4. Estimation of sodium / potassium present in water using photometer.
5. Synthesis of Polymers (Phenol Formaldehyde or Urea Formaldehyde Resins).
6. Conductometric estimation of Strong Acid and Weak acid from a given mixture.
7. Determination of chloride content of water sample by Argentometric method.
8. Determination of strength of given hydrochloric acid using pH meter.

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**30**		**TOTAL**	**90**

BOOK REFERENCES	
1	S.S Dara and S.S. Umare ‘ A Textbook of Engineering Chemistry for Anna University’, S.Chand Publication, 2020
2	Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, Second Edition, 2019
3	“Engineering Chemistry” by Dr.A.Ravikrishna, Sri Krishna Hi Tech Publishing Company, 2021
4	“Experiments In Engineering Chemistry” – Payal B Joshi, I.K. International Publishing House. 2016
5	Group Theory and Spectroscopy by Pragati Prakashan Alka L Gupta and Mukesh Kumar Alka L Gupta and Mukeshkumar ,2021
6	Anil Kumar P.V Polymer Chemistry, First Edition -2021

OTHER REFERENCES	
1	https://sctevtodisha.nic.in/wp-content/uploads/2021/03/Engineering-Chemistry-1ST-YEAR-LM.pdf
2	https://www.youtube.com/watch?v=Fyq4Q5yWDDU&list=PLyqSpQzTE6M927gXIZdVbbsyj9cmxam-b
3	https://www.youtube.com/watch?v=nh2xbyOaERw
4	https://archive.nptel.ac.in/courses/104/106/104106122/
5	https://nptel.ac.in/courses/118104008
6	https://www.britannica.com/science/water

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23CS1LT5	PROBLEM SOLVING AND C PROGRAMMING	3	0	4	5

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand the basic concepts to write efficient C program.	K2	1
CO2	Implement the identified looping and control statements in C program for developing applications.	K2	2
CO3	Understand the concepts of arrays and strings to develop C program with different dimensions.	K2	3
CO4	Write and implement C programs using user defined functions.	K3	4
CO5	Apply dynamic memory allocation functions for assigning memory space during execution.	K3	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	-	-	2	2	3	3	2	3	-	-
CO2	1	2	3	2	2	-	2	2	3	3	-	3	-	2
CO3	3	2	2	-	-	-	2	2	3	3	2	3	-	2
CO4	1	3	2	2	-	-	2	2	3	3	-	3	2	-
CO5	3	2	-	-	-	-	2	2	3	3	3	3	-	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Model Practical Examinations and Laboratory Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**PROBLEM SOLVING AND C PROGRAMMING BASICS**	**6**
General Problem Solving: Algorithms, Flowcharts and Pseudo-codes, implementation of algorithms Basics of C Programming : Introduction to C - Structure of C program - Programming Rules – Compilation – Errors - C Declarations: Tokens - keywords - identifiers - constants - data types - variable declaration and initialization - type conversion - constant and volatile variables - operators and expressions.		
Topic – 2	**DECISION CONTROL STATEMENTS**	**6**
Managing Input and Output operations, Decision Control Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops break and continue statements.		
Topic – 3	**ARRAYS AND STRINGS**	**6**
Introduction to Array - Definition - Array initialization - Characteristics - One Dimensional Array - Array operations -Two dimensional arrays -Strings and String handling functions.		
Topic – 4	**FUNCTIONS**	**6**
Functions: Basics - definition - Elements of User defined Functions - return statement, Function types, Parameter Passing Techniques, Function returning more values - Passing Array to Functions - Recursion - Storage classes.		
Topic - 5	**POINTERS AND FILE MANAGEMENT**	**6**
Pointer concepts - Pointers & Arrays, Structure concepts - Defining, Declaring, Accessing Member Variables, Structure within Structure - Union - File Management in C- Dynamic Memory allocation.		

LIST OF EXPERIMENTS	
1	Draw the flowchart for the following using Raptor tool. a) Simple interest calculation b) Greatest among three numbers c) Find the sum of digits of a number.
2	Programs for demonstrating the use of different types of operators like arithmetic, logical,relational and ternary operators (Sequential and Selection structures).
3	Programs for demonstrating repetitive control statements like ‘for’, ‘while’ and ‘do-while’ (Iterative structure).
4	Programs for demonstrating one-dimensional and two-dimensional numeric array.

5	Programs to demonstrate modular programming concepts using functions.
6	Programs to implement various character and string operations with and without built-in library functions.
7	Programs to demonstrate the use of pointers.
8	Programs to illustrate the use of user-defined data types.
9	Programs to implement various file management.
10	Program Using Dynamic memory allocation functions.

THEORY	**30**		**TUTORIAL**	**0**		**PRACTICAL**	**60**		**TOTAL**	**90**

BOOK REFERENCES	
1	Ashok N. Kamthane, “Programming in C”, 2nd Edition., Pearson Education, 2013.
2	Sumitabha Das, “Computer Fundamentals and C Programming”, 1st Edition, McGraw Hill, 2018.
3	Yashavant Kanetkar, "Let us C", 16th Edition, BPB Publications, 2018.
4	C programming for problem solving. Paperback – Import, 9 October 2020 by Sukhendra Singh (Author), Hemant Jain (Author)
5	Let Us C: Authentic guide to C programming language - 19th Edition Paperback – 15 December 2022 by Yashavant Kanetkar (Author)

OTHER REFERENCES	
1	R. G. Dromey, “How to Solve it by Computer”, Pearson Education India; 1st edition, ISBN10: 8131705625, ISBN-13: 978-8131705629.
2	Maureen Spankle, “Problem Solving and Programming Concepts”, Pearson; 9th edition, India, ISBN10: 9780132492645, ISBN-13: 978- 013249264.
3	ReemaThareja., “Programming in C ”, 2nd Edition, Oxford University Press, New Delhi, 2018.
4	Balagurusamy E., "Programming in ANSI C", 7th Edition, Mc Graw Hill Education, 2017.

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23HS1T6	HERITAGE OF TAMILS	1	0	0	1

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand the extensive literature of Tamil and its classical nature.	K2	1
CO2	Understand the heritage of sculpture, painting and musical instruments of ancient people.	K2	2
CO3	Review on folk and material arts of Tamil people.	K2	3
CO4	Realization of thinai concepts trade and victory of chozha dynasty.	K2	4
CO5	Understand the contribution of tamils in Indian freedom struggle, self esteem movement and siddha medicine.	K2	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**LANGUAGE AND LITERATURE**	**3**
Language Families in India – Dravidan Languages – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature-Management Principles in Thirukural – Tamil Epics and Impact of Buddhism and Jainism in Tamil Land – Bakthi Literature Azhwars and Nayanmars – Forms of Minor Poetry – Development of Modern Literature in Tamil- Constribution of Bharathiyar and Bharathidhasan		
Topic - 2	**HERITAGE –ROCK ART PAINTINGS TO MODENT ART-SCULPTURE**	**3**
Hero stone to modern sculpture – Bronze icons – Tribes and their handicrafts – Art of Temple car making – Massive Terracotta sculptures,Villages deities, Thiruvalluvar Statue at Kanyakumari, Making of Musical instruments – Mirudhangam , Parai, Veenai , Yazh and Nadhaswaram – Role of Temples in Social and Economic Life of Tamils		
Topic - 3	**FOLK AND MARTIAL ARTS**	**3**
Therukoothu, Karagattam,Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance – Sports and Games of Tamils		
Topic - 4	**THINAI CONCEPT OF TAMILS**	**3**
Flora and Fauna of Tamils & Aham and Puram concept from Tholkappiyam and Sangam Literature – Aram concept of Tamils – Education And Literacy during Sangam Age – Ancient Cities and Ports of Sangam Age – Export and Import during Sangam Age – Overseas Conquest of Cholas		
Topic - 5	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	**3**
Contribution of Tamils to Indian Freedom Struggle – The Cultural Influence of Tamils over the other parts of India – Self –Respect movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions and Manuscripts – Print History of Tamil Books		

THEORY	**15**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**15**

BOOK REFERENCES	
1	தமிழக வரலாறு –மக்களும் பண்பாடும் கேகே பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2	கணினித் தமிழ் – முனைவர். இல. சுந்தரம் (விகடன் பிரசுரம்)
3	கீழடி வைகை நதி கரையில் சங்க கால நகர நாகரிகம் தொல்லியல் துறை வெளியீடு

4	Social Life of Tamils(Dr.K.K.Pillai) A joint publication of TNTB and ESC and RMRL – (in print)
5	Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) Published by International Institute of Tamil Studies.
6	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by International Institute of Tamil Studies.

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23HS1T6	தமிழர் மரபு	1	0	0	1

பாடம் கற்றதின் விளைவுகள்			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	தமிழ் மொழியின் செந்தன்மை மற்றும் இலக்கியங்கள் குறித்து தெரிதல் புரிதல்.	K2	1
CO2	தமிழர்களின் சிற்பக்கலை ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்து தெளிவு புரிதல்.	K2	2
CO3	தமிழர்களின் நாட்டுப்புற கலைகள் மற்றும் வீர விளையாட்டுகள் குறித்து அறிமுகம் புரிதல்.	K2	3
CO4	தமிழர்களின் திணை கோட்பாடுகள் சங்க கால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள் புரிதல்.	K2	4
CO5	இந்திய தேசிய இயக்கம் சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்துவம் பற்றி புரிதல்.	K2	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course Exit Survey

பாடத்திட்டங்கள்		
அலகு 1	மொழி மற்றும் இலக்கியம்	3
இந்திய மொழிக்குடும்பங்கள்- திராவிட மொழிகள்- தமிழ் ஒரு செம்மொழி- தமிழ் செவ்விலக்கியங்கள் -சங்க இலக்கியத்தின் சமயச்சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் -திருக்குறளில் மேலாண்மை கருத்துக்கள் -தமிழ்க்காப்பியங்கள் -தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம்- பக்தி இலக்கியம்- ஆழ்வார்கள் மற்றும் நாயன்மார்கள்- சிற்றிலக்கியங்கள்- தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி- தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.		
அலகு 2	மரபு பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை-சிற்பக்கலை	3
நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள்- தேர் செய்யும் கலை- சுடுமண் சிற்பங்கள்- நாட்டுப்புற தெய்வங்கள்- குமரி முனையில் திருவள்ளுவர் சிலை- இசைக்கருவிகள்- மிருதங்கம், பறை, வீணை, யாழ் ,நாதஸ்வரம் -தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு		
அலகு 3	நாட்டுப்புற கலைகள் மற்றும் வீர விளையாட்டுகள்	3
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து,ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்		
அலகு 4	தமிழர்களின் திணைக்கோட்பாடுகள்	3
தமிழகத்தின் தாவரங்களும், விலங்குகளும்- தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள்- தமிழர்கள் போற்றிய அறக்கோட்பாடு-		

சங்ககாலத்தில் எழுத்தறிவும், கல்வியும்- சங்க கால நகரங்களும், துறைமுகங்களும்- சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி- கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி		
அலகு 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்கு தமிழர்களின் பங்களிப்பு	**3**
இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு- இந்தியாவின் பிற பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் -சுயமரியாதை இயக்கம்- இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு -கல்வெட்டுகள் ,கையெழுத்துப்படிகள் -தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு		

THEORY	**15**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**15**

BOOK REFERENCES	
1	தமிழக வரலாறு –மக்களும் பண்பாடும் கேகே பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2	கணினித் தமிழ் – முனைவர். இல. சுந்தரம் (விகடன் பிரசுரம்)
3	கீழடி வைகை நதி கரையில் சங்க கால நகர நாகரிகம் தொல்லியல் துறை வெளியீடு.
4	Social Life of Tamils(Dr.K.K.Pillai) A joint publication of TNTB and ESC and RMRL – (in print)
5	Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) Published by International Institute of Tamil Studies.
6	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by International Institute of Tamil Studies.

SEMESTER II

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23EN2T1	Technical English	HS	40	60	3	0	0	3
2	23HS2T2	Environmental Sciences	HS	100	-	3	0	0	0
3	23HS2T3	Tamils and Technology	HS	100	-	1	0	0	1
4	23ME2T4	Engineering Mechanics	ES	40	60	3	0	0	3
5	23MA2T5	Laplace Transforms and Complex Analysis	BS	40	60	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENT									
6	23ME2LT1	Engineering Graphics	ES	50	50	3	0	2	4
LABORATORY COURSE									
7	23EM2L1	Engineering Practices Laboratory	ES	60	40	0	0	4	2
Total						**16**	**1**	**6**	**17**

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23EN2T1	TECHNICAL ENGLISH	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Learn about personality development to enhance interactions.	K2	1
CO2	Improve skills by cultivating self-confidence.	K4	2
CO3	Increase social abilities by mastering communication.	K2	3
CO4	Reveal true personality for stronger interactions.	K6	4
CO5	Develop the ability to speak confidently in any situation	K6	5

PRE-REQUISITE	Communicative English

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO2	-	-	-	-	-	-	-	1	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Online Grammar Quizzes
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1		**9**
GRAMMAR COMPONENTS: Mixed Tenses • Homophones • Homonyms • Words often Confused • Pairs of Words• Texting and SMS language **LINGUISTIC FUNCTIONS:** - – Professional emails, Email etiquette •Paragraph Construction • Introduction to Presentation • Communication •Note Making • Reading advertisements		
Topic - 2		**9**
GRAMMAR COMPONENTS: Abbreviations and Acronyms •Concord • Collocations – Fixed and Semi Fixed Expressions. **LINGUISTIC FUNCTIONS:** Letters / emails of complaint •Telephoning Skills• Leadership and Team Management • Qualities of a Good Leader • Leadership Styles • Decision Making • Problem Solving • Technical Report Writing		
Topic - 3		**9**
GRAMMAR COMPONENTS: Direct Indirect Speech • Active Passive Voice • Conditional Sentences **LINGUISTIC FUNCTIONS:** Group Discussions • Letter to the Editor • Checklists • Reading Comprehension Memo • Notices/Circulars Agenda and Minutes of a Meeting.		
Topic - 4		**9**
GRAMMAR COMPONENTS: Misspelled words • Spot the errors • Vocabulary Development • Guessing Meanings of Words. **LINGUISTIC FUNCTIONS:** •Recommendations•Interviews: Types of Interviews • Preparing Resumes & CV • Covering Letter • Brainstorming.		
Topic - 5		**9**
LINGUISTIC FUNCTIONS: Mock Presentation • Job / Internship application – Cover letter & Resume • Casual Conversation • Participating in a Group Discussion • Speeches for special Occasions.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Teaching Communicative English By Dr.N.Badhri Ph.D(Eng.).,Ph.D(Edn.)., 2021.
2	Communicative English By S. Kannan Padmasani , 2019.

3	Technical English – II by Prof. Ravindra Nath Tiwari, 2020.
4	Communication Skills (Sem-2) Edition/Reprint: 2022Author(s): Neelkamal JhalniPublisher: JHUNJHUNUWALA Product ID: 526288
5	English Communication ISBN: 9789385879036 Edition/Reprint: 2023Author(s): Pooja Khanna Publisher: VIKASH PUB HOUSE PVT LTD Product ID: 625971

OTHER REFERENCES	
1	https://youtu.be/RkOb-IjkBbw
2	https://youtu.be/8SyZWgzLQSo
3	https://youtu.be/0E9deF06NUU
4	https://youtu.be/CAU2zx2Ri_M?si=jWLm7ZGegmKwO8Ii
5	https://youtube.com/playlist?list=PLyViUDdoFYKypuYyhNF2ZC9xEUE8zDmzx&si=uYKTb1eZGCWwDV

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23HS2T2	ENVIRONMENTAL SCIENCES	3	0	0	0

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand the scientific inquiry in the field of ecosystems for future life.	K2	1
CO2	Identify the different methods of conservation of biodiversity by analysing the factors that contribute the threat to extinction.	K2	2
CO3	Enumerate the control plan for environmental pollution problems by identifying and quantifying it's magnitude and intensity	K2	3
CO4	Understand systematically the natural resources and identify the resource management.	K2	4
CO5	Solve current environmental problems by practising the adoption of sustainability in society and industry	K2	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	2	1	2	3	2	3	2	-	2	-	-
CO2	1	-	-	2	-	2	3	2	3	2	-	2	-	-
CO3	1	-	-	2	-	2	3	2	3	2	-	2	-	-
CO4	1	-	-	2	-	2	3	2	3	2	-	2	-	-
CO5	1	2	2	3	-	2	3	2	3	2	-	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**ENVIRONMENT AND ECOSYSTEMS**	**9**
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs – Introduction, types, characteristic features, structure and function of the forest ecosystem and aquatic ecosystems (ponds, river and marine). Activity: Study of the ecosystem structure in Cauvery River.		
Topic - 2	**BIODIVERSITY**	**9**
Introduction to biodiversity - definition: genetic, species and ecosystem diversity – values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species of India – In-situ and ex- situ conservation of biodiversity. Activity: Study of common plants, insects, birds.		
Topic - 3	**ENVIRONMENTAL POLLUTION**	**9**
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Thermal pollution (d) Noise pollution – solid waste management: causes, effects and control measures of municipal solid wastes – Hazardous and biomedical waste management -pollution case studies. Activity: Study of air and water pollution in industry		
Topic - 4	**NATURAL RESOURCES**	**9**
Forest resources: over-exploitation, deforestation, – Water resources: Rain water harvesting - watershed management - utilization of surface and ground water, conflicts over water, dams-benefits and problems Food resources: effects of modern agriculture, fertilizer - pesticide problems - Principles of Green Chemistry- Case studies Activity: Tree plantation and maintenance within the campus		
Topic - 5	**SUSTAINABILITY AND POPULATION**	**9**
From unsustainable to sustainable development – Environmental Impact Assessment (EIA) – environmental ethics: Issues and possible solutions – climate change, acid rain, ozone layer depletion, and case studies – Environment Protection Act 1986 – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act - Environment and Human Health – Value Education – HIV / AIDS – Women and Child Welfare. Activity: Small group meetings about environment and human health in local area peoples and making poster and short films about HIV / AIDS – women and child welfare.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Erach Bharucha, “Environmental Studies for Undergraduate Courses”, Third Edition, Orient Blackswan Pvt Ltd (8 March 2021).
2	Rajagopalan, R, ‘Environmental Studies-From Crisis to Cure’, Oxford University Press, 2015.
3	Benny Joseph, “Environmental Science and Engineering”, Tata McGraw-Hill Education, New Delhi, 2017.
4	E-book: The Sustainable Use of Natural Resources: The Governance Challenge Jennifer Bansard Mika Schröder April 2021.
5	E-book: The Climate Solution: India's Climate-Change Crisis and What We Can Do about it, Mridula Ramesh May 2018.

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23HS2T3	TAMILS AND TECHNOLOGY	1	0	0	1

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand the weaving ceramic technology of ancient Tamil people nature.	K2	1
CO2	Understand the construction technology, building materials in Sangam period and case studies.	K2	2
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence.	K2	3
CO4	Realize the agriculture methods, irrigation technology and pearl driving.	K2	4
CO5	Understand the knowledge of scientific tamil and tamil computing.	K2	5

PRE-REQUISITE	Heritage of Tamils

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**WEAVING AND CERAMIC TECHNOLOGY**	**3**
Weaving Industry during Sangam Age-Ceramic technology-Black and Red Ware Potteries(BRW)-Graffiti on Potteries		
Topic - 2	**DESIGN AND CONSTRUCTION TECHNOLOGY**	**3**
Designing and Structural construction House & Designs in household materials during Sangam Age-Building materials and Hero stones of Sangam Age-Details of Stage Constructions in Silappathikaram-Sculptures and Temples of Mamallapuram-Great Temples of Cholas and other worship places-Temples of Nayaka Period-Type study (Madurai Meenakshi Temple)-Thirumalai Nayakar Mahal-Chetti Nadu Houses,Indo-Saracenic architecture at Madras during British Period		
Topic - 3	**MANUFACTURING TECHNOLOGY**	**3**
Art of Ship Building-Metallurgical studies-Iron industry- Iron smelting steel- Copper and gold-Coins are source of history- Minting of Coins-Beads making- industries Stone beads- Glass beads- Terracotta beads-Shell beats/bone beats- Archeological evidences-Gem stone types described in Silapathigaram		
Topic - 4	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	**3**
Dam ,Tank, ponds, sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry- Wells designed for cattle use- Agriculture and Agro Processing- Knowledge of Sea- Fisheries-Pearl- Conche diving-Ancient Knowledge of Ocean- Knowledge Specific Society		
Topic - 5	**SCIENTIFIC TAMIL & TAMIL COMPUTING**	**3**
Development of Scientific Tamil- Tamil computing- Digitalization of Tamil Books- Development of Tamil Software- Tamil Virtual Academy- Tamil Digital Library- Online Tamil Dictionaries- Sorkuvai Project		

THEORY	**15**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**15**

BOOK REFERENCES	
1	தமிழக வரலாறு –மக்களும் பண்பாடும் கேகே பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2	கணினித் தமிழ் – முனைவர். இல. சுந்தரம் (விகடன் பிரசுரம்)
3	கீழடி வைகை நதி கரையில் சங்க கால நகர நாகரிகம் தொல்லியல் துறை வெளியீடு
4	Social Life of Tamils(Dr.K.K.Pillai) A joint publication of TNTB and ESC and RMRL – (in print)
5	Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) Published by International Institute of Tamil Studies.
6	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by International Institute of Tamil Studies.

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. Mech	23ME2T4	ENGINEERING MECHANICS	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Apply the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D.	K3	1
CO2	Examine the concept of reaction forces (non-concurrent coplanar and non - coplanar forces) and moment of various support systems with rigid bodies in 2D equilibrium. Reducing the force, moment, and couple to an equivalent force - couple system acting on rigid bodies in 2D.	K4	2
CO3	Determine the various sections properties and to find out area moments of inertia for the sections.	K4	3
CO4	Analyse the frictional forces at the contact surfaces of various engineering systems.	K4	4
CO5	Solve the various problems of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.	K4	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	-	-	3	-
CO2	3	2	2	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	3
CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**BASICS AND STATICS OF PARTICLES**	**9**
Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces –Coplanar Forces – rectangular components – Equilibrium of a particle -Equivalent systems of forces – Principle of transmissibility.		
Topic - 2	**EQUILIBRIUM OF RIGID BODIES**	**9**
Free body diagram – Types of supports – Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions		
Topic - 3	**PROPERTIES OF SURFACES**	**9**
Centroids of areas, composite areas, determination of moment of inertia of plane figures by integration, polar moment of inertia-radius of gyration - Parallel axis theorem and perpendicular axis theorem .		
Topic - 4	**FRICTION**	**9**
Laws of friction – angles of friction- coefficient of friction - angle of repose - wedges Ladder		
Topic - 5	**KINEMATICS AND KINETICS OF RIGID BODIES**	**9**
Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion - Newton's laws of motion – Work Energy Equation– Impulse and Momentum – Impact of elastic bodies .		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Bansal R K, "Engineering Mechanics", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
2	Young D H and Timashenko S, "Engineering Mechanics", Tata Mcgraw-Hill, 2006.
3	Bhavikatti S S, "Engineering Mechanics", New Age International Pvt. Ltd., New Delhi, 2003.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=LG0YzGeAFxk
2	https://www.youtube.com/watch?v=nGfVTNfNwnk
3	https://www.youtube.com/watch?v=v6VTMwxx4oA

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E.Mech	23MA2T5	LAPLACE TRANSFORMS AND COMPLEX ANALYSIS	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Apply the concepts of Laplace transformation in core engineering applications.	K3	1
CO2	Solve linear differential equations using Laplace transform techniques.	K3	2
CO3	Apply the concepts of analytic functions and conformal mapping to transform the functions from z- plane into w- plane.	K3	3
CO4	Apply the techniques of integration to evaluate real and complex integrals.	K3	4
CO5	Evaluate contour integrals of a given function at given points using residue theorem	K3	5

PRE-REQUISITE	CALCULUS AND DIFFERENTIAL EQUATIONS

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO2	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO3	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO4	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO5	3	3	3	3	-	-	-	1	3	2	-	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**LAPLACE TRANSFORMS**	**9 + 3**
Laplace transform – Condition for existence – Transform of elementary function– Standard properties (Statement only)–Transform of unit step function– Impulse function – periodic function– Initial and final value theorem – Convolution theorem(without proof).		
Topic - 2	**INVERSE LAPLACE TRANSFORMS**	**9 + 3**
Inverse Laplace transform – Standard properties (Statement only) – Second order linear differential equations with constant coefficients.		
Topic - 3	**ANALYTIC FUNCTIONS**	**9 + 3**
Analytic functions : Cauchy –Riemann equations (Cartesian form) and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions – Bilinear transformations.		
Topic - 4	**COMPLEX INTEGRATION**	**9 + 3**
Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula- Taylor's and Laurent's series expansions.		
Topic - 5	**SINGULARITIES AND RESIDUES**	**9 + 3**
Singular points–Classification of singularities–Residues–Cauchy's residue theorem– Application of residue theorem for evaluation of real integrals–Use of circular contour and semi circular contour.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Grewal B.S., "Higher Engineering Mathematics", 43nd Edition,Khanna Publications New Delhi, 2015
2	Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 5rd Edition, Narosa Publishing House, New Delhi, Reprint 2019.
3	Ramana B.V., "Higher Engineering Mathematics", Tata Mcgraw Hill Publishing Company, New Delhi, 2017.
4	Kreyszig E., "Advanced Engineering Mathematics", 10th Edition, John Wiley Sons, 2010.
5	"Advanced Modern Engineering Mathematics", Third Edition, Glyn James, David Burley, Dick Clements, Phil Dyke John Sear, Nigel Steele Jerry Wright. Unversity of Brisb University of Plymouth University of Edinburgh Coventry University.
6	N P Bali, Manish Goyal, "A Text Book of Engineering Mathematics", 9rd Edition, Laxmi Publication Private Limited, 2010.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=GSpbh94-Cjo
2	https://www.studocu.com/row/document/university-of-engineering-and-technology-lahore/principle-of-marketting/applications-of-complex-numbers-ppt/8436504

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. MECH	23ME2LT1	ENGINEERING GRAPHICS	3	0	2	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Identify the drawing instruments effectively and able to dimension the figure.	K2	1
CO2	Appraise the usage of engineering curves in tracing the path of simple machine components.	K3	2
CO3	Interpret the concept of projection and acquire visualization skills, projection of points.	K4	3
CO4	Construct the basic views related to projections of lines, planes.	K2	4
CO5	Plan to use the modern tool for drawing communication.	K2	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	2	3	-	-	3	2
CO2	3	2	3	-	2	-	-	-	2	3	-	2	3	3
CO3	3	2	3	-		-	-	-	2	3	-	-	3	3
CO4	3	2	2	-	2	-	-	-	2	3	-	-	3	3
CO5	3	-	3	-	3	-	-	-	2	3	-	3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Model Practical Examination and Record
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**BASICS OF ENGINEERING DRAWING**	**9**
Introduction and its importance – conventions – Engineering drawing sheets, Drawing instruments as per BIS SP:4-2003. – Types of lines and its application. Geometric figures– Lettering and Numbering as per BIS SP:4-2003. Dimensioning – Types, Methods, Arrow head and leader line.		
Topic - 2	**ORTHOGRAPHIC PROJECTION**	**9**
Concept of axes, planes and quadrant – Projection of plane figure – Visualisation of object – Procedure of Orthographic projection – related exercise.		
Topic - 3	**ISOMETRIC DRAWING**	**9**
Types of pictorial drawing (Isometric, Oblique, Perspective drawing) - Procedure of isometric Drawing – Simple isometric related exercise.		
Topic - 4	**FREEHAND SKETCHING**	**9**
Freehand sketching of multiple views from pictorial views of objects		
Topic - 5	**COMPUTER AIDED DRAFTING**	**9**
Introduction to AutoCAD – creating object – creating text and drawing – editing and modifying commands – Basic Dimensioning – Orthographic drawing – Isometric drawing– related exercise.		

LIST OF EXPERIMENTS		
Experiment - 1	Draw the 2D line diagram using AutoCAD software.	**5**
Experiment - 2	Draw the 2D rectangle block using AutoCAD software.	**5**
Experiment - 3	Practice Dimensioning and all Commands using Auto CAD Software.	**5**
Experiment - 4	Draw the Isometric diagram using AutoCAD software.	**5**
Experiment - 5	Draw the home civil layout plan using AutoCAD software.	**5**
Experiment - 6	Draw the Orthographic using AutoCAD software.	**5**

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**75**

BOOK REFERENCES	
1	R.K. Dhawan, “A text book of Engineering Drawing” , S.Chand Publishers, Delhi,2010.
2	Dhananjay. A.Jolhe, “ Engineering Drawing with an introduction to AutoCAD”, Tata McGrawHill Publishing Company Ltd., Delhi,2008.
3	Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.
4	Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005
5	Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/112103019
2	https://nptel.ac.in/courses/112105294
3	https://www.youtube.com/watch?v=j5nwO-JwVv4
4	https://www.youtube.com/watch?v=1sjaelzuGAk
5	https://www.youtube.com/watch?v=viNCXvO9bzY

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. Mech	23EM2L1	ENGINEERING PRACTICES LABORATORY	0	0	4	2

OURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Combine carpentry components and plumbing works.	K5	I - IV
CO2	Prepare weld structures and use of basic machining operations.	K3	
CO3	Develop the models using sheet metal work and identify components of centrifugal pump and air-conditioning.	K5	
CO4	Demonstrate and evaluate the parameters of basic electronic components (Wires, Resistor, Capacitor, Diodes etc.) and test the components.	K3	
CO5	Experiment with DC and AC Voltage and currents using appropriate measuring instruments.	K4	
CO6	Estimate electronic parameters, Compare Logic gates, Ripple factor, Clock signal and Soldering practice.	K6	

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	2	3	3	3	-	2	1	2	2
CO2	3	3	2	-	-	2	3	3	3	3	2	1	2	-
CO3	3	3	2	-	-	2	3	-	3	3	2	1	2	2
CO4	3	2	1	1	3	2	1	1	3	-	2	2	2	-
CO5	1		1	1	2	2	1	1	3	-	1	2	1	-
CO6	2	1	-	-	2	1	1	-		2	1	2	1	1

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course End Survey

LIST OF EXPERIMENTS	
1	**GROUP A (CIVIL & MECHANICAL)** **I.CIVIL ENGINEERING PRACTICE** **Buildings:** a) Study of plumbing and carpentry components of residential and industrial buildings safety aspects. *Plumbing Works:* a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings. b) Preparation of plumbing line sketches for water supply and sewage works. c) Hands-on-exercise: Basic pipe connections – mixed pipe material connection – Pipe connections with different joining components. d) Demonstration of plumbing requirements of high-rise buildings. *Carpentry using manual and power tools:* a) Study of the joints in roofs, doors, windows and furniture. b) Hands-on-exercise: Wood work, joints by sawing, planning and cutting.
2	**II.MECHANICAL ENGINEERING PRACTICE** **Welding:** a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding. b) Gas welding practice *Basic Machining:* a) Simple turning and taper turning b) Drilling Practice *Sheet Metal Work:* a) Forming & bending b) Model making – trays and funnels. c) Different type of joints. *Machine Study practice:* a)Study of centrifugal pump b) Study of air conditioner
3	**GROUP B (ELECTRICAL AND ELECTRONICS)** **III.ELECTRICAL ENGINEERING PRACTICE** 1. Testing and connection of fluorescent lamp wiring. 2. Stair case wiring.

	3. Measurement of energy using single phase energy meter. 4. Assembly of residential house wiring. 5. Measurement of earth resistance of an electrical equipment using megger.									
4	**IV.ELECTRONICS ENGINEERING PRACTICE** 1. Resistor colour coding & Measurement of AC signal parameters (Peak-Peak, RMS period, Frequency) using CRO. 2. Study of logic gates AND, OR, EX-OR and NOT. 3. Measurement of ripple factor of HWR and FWR. 4. Soldering practice for components, devices and circuits. **5.** Generation of clock signal.									
THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**60**		**TOTAL**	**60**

SEMESTER III

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23HS3T1	Constitution of India	MC	100	-	3	0	0	0
2	23ME3T2	Classical Thermodynamics	PC	40	60	3	1	0	4
3	23ME3T3	Manufacturing Processes I	PC	40	60	3	0	0	3
4	23MA3T5	Fourier Analysis And Statistics	BS	40	60	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENT									
5	23ME3LT1	Fluid Mechanics and Hydraulic Machines	PC	50	50	2	0	4	4
LABORATORY COURSES									
6	23EN3L1	Interpersonal Communication Skills Laboratory I	HS	60	40	0	0	3	1.5
7	23ME3L2	Manufacturing Processes Lab I	PC	60	40	0	0	3	1.5
Total						**14**	**2**	**10**	**18**

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. /B. Tech. Common to All	23HS3T1	CONSTITUTION OF INDIA	3	0	0	0

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand and abide the rules of the Indian constitution.	K2	1
CO2	Applying the functions of Central government.	K2	2
CO3	Applying the function of state government.	K2	3
CO4	Evaluate the various constitutional functions.	K2	4
CO5	Explain the different culture among the people of India	K2	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	2	2	3	3	-	3	-	-
CO2	-	-	-	-	-	-	2	2	3	3	-	3	-	-
CO3	-	-	-	-	-	-	2	2	3	3	-	3	-	-
CO4	-	-	-	-	-	-	2	2	3	3	-	3	-	-
CO5	-	-	-	-	-	-	2	2	3	3	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic – 1	**INTRODUCTION**	**9**
Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Role of the Election Commission.		
Topic - 2	**STRUCTURE AND FUNCTION OF CENTRAL AND STATE GOVERNMENT**	**9**
Union Government – Structures of the Union Government and Functions – President – Vice President– Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review. State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.		
Topic - 3	**CONSTITUTION FUNCTIONS OF INDIA AND INDIAN SOCIETY**	**9**
Indian Federal System – Central – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India. Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections		
Topic - 4	**POLICIES AND ACTS – GENERAL**	**9**
Insurance and Bonding – Laws Governing Sale, Purchase and use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax , Excise and Custom duties and their Influence on Construction Cost – Legal Requirements for Planning – Property Law– Agency Law – Local Government Laws for Approval.		
Topic - 5	**POLICIES AND ACTS ON INFRASTRUCTURE DEVELOPMENT**	**9**
A Historical Review of the Government Policies on Infrastructure – Current Public Policies on Transportations – Power and telecom Sector – Plans for Infrastructure Development – Legal framework for Regulating Private Participation in Roads and Highways – Ports and Airport and Telecom		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Durga Das Basu, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi,2018.
2	R.C.Agarwal, "Indian Political System", S.Chand and Company, New Delhi, 2004
3	Maciver and Page, "Society: An Introduction Analysis", Mac Milan India Ltd., New Delhi,2007
4	K.L.Sharma, "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi,2006.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/106/105/106105034/
2	https://www.youtube.com/watch?v=6XTYoZymbwE
3	https://www.youtube.com/watch?v=MP6VlAE_7WY

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. Mechanical	23ME3T2	CLASSICAL THERMODYNAMICS	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Apply the law of thermodynamics and steady flow energy equation for thermal system.	K3	1
CO2	Analyze and derive the efficiency of thermodynamic cycles.	K4	2
CO3	Estimate the properties of steam by stem table, dryness fraction and other properties.	K3	3
CO4	Analyze the process of nozzles and turbine.	K4	4
CO5	Analyze the psychometric properties with psychometric chart.	K4	5

PRE-REQUISITE	Nil

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	2	3	3	-	2	3	3
CO2	3	3	-	-	-	-	-	2	3	3	-	2	3	3
CO3	3	3	-	-	-	-	-	2	3	3	-	2	3	3
CO4	3	3	-	-	-	-	-	2	3	3	-	2	3	3
CO5	3	3	-	-	-	-	-	2	3	3	-	2	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic – 1	**BASIC CONCEPTS AND THERMODYNAMICS RELATIONS**	**10 + 2**
Introduction – Macroscopic and microscopic approach - Thermodynamics system – boundary – surroundings – thermodynamic properties - point and path function. Availability and irreversibility - Boyle‘s law, Charles law, Gay-lussac‘s law, first law, second law of thermodynamics – Zeroth law of thermodynamics – Steady flow energy equation – Maxwell Relations – Joule-thomson Co-efficient – Clausius –Claperyon Equation.		
Topic – 2	**THERMODYNAMIC PROCESS AND CYCLES**	**9 + 4**
P-V diagram, T-S diagram - Isobaric process, Isochoric process, isothermal process, isoentropic process and polytropic process. Concept of thermodynamic cycle with PV and TS diagram – Carnot cycle, otto cycle, diesel cycle and dual cycle.		
Topic – 3	**BOILERS AND STEAM**	**9 + 4**
Introduction to steam - Classification of Boilers – Fire and water tube boiler – Requirements of Good Boilers. Phase Transformation – thermodynamic properties of steam and steam tables - Steam Property charts – Measurements of dryness fraction of steam.		
Topic – 4	**NOZZLE AND TURBINE**	**9 +3**
Types of nozzle – Flow of steam through nozzle - supersaturated flow through nozzle – Steam turbine – Classification – Compounding of steam turbine – Rankine cycle.		
Topic – 5	**PSYCHROMETRY**	**8 + 2**
Introduction – Psychrometry and psychometric properties – Psychometric relations – Psychometric chart – Psychometric process – Thermodynamics of human body – Comfort Conditions – Introduction to Refrigeration and Air Conditioning.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Kothandaraman, C.P., Domkundwar .S and Domkundwar A.V.,”A course in Thermal Engineering”, Dhanpat Rai & Sons, 2016.
2	Ballaney. P.L ." Thermal Engineering”, Khanna publishers, 24th Edition 2012
3	Rajput. R. K., “Thermal Engineering” S.Chand Publishers, 2017

OTHER REFERENCES	
1	https://www.damtp.cam.ac.uk/user/tong/statphys/four.pdf

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. MECH	23ME3T3	MANUFACTURING PROCESSES I	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Distinguish various cutting metals and cutting tool materials and explain tool geometry.	K1	1
CO2	Identify the construction of centre lathe and its operation.	K3	2
CO3	Demonstrate suitable casting process to produce the simple casting components and prepare mould with core.	K2	3
CO4	Employ suitable welding equipment and weld the given material.	K3	4
CO5	Use the suitable bulk deformation process based on application.	K3	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	3	-	2	-	3	-	-	2	2	3
CO2	3	2	3	2	3	-	2	-	3	-	-	2	2	3
CO3	3	2	3	2	3	-	2	-	3	-	-	2	2	3
CO4	3	2	3	2	3	-	2	-	3	-	-	2	2	3
CO5	3	2	3	2	3	-	2	-	3	-	-	2	2	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**THEORY OF METAL CUTTING**	**9**
Introduction: Material removal processes, types of machine tools - theory of metal cutting: chip formation, orthogonal cutting, cutting force calculations - cutting tool materials, tool wear, tool life, surface finish, cutting fluids.		
Topic - 2	**CENTRE LATHE**	**9**
Centre lathe, constructional features, cutting tool geometry, various operations, taper turning methods, thread cutting methods, special attachments, machining time and power estimation.		
Topic - 3	**METAL CASTING PROCESSES**	**9**
Introduction: Manufacturing process - Sand Casting : Sand Mould – Type of patterns - Pattern Materials – Pattern allowances –Moulding sand Properties and testing – Cores –Types and applications –Gating and riser System-Solidification time- Moulding machines– Types; Principle of special casting processes : Shell - investment – Ceramic mould – Pressure die casting - Centrifugal Casting - Defects in Sand casting.		
Topic - 4	**METAL JOINING PROCESSES**	**9**
Fusion welding process - Principle of Gas welding and its flames – Principle of arc welding – Filler and flux materials-Electrodes-TIG-MIG-Submerged arc welding. Principle of Resistance welding - Plasma arc welding, Thermit welding, Electron beam welding, Laser beam welding and Friction welding - weld defects - Brazing and soldering.		
Topic - 5	**BULK DEFORMATION PROCESSES**	**9**
Introduction - Hot and cold working of metals - Forging processes - Open and close die forging, Forging equipment and operations. Rolling of metals- Types of Rolling- shape rolling operations, Defects in rolled parts. Principle of rod and wire drawing-Tube drawing. Principle of Extrusion and its types.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	P.N. Rao, Manufacturing Technology vol. I, Tata McGraw-Hill Publishing Company Private Limited, New Delhi, 2010.
2	Serope Kalpakjian, Steven R.Schmid, Manufacturing Engineering and Technology,Pearson Education Limited,New Delhi, 2013

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=szOwGvYO_Tc
2	https://www.youtube.com/watch?v=Cd6L9k51vug
3	https://www.youtube.com/watch?v=w6_Cx3BAdJI
4	https://www.youtube.com/watch?v=JmspmH4nB7U
5	https://www.youtube.com/watch?v=7O29V_fDdbQ

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. MECH	23MA3T5	FOURIER ANALYSIS AND STATISTICS	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Use the appropriate methods related to Fourier series to solve the problems based on periodic and non periodic functions.	K3	1
CO2	Understand the situation and select appropriate techniques for solving problems based on Fourier transforms.	K2	2
CO3	Apply probability axioms and the moments of discrete and continuous random variables to core engineering problems.	K3	3
CO4	Analyse large and small sample tasks and interpret the results using Chi-square distribution and F distribution.	K4	4
CO5	Classify the experiment with proper observations and measurement to get a valid result using various design methods.	K2	5

PRE-REQUISITE	CALCULUS AND DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS AND COMPLEX VARIABLES

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO2	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO3	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO4	3	3	3	3	-	-	-	1	3	2	-	2	-	-
CO5	3	3	3	3	-	-	-	1	3	2	-	2	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**FOURIER SERIES**	**9 + 3**
Dirichlet's conditions- General Fourier series- Odd and even functions- Half range series- Parseval's identity- Harmonic analysis.		
Topic - 2	**FOURIER TRANSFORMS**	**9 + 3**
Fourier transform pair - Fourier sine and cosine transforms - Properties (without proof) - Transforms of simple functions - Convolution theorem - Parseval's identity.		
Topic - 3	**PROBABILITY**	**9 + 3**
Probability – Axioms of probability – Conditional probability – Total probability – Baye's Theoreem – Discrete and continuous random variable.		
Topic - 4	**TESTING OF HYPOTHESIS**	**9 + 3**
Large sample tests for single mean and difference of means – Small sample test: t distribution - Chi-square distribution - F distribution.		
Topic - 5	**DESIGN OF EXPERIMENTS**	**9 + 3**
One way and two way classifications – Completely randomized design – Randomized block design – Latin square design.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Jain .R.K and Iyengar S.R.K,"Advanced Engineering Mathematics",5th Edition, Narosa Publishing House, New Delhi , Reprint 2019
2	Ramana B.V., "Higher Engineering Mathematics",Tata Mcgraw Hill Publishing Company, New Delhi, 2017
3	McGraw –Hill "Statistical Methods", Combined Edition (Volumes I & II) , N G DAS
4	Introduction to "Probability and Statistics for Engineers and Scientists", Third Edition SHELDON M. ROSS
5	Oliver . C. Lbe., "Fundamentals of applied probability and random processes" 2nd Edition, 2014.
6	N P Bali, Manish Goyal, "A Text Book of Engineering Mathematics", 9th Edition, Laxmi Publication Private Limited, 2010.

OTHER REFERENCES	
1	https://slideplayer.com/slide/15496011/
2	https://youtu.be/tp_MdKz3fC8
3	https://youtu.be/InVTlLPF2e8

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. MECH	23ME3LT1	FLUID MECHANICS AND HYDRAULIC MACHINES	2	0	4	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Explore the various properties of fluid flow.	K1	1
CO2	Analysis and calculations of major and minor losses associated with pipe flow in piping networks.	K4	2
CO3	Modeling of fluid flow with dimensional quantities.	K3	3
CO4	Analysis of the performance of pumps and types.	K4	4
CO5	Analysis of the performance of turbines and its classifications.	K4	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	-	-	-	-	2	-	2	2	2
CO2	3	3	2	2	2	-	-	-	-	2	-	2	2	2
CO3	3	3	2	2	2	-	-	-	-	2	-	2	2	2
CO4	3	3	2	2	2	-	-	-	-	2	-	2	2	2
CO5	3	3	2	2	2	-	-	-	-	2	-	2	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Laboratory Record & Model Examinations
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**FLUID PROPERTIES AND FLUID FLOW**	**6**
Units & Dimensions, Properties of fluids - Specific gravity, specific weight, viscosity, compressibility, vapour pressure and gas laws - capillarity and surface tension, Pressure measurement. Fluid Flow-Types, rate of flow, continuity equation, momentum equation, Bernoulli's equation and its applications		
Topic - 2	**FLOW THROUGH CIRCULAR CONDUITS**	**6**
Laminar flow through circular conduits and circular annuli-Boundary layer concepts – types of boundary layer thickness – Darcy Weisbach equation –friction factor- Moody diagram- commercial pipes- minor losses.		
Topic - 3	**DIMENSIONAL ANALYSIS**	**6**
Need for dimensional analysis – methods of dimensional analysis – Similitude –types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis.		
Topic - 4	**PUMPS**	**6**
Euler's equation-Centrifugal pumps- Performance curves- Reciprocating pump- Indicator diagrams-Air vessels-Rotary pumps-Classification and working.		
Topic - 5	**TURBINES**	**6**
Classification of turbines – heads and efficiencies – velocity triangles -Pelton wheel, Francis turbine and Kaplan turbines working principles - work done by water on the runner – draft tube. Specific speed - unit quantities – performance curves for turbines.		
List of Experiments		
Experiment - 1	Determination of Darcy's friction factor	**3**
Experiment - 2	Calculation of the rate of flow using rotometer	**3**
Experiment - 3	Calibration flow meters	**3**
Experiment - 4	Flow through mouth piece / orifice	**3**
Experiment - 5	Study on performance characteristic of reciprocating pump	**3**
Experiment - 6	Study on performance characteristic of Gear pump	**3**
Experiment - 7	Study on performance characteristic of Pelton wheel	**4**
Experiment - 8	Study on performance characteristic of Francis turbine	**4**

Experiment - 9	Study on performance characteristic of Kaplan turbine									**4**
THEORY	**30**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**60**

BOOK REFERENCES	
1	R.K.Bansal, A Textbook of Fluid Mechanics and Machinery, LaxmiPublications(P) Ltd., New Delhi, Revised Ninth edition, 2014.
2	Frank M White, "Fluid Mechanics", Tata McGraw Hill Education Pvt. Ltd., New Delhi,2011.
3	Kumar K L, “Engineering Fluid Mechanics”, Eurasia Publications Limited, New Delhi,1990.
4	YunusCengel and John Cimbala, Fluid Mechanics Fundamentals and Application, Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi2009.
5	Fluid Mechanics laboratory Manual:- Al-Ameen Publication

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=A0BuHEqDm88
2	https://www.youtube.com/watch?v=-AS9GsP1Ac8
3	https://www.youtube.com/watch?v=4Lz8M2FL8dU
4	https://www.youtube.com/watch?v=la-5TqEUCt0
5	https://www.youtube.com/watch?v=dlXvmgDav-Y
6	https://www.youtube.com/watch?v=Y5k4vxoztFo
7	https://www.youtube.com/watch?v=hZVvByoCDAU

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. / B.Tech., Common to all	23EN3L1	INTERPERSONAL COMMUNICATION SKILLS LABORATORY I	0	0	3	1.5

After Successful completion of the course, the students should be able to		RBT Level
CO1	Use accurate and appropriate language in decisions to avoid errors.	K3
CO2	Learn to interact efficiently with individuals at all levels.	K3
CO3	Expose their personality effectively.	K4
CO4	Learn communication skills for socializing, telephone conversations, and negotiations.	K4
CO5	Assess the culture and professional principles.	K2

PRE-REQUISITE	COMMUNICATIVE ENGLISH & TECHNICAL ENGLISH

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO2	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO3	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO4	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO5	-	-	-	-	-	-	-	1	3	3	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Model Examinations
	2	Laboratory Record
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT										
Experiment - 1	Conversation Practice Sessions (To be done as real-life interactions)									
Experiment - 2	Talking to friends									
Experiment - 3	Listening skills									
Experiment - 4	Email Etiquette									
Experiment - 5	Business English									
Experiment - 6	Discussion on the clips									
Experiment - 7	Decision Making									
Experiment - 8	Developing Conversation									
THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**45**		**TOTAL**	**45**

BOOK REFERENCES	
1	Communication skills in English by Anjana Tiwari, 2021
2	How to improve your communication skills by Dawood Khan,2021.
3	Comprehension & Communication Skills In English, ISBN: 9789327278873, Edition/Reprint: 2021, Author(s): Varinder Kumar, Publisher: KALYANI PUBLISHERS, Product ID: 577073,Country of Origin: India
4	Language Lab - Mentorship in Developing Communication Skills: Crafting Connections, Influencing Change: Your Roadmap to Effective Communication Kindle Edition by SIROHI WRITING (Author) Format: Kindle Edition Publication date - 26 January 2024
5	Comprehension & Communication Skills In English, ISBN: 9789327278873, Edition/Reprint: 2021, Author(s): Varinder Kumar, Publisher: KALYANI PUBLISHERS, Product ID: 577073,Country of Origin: India by Sumreen Mahmood (Author) Publication date 1 February 2024

OTHER REFERENCES	
1	https://youtu.be/cC2vxmBDAG8
2	https://youtu.be/l3RSiSUwlT0
3	https://youtu.be/cyXADWE7KPo
4	https://youtu.be/SByFAGGTDoQ
5	https://youtu.be/q8tIgb_BtiI
6	https://youtu.be/X3Fz_Gu5WUE

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. MECH	23ME3L2	MANUFACTURING PROCESSES LABORATORY I	0	0	3	1.5

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		RBT Level
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Manufacturing Process Laboratory I Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	2	3	3	2	-	2	2	-	-	-	2	2
CO2	-	-	3	3	3	2	-	2	2	-	-	-	2	2
CO3	-	-	2	3	3	2	-	2	3	-	-	-	2	2
CO4	-	-	2	3	3	2	-	2	3	-	-	-	2	2
CO5	-	-	2	3	3	2	-	2	3	-	-	-	2	2
CO6	-	-	3	3	3	2	-	2	2	-	-	-	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Taper Turning
2	External Thread cutting
3	Internal Thread Cutting
4	Eccentric Turning
5	Knurling
6	Square Head Shaping
7	Hexagonal Head Shaping
8	Facing, plain and step turning
9	Manufacturing of simple sheet metal components using shearing and bending operations.

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**30**

BOOK REFERENCES	
1	Manufacturing process laboratory manual, Al-ameen publications,2020

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=i9OXRU2fwb4
2	https://www.youtube.com/watch?v=cWEC1pTmDw8
3	https://www.youtube.com/watch?v=PH0fHF9laoY
4	https://www.youtube.com/watch?v=lU2p6RsDKag
5	https://www.youtube.com/watch?v=uqO-zlS2ey8

SEMESTER IV

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	23HS4T1	Universal Human Values 2: Understanding Harmony	HS	100	-	2	1	0	3
2	23ME4T2	Manufacturing Processes II	PC	40	60	3	0	0	3
3	23ME4T3	Metallurgy and Materials Engineering	PC	40	60	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENTS									
4	23ME4LT1	Mechanics of Materials	PC	50	50	2	0	4	4
5	23ME4LT2	Kinematics of Machinery	PC	50	50	2	0	4	4
LABORATORY COURSES									
6	23EN4L1	Interpersonal Communication Skills Laboratory II	HS	60	40	0	0	3	1.5
7	23ME4L2	Manufacturing Processes Lab II	PC	60	40	0	0	3	1.5
Total						**12**	**1**	**14**	**20**

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. / B.Tech., Common to all	23HS4T1	UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY	2	1	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand Need, Basic Guidelines, Content and Process for Value Education	K2	1
CO2	Understand Harmony in the Human Being - Harmony in Myself	K2	2
CO3	Understand Harmony in the Family and Society- Harmony in Human Relationship	K2	3
CO4	Understand Harmony in the Nature and Existence - Whole existence as Coexistence	K2	4
CO5	Understand Harmony on Professional Ethics	K2	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	2	2	3	3	-	2	2	-
CO2	-	-	-	-	-	-	2	2	3	3	-	2	2	-
CO3	-	-	-	-	-	-	2	2	3	3	-	2	2	-
CO4	-	-	-	-	-	-	2	2	3	3	-	2	2	-
CO5	-	-	-	-	-	-	2	2	3	3	-	2	2	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**	**9**
1. Purpose and motivation for the course, recapitulation from Universal Human Values-I 2. Self-Exploration–what is it? - Its content and process; „Natural Acceptance" and Experiential Validation- as the process for self-exploration 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.		
Topic - 2	**Understanding Harmony in the Human Being - Harmony in Myself!**	**9**
7. Understanding human being as a co-existence of the sentient „I" and the material „Body" 8. Understanding the needs of Self („I") and „Body" - happiness and physical facility 9. Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer) 10. Understanding the characteristics and activities of „I" and harmony in „I" 11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail 12. Programs to ensure Sanyam and Health.		
Topic - 3	**Understanding Harmony in the Family and Society- Harmony in Human Relationship**	**9**
13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship 14. Understanding the meaning of Trust; Difference between intention and competence 15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship 16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals 17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.		

Topic - 4	Understanding Harmony in the Nature and Existence - Whole existence as Coexistence	9

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all pervasive space
21. Holistic perception of harmony at all levels of existence.

Topic - 5	Implications of the above Holistic Understanding of Harmony on Professional Ethics	9

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up

THEORY	45		TUTORIAL	0		PRACTICAL	0		TOTAL	45

BOOK REFERENCES	
1	Jeevan Vidya: E.K. Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004
3	The Story of Stuff (Book)by Annie Leonard , 2011
4	The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5	Small is Beautiful - E. F Schumacher.
6	Slow is Beautiful - Cecile Andrews
7	Economy of Permanence - J C Kumarappa
8	India Wins Freedom - Maulana Abdul Kalam Azad
9	Vivekananda - Romain Rolland (English)
10	Gandhi - Romain Rolland (English)

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=XGxNCFjDGEg
2	https://www.c-span.org/video/?292709-1/the-story-stuff

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. MECH	23ME4T2	MANUFACTURING PROCESSES II	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Demonstrate lathe, shaping and planning machines.	K2	1
CO2	Illustrate drilling, broaching and grinding machines.	K3	2
CO3	Relate the principles, operation and working of milling and gear generating machines.	K2	3
CO4	Revise the details about various techniques of non-traditional machines.	K2	4
CO5	Develop a CNC part program for the given part drawing	K3	5

PRE-REQUISITE	MANUFACTURING TECHNOLOGY I

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	3	-	2	-	2	-	-	2	2	3
CO2	3	3	2	3	3	-	2	-	2	-	-	2	2	3
CO3	3	3	2	3	3	-	2	-	2	-	-	2	2	3
CO4	3	3	2	3	3	-	2	-	2	-	-	2	2	3
CO5	3	3	2	3	3	-	2	-	2	-	-	2	2	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**SPECIAL PURPOSE LATHE, SHAPING AND PLANNING MACHINES**	**9**
Capstan and turret lathes – construction – indexing mechanism – operations – working principle of single and multi – spindle automats – shaping and planning machines – types– construction – mechanism – principle of operation – different operation – work holding devices.		
Topic - 2	**DRILLING , BROACHING AND ABRASIVE PROCESSES**	**9**
Drilling machines – specifications, types – feed mechanism, operations – drill tool nomenclature – broaching – specifications, types, tool nomenclature, broaching operations – grinding wheel – Specifications and selection. Type of grinding processes – cylindrical, surface, centreless and internal grinding.		
Topic - 3	**MILLING AND GEAR GENERATING MACHINES**	**9**
Milling – specifications – types – cutter nomenclature – types of cutters – milling processes – indexing – gear forming in milling – gear generation – gear shaping and gear hobbing – specifications – cutters – coated tools & inserts – cutting spur and helical gears– generators – gear finishing methods.		
Topic - 4	**NON-TRADITIONAL MACHINING**	**9**
Classification of machining process – process selection – ultrasonic machining – abrasive jet machining – water jet machining – laser beam machining electron beam machining – plasma arc machining.		
Topic - 5	**CNC MACHINING**	**9**
Numerical Control (NC) machine tools – CNC types, constructional details, special features, machining centres (VMC, HMC), part programming fundamentals CNC – manual part programming – micromachining – wafer machining.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	SeropeKalpakjiam and Steven R. Schmid, ‘’Manufacturing Engineering and Technology ‘’, Addiison Wesley longmam (Singapore) Pte Ltd, Delhi, 2009
2	Jain R.K. and Gupta S.C., “Production Technology “’ Khanna Publishers, New Delhi, 1999
3	Richerd R Kibbe, John E. Neely, Ronald O. Merges and Warren J. White “Machine Tool Practices”, Premtice Hail of India, 1998
4	Roy. A. Lindberg, “Process and Materials of Manufacture “, Fourth edition, PHI/Pearson Education 2006.

OTHER REFERENCES	
1	https://www.youtube.com/channel/UCYihp-A43UpzDqZzNwsEKOA
2	https://www.youtube.com/channel/UCTdGJFL8ko-jYuXEXNUnqMQ
3	https://www.youtube.com/watch?v=k301tNeEEAU
4	https://www.youtube.com/watch?v=16ZgvPNB7QQ
5	https://www.youtube.com/watch?v=gQZv6B88Z2o

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E., Mech	23ME4T3	METALLURGY AND MATERIALS ENGINEERING	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Summarize the crystallography and its terminology.	K2	1
CO2	To show the constructing the phase diagram and using of iron-iron carbide phase diagram for microstructure formation.	K2	2
CO3	Explain selecting and applying various heat treatment processes and its microstructure formation.	K2	3
CO4	Illustrate the different types of ferrous and non-ferrous alloys and their uses in engineering field.	K2	4
CO5	Illustrate the different polymer, ceramics and composites and their uses in engineering field.	K2	5

PRE-REQUISITE	Engineering Mechanics, Basic Physics and Mathematics.

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	3	3	2	3	2	-	2	3	1
CO2	3	3	3	2	-	3	2	1	-	-	3	3	3	3
CO3	3	3	3	2	-	3	3	2	2	2	3	3	3	3
CO4	3	3	3	2	-	3	3	2	-	-	3	3	3	2
CO5	3	3	3	2	3	3	3	2	-	-	3	3	3	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**CRYSTAL STRUCTURE**	**9**
Crystallography, Atomic structure and; Structure of crystalline solids; Lattices, unit cells; Crystal systems, Bravais lattices; Indexing of directions and planes, notations, co-ordination number, packing factors stacking sequence in BCC, FCC and HCP.		
Topic - 2	**CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS**	**9**
Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron – carbon equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.		
Topic - 3	**HEAT TREATMENT**	**9**
Definition – Full annealing, stress relief, recrystallisation and spheroidising – normalising, hardening and Tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram CCR – Hardenability, Jominy end quench test - Austempering, martempering – case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening.		
Topic - 4	**FERROUS AND NON-FERROUS METALS**	**9**
Effect of alloying additions on steel- α and β stabilisers– stainless and tool steels – HSLA, Maraging steels – Cast Iron - Grey, white, malleable, spheriodal – alloy cast irons, Copper and copper alloys – Brass, Bronze and Cupronickel – Aluminium and Al-Cu – precipitation strengthening treatment – Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys.		
Topic - 5	**NON-METALLIC MATERIALS**	**9**
Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers – Urea and Phenol formaldehydes)- Engineering Ceramics – Properties and applications of Al2O3, SiC, Si3N4, PSZ and SIALON –Composites-Classifications- Metal Matrix and FRP - Applications of Composites.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Avner, S.H., “Introduction to Physical Metallurgy”, McGraw Hill Book Company, 1997.
2	Williams D Callister, “Material Science and Engineering” Wiley India Pvt Ltd, Revised Indian Edition 2014.
3	Raghavan.V, “Materials Science and Engineering”, Prentice Hall of India Pvt. Ltd., 2015.
4	O.P.Khanna, “Material Science and Metallurgy”, Dhanpat Rai Publication, First Edition, 2003.

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E., Mech	23ME4LT1	MECHANICS OF MATERIALS	2	0	4	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Explain the testing of mechanical properties.	K2	1
CO2	Estimate the stress and strains in various types of bars.	K4	2
CO3	Determine the shear forces, bending moments, bending stresses and Shear stresses in beams.	K4	3
CO4	Analyze the stresses in machine members subjected to torsion.	K4	4
CO5	Estimate the stresses in thin and thick cylinders due to internal pressure.	K4	5

PRE-REQUISITE	Engineering Mechanics, Basic Physics and Mathematics.

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	1	2	-	-	3	2	-	2	3	1
CO2	3	3	3	2	-	3	2	1	-	-	3	3	3	3
CO3	3	3	3	2	-	3	3	2	2	2	3	3	3	3
CO4	3	3	3	2	-	3	3	2	-	-	3	3	3	2
CO5	3	3	3	2	3	3	3	2	-	-	3	3	3	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS**	**8**
Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test lzod and charpy, fatigue and creep failure mechanisms.		
Topic - 2	**STRESS, STRAIN AND DEFORMATION OF SOLIDS**	**6**
Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of simple and compound bars – Thermal stress.		
Topic - 3	**BENDING STRESSES AND TORSION**	**6**
Shear Force and Bending Moment Diagrams: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, uniformly varying loads and combination of these loads – Point of contra flexure.		
Topic - 4	**TORSION**	**4**
Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts– Deflection in shafts fixed at the both ends.		
Topic - 5	**THIN CYLINDERS, SPHERES AND THICK CYLINDERS**	**6**
Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin and thick cylinders – spherical shells subjected to internal pressure –Deformation in spherical shells – Lame's theorem.		

List of Experiments		
Experiment - 1	Evaluation of Engineering stress and strain curve on mild steel under tension load.	**4**
Experiment - 2	Torsion test on circular shaft –compute the shear stress and modulus of rigidity.	**4**
Experiment - 3	Estimation of notch impact energy using Charpy and Izod Impact Testing Machines.	**4**
Experiment - 4	Evaluate the hardness values of steel, copper, aluminium using Rockwell hardness testing machine.	**3**
Experiment - 5	Evaluate the hardness values of steel, copper, aluminium using Brinell hardness testing machine	**3**
Experiment - 6	Determine the stiffness and modulus of rigidity of the material of a spring by conducting	**4**

	compression test.	
Experiment - 7	Compute the bending stress and young modulus of simply supported beam.	**4**
Experiment - 8	Determine the Effect of hardening- Improvement in hardness and impact resistance of steels.	**4**

THEORY	**30**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**60**

BOOK REFERENCES	
1	Jindal U C, “Textbook on Strength of Materials”, Asian Books Pvt. Ltd., 2009.
2	Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., 2016
3	Egor. P.Popov “Engineering Mechanics of Solids” Prentice Hall of India, New Delhi, 2002
4	S S Rattan, Strength of materials, 3/e, Tata McGraw-Hill, 2016.

OTHER REFERENCES	
1	Timoshenko, Strength of Materials Part-I & II, 3/e, CBS Publishers, 2004.

BOOK REFERENCES	
1	Strength of Material Laboratory Manual:- Al-Ameen Publication

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E., Mechanical Engineering	23ME4LT2	KINEMATICS OF MACHINERY	2	0	4	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Identify the simple mechanisms based on given application.	K3	1
CO2	Determine the velocity and acceleration of simple mechanisms.	K3	2
CO3	Construct the cam profile for different types of follower motion.	K3	3
CO4	Identify the kinematic terminologies of spur gear and calculate speed ratio of various types of gear train.	K3	4
CO5	Estimate the amount of power transmitted by friction drive.	K3	5

PRE-REQUISITE	Engineering Mechanics, Basic Physics and Mathematics.

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	3	2	-	1	-	1	3	3	-	3	3	2
CO2	3	3	2	2	-	1	-	1	3	3	-	3	3	3
CO3	3	3	2	2	-	1	-	1	3	3	-	3	3	2
CO4	3	3	2	1	-	-	-	1	3	3	-	3	3	3
CO5	3	3	3	3	-	1	-	1	3	3	-	3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessment (Assignments, Quiz, Etc.,)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**FUNDAMENTALS OF MECHANISMS**	**6**
Basic Terminology - Kinematic link, Pair, joints, Structure, Machine, Degree of freedom, Grubler & Kutzbach Criterion - Inversions of four bar mechanism, Mechanical advantage - Transmission Angle, Inversion of single slider and double slider crank mechanisms.		
Topic - 2	**KINEMATIC ANALYSIS OF MECHANISMS**	**6**
Relative velocity of kinematic link, Rubbing Velocity of kinematic pair, Coriolis component of acceleration. Construction of velocity and acceleration diagram by graphical method (Relative Velocity Method) - Four bar mechanism, slider crank mechanisms.		
Topic - 3	**CAM AND FOLLOWER MECHANISMS**	**6**
Introduction - Terminology, Classifications, Types of follower motion - Uniform velocity Motion, Simple Harmonic Motion, Uniform Acceleration and Retardation Motion and Cycloidal Motion - Construction of cam profile - Knife edge follower, Roller and flat faced follower.		
Topic - 4	**GEAR AND GEAR TRAIN**	**6**
Gears - Terminology, Law of gearing, Length of path of contact, Length of arc of contact, contact ratio. Gear trains - Speed ratio, train value. Simple gear train, compound gear train, Epicyclic gear train - speed calculation by tabular method.		
Topic - 5	**FRICTION DRIVES**	**6**
Introduction-Friction clutch, types -single plate and Multi plate clutch. Flat Belt Drives Velocity, slip, creep and Centrifugal effect of belt, length of open and cross belt drives, Maximum power transmitted, and ratio of driving tension in flat belt drives.		

LIST OF EXPERIMENTS		
Experiment - 1	To plot slider displacement, velocity and acceleration against crank rotation for single slider crank mechanism.	**4**
Experiment - 2	To find coefficient of friction between belt and pulley.	**4**
Experiment - 3	To plot follower displacement vs cam rotation for various Cam Follower systems.	**4**
Experiment - 4	To generate spur gear involute tooth profile using simulated gear shaping process.	**4**
Experiment - 5	To find co-efficient of friction between belt and pulley.	**4**

Experiment - 6	Create various types of linkage mechanism in CAD and simulate for motion outputs and study the relevant effects.	**5**
Experiment - 7	To design a cam profile by using the requirement graph using on-line engineering handbook and verify the same using a 3D mechanism on CAD.	**5**

THEORY	**30**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**60**

BOOK REFERENCES	
1	S.S Rattan, Theory of Machines, Tata McGraw Hill Publishing Company Pvt. Ltd, New Delhi, 2014.
2	R.S Khurmi, ”Theory of Machines”,16th Edition, S Chand Publications, 2017.
3	Sadhu Singh, Theory of Machines, Second Edition, Pearson Education, 2012.
4	Rao J S and Dukkipati, Mechanism and Machine Theory, Wiley- Eastern Ltd., New Delhi, 2006.

BOOK REFERENCES	
1	Kinematics of Machines Laboratory Manual:- Al-Ameen Publication

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. / B.Tech., Common to all	23EN4L1	INTERPERSONAL COMMUNICATION SKILLS LABORATORY II	0	0	3	1.5

After Successful completion of the course, the students should be able to		RBT Level
CO1	Enhance academic potential with the essential English language abilities.	K3
CO2	Learn comprehend English texts with the assistance.	K2
CO3	Improve communication skills in any situation.	K4
CO4	Enhance speaking and academic conversation skills	K4
CO5	Develop ability to make interesting presentations.	K2

PRE-REQUISITE	Communicative English, Technical English &Interpersonal Communication Skills Lab - I

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO2	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO3	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO4	-	-	-	-	-	-	-	1	3	3	-	3	-	-
CO5	-	-	-	-	-	-	-	1	3	3	-	3	-	-

COURSE ASSESSMENT METHODS		
DIRECT	1	Model Examinations
	2	Laboratory Record
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT	
Experiment - 1	Role Play
Experiment - 2	Empathy
Experiment - 3	Time Management
Experiment - 4	Body Language
Experiment - 5	Mock Interview
Experiment - 6	Group Discussion
Experiment - 7	Presentation
Experiment - 8	Team Building Skills

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**45**		**TOTAL**	**45**

BOOK REFERENCES	
1	Communication Skill by Dale Carnegie,2022.
2	Communication: Core Interpersonal Skills by Gjyn O'Toolee,2020.
3	Effective Communication in the workplace by David L.Lewis,2019.
4	25 Business Skills In English, ISBN: 9788122416572, Edition/Reprint: 1st, Author(s): McCracken, Mark Publisher: NEW AGE INTERNATIONAL (P) LTD PUBLISHERS, Product ID: 563189, Country of Origin: India
5	English Communication: Theory And Practice Author(s): Manoj Kumar Garg (ISBN: 9789382209898) Publisher: SCHOLAR TECH PRESS, Edition/Reprint: 2022, Country of Origin: India

OTHER REFERENCES	
1	https://youtu.be/cC2vxmBDAG8
2	https://youtu.be/l3RSiSUwlT0
3	https://youtu.be/cyXADWE7KPo
4	https://youtu.be/aZYHsnIAQqo
5	https://youtu.be/7LP-cXkaRIo?list=PLvbKJaHKFw3ZYTp2Fc9cj2LwZtIbOd5ux
6	https://youtu.be/PcDut8zfAsk

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. MECH	23ME4L2	MANUFACTURING PROCESSES LABORATORY II	0	0	3	1.5

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		RBT Level
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Manufacturing Process Laboratory II Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	Manufacturing Processes Lab I

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	-	-	-	-	2	2	-	-	2	2
CO2	3	-	3	-	-	-	-	-	2	2	-	-	2	2
CO3	3	-	3	-	-	-	-	-	3	2	-	-	2	2
CO4	3	-	3	-	-	-	-	-	3	2	-	-	2	2
CO5	3	-	3	-	-	-	-	-	3	2	-	-	2	2
CO6	3	-	3	-	-	-	-	-	2	2	-	-	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Spur Gear cutting using milling machine
2	External keyway machining using milling machine
3	Dove tail machining using shaper machine
4	Drilling, reaming and tapping for a given dimension of hole
5	Plain Surface grinding
6	Surface grinding of a rectangular block
7	Spur, helical gear hobbing
8	Tool angle grinding with tool and Cutter Grinder
9	Cylindrical grinding

THEORY	0		TUTORIAL	0		PRACTICAL	30		TOTAL	30

BOOK REFERENCES	
1	Manufacturing Process Laboratory Manual, Al-AmeenPublications,2020

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=i9OXRU2fwb4
2	https://www.youtube.com/watch?v=cWEC1pTmDw8
3	https://www.youtube.com/watch?v=PH0fHF9laoY
4	https://www.youtube.com/watch?v=lU2p6RsDKag
5	https://www.youtube.com/watch?v=uqO-zlS2ey8