



VELAMMAL

COLLEGE OF ENGINEERING AND TECHNOLOGY

Viraganoor, Madurai – 625 009

(Autonomous)

(Accredited by NAAC with 'A' Grade and by NBA for 6 UG Programmes)

(Approved by AICTE and affiliated to Anna University, Chennai)

DEPARTMENT OF MECHANICAL ENGINEERING

REGULATIONS 2025 B.E., MECHANICAL ENGINEERING CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABUS

GOLDEN GOALS OF VCET:

1. Regularity & Punctuality.
2. Nil Failures, High Subject Average & More Centum.
3. Research & Development.
4. Focus in General Knowledge & Depth in the Subject.
5. Communication Skills (Spoken English & Learning more Languages).
6. Extracurricular Activities & Co-Curricular Activities (All-around Development).
7. Good Health and Food Habits.
8. Human Values.

VISION AND MISSION OF THE INSTITUTE

VISION OF VCET

To emerge and sustain as a center of excellence for technical and managerial education upholding social values.

MISSION OF VCET

Our aspirants are

- Imparted with comprehensive, innovative and value – based education.
- Exposed to technical, managerial and soft skill resources with emphasis on research and professionalism.
- Inculcated with the need for a disciplined, happy, married and peaceful life.

VISION AND MISSION OF MECHANICAL DEPARTMENT

VISION

To prepare our students for meeting global Mechanical Engineering challenges and contribute to the prosperity of the society.

MISSION

- To develop the ability of the students towards meeting diversified Engineering needs of industries and higher education.
- To promote students' awareness about the importance of professional ethical practices and the needs of sustainable environment.
- To create awareness about innovation which meet the requirement of industry and common people.
- To provide opportunities to the students to exhibit leadership, teamwork and effective communication skills.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- PEO1:** Graduates of the program will have a successful career as a Mechanical Engineer by imparting Mechanical Engineering concepts and practical knowledge.
- PEO 2:** Graduates of the program will pursue higher education and research in the field of mechanical engineering.
- PEO 3:** Graduates of the program will exhibit Scientific and Engineering expertise and perform as a Professional Engineer

PROGRAMME OUTCOMES (POs)

- PO1: Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- PO3: Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5: Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7: Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

PROGRAMME SPECIFIC OUTCOMES (PSOS)

PSO 1: Ability to apply the acquired Mechanical Engineering knowledge for the advancement of society and self

PSO 2: Ability to implement the learned principles of Mechanical Engineering to analyze, evaluate and create more advanced mechanical systems or processes.

KNOWLEDGE AND ATTITUDE PROFILE (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.



VELAMMAL
COLLEGE OF ENGINEERING AND TECHNOLOGY
Viraganoor, Madurai – 625 009
(Autonomous)



REGULATIONS 2025
CHOICE BASED CREDIT SYSTEM

B.E., MECHANICAL ENGINEERING
BATCH 2025 – 2029
CURRICULUM FOR SEMESTERS I TO IV
SEMESTER I

S. No.	COURSE CODE	COURSE TITLE	Category	L	T	P	C
1	IP25C01	Induction Programme (Common to all B.E./B.Tech., Programmes)	MC	0	0	0	0
THEORY COURSES							
2	EN25C01	Technical English (Common to all B.E./B.Tech. Programmes)	HSMC	3	0	0	3
3	MA25102	Mathematical Analysis for Engineers	BSC	3	1	0	4
4	PH25101	Physics for Mechanical Engineering	BSC	3	0	0	3
5	CH25C01	Engineering Chemistry (Common to all B.E./B.Tech. Programmes)	BSC	3	0	0	3
6	EE25101	Basic Electrical and Electronics Circuits	ESC	3	0	0	3
7	TA25C01	Heritage of Tamils / தமிழ் மர (Common to all B.E./B.Tech. Programmes)	HSMC	1	0	0	1
THEORY WITH PRACTICAL COURSE							
8	CS25C05	Problem Solving and Python Programming (Common to ECE and MECH)	ESC	3	0	2	4
PRACTICAL COURSES							
9	EE25102	Basic Electrical and Electronics Circuits Laboratory	ESC	0	0	4	2
10	EM25C01	Engineering Practices Laboratory (Common to CIVIL, CSE, EEE, IT, MECH, CSE(CS) and VLSI)	ESC	0	0	4	2
Total Credits				19	1	10	25

SEMESTER II

S. No.	COURSE CODE	COURSE TITLE	Category	L	T	P	C
THEORY COURSES							
1	MA25204	Advanced Mathematical Techniques	BSC	3	1	0	4
2	CH25C02	Environmental Science (Common to all B.E./B.Tech. Programmes)	BSC	2	0	0	2
3	ME25C01	Engineering Graphics and Design (Common to CSE, CSE(CS), EE(VLSI), IT, AIDS, EEE and MECH)	ESC	2	0	2	3
4	ME25201	Engineering Mechanics	ESC	3	0	0	3
5	ME25202	Manufacturing Technology I	PCC	3	0	0	3
6	ME25203	Engineering Metallurgy	ESC	3	0	0	3
7	TA25C02	Tamils and Technology / தமிழ் தொழில்நுட்ப (Common to all B.E./B. Tech. Programmes)	HSMC	1	0	0	1
THEORY WITH PRACTICAL COURSE							
8	EN25C03	Advanced Communication and Interpersonal Skills Development (Common to ECE and MECH)	HSMC	1	0	2	2
PRACTICAL COURSES							
9	ME25204	Manufacturing Technology I Laboratory	PCC	0	0	4	2
10	PC25C01	Physics and Chemistry Laboratory (Common to all B.E./B. Tech. Programmes)	BSC	0	0	4	2
Total Credits				18	1	12	25

SEMESTER III

S. No.	COURSE CODE	COURSE TITLE	Category	L	T	P	C,
THEORY COURSES							
1	MA25C05	Probability and Statistical Techniques	BSC	3	1	0	4
2	ME25301	Engineering Thermodynamics	ESC	3	0	0	3
3	ME25302	Fluid Mechanics and Machinery	PCC	3	0	0	3
4	ME25303	Strength of Materials	PCC	3	0	0	3
5	ME25304	Manufacturing Technology II	PCC	3	0	0	3
PRACTICAL COURSES							
6	ME25305	Solid and Fluid Mechanics laboratory	PCC	0	0	3	1.5
7	ME25306	Manufacturing Technology II Laboratory	PCC	0	0	3	1.5
8	EN25C04	Communicative English - I	HSMC	0	0	2	1
Total Credits				15	1	8	20

SEMESTER IV

S. No.	COURSE CODE	COURSE TITLE	Category	L	T	P	C
THEORY COURSES							
1	MA25C06	Numerical Methods	BSC	3	1	0	4
2	ME25401	Theory of Machines	PCC	3	0	0	3
3	ME25402	Metrology and Measurements	PCC	3	0	0	3
4	ME25403	Industrial Engineering and Management	PCC	3	0	0	3
5	AD25P43	Artificial Intelligence and Machine Learning	ESC	3	0	0	3
6	ME25404	Standards in Mechanical Engineering	EEC	1	0	0	1
THEORY WITH PRACTICAL COURSE							
7	ME25405	Thermal Engineering I	PCC	3	0	2	4
PRACTICAL COURSES							
8	ME25406	Theory of Machines Laboratory	PCC	0	0	3	1.5
9	ME25407	Metrology and Measurements Laboratory	PCC	0	0	3	1.5
10	EN25C05	Communicative English - II	HSMC	0	0	2	1
Total Credits				19	1	10	25

Course Component and Credits Matrix

CATEGORY	I	II	III	IV	V	VI	VII	VIII	TOTAL CREDITS
BSC	10	8	4	4	-	-	-	-	26
ESC	11	9	3	3	-	-	-	-	26
HSMC	4	3	1	1	-	-	-	-	9
PCC	-	5	12	16	-	-	-	-	33
PEC	-	-	-	-	-	-	-	-	-
OEC	-	-	-	-	-	-	-	-	-
EEC	-	-	-	1	-	-	-	-	1
MCC	√	-	-	-	-	-	-	-	-
TOTAL	25	25	20	25	-	-	-	-	95

S. No.	Topic
1	Humanities and Social Sciences including Management Courses (HSMC)
2	Basic Sciences Courses (BSC)
3	Engineering Sciences including workshop, drawing, basics of electrical/mechanical/computer etc. Courses (ESC)
4	Professional Core Courses (PCC)
5	Professional Elective : Courses relevant to chosen specialization/ branch Courses (PEC)
6	Open Electives : Courses from other technical and/or emerging courses (OEC)
7	Project work, Seminar and Internship in Industry –Employability Enhancement Courses (EEC)
8	Mandatory Course (MCC)

SYLLABUS FOR SEMESTERS I TO IV SEMESTER I

IP25C01	INDUCTION PROGRAMME (Common to all B.E./B.Tech. Programmes)	L	T	P	C
		0	0	0	0
This is a mandatory 2-week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over. The induction programme has been introduced by AICTE with the following objective: “Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfil his/her responsibility as an engineer, as a citizen and as a human being. Besides the above, several meta-skills and underlying values are needed.” “One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. “ The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program. (i) Physical Activity This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc. (ii) Creative Arts Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and enhance creativity, which would, hopefully, grow into engineering design later. (i) Universal Human Values This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. Methodology of teaching this content is extremely important. It must not be through do's and don'ts but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme					

(i) Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(ii) Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

(iii) Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(iv) Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

(v) Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(i) Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and **therefore there shall be no tests / assessments** during this programme.

REFERENCE:

Guide to Induction program from AICTE

**SYLLABUS FOR SEMESTERS I TO IV
SEMESTER I**

EN25C01	TECHNICAL ENGLISH (Common to all B.E. B.TECH. Programmes)	L	T	P	C
		3	0	0	3
COURSE OBJECTIVE: The course enables the students to: • Recognize and interpret listening cues for enhancing comprehending skills in spoken interactions • Develop confidence in expressing ideas clearly in speaking situations. • Understand and apply vocabulary effectively while summarizing written content. • Build the ability to plan and structure coherent written compositions • Encourage articulation to support personal viewpoints in diverse formats.					
UNIT I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION				9
Listening – Pronunciation, Stress, Syllable, Listening for general information and specific details - Listening and filling a form; Speaking - Self Introduction, asking for information to fill details in a form; Reading - Comprehension Passages - Skimming Scanning and intensive & extensive reading; Writing - Writing emails / letters (formal & informal - requisition, Complaint); Grammar - Parts of Speech (Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections), Kinds of Sentences; Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).					
UNIT II	NARRATION AND SUMMATION				9
Listening - Listening short talks/ podcast/ stories / event narration, documentaries and say true or false Speaking - Narrating personal experiences/events, summarizing of documentaries/podcasts; Reading - Reading biographies, travelogues & technical blogs; Writing -- Paragraph writing, Short Report on an event (Industrial visits etc.); Grammar - Question types: Framing “WH” Questions & Yes or No Questions and Tenses; Vocabulary - Word forms (prefixes & suffixes), Antonyms, Phrasal verbs.					
UNIT III	DESCRIPTION OF A PROCESS / PRODUCT				9
Listening - Listening to advertisements about products and process descriptions and summarize them: Speaking - Giving instruction to use the product; Presenting a product; Reading - Reading advertisements, gadget reviews; user manuals; Writing - Writing definitions; instructions; and Product /Process description; Grammar - Tenses, Subject - Verb Agreement; Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words)					

UNIT IV	CLASSIFICATION AND RECOMMENDATIONS	9
Listening - Listening to TED Talks; differentiate instructions and recommendations; Speaking - Short Talk; Mini presentations and making recommendations; Reading - Newspaper articles - interviews, Non Verbal Communication (infographics, tables, pie charts etc) to understand and classify information Writing - Writing recommendations; Transferring information from non - verbal (chart, graph etc, to verbal mode) Grammar - Articles, Degrees of comparison; Vocabulary - Collocations; Fixed / Semi fixed expressions.		
UNIT V	EXPRESSIONS	9
Listening - Listening to debates/ discussions; different viewpoints on an issue; and panel discussions; Speaking - Group discussions, Debates, and Expressing opinions through Simulations & Role-play; Reading - Reading editorials; and Opinion Blogs; Writing - Essay Writing (Descriptive or narrative); Grammar -Phrases & Clauses, Simple, Compound & Complex Sentences; Vocabulary - Connotations- Content vs. Function words.		
TOTAL:45 PERIODS		
COURSE OUTCOMES: On successful completion of the course, the students will be able to: CO1: Identify listening cues and respond appropriately in real-time communication. CO2: Deliver spoken messages clearly and appropriately in varied contexts. CO3: Use new vocabulary in context and summarize main ideas from texts. CO4: Create and organize clear written compositions. CO5: Express and justify opinions through oral, written, and digital formats		
TEXT BOOK: - Shoba. K N.& Lourdes Joavani Rayen. "Communication Skills", New Delhi, Cambridge University Press, 2021 - Board of Editors, Fluency in English-A Course book for Undergraduate Engineers and Technologists. Orient Blackswan Pvt Ltd, Hyderabad: 2018 - Jawahar, Jewelcy & Rathna.P. Communicative English Workbook. VRB Publishers Pvt Ltd. Chennai. 2018.		
REFERENCE BOOKS: - Department of English. Mindscapes English for Technologists and Engineers. Orient Black swan Ltd, Hyderabad: 2012 - Verma, Shalini. Technical Communication for Engineers. Vikas Publishing House Pvt Ltd. New Delhi. 2015 - Rizvi, Ashraf.M. Effective Technical Communication. MCGraw Hill Education Pvt Ltd. New Delhi. 2016. - Leech Geoffrey and Svartvik Jan. A Communicative Grammar of English. Third Edition, Routledge, New York. 2013		
WEB SOURCES: www.esl.org elt.oup.com/learning resources a4esl.org		

CO-PO-PSO MAPPING													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	2	1	3	-	2	-	-
CO2	-	-	-	-	-	-	2	2	3	-	2	1	-
CO3	-	-	-	-	-	-	-	-	3	-	2	1	-
CO4	-	-	-	-	1	-	2	1	3	-	2	1	-
CO5	-	-	-	-	1	1	2	2	3	-	2	1	-
Course Contribution	-	-	-	-	1	1	2	1.5	3	-	2	1	-

MA25102	MATHEMATICAL ANALYSIS FOR ENGINEERS (B.E. Mechanical Engineering)	L	T	P	C
		3	1	0	4
COURSE OBJECTIVES: - To make use of the concept of differentiation in functions of two variables. - To establish the techniques used in evaluating multiple integrals. - To obtain sound knowledge of techniques in solving ordinary differential equations that model engineering problems - To provide students with the ideas of solving homogeneous linear second order ordinary differential equations with constant coefficients. - To explain the concepts of vector calculus, needed for problem solving in Mechanical Engineering discipline.					
UNIT I	DIFFERENTIAL CALCULUS				12
Functions of two variables, Partial derivatives, chain rule, extreme values and saddle points, Lagrange multipliers, Taylor's formula for two variables					
UNIT II	INTEGRAL CALCULUS				12
Double and triple integrals, double integrals over general regions, area and volume, change of order of integration, integrals in polar form and spherical coordinates.					
UNIT III	FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS				12
Basic concepts, separable differential equations, exact differential equations, integrating factor, linear differential equations. Applications: Newton's law of cooling, decay and growth problems.					
UNIT IV	SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS				12
Homogeneous linear equations of second order, homogeneous linear ODEs with constant coefficients, Euler-Cauchy equations, solution by variation of parameters. Applications: Free oscillations mass spring systems, electric circuits.					
UNIT V	VECTOR CALCULUS				12
Gradient and directional derivative of a scalar field, divergence and curl of a vector field (Basic theorems only). Integration in vector field: Line integrals, path independence of line integrals, Green's theorem in the plane, divergence theorem of Gauss and Stokes theorem. (Theorems without proof).					
TOTAL: 60 PERIODS					
COURSE OUTCOMES: At the end of the course, learners will be able to CO1: Apply the concept of differentiation on several variable functions. CO2: Solve practical problems of areas, volumes using integration CO3: Apply the suitable method to solve the given differential equation of first order. CO4: Solve homogeneous linear differential equations of second order using appropriate methods. CO5: Apply the concept of vector calculus in Engineering problems					
TEXT BOOKS: - Grewal.B.S. "Higher Engineering Mathematics", 44 th Edition, Khanna Publishers, New Delhi, 2018 - Bali N.P and Manish Goyal "A Text Book of Engineering Mathematics", 8th edition, Lakshmi Publications Pvt., Ltd., New Delhi, 2011 - Kreyszig.E, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons, New Delhi, 2016					

REFERENCES:

1. James Stewart, Calculus: Early Transcendental, 8th Edition, Cengage Learning, 8th edition, New Delhi, 2015
2. Ramana. B.V, Higher Engineering Mathematics, Sixth Edition, McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", 5th Edition, Narosa Publications, New Delhi, 2016.

CO-PO-PSO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	-	1	1	1	-	1	1	1
CO2	3	2	1	-	-	-	1	1	1	-	1	1	1
CO3	3	2	1	-	-	-	1	1	1	-	1	1	1
CO4	3	2	1	-	-	-	1	1	1	-	1	1	1
CO5	3	2	1	-	-	-	1	1	1	-	1	1	1
Course Contribution	3	2	1	-	-	-	1	1	1	-	1	1	1

PH25101	PHYSICS FOR MECHANICAL ENGINEERING	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: • To understand the fundamental principles of mechanics. • To gain knowledge on the mechanical effect of force. • To demonstrate the laws of motion and kinematics of motion. • To outline the importance of quantum mechanics. • To explain the working of laser & its application.					
UNIT I	FUNDAMENTAL MECHANICS				9
Introduction – statics and dynamics – the centre of mass of a system of particles – kinetic energy of a system of particles – Theorems of the moment of inertia – moment of inertia of diatomic molecule – rotational energy levels.					
UNIT II	EFFECT OF FORCE				9
Introduction to Newtonian mechanics – Newton’s law - Vector representation of Force - Parallelogram law for Addition of Forces – Lami’s theorem - Triangular law of forces – Dot product & cross Product - classification of the system of forces – Problems on forces using vector representations.					
UNIT III	STATICS OF PARTICLES				9
Forces on a particle - resolution of a force- Resultant of several concurrent forces: Equilibrium of a particle - forces in space - equilibrium of a particle in space.					
UNIT IV	QUANTUM MECHANICS				9
Black body radiation (Qualitative) – Planck’s hypothesis - Matter waves – de Broglie hypothesis - Electron microscope – Uncertainty Principle – The Schrodinger Wave equation (time-independent and time-dependent) – Physical significance of wave function - Degenerate energy states - Barrier penetration and quantum tunnelling - Tunnelling microscope.					
UNIT V	LASERS				9
Laser – characteristics – spontaneous and stimulated emission - population – inversion - Metastable states - CO ₂ laser, Semiconductor laser - Industrial and medical applications - Optical Fibers – Total internal reflection – Numerical aperture and acceptance angle – Fiber optic communication.					
TOTAL: 45 PERIODS					
COURSE OUTCOMES: At the end of the course, learners will be able to CO1: Understand the fundamental principles behind the mechanics CO2: Infer the basic mechanical principle to understand the forces on particles CO3: Solve basic problems on particles using the concept of static equilibrium CO4: Demonstrate the importance of quantum physics CO5: Know the basics of optics, lasers and its applications.					
TEXT BOOKS: 1. R. K. Gaur, S. L. Gupta, “Engineering Physics”, 8th Edition, Dhanpat Rai Publication. 2. Beer, F.P and Johnston “Vector Mechanics for Engineers (In SI Units): Statics and Dynamics”, 8th Edition, Tata McGraw-Hill Publishing company, New Delhi 2004 3. Meriam J.L and Kraig L.G, ‘Engineering Mechanics-Statics and Dynamics’, 9th Edition,					

John Wiley & sons, 2021.

4. Vela Murali, "Engineering Mechanics", 3rd Edition, Oxford University Press, 2017.

REFERENCES:

1. Hibbler, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education, 2010.
2. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education, 2006.
3. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

CO-PO-PSO Mapping													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	-	-	-	1	1	-	1	-	1	1	1
CO2	2	1	-	-	-	1	1	-	1	-	1	1	1
CO3	2	1	-	-	-	1	1		1	-	1	1	1
CO4	2	1	-	-	-	1	1		1	-	-	-	-
CO5	2	1	-	-	-	1	1		1	-	-	-	-
Course Contribution	2	1	-	-	-	1	1		1		1	1	1

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

CH25C01	ENGINEERING CHEMISTRY (Common to all B.E / B.Tech. Programmes)	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: • To inculcate the sound understanding of water quality parameters and water treatment techniques. • To acquire basic principles and preparatory methods of nanomaterials. • To describe the characteristics, applications of polymeric materials and composites. • To illustrate the operating principles in electrochemistry and working processes and applications of storage devices. • To use appropriate synthetic fuels and fuel additives for better combustion characteristics.					
UNIT I	WATER AND ITS TREATMENT				9
Water: Sources and impurities, Water quality parameters: Definition and significance of- colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Boiler troubles: Scale and sludge, boiler corrosion, caustic embrittlement, priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and external treatment – Ion exchange demineralization and zeolite process. Desalination of brackish water: Reverse Osmosis (RO) method.					
UNIT II	NANOCHEMISTRY				9
Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic). Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, and electrochemical deposition. Applications of nanomaterials. Sensors: Basic components, types and applications. Chemiresistive sensors - environmental monitoring – CO ₂ sensor.					
UNIT III	POLYMERS AND COMPOSITES				9
Polymers: Classification, functionality of monomers, Types of polymerizations, free radical mechanism, degree of polymerization, weight and number average molecular weights (definition only). Engineering Plastics - Properties and types. Composites: Definition & need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and reinforcement (fiber, particulates, flakes and whiskers). Properties and applications: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites.					
UNIT IV	ELECTROCHEMICAL POWER SOURCES				9
Electrochemical cells – EMF, electrode potential, dependence of emf on electrolyte concentration – Nernst equation. Electrochemical series and its applications. Batteries: Types of batteries, primary battery - dry cell, secondary battery - lead acid battery, Zn- Carbon, and lithium-ion-battery; Fuel cells: H ₂ -O ₂ fuel cell, Super capacitors: Storage principle, types and examples. Electric vehicles - working principles					

UNIT V	FUELS AND COMBUSTION	9
Fuels: Introduction, classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, and manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction, calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO₂ emission and carbon foot print.		
TOTAL: 45 PERIODS		
OUTCOMES: At the end of the course, learners will be able to: CO1: Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water. CO2: Describe the basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications. CO3: Apply the knowledge of polymers and composites for material selection requirements. CO4: Illustrate the basics of electrochemistry and apply them for suitable applications in energy sectors. CO5: Utilize different fuels and predict their performance and combustion characteristics.		
TEXT BOOKS:		
1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018. 2. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008. 3. S.S.Dara, "A text book of Engg Chemistry", 12th Edition, S.Chand Publishing, 2018.		
REFERENCES:		
1. B. S. Murty, P. Shankar, Baldev Raj, B.B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-II M Series in Metallurgy and Materials Science, 2018. 2. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", 2nd Edition, Cambridge University Press, Delhi, 2019. 3. V. R. Gowarikar, N.V. Viswanathan and Jayadev Sreedhar, "Polymer Science", New Age International (P) Ltd., 2015.		

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	1	-	-	-	-	-	-	-	-	1	1	-
CO2	-	1	-	-	-	-	-	-	-	-	1	1	-
CO3	2	1	-	-	-	-	-	-	-	-	1	1	-
CO4	2	1	-	-	-	-	-	-	-	-	1	1	-
CO5	2	1	-	-	-	-	-	-	-	-	1	1	-
Course Contribution	2	1	-	-	-	-	-	-	-	-	1	1	-

TA25C01	HERITAGE OF TAMILS / தமிழர் மரபு (Common to all B.E./B.Tech. Programmes)		L	T	P	C
			1	0	0	1
UNIT I	LANGUAGE AND LITERATURE					3
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyaar and Bharathidhasan.						
UNIT II	HERITAGE -ROCK ART PAINTINGS TO MODERN ART – SCULPTURE					3
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple carmaking - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.						
UNIT III	FOLK AND MARTIAL ARTS					3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.						
UNIT IV	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.						
UNIT V	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 & Manuscripts – Print History of Tamil Books.						
TOTAL: 15 PERIODS						
TEXT-CUM-REFERENCE BOOKS						
1. தமிழகவரலாறு மக்களும் உபண்பாடும்க்க.கக.பி.என். (வலைவாய்வு : தமிழ்நாடு) பாடலு மறற்றும் உகலவ்வாயிய பணிகள் கழகமம்) 2. கண்ணிதந்தமிழம்மாளன் இல. தரமம். (விகிட பரிசுரமம்). 3. கழக எவளக நதிகளரயி சங்கமால நகர நாகரிக (வதாலல்லிய துறை வலைவாய்வு) 4. வபாராள ஆற்றைள்ள நாகரிகமம். (வதாலல்லிய துறை வலைவாய்வு) 5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print) 6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.) 7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).						

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) –

CS25C05	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to ECE and MECH)	L	T	P	C
		3	0	2	4
COURSE OBJECTIVES: - To solve problems using Python conditionals and loops. - To make use of Python data structures - lists, tuples, and dictionaries to represent complex data. - To illustrate Python functions and use function calls to solve problems. - To explain input/output with files in Python. - To solve the complex problems using OOP concepts in Python..					
UNIT I	BASICS OF PYTHON				9
Python - Variables – Executing Python from the Command Line - Editing Python Files - Python Reserved Words - Comments – Simple Input and Output—Indenting. Data types: Numeric, Boolean Data Types. Conditional Statements: if Statements – Loops: while Loop – break and continue – for Loop -String data type –methods. Lab Component: Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).					
UNIT II	COLLECTIONS				9
Lists, Tuples - Sets – frozen sets -Mapping types: Dictionaries - Standard Modules: math- sys- time – dir Function, Packages: Importing from package. Lab Component: Implementing real-time/technical applications using Lists, Tuples. (Components of a car/ Materials required for construction of a building –operations of list & tuples)					
UNIT III	FUNCTIONS				9
Definition – Passing parameters to a Function - recursive functions –Scope – Passing Functions to a Function – Lambda functions- Modules: Creating modules. Introduction to numpy – matplotlib. Lab Component: Implementing programs using Functions. (Factorial, largest number in a list)					
UNIT IV	FILE ORGANIZATION				9
Access Modes : Writing data to a File –Reading data From a file – seek –tell- Error Handling: Run Time Errors – Exception Model - Exception Hierarchy - Handling Multiple Exceptions – raise exceptions. Lab Component: Implementing real-time/technical applications using File handling. (copy from one file to another, word count)					
UNIT V	OBJECT ORIENTED FEATURES				9
Principles of Object Orientation – Creating Classes, objects – Instance Methods –Special Methods – Class Variables – Inheritance – Polymorphism – Type Identification. Lab Component: Implementing Python program to create a class representing a bank. Include methods for managing customer accounts and transactions.					
TOTAL: 60 PERIODS					
COURSE OUTCOMES: At the end of this course, learners will be able to CO1: Solve simple programs using conditionals, loops and functions for solving problems. CO2: Construct compound data using Python lists, tuples, dictionaries etc. CO3: Develop and execute programs using functions. CO4: Build Python programs to read and write data in files. CO5: Construct Complex programs using OOP Concepts					

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Mark Summerfield. "Programming in Python 3: A Complete introduction to the Python Language", Addison-Wesley Professional, 2009.
3. Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford university Press 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", 1st Edition, Pearson Education, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
4. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", 3rd Edition, MIT Press, 2021

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	1	-	-	1	2	2	2	-	2
CO2	3	2	1	1	1	-	-	1	2	2	2	-	2
CO3	3	2	1	1	1	-	-	1	2	2	2	-	2
CO4	3	2	1	1	1	-	-	1	2	2	2	-	2
CO5	3	2	1	1	1	-	-	1	2	2	2	-	2
Course Contribution	3	2	1	1	1	-	-	1	2	2	2	-	2

SEMESTER II

MA25204	ADVANCED MATHEMATICAL TECHNIQUES (For B.E., Mechanical Engineering)	L	T	P	C
		3	1	0	4
COURSE OBJECTIVES: - To establish the derivative of complex functions and its significance in complex analysis. - To equip students with necessary knowledge and skills to enable them handle mathematical operations, analyses and problems involving in complex integration. - To use various methods of Laplace Transforms for solving Engineering problems - To introduce the concepts of Fourier Analysis which is essential in many Engineering applications - To explain the methods of solving different partial differential equations that model wave and heat equations with boundary conditions.					
UNIT I	ANALYTIC FUNCTIONS	12			
Introduction of Complex function, analytic function, Cauchy-Riemann equations, Properties of analytic function, Construction of an analytic function, linear fractional transformations.					
UNIT II	COMPLEX INTEGRATION	12			
Cauchy's integral theorem, Cauchy's integral formula, Laurent series, singularities and zeros, Cauchy's residue theorem.					
UNIT III	LAPLACE TRANSFORMS	12			
Laplace transform-definition, linearity, first shifting theorem, unit step function, second shifting theorem, periodic functions, inverse Laplace transform, solving ODEs with constant coefficients and initial value problems.					
UNIT IV	FOURIER SERIES	12			
Dirichlet's conditions, General Fourier series, even and odd functions, half range expansions, Harmonic Analysis					
UNIT V	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	12			
Basic concepts of PDEs, wave equation, heat equation, steady state two- dimensional heat problems - solution by Fourier series					
TOTAL: 60 PERIODS					
OUTCOMES: At the end of this course, learners will be able to CO1: Demonstrate the ability to identify and work with analytic functions, applying key properties in problem-solving. CO2: Apply complex integration techniques to evaluate some of the real integrals. CO3: Compute Laplace transform and inverse Laplace transform of different functions. CO4: Expand the Fourier series to represent the given periodic function. CO5: Solve boundary value problems using the concept of Partial Differential equation.					
TEXT BOOKS: - Grewal.B.S. "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2018. - Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, Delhi, 2018. - Peter V.O Neil, "Advanced Engineering Mathematics", Cengage, New Delhi, 2018.					

REFERENCES:

1. Dennis G. Z and Patrick D. S, "A first course in Complex Analysis with applications", Jones and Bartlett Pvt. Ltd, New Delhi, 2015.
2. Wylie C. R and Barret L. C, "Advanced Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2019.
3. Dennis G. Z, "Advanced Engineering Mathematics", Jones and Bartlett Pvt Ltd, New Delhi, 2017.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	-	1	1	1	-	1	1	1
CO2	3	2	1	-	-	-	1	1	1	-	1	1	1
CO3	3	2	1	-	-	-	1	1	1	-	1	1	1
CO4	3	2	1	-	-	-	1	1	1	-	1	1	1
CO5	3	2	1	-	-	-	1	1	1	-	1	1	1
Course Contribution	3	2	1	-	-	-	1	1	1	-	1	1	1

CH25C02	ENVIRONMENTAL SCIENCE (Common to all B.E. / B.Tech. Programmes)	L	T	P	C
		2	0	0	2
COURSE OBJECTIVES:					
• To appreciate the structure and function of an ecosystem and biodiversity • To realize the environmental impacts of natural resources. • To recognize causes, effects and control measures of different types of pollution. • To comprehend the importance of disaster management, environmental ethics and values. • To appreciate the relevance of the environment by evaluating its impact on the surrounding environment and its functions.					
UNIT-I	ENVIRONMENT, ECOSYSTEM AND BIODIVERSITY				6
Definition, scope and importance of environment – need for public awareness - ecosystem- general structure and function of an ecosystem- ecological succession-biodiversity-types-values of biodiversity- endangered and endemic species-red data book- hot spots of biodiversity-criteria- hot spots in India-threats to biodiversity(man-animal conflicts, habitat loss, poaching) - case studies - conservation of biodiversity- in-situ and ex-situ conservation – case studies for conservation of biodiversity in Mudumalai.					
UNIT-II	NATURAL RESOURCES AND ITS ENVIRONMENTAL IMPACTS				6
Natural resources-forest resource-ecological functions – causes, effects and control measures of deforestation-water resource-sources-conflict over water-dams benefits and problems-food resource-overgrazing- impacts of over grazing- impacts of modern agriculture- Energy Resources: Growing energy needs, renewable and non-renewable energy sources, and use of alternative energy sources, - windmills and solar panels case studies.					
UNIT III	ENVIRONMENTAL POLLUTION AND CONTROL				6
Air pollution-causes, effects and control methods - water pollution- causes, effects-waste water treatment-soil pollution-causes, and effects-solid waste management - causes, effects and management - E- waste: composition and generation of E-waste pollutants, hazardous properties, Effects of pollutant on human health and environment, domestic E- waste disposal, Basic principles of E waste management, Component of E-waste management. Pollution control acts - air, water-wildlife - E- waste management rules - case studies – role of an individual in control of pollution.					
UNIT IV	DISASTER MANAGEMENT AND ENVIRONMENTAL ETHICS				6
Disaster management-causes, effects and management of- flood, landslide, earthquake and tsunami-case studies- environmental ethics - value education-traditional value systems in India-water conservation-rain water harvesting-watershed management.					
UNIT V	SUSTAINABLE MANAGEMENT AND PRACTICES				6
Social issues - climate change - causes, effects and control measures - global warming - causes, effects and control measures - Acid rain - causes, effects and control measures - ozone layer depletion - causes, effects and control measures - nuclear accident and holocausts – Sustainability - concept, needs and challenges - economic, social and aspects of sustainability - from unsustainability to sustainability - EIA - Sustainable development – Goals, target - green buildings - ISO 14000 series					
TOTAL: 30 PERIODS					

OUTCOMES:

At the end of the course, learners will be able to:

- CO1: Explain the concept of an ecosystem and biodiversity.
 CO2: Demonstrate the environmental impressions of natural resources.
 CO3: Illustrate the appropriate management approach for pollution control.
 CO4: Relate the proper way for disaster management
 CO5: Apply social issues and adopt sustainable practices

TEXT BOOKS:

1. Kaushik, and C. P. Kaushik. "Environmental Science and Engineering", 6th Edition, New Age International, 2018.
2. S. K. Garg and K. Garg, Ecological and Environmental studies, Khanna Publishers, 2015.
3. Wright and Nebel, Environmental science towards a sustainable future, 12th Edition, Prentice Hall of India Ltd, 2015.

REFERENCES:

1. Erach Bharucha, "Text book of Environmental studies for Undergraduate courses", 3rd Edition, UGC, 2021.
2. P. Ravi, and Agrahari, Environmental ecology, Biodiversity, climatic change & Disaster management, 1st Edition, McGraw Hill, 2020
3. Benney Joseph, "Environmental Science and Engineering", 1st Edition, McGraw Hill Education (India) Pvt Ltd, New Delhi, 2017

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	-	-	-	2	1	-	-	1	1	-	-
CO2	1	1	-	-	-	2	1	-	-	-	1	-	-
CO3	-	1	-	-	-	2	-	-	-	-	-	1	-
CO4	-	1	1	-	-	2	2	-	-	1	1	1	-
CO5	-	1	1	-	-	2	2	-	-	1	1	-	-
Course Contribution	1	1	1	-	-	2	2	-	-	1	1	1	-

ME25C01	ENGINEERING GRAPHICS AND DESIGN (Common to AIDS, CSE, CSE(CS), EEE, EE(VLSI), IT, and MECH)	L	T	P	C
		2	0	2	3
COURSE OBJECTIVES: • Apply fundamental concepts of engineering graphics and orthographic projections using basic 2D CAD software. • Interpret and sketch the projection of simple solids and understand basic 3D CAD modelling techniques. • Create sectional views and develop true shapes of solids through manual sketching and CAD tools. • Apply isometric projection techniques and use basic AR/VR tools to visualize engineering objects. • Sketch orthographic projections and understand the fundamentals of design for 3D printing and additive manufacturing.					
UNIT I	BASICS OF ENGINEERING GRAPHICS AND VISUALIZATION	9			
Introduction to Engineering Graphics: Importance, applications, and tools. Use of Drafting Instruments: Lettering, dimensioning, line types, and scales. Orthographic Projections: Principles, projection of points, straight lines <i>Introduction to CAD Software: Basics of 2D drawing and layout views. Demo on 2D CAD practice – Demo.</i> <i>Introduction to UX/UI in Engineering Design: Overview of the importance of user interface (UI) and user experience (UX) in engineering applications (e.g., dashboards, software interfaces) – Demo</i>					
UNIT II	PROJECTION OF SOLIDS	9			
Projection of Solids: Prisms, pyramids, cylinders, cones, with the axis inclined to principal planes. <i>Basic CAD Modelling of Solids: Introduction to simple 3D modelling in CAD tools. Demo on 3D CAD practice – Demo.</i>					
UNIT III	PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES	9			
Sectioning of Solids: Sectional views of simple solids with cutting planes inclined to horizontal plane. True Shape of Sectional Views: Obtaining true shape and development of sections.					
UNIT IV	ISOMETRIC PROJECTIONS	9			
Isometric Projection: Principles, isometric scale, and isometric views of simple solids like prisms, pyramids, cones and cylinders. <i>Introduction to Visualization Tools: Use of simple AR/VR applications for viewing isometric and perspective projections. Demo on AR/VR – Demo</i>					
UNIT V	ORTHOGRAPHIC PROJECTIONS AND DESIGN APPLICATIONS	9			
Freehand Sketching: Sketching orthographic views of simple isometric solids. <i>Design for 3D Printing: Basics of modelling for additive manufacturing. Demo on 3D Printing – Demo</i>					
TOTAL: 45 PERIODS					

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

OUTCOMES:

At the end of the course, learners will be able to:

CO1: Construct orthographic projections of points, lines, and simple objects using drafting tools and 2D CAD software.

CO2: Sketch projections of prisms, pyramids, cylinders, and cones and create basic 3D models using CAD software.

CO3: Generate sectional views and develop true shapes of simple solids using manual and CAD tools.

CO4: Create isometric projections and use AR/VR tools for enhanced spatial visualization of engineering objects.

CO5: Apply freehand sketching to produce orthographic projections and understand basic 3D printing design considerations.

TEXT BOOKS:

1. Natarajan K.V., "A text book of Engineering Graphics", 31st Edition, Dhanalakshmi Publishers, Chennai, 2018.

2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", 15th Edition, New Age International (P) Limited, 2018.

3. Bhatt N.D. and Panchal V.M., "Engineering Drawing", 53rd Edition, Charotar Publishing House, 2014.

REFERENCES:

1. S.S. Sashikiran., "The 7S Design Framework", 1st Edition, Notion Press, 2024.

2. Rajiv Chopra, "Virtual and Augmented Reality" 1st Edition, Khanna Publishing House, 2021.

3. Sabrie Soloman, "3D Printing & Design", 1st Edition, Khanna Publishing House, 2020.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	1	1	1	1	3	-	1	3	2
CO2	3	2	2	1	1	1	1	1	3	1	1	3	2
CO3	3	2	2	1	1	1	1	1	3	1	1	3	2
CO4	3	2	2	1	1	1	1	1	3	1	1	3	2
CO5	3	2	2	1	1	1	1	1	3	1	1	3	2
Course Contribution	3	2	2	1	1	1	1	1	3	1	1	3	2

B.E. MECH (I TO IV SEMESTERS)



BoS Chairman

R-2025(CBCS)

ME25201	ENGINEERING MECHANICS	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: • To calculate the effect of force in rigid bodies. • To interpret various forces acting on a structure. • To predict the centroid and moment of inertia of given section. • To demonstrate effect of forces in a moving body. • To apply the role of friction in rigid bodies.					
UNIT I	STATICS OF RIGID BODIES				9
Equivalent systems of forces acting on a rigid body in 2D space: Transmissibility, moment of a force, Varignon's theorem, moment of a couple, resolution of a given force, reduction of a system of forces-support reaction of beams;					
UNIT II	ANALYSIS OF STRUCTURES				9
Simple trusses - method of joints, method of sections, joints under special loading conditions, analysis of frames.					
UNIT III	CENTROIDS, CENTRES OF GRAVITY AND MOMENTS OF INERTIA				9
Centroids of areas and lines, Centroids of composite areas, moment of inertia of plane figures, polar moment of inertia, radius of gyration.					
UNIT IV	DYNAMICS OF PARTICLE				9
Newton's law of motion - D'Alembert's principle - Principle of work and energy- Conservation of energy- Impulse and momentum principle-impact of elastic bodies –Types of impact-Direct impact and Oblique central impact.					
UNIT V	FRICTION				9
Friction: concepts of friction- Coulomb's laws of dry friction – Impending motion- Angle of repose-Problems involving dry friction; Ladder friction --Wedge friction - Belt friction.					
TOTAL: 45 PERIODS					
COURSE OUTCOMES: At the end of the course, learners will be able to: CO1: Solve problems on rigid bodies using the concept of static equilibrium. CO2: Determine the effect of forces acting on the structures. CO3: Calculate the centre of gravity and moment of inertia of the given geometry. CO4: Apply the suitable method for solving problems on dynamics of particles. CO5: Predict the effect of friction in rigid bodies.					
TEXT BOOKS: 1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 10 th Edition, Tata McGraw-Hill Publishing company, New Delhi, 2017. 2. Meriam J.L and Kraig L.G, 'Engineering Mechanics-Statics and Dynamics', 9 th Edition, John Wiley & sons, 2021. 3. Vela Murali, "Engineering Mechanics", 3 rd Edition, Oxford University Press, 2017.					
REFERENCES: 1. Hibbler, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education, 2010. 2. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education, 2006. 3. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3 rd Edition, Vikas Publishing House Pvt. Ltd., 2005.					

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	2	1	1	2	2	1	1	3	3
CO2	3	3	2	2	2	1	1	2	2	1	1	3	3
CO3	3	3	2	2	2	1	1	2	2	1	1	3	3
CO4	3	3	2	2	2	1	1	2	2	1	1	3	3
CO5	3	3	2	2	2	1	1	2	2	1	1	3	3
Course Contribution	3	3	2	2	2	1	1	2	2	1	1	3	3

B.E. MECH (I TO IV SEMESTERS)

 BoS Chairman

R-2025(CBCS)

ME25202	MANUFACTURING TECHNOLOGY I	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: - To understand metal casting processes, including pattern design and defect identification. - To acquire knowledge of various welding and joining techniques. - To understand the principles of sheet metal forming operations and die design. - To gain an understanding of bulk deformation processes like rolling, forging, drawing, and extrusion. - To learn the fundamentals of powder metallurgy and plastic processing techniques					
UNIT I	METAL CASTING	9			
Casting process: Terminology, green sand moulding, investment casting, die casting, patterns, moulds, and cores; solidification and cooling; riser and gating systems; casting defects.					
UNIT II	JOINING PROCESSES	9			
Gas welding: flame types, equipment; Electric Arc Welding (EAW), Gas Metal Arc Welding (GMAW), Gas Tungsten Arc Welding (GTAW); Resistance welding - Spot, seam, projection and flash; Welding defects; Laser beam and friction-stir welding; Principles of brazing, soldering and adhesive bonding					
UNIT III	SHEET METAL PROCESSES	9			
Principle of shearing, punch-die clearance; Sheet metal operations: blanking, punching, spinning; Blanking force calculation; Die-set: simple, progressive, compound; Press open back inclinable press, hydraulic press; Deep drawing and bending processes.					
UNIT IV	BULK DEFORMATION PROCESSES	9			
Plastic deformation, hot and cold working; Rolling - Rolling mills, defects in rolled parts Drawing - Wire and rod drawing; Forging - Open and closed die forging, forging hammers, rotary swaging; Extrusion - direct and indirect extrusion.					
UNIT V	POWDER METALLURGY AND PLASTIC PROCESSING	9			
Production of metal powder: Atomization, crushing; Blending; Compacting: Die pressing, isostatic pressing; Sintering; Plastic processing: Injection, blow moulding.					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to: CO1 Explain the various metal casting processes. CO2 Outline the various welding techniques and joining processes. CO3 Discuss different metal forming processes. CO4 Illustrate bulk deformation processes such as rolling, forging, drawing, and extrusion. CO5 Describe the different methods used in plastic component manufacturing.					
TEXT BOOKS: 1. Rao P N "Manufacturing Technology", 5th Edition, Tata McGraw Hill Education Private Limited., New Delhi, 2018. 2. Serope Kalpakjian and Stephen Schmid, 8th Edition, "Manufacturing, Engineering and Technology", Pearson Education., 2023. 3. Amitabhaghosh and Ashok kumar mallik, 2nd Edition, "Manufacturing Science", East-west press pvt ltd, 2022 (reprint).					

B.E. MECH (I TO IV SEMESTERS)

BOS Chairman

R-2025(CBCS)

Mech

REFERENCES:

1. Mikell P Groover, 7th Edition, "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", Wiley, 2020.
2. Arora R P "Manufacturing Technology", Macmillan India Limited, New Delhi, 2011.
3. Ian Gibson, David Rosen Brent Stucker, 3rd Edition, "Additive Manufacturing Technologies 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing" Springer Second edition, 2021.

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	1	-	1	-	-	-	-	1	1	1	1
CO2	2	1	1	-	1	-	-	-	-	1	1	1	1
CO3	2	1	1	-	1	-	-	-	-	1	1	1	1
CO4	2	1	1	-	1	-	-	-	-	1	1	1	1
CO5	2	1	1	-	1	-	-	-	-	1	1	1	1
Course Contribution	2	1	1	-	1	-	-	-	-	1	1	1	1

B.E. MECH (I TO IV SEMESTERS)


BOS Chairman

R-2025(CBCS)

ME25203	ENGINEERING METALLURGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:					
- To understand the classification of materials and their crystal structures, including crystallographic principles. - To analyse phase diagrams and their role in the constitution of alloys. - To explore heat treatment processes and strengthening mechanisms of metals and alloys. - To evaluate the mechanical behaviour and testing methods for materials. - To interpret the composition, properties, and applications of ferrous and non-ferrous industrial materials.					

UNIT I	OVERVIEW OF METALS AND PHASE DIAGRAMS	9
Classification of Materials, Crystal Structures, Crystallography - Points, directions, planes, and Miller indices, Imperfections in Crystal Structures: Point defects, dislocations, Schmidt's Law, surface defects, and volume defects, Solid solutions, Hume-Rothery's rules; Phases, Gibb's phase rule; Phase Diagrams - Introduction to binary systems.		
UNIT II	FERROUS METALS	9
Iron-Iron Carbide Phase Diagram, Cast Irons - Classification, properties, and applications, Plain Carbon Steels - Classification, properties, and applications, Alloy Steels - Overview of low and high-alloy steels, HSLA steels, and effects of alloying elements. Specialty Steels - Stainless steels and tool steels. Standards for Ferrous alloys.		
UNIT III	HEAT TREATMENT AND STRENGTHENING METHODS	9
Annealing: Full annealing, stress relief annealing, recrystallization annealing, spheroidizing; Normalizing, hardening and tempering of steel; Concept of TTT and CCT diagrams, hardenability - Jominy end quench test, austempering and martempering; Surface hardening techniques: Carburizing, nitriding, cyaniding, carbonitriding, flame and induction hardening; Strengthening of metals and alloys: Cold working/strain hardening, solid solution strengthening, dispersion hardening.		
UNIT IV	NON-FERROUS METALS	9
Aluminium Alloys - properties, and applications, Al-Cu and Al-Si phase diagrams. Solid solution strengthening and precipitation hardening of Al alloys. Copper Alloys - properties, and applications, Cu-Zn, Cu-Sn phase diagrams, Solid solution strengthening, work hardening, and precipitation hardening of Cu alloys.		
UNIT V	MECHANICAL BEHAVIOUR AND TESTING OF MATERIALS	9
Mechanical Behaviour - Stress-strain behaviour, plastic deformation, slip, twinning, and dislocation mechanics. Fracture Mechanics: Ductile and brittle fractures, Fatigue and Creep - Fatigue mechanisms, S-N curves, creep stages, and high-temperature applications. Standard Mechanical Testing - Tensile, hardness, and impact tests. Non-Destructive Testing: LPT, MPT, UT, RT.		

OUTCOMES:	TOTAL: 45 PERIODS
At the end of the course, learners will be able to: CO1: Understand the classification of materials, crystallography, and phase diagrams. CO2: Explain the properties, classifications, and applications of ferrous materials, including steels and cast irons. CO3: Describe the various heat treatment processes and strengthening methods for materials. CO4: Interpret the properties and applications of non-ferrous materials based on phase diagrams and hardening techniques. CO5: Demonstrate the mechanical behaviour of materials and describe standard mechanical and non-destructive testing methods.	

RE MECH (I TO IV SEMESTERS)

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

TEXT BOOKS:													
1. Avner, S. H., "Introduction to Physical Metallurgy", McGraw Hill Book Company, 2 nd Edition, 2017.													
2. William D Callister "Material Science and Engineering", Wiley India Pvt Ltd, Revised Indian Edition 2020.													
3. Dieter G E, "Mechanical Metallurgy", McGraw-Hill Book Company, 2018.													
REFERENCES:													
1. Kenneth G. Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 2010.													
2. Raghavan. V, "Materials Science and Engineering", Prentice Hall of India Pvt. Ltd., 2015.													
3. Donald R Askeland, Pradeep P Fulay, Wendelin J Wright, "The Science and Engineering of Materials", 7 th edition Thomson brooks, 2015.													

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	1	1	0	1	-	-	-	1	1	2	2
CO2	3	1	1	1	1	1	-	-	-	1	1	2	2
CO3	3	1	1	1	1	1	-	-	-	1	1	2	2
CO4	3	1	1	1	1	1	-	-	-	1	1	2	2
CO5	3	1	1	1	1	1	1	1	1	1	1	2	2
Course Contribution	3	1	1	1	-	-	-	-	-	1	1	2	2

B.E. MECH (I TO IV SEMESTERS)


BoS Chairman

R-2025(CBCS)

TA25C02	TAMILS AND TECHNOLOGY / தமிழர் தொழில்நுட்பம் <i>(Common to all B.E./B.Tech. Programmes)</i>	L	T	P	C
		1	0	0	1
UNIT I	OVERVIEW OF METALS AND PHASE DIAGRAMS				9
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti and Potteries.					
UNIT II	FERROUS METALS				9
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					
UNIT III	HEAT TREATMENT AND STRENGTHENING METHODS				9
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel - Copper and gold coins as source of history - Minting of Coins – Beads making - industries Stone beads - Glass beads - Terracotta beads - Shell beads/ bone beads - Archeological evidences – Gem stone types described in Silappathikaram.					
UNIT IV	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.					
UNIT V	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.					
TOTAL: 45 PERIODS					
TEXT BOOKS:					
1. தமிழக வரலாறு மகாபாரதம் பண்பாடு மற்றும் கலாச்சாரம் (வழுவட்டி: தமிழ்ச்நாடு பண்பாடு கலாச்சாரம்) பண்பாடு கழகம்) 2. கண்ணினித்தமொழி மொழி இல. தரமம். (வழிகட. பரிசு: ரமம்). 3. கழி எவளக நதிகளாயி நகர நாகரிகம் (வதாலலியை வழுவட்டி) சாலை துறை 4. வபாராள் ஆற்றை எர நாகரிகம். (வதாலலியை துறை வழுவட்டி) 5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print) 6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies. 7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).					

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

EN25C03	ADVANCED COMMUNICATION AND INTERPERSONAL SKILLS DEVELOPMENT (Common ECE and MECH) (TwP)	L	T	P	C
		1	0	2	2
COURSE OBJECTIVES: The course enables the students to: • Apply verbal skills to enhance clarity and voice modulation. • Demonstrate effective non-verbal communication techniques. • Develop interpersonal and empathy skills for positive interactions. • Enhance public speaking and presentation skills across different contexts. • Improve written communication for emails, applications, and proposals.					
UNIT I	FUNDAMENTALS OF VERBAL AND NON-VERBAL COMMUNICATION	6			
Business Communication Skills - Voice and Accent, Voice Clarity, Voice Modulation & Intonation, Word Stress etc., Feedback & Questioning Development Techniques, Etiquette in Non-Verbal Communication- Facial Expression, Posture, Gesture, Eye Contact, Appearance, Dress code - Flow of Communication, Strategies for effective reading - Usage of glossaries and footnotes to aid reading Comprehension - Read and recognize different text types - Predicting content using photos and title, Developing a paragraph: topic sentence, supporting sentences, concluding sentence					
UNIT II	INTERPERSONAL AND INTRAPERSONAL SKILLS DEVELOPMENT	6			
Interpersonal and Intrapersonal skills - Positive Relationship - Positive Attitudes-Empathy: Comprehend other Opinions, Points of Views, and Face them with Understanding - Mutuality, Trust, Emotional Bonding - Handling Situations (Interview, Holding a Meeting etc.), State reasons and examples to support ideas in writing - Parallel paragraph - Write a paragraph with reasons and examples - Write an opinion paragraph					
UNIT III	PUBLIC SPEAKING AND PRESENTATION EXCELLENCE	6			
Public Speaking-Nonverbal Communication-Giving Seminars and Presentations, Nuances of Addressing a Gathering - One to one, One to Many- Extempore Speech, speed reading techniques; Writing - Hints Developing - Elements of a good essay -Types of essays – Descriptive, Narrative, Issue- based, Argumentative - Analytical.					
UNIT IV	PROFESSIONAL WRITING AND EMAIL ETIQUETTE	6			
Cohesion of ideas, Organization of Ideas; Email Etiquette-Do's and Don'ts of E-mail Writing, Desirable drafting of E-mails, Types of E-mails-personal E-mails, Professional E-mails, Demi-official Emails, Business Mails, Unknown Ad mails, Resumes - Writing Job application - Formats of project proposals.					
UNIT V	LEADERSHIP AND DECISION-MAKING SKILLS	6			
Leadership skills- Leadership and Productivity Importance and necessity of decision making, process and practical way of decision-making, Weighing Positives & Negatives-Strategic. decision making- Case studies of Efficient and Inefficient Leaders, Problem solving, Critical reading and thinking - Reading and comprehending texts of different domains – Identify; Writing - Statement of Purpose - Letter of recommendation					
					TOTAL: 30 PERIODS

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

OUTCOMES:

At the end of the course, learners will be able to:

CO1: Apply verbal skills to achieve clarity and effective voice modulation.

CO2: Demonstrate professional non-verbal communication techniques.

CO3: Develop interpersonal and empathy skills to foster positive interactions.

CO4: Enhance public speaking and presentation skills in diverse contexts.

CO5: Strengthen written communication for emails, applications, and proposals.

TEXT BOOKS:

1. Covey, Stephen R., and Sean Covey. The 7th habits of highly effective people. Simon & Schuster, 2020.
2. Klaus, Peggy, Jane Rohman, and Molly Hamaker. The hard truth about soft skills. Harper Collins Publishers, 2007.
3. Pease, Barbara, and Allan Pease. The definitive book of body language: The hidden meaning behind people's gestures and expressions. Bantam, 2008.

Extensive Reading:

1. Peterson, Jordan B. 12 rules for life: An antidote to chaos. Random House Canada, 2018. Gangwar, Swetab. The Rudest Book Ever.2019
2. De Bono, Edward. "Serious creativity." The Journal for Quality and Participation 18.5 (1995): 12

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	1	1	2	3	-	2	1	-
CO2	-	-	-	-	-	1	1	2	3	-	2	1	-
CO3	-	-	-	-	-	1	2	2	3	-	2	-	-
CO4	-	-	-	-	-	1	1	2	3	-	2	1	-
CO5	-	-	-	-	-	1	2	2	3	-	2	1	-
Course Contribution	-	-	-	-	-	1	1.4	2	3	-	2	1	-

ME25204	MANUFACTURING TECHNOLOGY I LABORATORY	L	T	P	C
		0	0	4	2
COURSE OBJECTIVES:					
- To provide fundamental knowledge of sand molding techniques and enable students to prepare green sand molds for casting applications. - To familiarize with various lathe operations such as taper turning, internal and external threading, and knurling to develop machining skills. - To impart knowledge of shaping operations and enhance students' ability to produce square and hexagonal head components using shaping machines. - To develop proficiency in arc welding for fabricating and joining structural shapes and plates, ensuring strong and reliable joints. - To introduce sheet metal fabrication techniques, including shearing and bending, for manufacturing simple components.					
LIST OF EXPERIMENTS					
- Preparation of green sand molds. - Taper & eccentric turning - Internal thread cutting - External thread cutting - Knurling - Square head shaping - Hexagonal head shaping - Fabrication of simple structural shapes using Arc Welding - Joining of plates using arc welding - Manufacturing of simple sheet metal components using shearing and bending operations					
TOTAL: 60 PERIODS					
OUTCOMES:					
At the end of the course, learners will be able to:					
CO1: Apply the principles of green sand molding to prepare molds with appropriate gating and riser techniques.					
CO2: Demonstrate proficiency in performing various lathe operations such as taper turning, internal and external threading, and knurling.					
CO3: Analyze the shaping process to produce square and hexagonal head components with accuracy and precision.					
CO4: Construct welded joints using arc welding techniques for fabricating and assembling structural components.					
CO5: Develop sheet metal components by applying shearing and bending operations to achieve desired shapes and dimensions.					

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	1	-	1	-	-	-	-	1	1	1	1
CO2	2	1	1	-	1	-	-	-	-	1	1	1	1
CO3	2	1	1	-	1	-	-	-	-	1	1	1	1
CO4	2	1	1	-	1	-	-	-	-	1	1	1	1
CO5	2	1	1	-	1	-	-	-	-	1	1	1	1
Course Contribution	2	1	1	-	1	-	-	-	-	1	1	1	1

B.E. MECH (I TO IV SEMESTERS)


BoS Chairman

R-2025(CBCS)

PC25C01	PHYSICS AND CHEMISTRY LABORATORY (Common to all B.E / B.Tech. Programmes)	L	T	P	C
		0	0	4	2
COURSE OBJECTIVES:					
- To explain the proper use of various kinds of laboratory equipment. - To extend how data can be collected, presented and interpreted in a clear and concise manner. - To infer problem solving skills and interpretation of experimental data. - To summarize error in experimental measurements and techniques used to minimize such error. - To translate the student as an active participant in each part of all lab exercises.					
LIST OF EXPERIMENTS: PHYSICS LABORATORY					
- Laser- Determination of the wavelength of the laser using grating. (Common to ALL) - Photoelectric effect – Determination of Planck’s constant. (Common to ALL) - Hall Effect – determination of Hall parameters. (Common to ALL) a) Optical fibre -Determination of Numerical aperture and acceptance angle. b) Compact disc- Determination of width of the groove using the laser. (Common to CSE,IT, AI&DS,CS(Cyber),ECE,EEE,EE(VLSI)) - Spectrometer-Determination of the wavelength of light using grating. (Common to CSE,IT, AI&DS,CS(Cyber),ECE,EE(VLSI)) - Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects. (Common to CIVIL,EEE,MECH) - Determination of Young’s modulus–cantilever method. (Common to CIVIL,MECH).					
LIST OF EXPERIMENTS: CHEMISTRY LABORATORY (Any 7 experiments)					
- Determination of chloride content of water sample by Argentometric method. - Determination of total hardness of water by EDTA method. - Determination of strength of acids in a mixture of acids using conductivity meter. - Conductometric titration of strong acid against strong base. - Determination of DO content of water sample by Winkler’s method. - Determination of strength of given hydrochloric acid using pH meter. - Estimation of iron content of the given solution using potentiometer. - Conductometric titration of barium chloride against sodium sulphate. (precipitation titration) - Preparation of nanoparticles (TiO₂/ZnO/CuO) by Sol-Gel method. - Determination of types and amount of alkalinity in water sample.					
OUTCOMES:					TOTAL: 60 PERIODS
At the end of the course, learners will be able to:					
CO1: Apply the knowledge, to gain hands-on experience with laboratory equipment.					
CO2: Relate the graphical models to interpret the laboratory data.					
CO3: Interpret quantitative reasoning and describing physical reality.					
CO4: Apply the principle and process to access the scientific information.					
CO5: Translate students to solve problems individually and collaboratively.					
REFERENCES:					
“Physics Laboratory Manual”, Department of Physics, Velammal College of Engineering & Technology, Madurai (2021)					
P. Mani, “Physics Laboratory”, Dhanam Publications, Third Edition 2021.					

B.E. MECH (I TO IV SEMESTERS)

Bos Chairman

R-2025(CBCS)

3. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, "Vogel's Textbook of Quantitative Chemical Analysis" 2009.

CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	-	-	-	-	-	1	-	-	-	1	-
CO2	3	1	-	-	-	-	-	1	-	-	-	1	-
CO3	3	1	-	-	-	-	-	1	-	-	-	1	-
CO4	3	1	-	-	-	-	-	1	-	-	-	1	-
CO5	3	1	-	-	-	-	-	1	-	-	-	1	-
Course Contribution	3	1	-	-	-	-	-	1	-	-	-	1	-

B.E. MECH (I TO IV SEMESTERS)

I. P. Rao
Rat
 BoS Chairman

R-2025(CBCS)

SEMESTER III

SEMESTER III		L	T	P	C
MA25C05	PROBABILITY AND STATISTICAL TECHNIQUES (Common to B.E. Civil & B.E. Mechanical Engineering Programmes)	3	1	0	4
	COURSE OBJECTIVES:				
- To introduce the basic concepts of probability and random variables. - To acquaint the knowledge of discrete and continuous distributions - To compute different measures of central tendency, dispersion and to interpret the data - To enhance the knowledge of testing of hypothesis for small and large samples - To familiarize with the basic concepts of classification of design of experiments.					
UNIT I	PROBABILITY AND RANDOM VARIABLES	12			
Probability - axiomatic approach to probability - Conditional Probability - Baye's theorem - Random Variables -Discrete random variable- Continuous random variable- mean-variance-moments and moment generating functions.					
UNIT II	PROBABILITY DISTRIBUTIONS	12			
Discrete Distributions - Binomial, Poisson and geometric distributions -Continuous Distributions - uniform, exponential, and normal distributions					
UNIT III	STATISTICS	12			
Measures of central tendency - Arithmetic mean - Geometric mean - Harmonic mean - Median - Mode - Measures of dispersion - Range - Standard deviation - Coefficient of variation - Correlation - Coefficient of correlation - Lines of regression.					
UNIT IV	TESTING OF HYPOTHESIS	12			
Testing of hypotheses for large samples-Z-test, small samples-student's t-test, for single and difference of means, chi square test for goodness of fit and independence of attributes, F-test					
UNIT V	DESIGN OF EXPERIMENTS	12			
Analysis of variance - completely randomized design, randomized block design, Latin square design.					
TOTAL: 60 PERIODS					
OUTCOMES:					
At the end of the course, learners will be able to					
CO1: Illustrate the basic concepts of Probability and Random variables					
CO2 : Infer the basic concepts of Discrete and Continuous distributions					
CO3: Predict the Various measures of central tendency and measures of dispersion.					
CO4 : Explain the test of hypothesis for small and large samples by using various tests					
CO5: Apply the basic concepts of classifications of design of experiments					
TEXT BOOKS:					
1. Veerarajan.T " Probability , Statistics and Random Processes" , 3 rd edition , Tata McGraw Hill Publication Ltd., New Delhi 2007					
2. B.S. Grewal "Higher Engineering Mathematics " 45 th edition , Khanna Publications 2024					
REFERENCES:					
1. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", 7 th edition Wiley India, New Delhi, 2018.					
2. Richard A. Johnson , "Miller & Freund's, Probability and Statistics for Engineers", 9 th edition, Prentice Hall ,New Delhi, 2017					

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

3. Jay L. Devore , "Probability and Statistics for Engineering and the Sciences", 9th edition
Brooks/Cole, USA, 2015.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	-	1	1	1	-	1	1	1
CO2	3	2	1	-	-	-	1	1	1	-	1	1	1
CO3	3	2	1	-	-	-	1	1	1	-	1	1	1
CO4	3	2	1	-	-	-	1	1	1	-	1	1	1
CO5	3	2	1	-	-	-	1	1	1	-	1	1	1
Course Contribution	3	2	1	-	-	-	1	1	1	-	1	1	1

B.E. MECH (I TO IV SEMESTERS)


BoS Chairman

R-2025(CBCS)

ME25301	ENGINEERING THERMODYNAMICS (Usage of Steam table and Generalized compressibility chart are permitted in the end semester examinations)	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES:					
- To study the fundamental concepts of thermodynamics and the applications of the First Law. - To develop the understanding of the Second Law of Thermodynamics. - To impart knowledge on the properties of pure substances and apply thermodynamic laws to vapor power cycles. - To summarize ideal and real gas behavior and generalized compressibility concepts. - To estimate properties of gas mixtures and understand thermodynamic relations.					
UNIT I	BASIC CONCEPTS AND FIRST LAW OF THERMODYNAMICS				9
System, properties, zeroth law of thermodynamics and application, thermodynamic state and equilibrium, process and cycle, work, heat and other forms of energy; First law of thermodynamics, application to open and closed systems, general energy equation and applications.					
UNIT II	SECOND LAW OF THERMODYNAMICS				9
Second law of thermodynamics – Kelvin-Planck and Clausius statements of second law, Reversibility and irreversibility. Carnot theorem, Carnot cycle, reversed Carnot cycle, efficiency, Coefficient of Performance (COP). Thermodynamic temperature scale, Clausius inequality, concept of entropy, entropy of ideal gas, principle of increase of entropy.					
UNIT III	PROPERTIES OF PURE SUBSTANCES				9
Formation of steam and its thermodynamic properties, p-v, p-T, T-v, T-s, h-s diagrams. p-v-T surface. Use of Steam Table and Mollier Chart. Determination of dryness fraction. Application of I and II law for pure substances. Ideal and actual Rankine cycles, Cycle Improvement Methods – Reheat-Regeneration					
UNIT IV	IDEAL AND REAL GASES				9
Properties of Ideal gas, real gas - comparison. Equations of state for ideal and real gases. Vander Waal's relation - Reduced properties - Compressibility factor - Principle of Corresponding states - Generalized Compressibility Chart.					
UNIT V	PROPERTIES OF GAS MIXTURES AND THERMODYNAMIC RELATIONS				9
Ideal gas mixtures – Evaluation of properties, Dalton's law of partial pressure,– Mole and Mass fraction. Thermodynamic Relations, Maxwell's Equations, Tds equations, Clausius- Clapeyron Equation, Thermodynamic relations for changes in Entropy, Enthalpy & Internal Energy, Joule-Thomson coefficient & inversion curve.					
TOTAL: 45 PERIODS					

OUTCOMES:

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

CO1: Examine the first law of thermodynamics for systems and processes

CO2: Apply the Second Law of Thermodynamics cycle efficiency and entropy changes.

CO3: Investigate the thermodynamics laws for pure substances

CO4: Calculate ideal, real gases and generalized compressibility charts to evaluate properties

CO5: Determine properties of ideal gas mixtures and use thermodynamic relations

TEXT BOOKS:

1. Yunus A. Cengel & Michael A. Boles, "Thermodynamics-An Engineering Approach", 9th Edition, 2019.
2. Basic Thermodynamics, Pramodkumar, Atul Dhar, AICTE 2023.
3. Dr.E.Natarajan, Engineering Thermodynamics Fundamentals and Applications. 2nd Edition Aruragim Publications.2019

REFERENCES:

1. Arora C.P, "Thermodynamics", 12th Edition, Tata McGraw-Hill, 2017.
2. Borgnakke & Richard E. Sonntag, "Fundamental of Thermodynamics", 8th Edition, 2016.
3. R.K.Rajput, "A Text Book of Engineering Thermodynamics ", 6th Edition, Laxmi Publications, 2019.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	0	1	1	0	0	0	1	2	2
CO2	3	2	1	2	0	1	1	0	0	0	1	2	2
CO3	3	2	2	2	1	1	1	0	0	0	1	2	2
CO4	3	2	1	1	0	1	1	0	0	0	1	2	2
CO5	3	2	2	2	1	1	1	0	0	0	1	2	2
Course Contribution	3	2	1	1	0	1	1	0	0	0	1	2	2

ME25302	FLUID MECHANICS AND MACHINERY	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: ○ To describe the properties of fluids and Pressure measurement. ○ To explain law of conservation in flow through pipes. ○ To interpret the importance of dimensional analysis. ○ To relate the importance of various types of flow in pumps. ○ To discuss the importance of various types of flow in turbines					
UNIT I	FLUID PROPERTIES AND FLOW CHARACTERISTICS	9			
Units and dimensions- Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension and capillarity. Flow characteristics - application of continuity equation – Buoyancy – Pressure measurement-Bernoulli's equation and applications					
UNIT II	FLOW THROUGH CIRCULAR CONDUITS	9			
Laminar flow through circular conduits – Darcy Weisbach equation –friction factor- - Moody diagram- minor losses – Flow through pipes in series and parallel.					
UNIT III	DIMENSIONAL ANALYSIS	9			
Need for dimensional analysis – methods of dimensional analysis – Similitude –types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis.					
UNIT IV	PUMPS	9			
Theory of roto-dynamic machines – various efficiencies – velocity components at entry and exit of the rotor- velocity triangles – Theory of positive displacement pumps - Centrifugal pumps– working principle -Reciprocating pump- working principle.					
UNIT V	TURBINES	9			
Classification of turbines – heads and efficiencies - Pelton wheel, Francis turbine - working principles – velocity triangles					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Apply mathematical knowledge to predict the properties and characteristics of a fluid. CO2: Determine major and minor losses associated with pipe flow in piping network. CO3: Solve the dimensional analysis. CO4: Calculate the performance of pumps. CO5: Examine the performance of turbines.					
TEXT BOOKS: 1. Bansal, R. K., “Textbook of fluid mechanics and hydraulic machine: SI units” 10 th Edition, Laxmi Publication, 2018. 2. White, Frank M., “Fluid Mechanics” 8 th Edition, McGraw-Hill, 2017. 3.Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", 22 nd Edition, Standard Book House, 2019					

REFERENCES:

1. Kumar K. L., "Engineering Fluid Mechanics", 8th Revised Edition, Eurasia Publishing House(p) Ltd., 2014,
2. Robert W.Fox, Alan T. McDonald, Philip J.Pritchard, "Fluid Mechanics and Machinery", 8th Edition, John Wiley & Sons, 2011.
3. Streeter, V. L. and Wylie E. B., "Fluid Mechanics", 9th Edition, McGraw Hill Publishing Co., 2017.
4. https://onlinecourses.nptel.ac.in/noc23_ce65/preview
5. Introduction to Fluid Mechanics and Fluid Engineering NPTEL Study Materials - Video Lectures & Resources | NPTELPrep

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	2	0	1	0	1	1	0	1	3	2
CO2	3	2	1	2	0	1	0	1	1	0	1	3	2
CO3	3	2	1	2	0	1	0	1	1	0	1	3	2
CO4	3	2	1	2	0	1	0	1	1	0	1	3	2
CO5	3	2	1	2	0	1	0	1	1	0	1	3	2
Course Contribution	3	2	1	2	0	1	0	1	1	0	1	3	2

ME25303	STRENGTH OF MATERIALS	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES:					
- To apply the concepts of stress, strain, principal stresses and principal planes. - To determine shear forces and bending moments in beams and construct SFD&BMD for various loading conditions. - To understand bending theory and compute bending stresses and deflections in beams using standard analytical methods. - To calculate stresses and deformation in circular shafts and helical spring due to torsion. - To predict the stresses and deformations induced in thin cylindrical shells and determine principal stresses using analytical and graphical methods					
UNIT I	STRESS, STRAIN AND DEFORMATION OF SOLIDS				9
Stresses and strains, types; Elastic limit, Hooke's law, Poisson's ratio, volumetric strain, elastic constants, factor of safety; Stepped bars, uniformly varying sections, stresses in composite bar due to axial force and temperature; Strain energy in axially loaded components: Stresses due to gradual load, sudden load and impact loads.					
UNIT II	SHEAR FORCE AND BENDING MOMENT				9
Relationship between load, shear force and bending moment; Shear force and bending moment diagrams: Cantilever, simply supported and overhanging beams under concentrated load, uniformly distributed load, uniformly varying load, concentrated moments, maximum bending moment and point of contra flexure.					
UNIT III	BENDING STRESS AND DEFLECTION OF DETERMINATE BEAMS				9
Theory of simple bending: Assumptions and derivation, section modulus, bending stresses in symmetrical and unsymmetrical sections; Deflection of beams: Double integration method, Macaulay's method and moment area method. <i>Euler's theory of columns- Euler buckling concept- Effective length, slenderness ratio (outline only - Not for evaluation)</i>					
UNIT IV	TORSION				9
Theory of torsion: Assumptions and derivation, polar modulus; Stresses in solid and hollow circular shafts, power transmission, design for strength and stiffness; Stresses and deflection in close coiled helical spring and carriage springs. Springs in series and parallel					
UNIT V	THIN CYLINDERS AND STATE OF STRESS				9
Stresses in thin cylindrical shell due to internal pressure - circumferential and longitudinal stresses and deformation in thin cylinders – Thin spherical shells subjected to internal pressure – Deformation in spherical shells. State of stress at a point: Normal and tangential stresses on a given plane, principal stresses and their planes, plane of maximum shear stress, analytical method, Mohr's circle method.					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Apply Hooke's law in structural members. CO2: Construct the shear force and bending moment diagrams for various beams. CO3: Use bending theory to compute bending stresses in beams and determine deflection using standard analytical methods. CO4: Interpret the design of shafts and springs. CO5: Solve the stresses and deformations in cylindrical, spherical shells and principal planes.					
TEXT BOOKS:					
1 . Bansal R.K., "Strength of Materials", 6 th Edition, Laxmi Publications (P) Ltd., 2022.					
B.E. MECH (I TO IV SEMESTERS)		BoS Chairman		R-2025(CBCS)	

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

2. Egor. Popov "Engineering Mechanics of Solids" 2nd Edition, Prentice Hall of India, 2015.
3. Subramanian R., "Strength of Materials", 3rd Edition, Oxford University Press, Oxford Higher Education Series, 2016.

REFERENCES:

1. Jindal U.C., "A text book on Strength of Materials", 2nd Edition, Asian Books Pvt. Ltd., 2012
2. Ferdinand P. Beer, Russell Johnson, J.r. and John T. Dewolf "Mechanics of Materials", 8th Edition, Tata McGraw Hill Publishing 'co. Ltd., 2020.
3. Hibbeler, R.C., "Mechanics of Materials", 13th Edition, Pearson Education, Low Price Edition, 2021.
4. <https://nptel.ac.in/courses/112107146/>
5. <https://youtu.be/GkFgysZC4Vc>

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	1	3	2	-
CO2	3	2	2	1	-	-	-	1	-	1	3	2	-
CO3	3	2	2	-	1	1	-	-	1	1	3	2	-
CO4	3	2	2	1	-	-	-	1	-	1	3	2	-
CO5	3	2	2	-	1	1	-	-	1	1	3	2	-
Course Contribution	3	2	2	-	-	-	-	-	-	1	3	2	-

B.E. MECH (I TO IV SEMESTERS)


BoS Chairman

R-2025(CBCS)

ME25304	MANUFACTURING TECHNOLOGY – II	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES:					
- To discuss the mechanism of chip formation - To demonstrate the working procedure and various process of turning machine - To explain the working principle of milling and Gear cutting machines - To interpret the various types of finishing process. - To recognize the CNC program					
UNIT I	THEORY OF METAL CUTTING				9
Mechanics of chip formation, single point cutting tool, forces in machining, Types of chip, cutting tools– nomenclature, orthogonal metal cutting, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability					
UNIT II	MACHINING PROCESSES I – TURNING AND HOLE MAKING				9
Lathe-operation-Mechanism-Capstan and turret lathes- tool layout – automatic lathes: semi-automatic – single spindle: Swiss type, automatic screw type – multi spindle. Drilling, reaming, boring and tapping.					
UNIT III	MACHINING PROCESSES II – MILLING, BROACHING, AND GEAR MANUFACTURING				9
Milling operations-types of milling cutter. Gear cutting – forming and generation principle and construction of gear milling, hobbing and gear shaping processes. Broaching machines – push, pull, surface and continuous broaching machines.					
UNIT IV	FINISHING PROCESSES				9
Abrasive processes: grinding wheel – specifications and selection, types of grinding process– cylindrical grinding, surface grinding, centreless grinding and internal grinding. Not for examination: (Super finishing processes -Honing, lapping, polishing and buffing)					
UNIT V	CNC MACHINING				9
Numerical control machine tools – CNC types, constructional details, special features, machining centre, part programming fundamentals CNC – manual part programming.					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Explain the fundamentals of metal cutting principles. CO2: Describe turning and hole-making processes. CO3: Discuss milling, broaching, and gear manufacturing. CO4: Summarize finishing and grinding processes. CO5 Implement CNC machining fundamentals and basic part programming.					
TEXT BOOKS:					
1. Rao. P.N “Manufacturing Technology - Metal Cutting and Machine Tools”, 4 th Edition, Tata McGraw-Hill, New Delhi, 2018.					
2. Serope Kalpak Jain and Steven R.Schmid, ‘Manufacturing Engineering and Technology’, 8 th Edition, PHI, 2023.					
3. Hajra Choudhury, "Elements of Workshop Technology", Vol-II, 15 th Edition, Media Promoters 2016.					

REFERENCES:

1. Paul Degarma E., Black J.T. and Ronald A. Kosher, "Materials and Processes, in Manufacturing", 8th Edition, Prentice Hall of India, 2019.
2. Sharma, P.C., "A Textbook of Production Technology", 10th Edition, S.Chand and Co. Ltd., 2004.
3. Geoffrey Boothroyd, "Fundamentals of Metal Machining and Machine Tools", 3rd Edition, Mc Graw Hill, 2005.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	–	–	1	–	–	–	–	1	–	3	1
CO2	3	2	1	–	1	–	–	–	–	1	–	3	1
CO3	3	3	2	1	2	–	–	–	–	1	–	3	2
CO4	2	2	1	1	1	–	–	–	–	1	–	2	1
CO5	3	3	3	2	3	–	–	–	1	2	1	3	3
Course Contribution	3	2.4	1.75	1	1.6	–	–	–	1	1.2	1	2.8	1.6

ME25305	SOLID AND FLUID MECHANICS LABORATORY	L	T	P	C
		0	0	3	1.5
COURSE OBJECTIVES:					
- To study the mechanical properties of materials when subjected to different types of loading. - To estimate the hardness and impact of different metals - To compute the compression and deflections test on springs - To verify the principles studied in Fluid Mechanics theory by performing flow experiments in lab. - To calculate the efficiency of turbines					
LIST OF EXPERIMENTS					
CYCLE I					
- Tension test on mild steel rod - Torsion test on mild steel rod - Hardness test on metal (Rockwell and Brinell Hardness) - Impact test on metal specimen - Compression test on helical spring - Deflection test on beams					
CYCLE II					
- Determination of the Coefficient of discharge of given Orificemeter. - Determination of the Coefficient of discharge of given Venturimeter. - Determination of friction factor for a given set of pipes. - Draw the performance characteristic curves of centrifugal pump - Conduct the performance characteristic curves of reciprocating pump. - Determine the performance characteristic curves of Pelton wheel.					
TOTAL: 45 PERIODS					
OUTCOMES:					
At the end of the course, learners will be able to					
CO1: Calculate the yield strength, ultimate strength and torsional strength of given specimen.					
CO2: Compute the hardness and impact strength of metal specimens					
CO3: Conduct the compression test and deflection test on springs.					
CO4: Evaluate flow properties using various equipment's for flow measurement.					
CO5: Determine the performance efficiency for pumps and turbines.					

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	1	1	-	1	3
CO2	3	2	2	1	-	-	-	-	1	1	-	1	3
CO3	3	2	2	1	-	-	-	-	1	1	-	1	3
CO4	3	2	2	1	-	-	-	-	1	1	-	1	3
CO5	3	2	2	1	-	-	-	-	1	1	-	1	3
Course Contribution	3	2	2	1	-	-	-	-	1	1	-	1	3

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

ME25306	MANUFACTURING TECHNOLOGY LABORATORY – II	L	T	P	C
		0	0	3	1.5
COURSE OBJECTIVES:					
• To demonstrate various gear cutting in milling machine • To experiment gear cutting in hobbing and shaping machine • To enumerate various grinding operation in grinding machine • To calculate various cutting forces in lathe and milling using instruments • To compute CNC part programming					
LIST OF EXPERIMENTS					
CYCLE I					
1. Spur gear cutting in milling machine 2. Helical Gear Cutting in milling machine 3. Gear generation in hobbing machine 4. Gear generation in gear shaping machine 5. Plain Surface grinding 6. Cylindrical grinding 7. Tool angle grinding with tool and Cutter Grinder 8. Measurement of cutting forces in Milling / Turning Process 9. CNC Part Programming					
TOTAL: 45 PERIODS					
OUTCOMES:					
At the end of the course, learners will be able to					
CO1: Demonstrate gear cutting operation in milling machine.					
CO2: Experiment gear cutting operation in shaping and gear hobbing machine.					
CO3: Perform various operation in grinding machine.					
CO4: Evaluate various cutting forces in lathe and milling machine.					
CO5: Apply CNC part programming for given geometry					

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	2	-	1	2	1	1	1	2	2
CO2	3	2	2	1	2	-	1	2	1	1	1	2	2
CO3	3	2	2	1	2	-	1	2	-	1	1	2	2
CO4	3	2	2	1	2	-	1	2	-	1	1	2	2
CO5	3	2	2	1	2	-	1	2	2	1	1	2	2
Course Contribution	3	2	2	1	2	-	1	2	1.3	1	1	2	2

B.E. MECH (I TO IV SEMESTERS)


BoS Chairman

R-2025(CBCS)

EN25C04	COMMUNICATIVE ENGLISH – I (PRACTICAL) (B.E. - Mechanical Engineering)	L	T	P	C
		0	0	2	1
COURSE OBJECTIVES: The course enables the students, • To explain about English spoken in various accents and describe the features of fluent speech using a neutral accent. • To describe the English language skills necessity for academic study with emphasis on academic speaking and listening. • To identify appropriate spoken language for general classroom communication and academic speaking tasks. • To distinguish between language used in general contexts and language used in academic contexts. • To outline the ways to express ideas clearly and confidently during presentations.					
UNIT I	FUNDAMENTALS OF SPEAKING				6
Listening as a key skill - significance - Speaking - giving and asking personal information (real-life communication practices). Expressing and showing ability and inquiring about someone's ability, seeking clarification, and working on improving pronunciation. Mastering English consonant sounds - Pronunciation Basics: Covers core principles for clear and effective speech - Articulating complete ideas effectively - focus on clarity of thought, structuring message, use of complete sentences, and regular practice.					
UNIT II	CONVERSATIONAL SKILLS				6
Listen to process information - Giving and explaining information - Formulating clear, coherent explanations incorporating specialized vocabulary and academic discourse markers. Conversation starters: small talk - Sounds of English - Vowel Sounds - Stressing syllables and speaking clearly. Comparing and contrasting information and ideas from multiple sources - Engaging in conversations with reasonable accuracy across a wide range of everyday topics - Interviews.					
UNIT III	STRESS AND INTONATION				6
Lexical chunking for accuracy and fluency - Factors influencing fluency - Intonation - Role Plays and Simulations - Greeting - Responding to greetings - Describing health and symptoms - Invite and offer - Accept - decline - Take leave - Listening for the gist - Listening for the detail					
UNIT IV	PRESENTATIONS AND GROUP DISCUSSIONS				6
Active listening: giving verbal and non - verbal analysis as feedback - Extempore Activity - Story Starter Relay - participating in a group discussion - Summarizing academic readings and lectures, listening, engaging and participating in conversational speech and discussions- persuade.					
UNIT V	MAKING ACADEMIC PRESENTATIONS				6
Formal presentations and informal discussions - Listening attentively to understand and respond to explanations, directions, and instructions in academic and business settings - Developing and demonstrating effective presentation and interactive communication skills - Group/pair presentations - Negotiating disagreement in group work.					
TOTAL: 30 PERIODS					

OUTCOMES:

At the end of the course, learners will be able to:

CO1: Explain the main ideas and meaning of speech delivered by native English speakers.

CO2: Show suitable and appropriate responses to the speech of native English speakers.

CO3: Identify key elements of effective participation in group discussions.

CO4: Summarize the features of an impactful presentation, including structure, delivery, language use, and audience engagement.

CO5: Distinguish between communication strategies suitable for formal and informal.

TEXT BOOK:

1. Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014.

REFERENCES:

1. Geoffrey Leech and Jan Svartvik. A Communicative Grammar of English. Routledge 3rd edition. United Kingdom, 2015. U.S. Ramasamy. English Essentials - I. VRB Publishers, New Delhi, 2025.

2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.

3. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.

4. Bhatnagar, Nitin and Mamta Bhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	3	-	1	1	-
CO2	-	-	-	-	-	1	1	1	3	-	2	1	-
CO3	-	-	-	-	-	1	1	1	3	-	2	1	-
CO4	-	-	-	-	-	1	1	1	3	-	2	1	-
CO5	-	-	-	-	-	1	1	1	3	-	2	1	--
Course Contribution	-	-	-	-	-	1	1	1	3	-	1.8	1	-

SEMESTER IV

MA25C06	NUMERICAL METHODS (Common to B.E. Civil & B.E. Mechanical Engineering Programmes)	L	T	P	C
		3	1	0	4
COURSE OBJECTIVES: - To outline the basic concepts of solving system of linear equations and eigen value problems using numerical techniques - To explain the numerical techniques of interpolation in various intervals - To develop the knowledge of numerical techniques in differentiation and integration problems. - To describe various techniques and methods of solving ordinary differential equations. - To use various techniques and methods of solving partial differential equations					
UNIT I	SOLUTIONS OF LINEAR EQUATIONS AND EIGENVALUE PROBLEMS				12
Solution of algebraic and transcendental equations — Fixed point iteration method — Newton Raphson method — Solution of linear system of equations — Gauss elimination method — Pivoting — Gauss Jordan method — Iterative methods of Gauss Jacobi and Gauss Seidel — Eigenvalues of a matrix by Power method.					
UNIT II	INTERPOLATION AND APPROXIMATION				12
Interpolation with unequal intervals — Lagranges interpolation — Newton's divided difference interpolation — Difference operators and relations — Interpolation with equal intervals — Newton's forward and backward difference formulae.					
UNIT III	NUMERICAL DIFFERENTIATION AND INTEGRATION				12
Approximation of derivatives using interpolation polynomials — Numerical integration using Trapezoidal, Simpson's 1/3 rule— Two point and three point Gaussian quadrature formulae — Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules					
UNIT IV	NUMERICAL SOLUTION TO ORDINARY DIFFERENTIAL EQUATIONS				12
Single step methods — Taylor's series method — Euler's method — Modified Euler's method — Fourth order Runge — Kutta method for solving first order equations — Multi step methods — Milne's and Adams — Bash forth predictor corrector methods for solving first order					
UNIT V	NUMERICAL SOLUTION TO PARTIAL DIFFERENTIAL EQUATIONS				12
Finite difference: Elliptic equations - Laplace equation, Poisson equation – Leibmann's method, parabolic equations – heat conduction equation- explicit and implicit methods, hyperbolic equations – vibrating string.					
TOTAL: 60 PERIODS					
OUTCOMES: CO1: Solve the system of equations and Eigen value problems using iterative procedure. CO2: Apply the numerical techniques of interpolation and error approximations in various intervals CO3: Make use of a suitable numerical techniques to evaluate the approximation of derivatives and integrals CO4: Obtain the solutions of ordinary differential equations with initial conditions CO5: Determine the solutions of partial differential equations with initial and boundary conditions					

B.E. MECH (I TO IV SEMESTERS)


 A.P. Mohanpalai
 BoS Chairman

R-2025(CBCS)

TEXT BOOKS:

1. Veerarajan.T and Ramachandran T, "Numerical Methods with Programming in C", 2nd edition Tata McGraw Hill Publication Ltd, New Delhi 2007.
2. B.S. Grewal, "Higher Engineering Mathematics " 45th edition , Khanna Publications 2024.

REFERENCES:

1. Richard L Burden and Douglas J Faires, "Numerical Analysis", 10th edition , Thomas Learning, New York, 2017.
2. Steven C Chapra and Raymond P Canale, "Numerical Methods for Engineers", 7th edition, Tata McGraw Hill ,New Delhi, 2017.
3. Curtis F Gerald and Patrick O Wheatly, "Applied Numerical Analysis", 7th edition , Pearson, New Delhi, 2017

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1		-		1	1	1	-	1	1	1
CO2	3	2	1		-		1	1	1	-	1	1	1
CO3	3	2	1		-		1	1	1	-	1	1	1
CO4	3	2	1		-		1	1	1	-	1	1	1
CO5	3	2	1		-		1	1	1	-	1	1	1
Course Contribution	3	2	1		-		1	1	1	-	1	1	1

B.E. MECH (I TO IV SEMESTERS)



 A.P. Prashant
 BoS Chairman

R-2025(CBCS)

ME25401	THEORY OF MACHINES	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: • Explain the fundamentals of mechanisms and their kinematic analysis. • Describe cam design and follower motion for engineering applications. • Summarize gear geometry, gear trains, and their performance characteristics. • Discuss vibration analysis in mechanical systems and its engineering significance. • Interpret balancing techniques and gyroscopic effects in engineering applications.					
UNIT I	KINEMATICS AND MECHANISMS				9
Classifications of mechanisms – Basic kinematic concepts and definitions – Degree of freedom, Mobility – Kinematic inversions of four-bar chain and slider crank chains. Displacement, velocity and acceleration analysis of simple mechanisms – Graphical method—Instantaneous centers method. Coincident points – Coriolis component of Acceleration (concept only)					
UNIT II	KINEMATICS OF CAM				9
Classification of cams and followers – Terminology and definitions – Displacement diagrams – Uniform velocity, parabolic, simple harmonic and cycloidal motions – Derivatives of follower motions – Layout of plate cam profiles – Specified contour cams (Concept only)					
UNIT III	GEARS AND GEAR TRAINS				9
Law of toothed gearing – Involute and cycloidal tooth profiles –Spur Gear terminology and definitions –Gear tooth action – contact ratio – Interference and undercutting. Gear trains – Speed ratio, train value – Parallel axis gear trains – Epicyclic Gear Trains					
UNIT IV	VIBRATION				9
Basic features of vibratory systems – Degrees of freedom – single degree of freedom – Free vibration – Equations of motion – Natural frequency – Types of Damping – Damped vibration Torsional vibration of shaft – Critical speeds of shafts – Torsional vibration – Two and three rotor torsional systems. Forced Vibration analyze using MECHANALYZER (For internal evaluation only)					
UNIT V	BALANCING AND GYROSCOPIC COUPLES				9
Static and dynamic balancing – Balancing of rotating masses – Balancing a single cylinder engine – Balancing of Multi-cylinder inline.Gyroscopes –Effect of Gyroscopic couple on automobiles, ships and aircrafts					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Analyze displacement, velocity, and acceleration of simple mechanisms using graphical and analytical methods. CO2: Design cam profiles for specified follower motions and evaluate their kinematic characteristics. CO3: Apply the law of gearing to design and analyze spur gears and gear trains for desired speed ratios. CO4: Determine natural frequency, damping, and forced vibration response CO5: Perform static and dynamic balancing of rotating/reciprocating systems and evaluate gyroscopic effects in vehicles and machinery.					
TEXT BOOKS: 1.Uicker, J.J., Penock G.R and Shigley, J.E., “Theory of Machines and Mechanisms”, 6th Edition, Cambridge University Press, 2023.					

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

2. Ratan, S.S, "Theory of Machines", 5th Edition, Tata McGraw-Hill, 2019.
2. R.S. Khurmi, "Theory of Machine", 14th Edition, S Chand, 2020.

REFERENCES:

1. Cleghorn. W. L, "Mechanisms of Machines", 2nd Edition, Oxford University Press, 2005
2. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines", 3rd Edition, Affiliated East-West Pvt. Ltd., New Delhi, 2006 (reprinted in 2022).
3. Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.
4. <https://nptel.ac.in/courses/112106270>
5. <https://nptel.ac.in/courses/112105268>
6. <https://nptel.ac.in/courses/112104121>
7. <https://vibration2-nitk.vlabs.ac.in/>

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	-	2	-	-	-	-	1	3	2
CO2	3	2	2	1	-	2	-	-	1	-	1	3	2
CO3	3	2	2	1	-	2	-	-	-	-	1	3	2
CO4	3	2	2	1	-	2	-	-	-	-	1	3	2
CO5	3	2	2	1	-	2	-	-	1	-	1	3	2
Course Contribution	3	2	2	1	-	2	-	-	1	-	1	3	2

B.E. MECH (I TO IV SEMESTERS)



BoS Chairman

R-2025(CBCS)

ME25402	METROLOGY AND MEASUREMENTS	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: - To demonstrate knowledge on Tolerancing, BIS standards and on various basic concepts of metrology. - To examine Linear and Angular measurements. - To experiment with advanced measuring equipment. - To apply knowledge on the form measurement techniques. - To calculate of power, flow and temperature measurements					
UNIT I	BASICS OF METROLOGY AND TOLERANCING				9
Introduction to Metrology – Need – Elements – Work piece, Instruments – Persons Environment – their effect on Precision and Accuracy – Errors – Errors in Measurements – Types – Control – Introduction to BIS Standards – Tolerancing – Interchangeability, Selective assembly, Tolerance representation, Terminology, Limits and Fits, Fundamentals of GD & T- Conventional vs Geometric Tolerance					
UNIT II	LINEAR AND ANGULAR MEASUREMENTS				9
Linear Measuring Instruments – Evolution – Types – Classification – Limit gauges – Angular measuring instruments – Types – Bevel protractor clinometers angle gauges, spirit levels sine bar– Autocollimator – Applications					
UNIT III	ADVANCES IN METROLOGY				9
Basic concept of lasers Advantages of lasers – laser Interferometers – types – DC and AC Lasers interferometer – Applications – Straightness – Alignment. Basic concept of CMM – Types of CMM – Constructional features – Probes – Accessories – Software – Applications – Basic concepts of Machine Vision System – Element – Applications.					
UNIT IV	FORM MEASUREMENT				9
Principles and Methods of straightness – Flatness measurement – Thread measurement, gear measurement, surface finish measurement, Roundness measurement – Applications.					
UNIT V	MEASUREMENT OF POWER, FLOW AND TEMPERATURE				9
Force, torque, power - mechanical, Pneumatic, Hydraulic and Electrical type. Flow measurement: Venturimeter, Orifice meter, rotameter, pitot tube – Temperature: bimetallic strip, thermocouples, electrical resistance thermometer					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Describe basic metrology concepts, measurement errors, BIS standards, and Tolerancing. CO2: Explain linear and angular measuring instruments and their common applications. CO3: Apply suitable measurement methods for different mechanical parameters. CO4: Classify the principles and methods used for form measurement. CO5: Determine power, flow, and temperature using appropriate measuring instruments.					
TEXT BOOKS: 1. Gupta. I.C., “Engineering Metrology”, 7th Edition Dhanpatrai Publications, 2018. 2. Jain R.K. “Engineering Metrology”, 5th Edition, Khanna Publishers, 2018.					

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

3. Manohar Mahajan, "A Textbook of Metrology", 4th edition Dhanpatrai Publications, 2021.

REFERENCES:

1. Alan S. Morris, "The essence of Measurement", 7th Edition, Prentice Hall of India, 2021.
2. Beckwith, Marangoni, Lienhard, "Mechanical Measurements", 7th Edition, Pearson Education, 2023.
3. Charles Reginald Shotbolt, "Metrology for Engineers", 10th Edition, Cengage Learning EMEA, 2014.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	2	1	1	2	1	1	-	-	1	2	2
CO2	2	1	2	1	1	1	1	1	-	-	1	2	2
CO3	2	1	2	1	1	1	1	1	-	-	1	2	2
CO4	2	1	2	1	1	1	1	1	-	-	1	2	2
CO5	2	1	2	1	1	1	1	1	-	-	1	2	2
Course Contribution	2	1	2	1	1	1.2	1	1	-	-	1	2	2

B.E. MECH (I TO IV SEMESTERS)


BOS Chairman

R-2025(CBCS)

ME25403	INDUSTRIAL ENGINEERING AND MANAGEMENT	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: - To introduce the concepts and applications of Industrial Engineering. - To compare different types of plant layout and material flow patterns. - To learn process planning and Group Technology for efficient production. - To study production planning and control techniques used in industries. - To understand work study and ergonomics for improving workplace efficiency.					
UNIT I	INDUSTRIAL ENGINEERING AND PRODUCTION SYSTEM	9			
Industrial engineering - Concept, History and development, Applications, Roles of Industrial engineer- Production management, Industrial engineering versus production management, operations management					
UNIT II	PLANT LAYOUT	9			
Plant layout, Criteria for good layout, Types of layout - Process layout, Product layout, Combination layout and fixed position layout, Flow (material movement) pattern, Workstation Selection and design Computer aided layout algorithms.					
UNIT III	PROCESS PLANNING AND GROUP TECHNOLOGY	9			
Introduction to Process planning-Definition, Procedure, Process selection, Machine capacity, Process sheet. Process analysis - Group technology-Cellular layout, classification and coding system, formation of component family- CAPP.					
UNIT IV	PRODUCTION PLANNING AND CONTROL	9			
Production planning, loading, scheduling.- Master Production Schedule- Production control - dispatching, routing – Progress control bar, curve, Gantt chart, route and schedule chart.					
UNIT V	WORK STUDY AND ERGONOMICS	9			
Work study - Definition, Need, Advantages, objectives of method study and work measurement, method study procedure, Process chart - symbols, outline process chart, flow process chart, principles of motion economy, ergonomics- applications of ergonomic principles in the shop floor- work benches-seating arrangement, Industrial physiology.					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Explain the basic concepts and roles of industrial engineering. CO2: Compare different plant layouts and material flow patterns. CO3: Discuss process planning methods and group technology concepts. CO4: Describe production planning and control techniques. CO5: Outline work study, process charts, and ergonomic principles.					
TEXT BOOKS:					
1. Khanna O.P., Industrial Engineering and management, Dhanpat Rai Publications., 2020.					
2. Mikell. P. Groover, Automation, Production Systems and Computer Integrated Manufacturing , Pearson, 5 th Edition, 2022.					

REFERENCES:

1. .Panbeer selvam R., Production and operations management, Heritage Publishers, 3rd Editon, 2012.
2. Ravi Shankar, Industrial Engineering and Management, Golgotia Publications Pvt. Ltd., New Delhi, 2009
3. S.C. Sharma, T.R. Banga, Industrial Engineering and Management, Khanna Publishing House, 2nd Edition, 2022.
4. nptel.ac.in/courses/112107292
5. nptel.ac.in/courses/112107249
6. NOC: Operations Management NPTEL Study Materials - Video Lectures & Resources | NPTELPrep

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	-	-	-	1	-	1	1	3	3
CO2	2	2	2	1	1	1	-	-	1	1	1	3	3
CO3	3	3	2	2	1	-	-	1	1	1	1	3	3
CO4	2	3	2	2	1	-	-	1	1	1	1	3	3
CO5	2	2	2	2	1	1	1	2	1	2	2	3	3
Course Contribution	3	3	2	2	1	1	1	1.25	1	1.2	1.2	3	3

B.E. MECH (I TO IV SEMESTERS)


BoS Chairman

R-2025(CBCS)

AD25P35	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	L	T	P	C
		3	0	0	3
COURSE OBJECTIVES: - To infer knowledge of various search algorithms for problem solving. - To understand fundamental concepts of Artificial Intelligence, including agents, environments, and various problem-solving strategies. - To gain knowledge about basics of Machine Learning concepts. - To contrast the knowledge in supervised Machine learning algorithms - To demonstrate unsupervised Machine learning algorithms					
UNIT-I	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	9			
Introduction to Artificial intelligence - Agents and Environments - Problem Solving and examples - Search Algorithms - Uninformed Search Strategies - Informed Search Strategies.					
UNIT-II	PROBLEM SOLVING METHODOLOGY	9			
Heuristic search strategies - heuristic functions - Local search and optimization problems - local search in continuous space - search with non-deterministic actions - search in partially observable environments online search agents and unknown environments.					
UNIT-III	MACHINE LEARNING BASICS	9			
Introduction to Machine Learning (ML) - Essential concepts of ML - Types of learning - Machine learning methods based on Time - Dimensionality - Linearity and Non linearity - Early trends in Machine learning - Data Understanding Representation and visualization.					
UNIT-IV	SUPERVISED MACHINE LEARNING	9			
Types of supervised Machine learning Algorithms - Regression -Classification -Perceptron and Neural networks - Decision trees - Support vector machines - Probabilistic models -Case Study: Spam Email detection.					
UNIT-V	UNSUPERVISED MACHINE LEARNING	9			
Working of Unsupervised Learning - Clustering- Association - K-Means Clustering-Component Analysis-Self Organizing Maps- Featurization- Adult Salary Predictor.					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Apply appropriate search algorithms for AI based problems. CO2: Demonstrate foundational knowledge in artificial intelligence concepts, including agents, Environments, and diverse problem-solving techniques. CO3: Summarize various problem domains and prepare data accordingly for model building. CO4: Apply Supervised Learning algorithms to solve real world problems. CO5: Construct classifier models using unsupervised learning algorithms for unstructured data.					
TEXT BOOKS: 1. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, 4th Edition, Pearson Education,2021 2. Ethem Alpaydin,“Introduction to MachineLearning”,4th Edition,MIT Press,2020. 3. Saikat Dull, S. Chjandramouli, Das, “Machine Learning “,1st Edition, Pearson,2018					
REFERENCES: 1. Kevin Night,Elaine Rich,andNairB., “Artificial Intelligence”,3rd Edition, McGraw Hill,2017 2. Mehryar Mohri, Afshin Rostamizadeh and Ameet Talwalkar, “Foundations of Machine					

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

Learning", 2nd Edition, MIT Press, 2018.

3. Deepak Khemani, "Artificial Intelligence", 2nd Edition, Tata McGraw Hill Education, 2013

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	1	1	-	-	-	1	3	-	1
CO2	3	2	1	1	1	1	-	-	-	1	3	-	1
CO3	3	2	1	1	1	1	-	-	-	1	3	-	1
CO4	3	2	1	1	1	1	-	-	-	1	3	-	1
CO5	3	2	1	1	1	1	-	-	-	1	3	-	1
Course Contribution	3	2	1	1	1	1	-	-	-	1	3	-	1

B.E. MECH (I TO IV SEMESTERS)


BoS Chairman

R-2025(CBCS)

ME25404	STANDARDS IN MECHANICAL ENGINEERING	L	T	P	C
		1	0	0	1
COURSE OBJECTIVES: - Introduce the importance of engineering standards, codes, and specifications in mechanical design and manufacturing. - Provide knowledge of major national (BIS) and international (ISO, ASME, ASTM, DIN) standards. - Develop skills in interpreting and applying standards in design, materials selection, fabrication, testing, and quality control. - Familiarize students with standardized documentation, drawing practices, tolerances, safety protocols, and product certification. - Enable students to use standards in real-world engineering scenarios and industry-ready projects.					
UNIT I	ENGINEERING CODES, STANDARDS AND REGULATIONS	3			
Need four standards in engineering: safety, interoperability, reliability, global trade. Classification: Standards, codes, regulations, specifications, guidelines, recommended practices. Overview of national and international standard bodies: BIS and ISO.					
UNIT II	STANDARDS IN ENGINEERING DRAWING	3			
IS standards for engineering drawing -ISO standards for technical drawings: line conventions, scales, views, sectioning.					
UNIT III	MATERIAL STANDARDS	3			
BIS/ASTM material classification systems for: Steels- Standards for mechanical components:					
UNIT IV	STANDARDS FOR WELDING	3			
Welding codes: ASME Section IX, AWS D1.1, IS 816, IS 9595.					
UNIT V	PRODUCT CERTIFICATION AND SAFETY STANDARDS	3			
Product certification systems: CE marking, UL, BIS certification (ISI mark).Safety standards in mechanical systems: Machinery safety (ISO 12100).					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Explain the role the importance of engineering standards and codes CO2: Identify and compare major national and international standard organizations and their functions. CO3: Outline BIS/ISO standards in engineering drawing CO4: Describe design standards for welding CO5: Interpret certification systems used in industries					
TEXT BOOKS:					
1. BIS Handbook: Mechanical Engineering Standards (Latest Edition). 2. ASME Boiler and Pressure Vessel Code (Sections VIII & IX). 3. ASME Y14.5 – Geometric Dimensioning & Tolerancing. 4. ASHRAE Handbook & Standards.					

5. ISO/IEC Standards Compendium (Course-specific modules).

REFERENCES:

1. STM Standards Handbook for Materials Testing.
2. DIN Standards for Mechanical Components.
3. Engineering Standards and Standardization: A Practical Approach – Various authors.
4. Mechanical Engineering Design – J.E. Shigley (standards-based design data).

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	2	1	2	-	-	1	2	1
CO2	3	2	2	-	1	-	-	-	-	1	-	2	2
CO3	3	2	2	1	1	1	-	-	-	-	-	2	3
CO4	3	2	2	1	1	1	-	2	-	-	-	2	3
CO5	2	2	1	-	-	3	2	3	1	1	1	3	2
Course Contribution	2.8	2	1.75	1	1	1.75	1.5	2.3	1	1	1	2.2	2.2

ME25405	THERMAL ENGINEERING I (TwP)	L	T	P	C
		3	0	2	4
COURSE OBJECTIVES: - To study air-standard cycles, IC engine classification, operating principles and performance parameters. - To illustrate knowledge on automotive engine of Electric Vehicles and Hybrid Vehicles (HEVs). - To analyze the working, performance and multi-stage operation of reciprocating air compressors. - To estimate gas turbine cycles, cycle improvements and materials - To explain turbo machinery concepts and constructional details.					
UNIT I	AIR STANDARD CYCLES AND IC ENGINES				9
Air standard assumptions, Otto, Diesel and Dual cycles, comparison of Otto, Diesel, and Dual cycles; Classification and comparison of IC engines, working principle, four stroke and two stroke engines, valve and port timing diagrams.					
UNIT II	AUTOMOTIVE ENGINE, ELECTRIC AND HYBRID VEHICLES				9
Ignition systems, fuel pumps and injectors, MPFI, CRDI, lubricating and cooling systems; Super and turbocharging - - History of Electric Vehicles – Need and Importance – Vehicle Layout – EV vs IC Engine Vehicles, Types of EVs. Evolution of Hybrid Vehicles – Need for Hybridization – Classification: Micro, Mild, Full hybrids.					
UNIT III	COMPRESSORS				9
Classification, working principle of reciprocating compressors, equations for shaft work and efficiencies, effect of clearance on volumetric efficiency, multi-stage compression, inter-cooler and optimum intermediate pressure in a two-stage compressor.					
UNIT IV	GAS TURBINES				9
Gas turbine cycle analysis – open and closed cycle. Performance and its improvement - Regenerative, Reheated cycles and their combinations. Material selections for Turbines.					
UNIT V	TURBO MACHINERY				9
Centrifugal fans and blowers - centrifugal compressors – axial flow compressors – axial and radial flow turbines – constructional details and types (qualitative treatment only)					
TOTAL: 45 PERIODS					
PRACTICAL COURSE					30
LIST OF EXPERIMENTS					
1. Valve Timing and Port Timing diagrams.					
2. Load Test on 4 – stroke Diesel Engine with mechanical loading.					
3. Heat Balance Test on 4 – stroke Diesel Engine.					
4. Retardation Test on a Diesel Engine.					
5. Determination of Flash Point and Fire Point lubricants.					
6. Study on Steam Generators and Turbines.					
7. Examine the performance Test on 4 – stroke Diesel Engine with Electrical loading					
8. Conduct performance Test on 4 – stroke Petrol engine with mechanical loading					

OUTCOMES:

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

CO1: Apply thermodynamic concepts to analyze air-standard cycles

CO2: Explain the functioning of IC engines. Electric and Hybrid Vehicle fundamentals, classification.

CO3: Solve problems and analyze the performance of single-stage and multistage air Compressors

CO4: Describe gas turbine working, cycle improvements and evaluate performance.

CO5: Discuss the construction and operating principles of turbo machineries.

TEXT BOOKS:

1. Kothandaraman.C.P., Domkundwar. S, Domkundwar. A.V., "A course in thermal Engineering", 5th Edition, "Dhanpat Rai & sons", 2016
2. Rajput. R. K., "Thermal Engineering" S.Chand Publishers, 2017
3. Arora.C.P., "Refrigeration and Air Conditioning", Tata McGraw-Hill Publishers 2019.

REFERENCES:

1. Ganesan V., "Internal Combustion Engines", Third Edition, Tata McGraw-Hill 2019
2. Ramalingam. K.K., "Thermal Engineering", Scitech Publications (India) Pvt. Ltd., 2009.
3. Rudramoorthy, R., "Thermal Engineering", Tata McGraw-Hill, New Delhi, 2019

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	1	2	2
CO2	3	2	1	1	-	-	-	-	-	-	1	2	2
CO3	3	3	1	1	-	2	-	-	-	-	1	2	2
CO4	3	3	1	1	-	-	-	-	-	-	1	2	2
CO5	3	2	1	1	-	1	-	-	-	-	1	2	2
Course Contribution	3	3	1	1	-	1.5	-	-	-	-	1	2	2

ME25406	THEORY OF MACHINES LABORATORY	L	T	P	C
		0	0	3	15
COURSE OBJECTIVES: • To determine the mass moment of inertia • To relate the effect of gyroscopic couple and speed controller • To sketch the cam profile for followers • To demonstrate the vibration effect for springs under loading condition • To calculate the critical speed for shaft with concentrated loads.					
LIST OF EXPERIMENTS: 1. Determination of Mass Moment of Inertia using compound pendulum and Trifilar Suspension. 2. Motorized gyroscope – Study of gyroscopic effect and couple. 3. Performance characteristics of speed controller. 4. Cams – Cam profile drawing, Motion curves and study of jump phenomenon. 5. Longitudinal vibration of helical spring. 6. Whirling of shafts – Determination of critical speeds of shafts with concentrated loads. 7. Transverse vibrations of simply supported beam and Cantilever Beam. 8. Displacement, velocity and acceleration diagrams using simulation tool. 9. Study on vibration measurement using MEMS sensor.					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Calculate mass moment of inertia CO2: Interpret the effect of gyroscope and speed controller. CO3: Sketch the cam profile for various applications. CO4: Demonstrate the vibrations effect for spring mass system. CO5: Determine the critical speed for shaft under different loading systems					

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	1	-	2	2	2	-	-	3	3
CO2	3	2	2	2	1	-	2	2	2	-	-	3	3
CO3	3	2	2	2	1	-	2	2	2	-	-	3	3
CO4	3	2	2	2	1	-	2	2	2	-	-	3	3
CO5	3	2	2	2	1	-	2	2	2	-	-	3	3
Course Contribution	3	2	2	2	1	-	2	2	2	-	-	3	3

B.E. MECH (I TO IV SEMESTERS)

BoS Chairman

R-2025(CBCS)

ME25407	METROLOGY AND MEASUREMENTS LABORATORY	L	T	P	C
		0	0	3	1.5
COURSE OBJECTIVES: - To familiarize students with the principles and operation of basic measuring instruments used for dimensional and geometric measurements. - To develop practical skills in calibration and verification of measuring devices using standard reference instruments and gauge blocks. - To enable learners to perform accurate linear, angular, surface, thread, and gear measurements using conventional and advanced tools. - To expose students to modern metrological systems such as Coordinate Measuring Machines (CMM) and surface roughness testers for quality inspection. - To inculcate the ability to analyze measurement data, identify sources of errors, and apply metrological standards for industrial quality control and assurance.					
LIST OF EXPERIMENTS: - Calibration and use of measuring instruments – Vernier caliper, micrometer – using gauge blocks - Calibration and use of measuring instruments – Depth micrometer, Vernier height gauge – using gauge blocks - Measurement of linear dimensions using Comparators - Measurement of angles using bevel protractor and sine bar - Measurement of screw thread parameters –Three wire method (floating carriage micrometer) - Measurement of gear parameters – Gear tooth vernier caliper - Measurement of features in a prismatic component using Coordinate Measuring Machine (CMM) - Measurement of Surface finish in components manufactured using various processes (turning, milling, grinding, etc.,) using stylus based instruments. - Calibration and Measurement of Torque - Calibration and Measurement of Temperature					
TOTAL: 45 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Demonstrate the calibration and use of linear and angular measuring instruments for dimensional inspection. CO2: Perform measurements of thread, gear, and surface parameters using appropriate measuring tools. CO3: Operate modern instruments like Coordinate Measuring Machine (CMM) and Autocollimator for precision measurements. CO4: Evaluate the straightness, surface finish, torque, and temperature of machine components using suitable metrological equipment. CO5: Apply measurement data to ensure quality standards and prepare technical inspection reports.					

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	1	-	2	2	2	-	-	3	3
CO2	3	2	2	2	1	-	2	2	2	-	-	3	3
CO3	3	2	2	2	1	-	2	2	2	-	-	3	3
CO4	3	2	2	2	1	-	2	2	2	-	-	3	3
CO5	3	2	2	2	1	-	2	2	2	-	-	3	3
Course Contribution	3	2	2	2	1	-	2	2	2	-	-	3	3

EN25C05	COMMUNICATIVE ENGLISH – II (B.E./B. Tech. - AI&DS, CSE(CS),Mechanical Engineering) (Practical)	L	T	P	C
		0	0	2	1
COURSE OBJECTIVES: - To describe the skills involved in critical reading and purposeful writing. - To identify the abilities essential for success in engineering coursework and related contexts. - To outline the key features of effective technical writing. - To discuss the processes involved in logical inquiry and objective evaluation. - To summarize the impacts of research topics and present project plans effectively in written form.					
UNIT I	TECHNIQUES IN PARAGRAPH CONSTRUCTION AND COMPREHENSION				6
Reading - Strategies for effective reading – usage of glossaries and footnotes to enhance reading skills, Comprehension reading, understanding different types of content. Writing-Planning a synopsis- synopsis preparation -paragraph writing format. Exercise –Writing a descriptive paragraph.					
UNIT II	ADVANCED WRITING SKILLS - ORGANIZING				6
Reading-Reading for details-using graphic organizers. Writing - exercises to state reasons and examples to support ideas in writing- exercises to clearly state opinion or ideas. Writing a paragraph with reasons and examples -writing an opinion paragraph.					
UNIT III	CORE COMPONENTS OF EXTENDED TEXTS				6
Reading- Understanding pronoun references and the use of connectors to establish coherence within passages - speed reading techniques - The 4-3-2-1 Drilling technique. Writing- Hints developing, Idea mapping and prompt expansion. Elements of a good essay-Types of essays- descriptive/ narrative, issue-based, argumentative and analytical essays..					
UNIT IV	ADVANCED WRITING IN PERSONAL AND TECHNICAL CONTEXTS				6
Writing- Cohesion of ideas, organization of ideas, Email writing, Business letters, Memo writing- editing and proofreading. Writing a resume with a job application - AI tools for writing a resume. Response writing- Peer review and feedback.					
UNIT V	LANGUAGE FOR A PROFESSIONAL SETTING				6
Reading- Critical reading and thinking- reading and comprehending texts of different domains. Writing- statement of purpose- letter of recommendation- drafting meeting agendas and minutes.					
TOTAL: 30 PERIODS					
OUTCOMES: At the end of the course, learners will be able to CO1: Describe the main ideas in complex texts accurately. CO2: Demonstrate the principles of effective technical writing. CO3: Discuss the basic concepts involved in critical thinking. CO4: Outline the features of effective communication. CO5: Summarize the steps to improve project and proposal writing skills.					
TEXT BOOK: 1. Debra Daise, CharlNorloff, and Paul Carne Reading and Writing (Level 4) Oxford University Press: Oxford, 2011					
REFERENCES: 1. U.S. Ramasamy. English Essentials - I. VRB Publishers, New Delhi, 2025.					

2. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	1	3	-	2	1	-
CO2	-	-	-	-	-	1	1	1	3	-	2	1	-
CO3	-	-	-	-	-	-	-	1	3	-	2	1	-
CO4	-	-	-	-	-	1	1	1	3	-	2	1	-
CO5	-	-	-	-	-	-	-	1	3	1	2	1	--
Course Contribution	-	-	-	-	-	1	1	1	3	1	2	1	-