



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Basic Electronics
Course Code	ECL0101[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Foundation core							
Pre-Requisite/s	Knowledge of modern physics			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To become familiar with various types of semiconductors and basic electronic devices. (BL1-Remember) CO2- To understand the operation of various electronic devices. (BL2-Understand) CO3- To implement the concepts of semiconductors to various semiconductor devices. (BL3-Apply) CO4- To analyze the various electronic devices and their frequency response. (BL4-Analyze) CO5- To evaluate the performance of electronic devices such as diodes, transistors, function generators, and cathode ray oscilloscopes. (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
I	Semiconductor Basics: Intrinsic and Extrinsic Semiconductors, Current Mechanisms in Semiconductors: Drift and Diffusion Current. PN Junction: Formation of PN Junction, Creation of Depletion Layer, Forward and Reverse Biasing, Diode Current Equation, Volt – Ampere characteristics of PN junction diode and effect of temperature on V-I characteristics, Diode resistances, Diode Capacitances, Diode Equivalent circuits: Piecewise Linear approximation Model, Simplified approximation Model, Ideal equivalent circuit.	Lecture Method/Video Clips	12
II	Diode Applications: Diode as Rectifier: Half Wave rectifier, Full Wave Rectifier, Calculation of Average, RMS loads voltages and currents, Rectification efficiency, PIV, Ripple factor. Break Down Diodes: Avalanche and Zener Breakdown. V-I characteristics of Zener Diode, Zener Diode Specifications, Zener Diode Equivalent Circuit. Zener Diode as Shunt Regulator: Analysis of Zener diode as shunt regulator under varying Load capacitance and Supply voltage.	Lecture Method/Video Clips/Simulation	10
III	Bipolar Junction Transistor: Formation of NPN and PNP Transistor, unbiased and biased transistor, Transistor currents, Symbol of NPN and PNP Transistors, Common Base, Common Emitter and Common Collector Configurations along with Input and Output Characteristics, Transistor Amplifying action. Transistor Biasing: Load Line, Operating Point, Need of Biasing, Different Biasing Techniques: Fixed Bias, Emitter Stabilized Bias, Voltage Divider Bias, DC Bias with Voltage Feedback	Lecture Method/Video Clips/Virtual Labs	10
IV	Field Effect Transistor: JFET: Construction of N channel and P channel JFET, Working of JFET along with Drain and Transfer Curves, JFET Parameters and symbol, JFET Biasing. MOSFET: Construction and working of N channel and P channel Depletion and Enhancement MOSFETs, Drain and Transfer curves, Symbols. Operational Amplifier: Basics of operation amplifier, op-amp parameters: Input offset voltage, Output offset voltage, Slew rate, CMRR etc. Open and closed loop gain, Virtual Ground, Characteristic of ideal operational amplifier. Operational Amplifier Applications: Use of Ideal Op-amp to construct: Inverting amplifier, Non-inverting amplifier,	Lecture Method/Video Clips/Virtual Labs	12

	Differentiator, Integrator, Adder, Subtractor etc.		
V	Electronic Instruments: Digital Voltmeter, Digital Multimeter, Cathode Ray Oscilloscope, Applications of CRO: Measurement of Voltage, Current, Time Period, Frequency, Use of Lissajous Pattern to Measure unknown frequency and phase difference, Function Generator.	Lecture Method/Video Clips/Virtual Labs/Simulation	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Introduction to Laboratory Equipment's: Cathode Ray Oscilloscope (CRO), Function Generator, Digital Multimeter.	Experiments	BL2-Understand	2
3	To study Full Wave Centre Tap Rectifier and calculate various parameters.	Experiments	BL4-Analyze	2
1	To study and plot the V-I characteristics of PN Junction Diode.	Experiments	BL4-Analyze	2
4	To study Full Wave Bridge Rectifier and calculate various parameters	Experiments	BL4-Analyze	2
3	To study and plot Input & Output Characteristics of BJT in Common Base Configuration	Experiments	BL5-Evaluate	2
4	To study and plot Input & Output Characteristics of BJT in Common Emitter Configuration	Experiments	BL4-Analyze	2
2	To Design Half-Wave rectifier by using basic electronic components	PBL	BL6-Create	10
4	To Design subtractor using OPAM	PBL	BL6-Create	10

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Boylestad & Nashelsky Electronics Devices and Circuit Theory Pearson Education India, 2009. Ramakant A. Gayakwad Op Amps and Linear Integrated Circuits Englewood Cliffs: Prentice-Hall, 2012.
Articles	Popović, Božidar, et al. "Remote control of laboratory equipment for basic electronics courses: A LabVIEW-based implementation." Computer Applications in Engineering Education 21.S1 (2013): E110-E120.
References Books	Malvino, L. Electronic principles The McGraw Hill Companies, 2016. Sedra and Smith, Microelectronics circuits, Fifth edition by Oxford University Press 2017 Graham Bell Electronic Devices and Circuits Prentice-Hall 2009
MOOC Courses	https://nptel.ac.in/courses/122106025
Videos	https://nptel.ac.in/courses/122106025

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	-	-	3	-	-	-	-	1
CO2	3	2	1	-	-	2	-	-	-	3	-	-	2	2	2
CO3	1	1	1	3	-	-	-	-	-	-	-	-	2	3	2
CO4	1	1	1	3	2	-	-	-	-	-	-	-	3	3	2
CO5	1	1	-	2	-	-	-	-	-	-	-	-	2	3	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Communication Skills & Colloquim
Course Code	HUL0101[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have knowledge about Language proficiency.			Co-Requisite/s	Developed Communication skill.			
Course Outcomes & Bloom's Level	CO1- Determine interpersonal skills and be an effective goal-oriented team player.(BL1-Remember) CO2- Classify and formulate the elementary intricacies of Scientific and Technical Writing using applicative grammar construct. (BL2-Understand) CO3- Examine attitudes, emotional intelligence and understand its influence on behavior. (BL3-Apply) CO4- Justify approaches to conflict resolution(BL4-Analyze) CO5- Evaluate Formal Communication.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✗		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Module 1	Introduction to Communication Skills, Objectives, Significance of Communication, Flow of Communication, Principles Communication, Essential Features, Process of Communication, Verbal (Oral & Written) and Non-verbal Communication, Barriers to Effective Communication, Introduction to Technical Communication, Major Difference between Technical Communication and General Communication.	Classroom Lecture, PPTs,	6
Module 2	Introduction & Significance of Listening skills, Types of Listening, Barriers in Effective Listening, Basic Grammar - Parts of Speech, Active Passive and Articles.	Classroom Lecture, PPTs,	6
Module 3	Introduction to Formal Letter Writing, Elements of Letter Writing and Style of Writing, Layout & Structure of Formal Letter Writing, Introduction to the Types of Business Letters- Enquiry, Calling Quotations, Order, Complaint and Adjustment. Introduction to Employment Communication- Job Application, Writing Resume, Differences among Resume, Curriculum Vitae & Bio-data.	Classroom Lecture, PPTs, Videos	6
Module 4	Introduction to Oral Presentations, Objectives, Significance and Approach, Preparation and Delivery of Oral Presentation (topics to be selected by the teachers). Introduction to Interview Skills. How to Develop Interview Skills. Dos and Don't of Interviews, Types of Interviews, Reviewing TV Program/Book/News Paper Articles etc	Classroom Lecture, PPTs, Videos	6
Module 5	Introduction to Report Writing, Major Objectives of Writing Reports, Significance of Business/Technical, Types and Forms of Reports, Styles of Writing Reports- Printed Format, Memo Format, Letter Format, Book/Letter Text Format. Layout and Structure of Reports, Components of Reports, Writing.	Classroom Lecture, PPTs, Videos	6

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	30

Part E

Books	Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi
Articles	https://www.jetir.org/papers/JETIR2108373.pdf https://open.lib.umn.edu/communication/chapter/1-2-the-communication-process/ https://www.iosrjournals.org/iosr-jbm/papers/Vol22-issue8/Series-2/E2208024254.pdf
References Books	Modern Technical Writing by Sherman, Theodore A (et.al); Apprenctice Hall; New Jersey; U.S
MOOC Courses	https://nptel.ac.in/courses/109103020
Videos	https://nptel.ac.in/courses/109103020

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	2	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	2	1	1	-	1	-	-	-	-	2	-	-	3	2	3
CO4	3	2	-	2	1	-	-	-	-	2	-	-	2	3	3
CO5	3	2	-	2	1	-	-	-	-	2	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Calculus For Engineers
Course Code	MAL0101[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Basic Sciences and Mathematics							
Pre-Requisite/s	Basic knowledge of Functions, Limit, Continuity and Differentiability			Co-Requisite/s	Basic knowledge of variables			
Course Outcomes & Bloom's Level	CO1- Knowledge about the derivative and use of derivative to expand the functions and evaluation of Maxima and Minima. (BL1-Remember) CO2- Knowledge about the vector valued function directional derivative, gradient, divergence and curl with their properties (BL2-Understand) CO3- Applying: Partial derivatives and its applications apply to evaluate the Maxima and Minima. (BL3-Apply) CO4- Find the area under a given curve, length of an arc through integration as application to Beta and Gamma Function. (BL4-Analyze) CO5- Evaluating: Find the area and volume by applying the techniques of double and triple integrals., (BL5-Evaluate) CO6- Applications of vector valued function in integration to find line , surface and volume. (BL5-Evaluate)							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Differentiation, Extrema on an Interval, Rolle's Theorem and the Mean Value Theorem, Increasing and Decreasing functions and First derivative test, Second derivative test, Maxima and Minima. Functions of two variables, partial derivatives, total differential, Jacobian and its Properties	Audio/Video clips, group discussion, lecture with PPTs, quiz	8
Unit 2	Taylor's expansion for two variables, maxima and minima, constrained maxima and minima, Lagrange's multiplier method. Integration, Average function value, Area between curves, Volumes of solids of revolution, Beta and Gamma functions, interrelation.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 3	Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates, Evaluation of triple integrals, change of variables between Cartesian and cylindrical and spherical co-ordinates, evaluation of multiple integrals using gamma and beta functions.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 4	Scalar and vector valued functions, gradient, tangent plane, directional derivative, divergence and curl, scalar and vector potentials, Statement of vector identities, Simple problems.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 5	Line, surface and volume integrals, Statement of Green's, Stoke's and Gauss divergence Theorems, verification and evaluation of vector integrals using them.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Introduction to MATLAB through matrices, and general Syntaxes.	Experiments	BL3-Apply	2
2	Plotting and visualizing curves and surfaces in MATLAB– Symbolic computations using MATLAB	Experiments	BL3-Apply	2
3	Evaluating Extremum of a single variable function	Experiments	BL3-Apply	2
4	Understanding integration as Area under the curve	Experiments	BL3-Apply	2
5	Evaluation of Volume by Integrals (Solids of Revolution)	Experiments	BL3-Apply	2
6	Evaluating Maxima and minima of functions of several variables	Experiments	BL3-Apply	2
7	Evaluating triple integrals	Experiments	BL3-Apply	2
8	Evaluating gradient, curl and divergence	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	0

Part E

Books	1. Thomas' Calculus by George B. Thomas, D. Weir and J. Hass, 13th edition 2014, Pearson. 2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers. 3. B.V. Ramana, Higher Engineering Mathematics, Tata Mc Graw Hill.
Articles	
References Books	1. E. Kreyszig, Advanced Engineering Mathematics, 8th Ed., John Wiley and Sons, 1999. 2. Gorakhprasad, Integral Calculus, Pothishala Publication. 3. Gorakhprasad, Differential Calculus, Pothishala Publication.
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_ee09/preview
Videos	https://onlinecourses.nptel.ac.in/noc24_ph02/preview

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	2	2	-	-	-	-	-	-	-	-	2	3
CO2	2	3	1	2	2	-	-	-	-	-	-	-	-	2	3
CO3	2	2	1	1	1	-	-	-	-	-	-	-	-	1	3
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	1	2
CO5	-	2	-	-	-	-	-	-	-	-	-	-	-	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Engineering Mechanics
Course Code	MEL0101[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Foundation core							
Pre-Requisite/s	Knowledge of basic sciences			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- CO1 Remember the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions(BL1-Remember) CO2- CO2 Understand the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions.(BL2-Understand) CO3- CO3 Apply system of forces in the belts drive systems as power transmission devices, shafts and beams.(BL3-Apply) CO4- CO4 Analyze the beams and trusses with centre of mass and moment of inertia.(BL4-Analyze) CO5- CO5 Evaluate shear force and bending moment in designing of shafts and beams and trusses.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Introduction of Engineering Mechanics Basic concepts of system of forces- Coplanar Concurrent Forces - Components in Space – Resultant Moment of Forces and its Application - Couples and Resultant of Force System - Equilibrium of System of Forces- Free body diagrams- Equations of Equilibrium of Coplanar Systems and Spatial Systems.	Lectures with whiteboard/PPT, Quiz, Group discussion	9
Unit-2	Friction Types of friction, Limiting friction, Laws of Friction, static and Dynamic Friction. Motion of Bodies - Wedge, Ladder and Screw jack.	Lectures with whiteboard/PPT, Quiz, Group discussion	7
Unit-3	Transmission of Power Belt Drivers - Open, Crossed and compound belt drives, length of belt, tensions- tight side and slack side, Power transmitted and condition for maximum power.	Lectures with whiteboard/PPT, Quiz, Group discussion	7
Unit-4	Center of Gravity & Moment of Inertia: Centroids - Centroids of Composite figures - Centre of Gravity of Bodies - Area moment of Inertia: - polar Moment of Inertia - Transfer - Theorems - Moments of Inertia of Composite Figures, Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia..	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-5	Shear Force & Bending Moment Diagrams & Trusses: Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple. Application of Equilibrium Concepts. Trusses- types, method of joints and method of moments.	Lectures with whiteboard/PPT, Quiz, Group discussion	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment-1	1. To verify the law of Triangle of forces and Lami's theorem.	Experiments	BL3-Apply	2
Experiment-2	2. To verify the law of parallelogram of forces	Experiments	BL3-Apply	2
Experiment-3	3. To verify law of polygon of forces	Experiments	BL3-Apply	2
Experiment-4	4. To find the support reactions of a given truss and verify analytically.	Experiments	BL3-Apply	2
Experiment-5	5. To determine support reaction and shear force at a given section of a simply supported beam and verify in analytically using parallel beam apparatus.	Experiments	BL3-Apply	2
Experiment-6	6. To verify bending moment at a given section of a simply supported beam.	Experiments	BL3-Apply	2
Experiment-7	7. To find coefficient of friction on horizontal and inclined planes.	Experiments	BL3-Apply	2
Experiment-8	8. To determine centre of gravity of different shapes.	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Engineering Mechanics by Dr. D.S. Kumar, S.K. Kataria & sons, latest edition. Engineering Mechanics by R. K. Rajput, S.Chand & Co. Engineering Mechanics: Statics & Dynamics by R.C. Hibbler
Articles	
References Books	• Engineering Mechanics- statics dynamics by Boresi & Schmidt, Thomson Books • Engineering Mechanics - Schaum's series - Mc.Grawhill Publications. • Engineering Mechanics by S. Timashenko, D.H. Young and J.V. Rao
MOOC Courses	https://archive.nptel.ac.in/courses/112/106/112106286/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	1	-	-	1	1	1	1	1	1
CO2	3	3	1	1	-	1	3	-	1	1	1	2	1	1	1
CO3	3	3	3	2	2	2	1	2	1	-	1	2	1	1	1
CO4	3	3	2	3	2	2	1	-	1	1	2	2	2	2	2
CO5	3	3	3	3	2	2	2	2	2	3	3	3	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Material Science
Course Code	MEL0104[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	The field of materials science is broad and subsumes aspects of physics, chemistry, mechanics, and more.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Recall the crystal structure and classification of materials(BL1-Remember) CO2- Understating the concept of advanced finishing processes, understand mechanical properties and their application.(BL2-Understand) CO3- To implement the phase diagram of materials(BL3-Apply) CO4- To analyze the heat treatment process to achieve desired properties of metals and alloy.(BL4-Analyze) CO5- To evaluate type of materials that are used in engineering with special emphasis on steel/ ferrous materials(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Introduction, Atomic models, Chemical bonding, Crystallography and Imperfections, Concept of unit cell, Space lattice, Crystal lattices, Common crystal structures, Atomic packing factor and density, Miller indices, Defects & imperfections in solids. Mechanical Properties: Stress-Strain Diagram, Ductile & Brittle Material, Strength, Toughness, Hardness, Fracture, Fatigue and Creep.	Lectures with whiteboard and PPT, Report writing	8
Unit-2	Plastic Deformation of Metals: Hot working, Cold working, Re-crystallization & grain growth. Phase Diagram and Equilibrium Diagram: Unary and Binary diagrams, Phase rules. Types of equilibrium diagrams, Iron-carbon equilibrium diagram, Solid solutions, eutectic and combination type.	Lectures with whiteboard and PPT, Quiz, Seminar, Poster	8
Unit-3	Ferrous Materials: Various types of carbon steels, alloy steels and cast irons, its properties and uses. Heat Treatment: Various types of heat treatment such as Annealing, Normalizing, Quenching, Tempering and Case hardening. Time Temperature Transformation (TTT) diagrams.	Lectures with whiteboard and PPT, Quiz, Report writing	8
Unit-4	Non-Ferrous metals and alloys such as Cu, Al, Zn, Cr, Ni, etc. and their applications. Various types: Brass, Bronze, bearing materials, its properties and uses. Aluminum alloys such as Duralumin. Ceramics: Structure types and properties and applications of ceramics.	Lectures with whiteboard and PPT, Abstract of research paper	8
Unit-5	True stress-strain, elastic recovery and plastic deformation. Strain Quiz, Case writing, seminar hardening, recovery, recrystallization, grain growth. Powder metallurgy: introductory concept & processes.	Lectures with whiteboard and PPT, Quiz, Case writing, seminar	8

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0	0			

Part E

Books	Material Science & Processes, Media Promoters & Publishers Narula - Material Science, TMH
Articles	
References Books	1. W. D. Callister, Jr, - Material Science & Engineering Addition, Wiley Publishing Co. 2. Van Vlash - Elements of Material Science & Engineering, John Wiley & Sons. 3. V. Raghvan - Material Science, Prentice Hall of India 4. Srivastava & Srinivasan - Science of Materials Engineering, New Age Publishers
MOOC Courses	https://archive.nptel.ac.in/courses/113/102/113102080/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	-	1	3	2	-	2	2	2	-	-	-	3	3	3	2
CO4	-	2	1	3	2	-	-	1	-	-	2	1	2	-	2
CO5	-	-	-	-	-	3	-	-	-	-	2	-	1	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Mechanical Workshop Practice
Course Code	MEP0101[P]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of casting, joining and machining.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember basics of physics.(BL1-Remember) CO2- To understand the tool materials and their proper applications.(BL2-Understand) CO3- To prepare and manufacture the various joints using carpentry and fitting shop tools and welding process.(BL3-Apply) CO4- To analyze casting and welding products.(BL4-Analyze) CO5- To evaluate the casting process parameters and welding parameters for efficient productivity.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Carpentry Shop Carpentry, process of finished products, building work, furniture, cabinet making Etc. joinery, preparation of joints, Timber, Timber sizes, classification of Timber, Characteristics of good timber, seasoning of wood.	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	
Unit-2	Marking and Measuring Tools Steel rule and Steel tape, Marking gauge, Try-square, Compass and divider, Scriber or marking knife, Bevel, Holding Tools- Carpenter's vice, C-clamp, Bar cramp, Planning Tools- Jack plane, Smoothing plane, Rebate plane, Plough plane Cutting Tools- Saws, Cross-cut or hand saw, Rip saw, Tenon saw, Compass saw, Chisels, Drilling and boring tools- Carpenter's brace, Auger bit, Hand drill, Gimlet, miscellaneous tools- Mallet, Pincer, Claw hammer, Screw driver, Wood rasp file, Bradawl, wood joints- Lap joints, Mortise and Tenon Joints, Bridle joint.	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	
Unit-3	Welding Shop Electric arc welding, Gas welding, Thermal welding, Electrical Resistance welding, Friction welding Equipment Used for Welding- Transformers, Motor generators, Rectifiers, Welding cables, Electrodes, electrode holder, Ground clamp, wire brush and chipping hammer, Welding table and cabin, Face shield, Hand gloves. Techniques of welding Preparation of work, striking an arc, Strike and Withdraw, Touch and with draw, Weaving, Types of Joints- Butt Joint, Corner Joint, Tee Joint, Lap joint, Edge welding positions- Flat position welding, Horizontal position welding, Vertical position welding, Overhead position welding.	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	
Unit-4	Fitting Shop Introduction hand fitting, the assembly of machine tools, jigs, gauges, etc., bench work. assembly of mating parts, removal of metal, fit, simple hand tools. filing, chipping, scraping, sawing drilling, and tapping. Holding tools, Cutting Tools - Finishing Tools, Reamers, Files, miscellaneous tools ---- File card, Spirit level, Ball Peen Hammer, Cross Peen, Hammer, Straight-Peen Hammer, Screw driver, Spanners.	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	
Unit-5	Foundry shop Process, Melting, Furnace, Degassing, Mold making, Pouring, Shakeout, Degating, Heat treating, Surface cleaning, Finishing,	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment-1	To study of Tools and Their Operations in Carpentry joint	Experiments	BL2-Understand	4
Experiment-2	To Prepare Half Lap corner joint and T- joint	Experiments	BL3-Apply	4
Experiment-3	To study of tools and their operations in Fitting Shop	Experiments	BL3-Apply	4
Experiment-4	To study of tool and operations in welding shop	Experiments	BL3-Apply	4
Experiment-5	To study of single point cutting tools , machine tool and operations in machine shop	Experiments	BL3-Apply	4

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0	0			
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	1. S. K. Hazra Chowdhry Elements of Workshop Technology Vol-1 Tata Mc Graw Hill Publication 2 John K.C Mechanical Workshop Practice Paperback – 1 Khanna Publishers, 2001
Articles	
References Books	1. English, Paperback, Dave A K, Dubey D Workshop Technology & Practice Standard Publishers, 2010 2. W.A.J. Chapman Workshop Technology by vol. 1,2 Mc Graw Hill, 2001
MOOC Courses	https://archive.nptel.ac.in/courses/112/103/112103108/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	2	2	1	-	-	2	2	2	1	-	-
CO2	1	2	2	2	2	1	2	2	-	-	-	2	2	3	3
CO3	2	1	2	-	-	-	2	2	-	-	-	2	3	-	3
CO4	1	2	2	-	-	2	1	-	-	2	2	3	3	2	2
CO5	-	2	1	2	2	2	3	2	-	-	-	2	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Essentials of Information Technology
Course Code	CSL0201[T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					2	0	2	4
Course Type	Embedded theory and lab							
Course Category	Foundation core							
Pre-Requisite/s	To understand the contents and successfully complete this course, a participant must have a basic understanding of Basics of Computer system, Storage Systems, Operating systems, Networking and Database.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Understand the basics of Computer systems like types, I/O devices, storage of computer systems (Knowledge, Understand)(BL1-Remember) CO2- Apply the various networking concepts, topologies and remove deadlocks. (Apply). (BL2-Understand) CO3- Explain various memory management techniques and Analyze the concept of Sub-programs and blocks (Analysis)(BL3-Apply) CO4- Design the concept of software, operating system for better utilization of external system (Design)(BL4-Analyze) CO5- Evaluating the various algorithm, its solution and other communication techniques. (Investigation).(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	Computer Basics: Basics of Computer Systems(T1,T2), Evolution of Computers, Computer Generations, Classification of Computers(T1,T3), Computer Applications, Interaction between User and Computer(T7). Hardware Components, Basic Computer Organization, Input and Output Devices(T1,T3), Central Processing Unit(T1), System Bus Architecture, Memory or Storage Unit	Lecture with White Board, PPT	6
2	Operating System: Introduction to Operating System, Function of Operating Systems(T1), Working Knowledge of GUI-Based Operating System (T3,T4), Working with latest version of Windows(T3,T4). Various Operating Systems, Evaluation of Operating System(T3,T4,T7), Virtual Machine, Operating Systems for Mobile, Installation of Operating System(T1,T3,T4), Boot Process.	Lecture with White Board, PPT	6
3	Computer Networks and World Wide Web: Introduction to Computer Networks (LAN, MAN, WAN, PAN)(T3,T4), Network Topologies, Ethical Issues related to Network Security(T2,T3). Internet and World Wide Web(T7,T8), Internet Evolution(T1), FTP, Electronic Mail, Search Engines(T1), Introduction to HTML, Static and Dynamic Web Pages	Lecture with White Board, PPT	6
4	Computer Software: Introduction, System Software(T1,T3), Application Software, Firmware(T3), Software Installing and Uninstalling(T3,T4), Software Development Steps, Characteristics of good software(T1,T7), Usability of software, Introduction to Free and Open Source Software(T3,T4), Introduction to Database Management System	Lecture with White Board, PPT	6
5	Subprograms and Blocks: Problem Solving: Flow Charts(T3,T4), Tracing Flow Chart, Algorithms. Fundamentals of sub-programs(T1,T3,T4), Scope of life time of variables, static and dynamic scope(T7), design issues of subprograms and operations, parameter passing methods(T3,T4), overloaded sub-programs, generic sub-programs(T1,T3), design issues for functions user defined overloaded operators	Lecture with White Board, PPT	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Explain the Installation process of Operating system and its Memory Management.	Experiments	BL2-Understand	10
2-3	Design of a Web Page which describe your Biodata.	PBL	BL3-Apply	10
4-5	Describe Software development life cycle (SDLC) with all components.	PBL	BL5-Evaluate	10

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	18	60	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	0

Part E

Books	P. K. Sinha, Priti Sinha; Computer Fundamentals; BPB Publication. V. Rajaraman; Fundamentals of Computers; Prentice Hall of India Publication. G. G. Wilkinson; Fundamentals of Information Technology; Wiley-Blackwell Publishing. Yashwant P. Kanetkar; Let Us C; BPB Publication.
Articles	
References Books	E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing. Ron Mansfield; Working in MS-Office; Tata McGraw Hill Publishing.
MOOC Courses	https://www.my-mooc.com/en/categorie/information-technology
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	1	1	2
CO2	1	2	-	-	-	-	-	-	-	-	-	-	3	3	2
CO3	-	-	1	-	-	-	-	-	-	-	-	-	3	2	2
CO4	-	-	-	2	-	-	-	-	-	-	-	-	2	2	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Programming logics
Course Code	CST0201[P]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Foundation core							
Pre-Requisite/s	Basic understanding of Windows/Linux operating system.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Remember: Recall the syntax and basic concepts of C programming.(BL1-Remember) CO2- Understand: Explain the meaning of C programming constructs and how they work together(BL2-Understand) CO3- Apply : Apply the various conditional and looping statement and functional programming.(BL3-Apply) CO4- Analyzing: Analyze and evaluate C programming code to identify errors and optimize performance.(BL4-Analyze) CO5- Evaluate : Evaluate the effectiveness of C programming solutions and propose improvements.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Character set, variables and identifiers, built-in data types, arithmetic operators and expressions, constants and literals, simple assignment statements, basic input/output statements, simple 'C' programs.	Demonstration through PPT, Computer	10
2	Conditional Statements and Loops: Decision making within a program, conditions, relational operators, logical connectives, if statement, if-else statement; Loops: while loop, do-while loop, for loop; nested loops, infinite loops; switch statement, structured programming. Array: One Dimensional Arrays - array manipulation, searching, insertion and deletion in an array; Two Dimensional Arrays - addition/multiplication of two matrices, transpose of a square matrix; string	Demonstration through PPT, Computer	10
3	Pointer: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, arrays and pointers, pointer arrays, dynamic memory allocation. Functions: Standard library functions, prototype of a function, return type, function calling, block structure, passing arguments to a function - call by reference and call by value; recursive functions, arrays as function arguments.	Demonstration through PPT, Computer	10
4	Structure and Union: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays - arrays of structure, structures containing arrays, unions. Dynamic Memory Management: Use of malloc, calloc, realloc and free keywords	Demonstration through PPT, Computer	10
5	File Management: Introduction, defining and opening a file, closing a file, input/output operations on files, error handling during i/o operations, random access to files, programs using files. Command Line Arguments: argv and argc arguments, programs using command line arguments. Preprocessor: Introduction, macro substitution, file inclusion, compiler control directives.	Demonstration through PPT, Computer	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Life Insurance Premium Calculator	Experiments	BL3-Apply	10
2-3	Program to compare best life insurance plan using an array.	PBL	BL4-Analyze	10
4-5	Write a C program to read name and marks of n number of students from user and store them in a file. If the file previously exists, add the information of n students.	PBL	BL5-Evaluate	20

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	40				
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	0

Part E

Books	B. W. Kernighan, Dennis M. Ritchi; The C Programming Language; Prentice Hall.
Articles	
References Books	Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing.
MOOC Courses	https://www.my-mooc.com/ja/mooc/logic-and-computational-thinking/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	-	-	-	-	-	-	-	2	3	1
CO2	1	2	1	2	2	1	-	-	-	-	-	-	1	-	3
CO3	2	-	1	-	-	2	-	-	-	-	-	-	3	2	2
CO4	2	1	-	2	1	-	-	-	-	-	-	-	3	3	2
CO5	2	2	-	2	1	-	-	-	-	-	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Principles of Electrical Engineering
Course Code	EEL0201[T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline-linked Engineering Science Courses							
Pre-Requisite/s	Knowledge of physics and basic electronics			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Predict the behavior of any electrical circuits, Formulate and solve complex DC circuits. (BL1-Remember) CO2- Predict the behavior of any electrical circuits, Formulate and solve complex single phase AC circuits. (BL2-Understand) CO3- Predict the behavior of any electrical circuits, Formulate and solve complex Three phase AC circuits. (BL3-Apply) CO4- Identify the type of electrical machine used for that particular application. Realize the requirement of transformers in transmission and distribution of electric power and other applications. (BL4-Analyze) CO5- Predict the behavior of various measuring instruments in electrical engineering (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	D.C. Circuit: - Combination of resistance in series & parallel, their solution, Star –Delta combination, KCL and KVL. Voltage and current sources, dependent and independent sources, source conversion, DC circuit's analysis using mesh & nodal method, Superposition theorem.	Lecture with white board, ppt	10
2	Single Phase Circuit:- Generation of Alternating Voltage & Currents, Their Equation, Definition, R.M.S and Average values, Vector representation of alternating quantities, Phasor relations between voltage & current in each of resistance, inductance and capacitance, A.C series circuit power & power factor, Resonance in series circuit.	Lecture with white board, ppt	12
3	Electrical Measuring Instruments:- Introduction and classification of Electrical Instruments, Essentials of indicating instruments, Moving iron instruments, Types of moving iron instruments, Advantages and Disadvantages of moving iron instruments, Applications of moving iron equipment, Permanent Magnet type moving coil instruments, extension of range of ammeters and voltmeter, Dynamometer type instruments, Dynamometer type wattmeters	Lecture with white board, ppt	7
4	Poly-phase Circuits:-Generation of Poly-phase Voltages, 3phase system, Phase sequence, Inter connection of 3 phases, Voltage, Currents & Power relationships in balanced 3 phase circuits, Power Measurement in single phase & 3 phase circuits..	Lecture with white board, ppt	8
5	Transformer:- Construction & working principle of transformer, Emf equation, No load & Full load phasor diagram, Equivalent circuit, Losses & Efficiency, Voltage Regulation, Open circuit & Short Circuit Test on the Transformer	Lecture with white board, ppt	10

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	

Part E

Books	Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition
Articles	
References Books	1. Basic Electrical Engg, Sunil S Gaikwad, Dream Tech/ Willey Publication.
MOOC Courses	https://www.coursera.org/courses?query=electrical
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	1	1	-	-	-	-	-	-	-	1	1	2
CO2	1	1	2	1	1	3	-	1	-	-	1	-	2	3	1
CO3	2	1	2	1	2	-	2	-	2	2	-	-	1	2	2
CO4	1	3	1	2	3	-	-	-	-	-	-	-	3	1	3
CO5	1	1	1	2	1	-	-	-	-	-	-	-	2	2	1
CO6	1	1	1	1	1	-	-	-	-	-	-	3	1	3	2

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Statistics for Engineers
Course Code	MAL0203

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Basic Sciences and Mathematics							
Pre-Requisite/s	statistics for engineers typically include basic mathematics (algebra, calculus), understanding of probability theory, and familiarity with concepts in engineering disciplines. Additionally, knowledge of software tools like MATLAB or Python for data analysis is beneficial.			Co-Requisite/s	statistics for engineers may include introductory courses in engineering mechanics, computer programming, and experimental methods. Additionally, concurrent enrollment in courses covering linear algebra and differential equations could provide valuable mathematical background for understanding advanced statistical concepts and applications in engineering contexts.			
Course Outcomes & Bloom's Level	CO1- To remember basic concept of about the design data collection plans and basic tools of descriptive statistics. (BL1-Remember) CO2- To understand the identify relationship between two variables using scatter plot and Interpret a simple correlation. To understand the Knowledge about the different types of continuous distribution with their properties and applications. (BL2-Understand) CO3- To apply the test and make hypothesis by Student's t-test, F-test, chi-square test, Z test, goodness of fit. (BL3-Apply) CO4- To analyze the concept of sampling distribution of a statistic and its properties, difference between parameter and statistic. (BL4-Analyze) CO5- To evaluate and describe the properties of unbiasedness. Also identifying and provide an application the null hypothesis, alternative hypothesis and test statistic. (BL5-Evaluate)							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to statistics and data analysis Measures of central tendency, Measures of variability, [Moments, Skewness, Kurtosis (Concepts only)]. Correlation and Regression, Partial and Multiple correlations, Multiple regressions.	lecture with ppt, quiz Audio/Video clips, group discussion,	10
2	Introduction, random variables, Probability mass Function, distribution and density functions, joint Probability distribution and joint density functions, Marginal, conditional distribution and density functions, Mathematical expectation, and its properties Covariance, moment generating function, characteristic function.	lecture with ppt, quiz Audio/Video clips, group discussion	10
3	Binomial and Poisson distributions, Normal distribution, Gamma distribution, Exponential distribution.	lecture with ppt, quiz lecture with ppt, quiz Audio/Video clips, group discussion, classroom presentations, Analysis	6
4	Testing of hypothesis, Introduction, Types of errors, critical region, procedure of testing hypothesis, Large sample tests, Z test for Single Proportion, Difference of Proportion, mean and difference of means.	lecture with ppt, quiz Audio/Video clips, group discussion	8
5	Small sample tests, Student's t-test, F-test, chi-square test, goodness of fit, independence of attributes, Design of Experiments, Analysis of variance, one and two way classifications, CRD, RBD, LSD.	lecture with ppt, quiz Audio/Video clips, group discussion,	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Introduction: Understanding Data types; importing/exporting data.	Experiments	BL2-Understand	2
2	Computing Summary Statistics/plotting and visualizing data using Tabulation and Graphical Representations.	Experiments	BL3-Apply	2
3	Applying correlation and simple linear regression model to real dataset; Computing and interpreting the coefficient of determination	Experiments	BL3-Apply	2
4	Applying multiple linear regression model to real data set; computing and interpreting the multiple coefficient of determination	Experiments	BL3-Apply	2
5	Fitting the following probability distributions: Binomial distribution,	Experiments	BL3-Apply	2
6	Normal distribution Poisson distribution	Experiments	BL3-Apply	2
7	Testing of hypothesis for One sample mean and proportion from real, time problems	Experiments	BL3-Apply	2
8	Testing of hypothesis for Two sample mean and proportion from real, time problems	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	M. Ray, H.S. Sharma, Sanjay Chaudhary Mathematical Statistics Ram Prasad & Sons J.N. Sharma, J.K. Goyal Mathematical Statistics Krishna Prakash and Media (P) Ltd
Articles	
References Books	E.Kreyszig Advanced Engineering Mathematics 8 th Ed., John Wiley and Sons, 1999 B.V. Ramana Higher Engineering Mathematics Tata McGraw Hill B. S. Grewal Higher Engineering Mathematics Khanna Publishers
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_ec03/preview
Videos	https://onlinecourses.nptel.ac.in/noc24_ec03/preview

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	1	-	-	-	-	1	-	1
CO2	3	3	1	3	3	2	-	1	-	1	-	-	2	-	2
CO3	3	2	-	1	3	-	-	-	-	-	-	-	1	3	2
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	3	1
CO5	2	2	-	1	-	-	-	-	-	-	-	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Environmental Pollution and Global Issues
Course Code	MCL0201[T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s	Basic knowledge of natural resources, biodiversity, ecological succession, energy flow, environmental issues and problems.			Co-Requisite/s	A detailed understanding of the complexity of environment and its challenges and solutions to these problems and challenges.			
Course Outcomes & Bloom's Level	CO1- CO1. Develop environmental scientists and engineers and sensitize them towards environmental issues.(BL2-Understand) CO2- CO2. To acquire analytical skills in assessing environmental impacts through a multidisciplinary approach(BL3-Apply) CO3- CO3. Ability to distinguish between various methods of various pollution analysis(BL4-Analyze) CO4- CO4.Acquire expertise and skills needed for the Environmental Management Systems and techniques of monitoring, Environment audit, Environmental Impact Analysis, environment instrumentation and control systems and for the projects development, implementation, and maintenance.(BL5-Evaluate) CO5- CO5. Students acquire skills for to communicate, prepare, plan and implement the environmental management project(BL6-Create)							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✓		SDG (Goals)	SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG12(Responsible consupction and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
1 (Environment, Ecosystem and Environmental Education)	Environment – Definition and its segments, (Lithosphere, Hydrosphere, Atmosphere and Biosphere), Multidisciplinary nature of Environmental Science, Ecology and Ecosystem: Basic concepts, functions of ecosystem, Energy Flow, Food chain, food web, Ecological Pyramids, Ecological Successions. Environmental Education- Definition, scope, importance, Need for Public Awareness, Environmental Ethics. Environmental Impact Assessment: Screening, Scoping, Base line Analysis, Impact Mitigation, Documentation, Review, Public hearing, Post Project Monitoring.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, discussion (questions & answers section)	8
2 (Natural Resources Management)	Natural Resources – Classification, Water Resources (availability, quality, water budget), Mineral Resources (distribution, availability and future perspectives), and Forest Resources. Energy Resources- Classification and alternatives of conventional energy resources- Solar, working of solar photovoltaic cells, Geothermal, Wind energy, Nuclear Energy, Biomass and Bio-gas	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
3 (Water, Soil & Noise Pollution)	Water pollution – sources & effects, characteristics and treatment of waste water, engineered systems for water purification: Aeration, solid separation, settling operations, filtration and disinfection. Soil - formation of soil, elementary and mineral composition, types of soil in India, soil pollution, effects and abatements. Noise Hazards: Continuous and impulse noise, Effect of noise on man, Measurement and evaluation of Noise, noise isolation and absorption techniques, silencers, practical aspects of noise.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
4 (Atmospheric chemistry and Air Pollution)	Classification, sources and toxic effects of air pollutants, dispersal of air pollutants, engineered systems for air purification: Atmospheric cleansing process, approaches to contamination control. Air pollutants with emphasis on reactive intermediates in atmosphere like hydroxyl radical, ozone and nitrate radical, types of hydrocarbon in the troposphere, reaction of organic compounds in the atmosphere. (Green house gas effect, Global warming, Climate change).	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
5 (Waste Management)	Solid waste: Generation and waste characterization. Collection, storage and transport. Waste disposal, waste processing techniques, reduction, reuse and recycling, resource recovery and utilization. Physical and chemical treatment methods and	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion. Field visits. Industrial Visit (MSW/BMW/STP/ETP)	8

composting. Hazardous waste management and treatment.

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

Part E

Books	Environmental Science by B. S. Chauhan; Firewall Media, 2008 • Environmental Science by Cuningham and Cuningham; McGraw-Hill Education; 13th edition (16 February 2014) • Environmental Engineering by S. K. Dhameja; S. K. Kataria & Sons, 2009 • Environmental Science by Richard T Wright; Benjamin-Cummings Pub Co.
Articles	
References Books	Environmental Engineering by Howards S Peavy, Donald R Rowe, T. George • Environmental Science & Engineering by Gilbert M. Master • Environmental Chemistry by Stanley
MOOC Courses	https://onlinecourses.swayam2.ac.in/cec21_ge08/preview
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	1	2	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	2	1	1	-	1	-	-	-	-	-	-	-	3	2	3
CO4	2	2	-	2	1	-	-	-	-	-	-	-	2	3	3
CO5	2	2	-	2	1	-	-	-	-	-	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Making of Modern India
Course Code	MCL0202[T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Humanities, Social Sciences and Management							
Pre-Requisite/s	Basic knowledge of social sciences and political sciences.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- At the end of this course, students would be intellectually well equipped to have a sense of modern Indian history and culture. (BL1-Remember) CO2- The students will have an understanding of making of India as a nation and salient features of modern India. (BL2-Understand) CO3- 4. It will help students to develop their personality and thinking horizon for being a good and concerned Indian citizen (BL3-Apply)							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✓ Human Values ✓ Environment ✕		SDG (Goals)	SDG1(No poverty) SDG4(Quality education) SDG5(Gender equality) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
5	1. Idea of India in historical perspective a) Indian culture, b) cultural commonness, c)cultural diversities, d)unity in diversity, e) culturall accomodations ,f) cultural conflicts, g)Idea of India and British Rule , h) Role of Indian Intelligentsia. 2. Emergence and growth of Indian Nationalism a) Anti-colonial basis ,b) Economic Nationalism ,c) communalism and nationalism ,d) revivalism and Indian nationalism ,e)Enlightenment values ,f)European Nationalism and Indian Nationalism 3. Social Reform Movements a) British Rule and Indian introspection ,b)Raja Rammohan Roy, c) social reform movements in 19th century , d)Swami Vivekanand ,e)The women issue ,f)Caste system 4. Indian National Movement a)Early Revolts and 1857 Revolt, b)Early Nationalists ,c) Bang Bhang Movement , d) Gandhi led Mass Movements, e) Socialist and Left trends , f) Princely States and their integration into nation, h)Partition and Independence . 5. India after independence a)Making of Indian Constitution ,b) Post Independent Nehru Era , c) India facing Wars , d) Indian econmy- From Planning to LPG ,e) Achievements, f) Challenges in 21st century India.	Class room Lecuters	24

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0	0			

Part E

Books	1. Bipan Chandra and others: India's Struggle For Independence , Penguin Publishers. 2. Bipan Chandra: History Of Modern India, Orient Blackswan publishers. 3. Sunil Khilnani: The Idea of India, Penguin publishers. 4. Shekhar Bandopadhyay: From Plastic to Partition and After, A History of Modern India, Orient Blackswan publishers. 5. Rakesh Batabyal: The Penguin Book of Modern Indian Speeches, 1878 to Present, Penguin Publishers. 6. A R Desai: Social Background of Indian Nationalism, Popular Prakashan . 7. B R Nanda: Mahatma Gandhi ,A Biography, London
Articles	
References Books	1. B.R.Nanda: Gandhi and His Critics, Oxford 2. Girja Shankar: Socialist Trends in Indian National Movement , Meerut 3. Urmila Phadnis: Towards the integration of Indian States, 1919-1947, Mumbai 4. Bimal Prasad: Gandhi, Nehru and JP, A Study in Leadership, New Delhi 5. Bipan Chandra and others: India Since Independence , Penguin 6. Ramchandra Guha: Makers of Modern India, Penguin. 17. Austin Granville: The Indian Constitution, Oxford
MOOC Courses	https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/61
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	1	-	-	2	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Engineering Graphics
Course Code	MEL0202[T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of geometrical construction, sketching, imagination etc.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To get the fundamentals of engineering graphics, geometrical construction and its applications. (BL1-Remember) CO2- To understand the basic concept of engineering graphics through real-life examples. (BL2-Understand) CO3- To implement the different engineering graphics concepts over appropriate drawing dataset. (BL3-Apply) CO4- To analyze the drawing performance of engineering graphics techniques. (BL4-Analyze) CO5- To evaluate the drawing performance of engineering graphics techniques on a corresponding object. (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	1. Drafting tools, 2. Principles of Graphics, 3. Geometrical constructions 4. Scales: Plain, diagonal, 5. Curves used in engineering practice: such as ellipse, parabola, hyperbola by different methods. Cycloidal curves, Involute and Spirals.	Lecture with Whiteboard, PPT	8
Unit-2	1. Types of projection, Orthographic projections, First angle and third angle projection. 2. Projections of points in different quadrants. Projections of lines, True inclination and true length of straight line, Traces.	Lecture with Whiteboard, PPT	8
Unit-3	Projections of planes: Perpendicular plane, oblique plane and Auxiliary plane, projection of planes with inclined to one or both the reference planes and traces of planes.	Lecture with Whiteboard, PPT	8
Unit-4	1. Projection of solids: Polyhedron and solids of revolution, projection of solids with inclined to one or both the reference planes. 2. Introduction to Section of solids and Development of surfaces.	Lecture with Whiteboard, PPT	8
Unit-5	1. Isometric projection: Isometric scale, isometric projections from orthographic drawing. 2. Computer Aided Drafting (CAD): Introduction, benefit, software's, basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD.	Lecture with Whiteboard, PPT	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	Drawing sheet of plane scale.	Experiments	BL3-Apply	2
Experiment -2	Drawing sheet of diagonal scale.	PBL	BL3-Apply	2
Experiment -3	Drawing sheet of ellipse.	PBL	BL3-Apply	2
Experiment -4	Drawing sheet parabola and hyperbola	PBL	BL3-Apply	2
Experiment -5	Drawing sheet of cycloidal curves.	PBL	BL3-Apply	2
Experiment -6	Drawing sheet of orthographic projection		BL3-Apply	2
Experiment -7	Drawing sheet of projection of line		BL3-Apply	2
Experiment -8	Drawing sheet of projection of plane.		BL2-Understand	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	1. N.D.Bhatt Elementary of Enginnering Drawing Charotar Publication P.S. Gill Engineering Drawing Kataria Publication Agrawal and Agrawal Engineering Drawing TMH
Articles	
References Books	Venu Gopal K Engineering Drawing New age K.L. Narayana& P. Kannaiah Engineering Drawing SCITECH Pub.
MOOC Courses	https://nptel.ac.in/courses/112103019
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	3	3	-	-	3	-	2
CO2	2	-	2	2	1	2	-	-	3	3	-	-	3	2	2
CO3	-	-	2	1	1	-	-	-	2	1	-	-	3	2	2
CO4	-	1	2	3	1	-	-	-	-	-	-	-	3	-	2
CO5	-	1	1	2	1	-	-	-	-	-	-	-	3	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Manufacturing Technology-I
Course Code	MEL0240[T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of properties of Materials, types of manufacturing process, concepts of force and Pascal's law, surface tension capillarity.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall basic principles of sciences and material science.(BL1-Remember) CO2- To describe the basic concept of casting and welding processes.(BL2-Understand) CO3- To implement basic knowledge in analyzing the forces and processes of welding and casting.(BL3-Apply) CO4- To analyze the welding and casting processes(BL4-Analyze) CO5- To evaluate and summarize the analysis in optimizing the casting and welding processes.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit – 1	Casting: Patterns and Pattern making, basic principle of casting process, types of patterns and allowances, types and properties of molding sand, sand perperation and control, element of mould, gating, riser, runners, cores and core making, solidification of casting, role of chilling	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit – 2	Casting Processes: Sand castings, pressure die casting, permanent mould casting, centrifugal casting, precision investment casting, shell Moulding, CO2 Moulding, electro slag casting, Fettling and finishing, defects in Castings, Casting of non-ferrous materials. Melting and Pouring: Melting furnaces- crucibles oil fired furnaces, electric furnaces, cupola furnace, selection of furnace.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit – 3	Basic Joining process- Types of welding-gas welding, -arc welding, -shielded metal arc welding, GTAW, GMAW, SAW, ESW- Resistance welding (spot, seam, projection, percussion, flash types)-atomic hydrogen arc welding-thermit welding.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit – 4	Welding Process-Special Welding Processes: Soldering, brazing and their applications, welding of special materials– Stainless steel, Aluminium etc. weldability of cast iron, steel, stainless steel, aluminium alloys. Introduction to Electron beam and Laser welding, Flame cutting - Use of Oxyacetylene, modern cutting processes, arc cutting, Pre welding and post welding.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit – 5	Design of Weldments: Welding symbols, Positions of welding, joint and groove design, heat input, effect of welding parameters, preheating and post heating, Selection of electrodes, flux etc. Weldments Testing: Inspection of welds – destructive and non- destructive testing methods, Defects in welding, causes and remedies.	Lectures with whiteboard/PPT, Quiz, Group discussion	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	Pattern design and making –for one casting drawing.	Experiments	BL3-Apply	2
Experiment -2	Sand properties testing exercise for strengths and permeability	Experiments	BL3-Apply	2
Experiment -3	Moulding melting and casting process.	Experiments	BL3-Apply	2
Experiment -4	Arc welding- lap & butt joint preparation.	Experiments	BL3-Apply	2
Experiment -5	spot welding joint preparation.	Experiments	BL3-Apply	2
Experiment -6	To perform TIG welding.	Experiments	BL3-Apply	2
Experiment -7	To perform Plasma welding and brazing process	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	1. Rao P N, Manufacturing Technology, McGraw Hill. 2. M. P. Groover, Fundamental of modern manufacturing: Materials, Processes and System, John Wiley and Sons
Articles	
References Books	1. Pandey P C “Production Engineering Science” Standard publishers 2. Little Richard L. “Welding & Welding Technology” Tata McGraw Hill
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_me48/preview
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	3	3	1	1	1	3	3	1	1	1
CO2	3	3	3	2	2	3	3	-	1	1	3	3	1	1	1
CO3	3	3	3	2	2	3	3	-	-	-	3	3	2	2	2
CO4	3	3	3	2	2	3	3	3	2	2	2	3	3	3	3
CO5	3	3	3	3	2	3	3	2	2	2	3	3	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Engineering Mathematics
Course Code	MAL0308[T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Basic Sciences and Mathematics							
Pre-Requisite/s	Basic knowledge of equations			Co-Requisite/s	Basic knowledge of roots			
Course Outcomes & Bloom's Level								
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Introduction to numerical computing, Approximation and error in numerical computations, Numerical solution of algebraic and Transcendental equations. Regula-Falsi method, Newton-Raphson method, Graffes-Root squaring method, Iterative method. Solution of simultaneous linear equation, Gauss-Elimination method, Jacobi's method Gauss- Seidel method Iterative method. Numerical differentiation and integration(Trapezoidal rule Simpson's 1/3rd rule , Simpson's 3/8rule)	Lecture with white board and PPT, Audio/Video clips, group discussion, quiz	8
Unit 2	Difference operators, Interpolation: Newton's forward and backward method, Lagrange method, Central difference interpolation, Numerical solution of ordinary differential equations: Picard's method, Euler method, Modified Euler method and Runge- Kutta Method, Numerical solution of partial differential equation: Elliptic (Laplace Equation), Parabolic (Heat conduction equation)	Lecture with white board and PPT, Audio/Video clips, group discussion, quiz	8
Unit 3	Laplace Transform: Laplace Transform of elementary functions, Laplace Transform of derivatives, integrals and multiplication by t^n and division by t , Inverse Laplace Transform., convolution Theorem (application only), application to solution of differential equations.	Lecture with white board and PPT, Audio/Video clips, group discussion, quiz	8
Unit 4	Fourier transform, Fourier complex transform Fourier integral theorem, Fourier sine and cosine transform of simple function of derivatives, Finite Fourier sine & cosine transform, inverse of Fourier transform, Application to differential equation, solution of one dimensional heat and wave equations through Fourier transform.	Lecture with white board and PPT, Audio/Video clips, group discussion, quiz	8
Unit 5	Transform: Definition of Z -transform, Z-transform of simple sequences. Properties of Z -transform. Initial and final value theorem, Inverse Z -transform, partial fraction method, convolution theorem, residue method, Application to finite difference equation.	Lecture with white board and PPT, Audio/Video clips, group discussion, quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

Part E

Books	1. B.V.Ramana, Higher Engineering Mathematics, Tata McGraw Hill 2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers 3. H.K.Das and R. Verma, Higher Engineering Mathematics, S.Chand and Company Pvt.Ltd.
Articles	
References Books	1. E.Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, 1999 2. M.K.Jain, S.R.K.Iyengar and R.K.Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers. 3. T. Veerajan and T. Ramachandran, Theory and Problems in Numerical Methods, Tata McGraw Hill
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_ma36/preview
Videos	https://onlinecourses.nptel.ac.in/noc24_ma36/preview

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	-	-	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	-	-	1	-	1	-	-	-	-	-	-	-	3	2	3
CO4	-	-	-	2	1	-	-	-	-	-	-	-	2	3	3
CO5	-	-	-	2	1	-	-	-	-	-	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Evaluation of Industrial Training-I
Course Code	MED0301[P]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Projects and Internship							
Pre-Requisite/s	subject knowledge of first and second semester .			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility. (BL2-Understand) CO2- Identify the needs and problem of the community and involve them in problem solving. (BL2-Understand) CO3- Utilize their knowledge in finding practical solution to individual and community problem. (BL3-Apply) CO4- Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. (BL4-Analyze) CO5- Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-I	Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices.	Field work	BL3-Apply	40 hrs
Module-II	It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings.	Field work	BL4-Analyze	40 hrs

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	50				
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	-	1	-	-	-	-	-	-	-	2-	2	2
CO2	1	-	2	-	2	-	-	-	-	-	-	-	1	2	1
CO3	1	2	-	2	1	-	-	-	-	-	-	-	2	2	1
CO4	-	1	-	2	-	-	-	-	01	-	-	-	2	2	1
CO5	-	-	-	-	1	-	-	-	-	01	-	-	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Basic Thermodynamics
Course Code	MEL0305[T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	An introductory background in chemistry, physics, and calculus			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall the energy and its transformation (BL1-Remember) CO2- To understand energy conservation techniques(BL2-Understand) CO3- To apply the oncept of energy transformation in heat and work systems(BL3-Apply) CO4- To analyze power producing devices(BL4-Analyze) CO5- To evaluate model for optimal power output(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
1	Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, statement and significance, concept of an Ideal gas,, Gas laws, Avogadro's hypothesis, Real gas, Deviation with ideal gas. Vander-wall's equation, evaluation of its constants, limitations of the equat. The law of corresponding states, Compressibility factor,generalized compressibility chart, P-V-T surface of a Real gas.	Lectures with whiteboard/PPT, Quiz, Group discussion	10
2	Pure Substance, Phase, Phase-transformations formation of steam, properties of steam, PVT surface HS, TS, PV, PH, TV diagram, measurement of dryness fraction of vapor.Use of steam table and Mollier chart, Gibbs and Helmholtz functions	Lectures with whiteboard/PPT, Quiz, Group discussion	10
3	First law of thermodynamics, Statement of first law of thermodynamics first law applied to closed system,, first law applied to a closed system undergoing a cycle processes analysis of closed system, flow process, flow energy,steady flow process,Relations for flow processes, limitations of first law of thermodynamics	Lectures with whiteboard/PPT, Quiz, Group discussion	8
4	Second law of thermodynamics, heat engine, heat reservoir Refrigerator, heat pump, COP, EPR, Available energy, Carnot's theorem, Carnot's cycle, efficiency of Carnot's cycle,statement of second law, Reversible and irreversible processes, consequence of second law, Entropy, Entropy change for ideal gas, T- S diagrams, Availability and Irreversibility, exergy, Gibbs and Helmholtz functions, Entropy of universe	Lectures with whiteboard/PPT, Quiz, Group discussion	8
5	Air standard cycles, --Otto, Diesel, Dual cycles and their comparison, MEP and Efficiency, Brayton cycle, Vapor power cycles-- Power generation by steam, Carnot cycle, Rankin cycle, reheat & regenerative cycles	Lectures with whiteboard/PPT, Quiz, Group discussion	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To Study of part of engine	Experiments	BL2-Understand	03
2	To study the construction and working of 2 stroke petrol engines	Experiments	BL2-Understand	03
3	To study the construction and working of 2 stroke diesel engines	Experiments	BL3-Apply	03
4	To study the construction and working of 4 stroke petrol engines	Experiments	BL4-Analyze	03
5	To study the construction and working of 4 stroke diesel engines	Experiments	BL2-Understand	03
6	To study of reciprocating pump	Experiments	BL3-Apply	03
7	To study of centrifugal pump	Experiments	BL3-Apply	03
8	To study the working of Vapor compression refrigeration test rig	Experiments	BL2-Understand	03

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	1. P. K. Nag Engineering Thermodynamics, TMH 4th Edition 2 D. S. Kumar Thermal Science & Engineering 5th Edition 3 Onkar Singh Applied Thermodynamics by New Age
Articles	
References Books	1 R. E. Sonntag, C. Borgnakke, and G.J. Van Wyle Fundamentals of Thermodynamics 5th Edition 2 Arora C. P Thermodynamics, TMH 1st Edition 3 Yunus A. Ceengel, Michael A. Boles Thermodynamics" TMH 5th Edition
MOOC Courses	https://www.coursera.org/courses?query=thermodynamics
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	1	1	2	2	1	2	3	1	-	3	3	3
CO3	-	1	3	2	1	2	2	2	-	1	-	3	3	3	2
CO4	1	2	2	3	2	-	-	2	-	-	2	1	3	2	2
CO5	-	-	-	-	1	2	-	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Measurement and Metrology
Course Code	MEL 0308[T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	fundamental understanding of mathematics, particularly algebra and geometry, basic physics concepts such as mechanics and thermodynamics, familiarity with instrumentation and data analysis techniques, and a grasp of engineering principles.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember and understand the basic principle of applied physics, i.e., Unit of measurement, characteristics of instruments(BL1-Remember) CO2- To understand the concept of generalized measurement system(BL2-Understand) CO3- To apply the measurement of mechanical parameter such as pressure, force, torque, and strain in equipments(BL3-Apply) CO4- To analyze the error in measurement system and tolerance(BL4-Analyze) CO5- To evaluate the measurement of linear and angular measurement.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit -1	Concept of measurement: General concept of measurement, Need for measurement, Generalized measuring system, Units, Standards, <u>Sensitivity, Readability, Range of accuracy, Precision, Accuracy Vs precision, Uncertainty, repeatability and reproducibility</u>, Errors in measurement, Types of error, Systematic and random error, Calibration, <u>Interchangeability</u>. Static and dynamic performance, types of sensors, types of transducers and their characteristics.	Lecture with white board/PPT, Audio/Video clips, group discussion, Physical model, quiz	8
Unit -2	Linear and angular measurements: Linear measuring instruments: Vernier caliper, Micrometer, Interval measurements: - Slip gauges, Checking of slip gauges for surface quality, Optical flat, Application of limit gauges, limit fits and tolerances. <u>Comparators: - Mechanical comparators, Electrical comparator, Optical comparator, Pneumatic comparator</u>, Sine bar, Use of sine bar, Limitations of sine bars, Sources of error in sine bars, Bevel protractor, Applications of bevel protractor. measurement of pressure – introduction of pressure gauge, gravitational, direct acting, elastic and indirect type pressure transducers, Measurement of strain.	Lecture with white board/PPT, Audio/Video clips, group discussion, Review Analysis	8
Unit -3	Form measurement: Introduction, Screw thread measurement, Thread gauges, Measurement of gears: Gear errors, Surface finish measurement: -Introduction, Elements of surface texture, Analysis of surface finish, Methods of measuring surface finish, Straightness measurement, Flatness testing, Roundness measurements, <u>Coordinate measuring machine (CMM):-Types of CMM, Features of CMM, Computer based inspection.</u>	Lecture with white board/PPT, Audio/Video clips, group discussion, , classroom presentations	8
Unit -4	Measurement of power, flow and temperature related properties: - Measurement of force, Accelerometer, <u>Load cells, Bourdon tube</u>. Torque measurement: Torque measurement using strain gauges, Torque measurement using torsion bars, Mechanical dynamometers.	Lecture with white board/PPT, Audio/Video clips, group discussion, quiz	8

	Straightness, flatness, roundness, tool maker's microscope, profile project autocollimator, Interferometry – principle and use, Michelson interferometer optical flat.		
Unit -5	Measurement of flow: Variable area meters – rotameter, Hot wire anemometer, Pitot tube. Temperature measurement, Bimetallic strip, Thermocouples (Thermo electric effects), Thermistors, Pyrometers. Feature inspection	Lecture with white board/PPT, Audio/Video clips, group discussion, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	MEASUREMENT WITH SCALE AND VERNIER CALIPERS	Experiments	BL3-Apply	2
Experiment -2	MEASUREMENT WITH MICROMETERS	Experiments	BL3-Apply	2
Experiment -3	STUDY AND USE OF SLIP GAUGES	Experiments	BL2-Understand	2
Experiment -4	MEASUREMENT OF ANGLE WITH SINE BAR AND HEIGHT GAUGE	Experiments	BL4-Analyze	2
Experiment -5	STUDY OF INSPECTION GAUGES SUCH AS PLUG, SNAP, AND THREAD GAUGES	Experiments	BL2-Understand	2
Experiment -6	MEASUREMENT OF ANGLES WITH BEVEL PROTRACTOR	Experiments	BL3-Apply	2
Experiment -7	MEASUREMENT WITH COMBINATION SET	Experiments	BL3-Apply	2
Experiment -8	MEASUREMENT WITH DIAL INDICATOR USING SURFACE PLATE AND ACCESSORIES	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Kumar, D. S. (2012). Mechanical Measurements & Control. New Delhi: Metropolitan Publications. Raghavendra, N. S. (2018). Metrology and Measurements. Pearson Education India.
Articles	
References Books	Sawhney, A. K. (1994). Mechanical Measurements & Instrumentation. New Delhi: Dhanpat Rai & Sons. Hume, D. R., & Hume, E. (2015). Metrology and Measurement. CRC Press.
MOOC Courses	https://archive.nptel.ac.in/courses/112/106/112106138/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	1	2	3	2	1	2	2	2	2	1	-	3	3	3	2
CO4	1	3	3	3	2	-	3	2	-	-	2	2	3	2	2
CO5	-	2	2	2	2	3	3	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Mechanics of Solids
Course Code	MEL 0310[T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	a complete description of the geometry of the member, its constraints, the loads applied to the member and the properties of the material of which the member is composed.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember the concept of physics and engineering mechanics (BL1-Remember) CO2- To understand the rigid and deformed bodies(BL2-Understand) CO3- To apply the concept of engineering to calculate stress strain value(BL3-Apply) CO4- To analyze the deformation of body under action of force(BL4-Analyze) CO5- To evaluate the results through testing of component/material.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Stress and strain; normal, shear and bearing stresses; normal and shear strain, modulus of Elasticity, Poisson's ratio, Elastic and Bulk modulus, relation between elastic constants, deformation of axial members, tensile tests for ductile and brittle materials, yield strength, yield criteria, ultimate strength, factor of safety, mechanical properties, temperature stresses in simple and composite members.	Lecture with white board and PPT, Quiz, Seminar, Poster	10
2	Strain energy due to axially applied loads (gradual, sudden and impact loads). State of stress, Generalized Hook's Law, stress transformation, principal planes, principal stresses and strains, maximum shear stress, Mohr's Circle representation for stress and strains	Lecture with white board and PPT, Quiz, Seminar, Poster	10
3	<u>Theories of failures and its assumptions.</u> Bending of beams: Pure bending, bending of beams with symmetric cross section, composite cross sections, shear stress in beams, deflection in beams by different methods for various boundary conditions	Lecture with white board and PPT, Quiz, Seminar, Poster	8
4	Torsion of Shafts: Torsional Moment Diagram, torsion formula for solid and hollow shafts, maximum normal and shear stress, angle of twist, combined effect of axial load, bending moment and torsional moment on circular shafts. Elastic Stability: Euler buckling, equivalent length, Rankine formula, eccentric loading.	Lecture with white board and PPT, Quiz, Case writing, seminar	8
5	Pressure Vessels: Thin and Thick walled pressure vessels; radial, axial and circumferential stresses, maximum shear stress, volumetric strain. <u>Compound cylinder. Leaf spring, Stress and deflection in open helical spring.</u> Curved Beams: beams with large initial curvature, position of neutral axis for circular, rectangular, and trapezoidal cross sections, crane hook.	Lecture with white board and PPT, Quiz, Case writing, seminar	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To study the mechanical Properties of metals	Experiments	BL2-Understand	03
2	To perform torsion test on mild steel rod	Experiments	BL3-Apply	03
3	To determined impact strength of steel (charpy test)	Experiments	BL4-Analyze	03
4	To determined impact strength of steel (izod test)	Experiments	BL3-Apply	03
5	To determine brinell hardness numbers for mild steel	Experiments	BL4-Analyze	03
6	To determine the rock well hardness numbers for steel	Experiments	BL5-Evaluate	03
7	To determine the tensile strength of mild steel	Experiments	BL6-Create	03
8	Analysis of simply supported beam with ANSYS	Experiments	BL6-Create	03

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Timushenko. S. P. and Young, Strength of Material, East-West Press. Beer, Johnston & Dewolf, Mechanics of Materials, Tata McGraw-Hill Education R K Bansal, Strength of Material, Laxmi Publication
Articles	
References Books	A. Pytel, and J Kiusalaas, Mechanics of Materials, CENGAGE Learning, 2012 G.H. Ryder, Strength of Materials, MACMILAN, 1969 Popov, Strength of Materials, PHI, New Delhi. Crandell, Dhal and Lardner, Introduction to Mechanics of Solids, McGraw Hill
MOOC Courses	https://www.coursera.org/courses?query=mechanics%20of%20materials
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	2	-	-	3	3	-	-	3	2	3
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	-	1	2	2	-	2	2	-	-	2	-	3	3	3	3
CO4	1	2	2	2	2	-	2	2	-	-	2	1	3	2	3
CO5	-	-	-	1	1	3	-	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Manufacturing Technology –II
Course Code	MEL 0341[T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of Material science and manufacturing process.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To get the fundamentals of various metal forming operations.(BL1-Remember) CO2- To understand the mechanism of metal forming.(BL2-Understand) CO3- To implement the different metal forming operations to deform the parts.(BL3-Apply) CO4- To analyze the different parameters used in metal forming.(BL4-Analyze) CO5- To evaluate different forces which act during the operations.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Fundamentals of Metal Forming Importance of manufacturing, Materials and their structures, Mechanical behavior of crystalline materials, elastic and plastic deformation, yield criteria, Concept of flow stress, hot working and cold working, Metallurgical aspects of metal forming, effects of temperature, classification of metal forming processes, <u>Heat treatment processes</u> , <u>Effect of heat treatment in metal forming processes</u> .	Lectures with whiteboard/PPT , Quiz, Group discussion	8
Unit 2	Forging: Forging principle, classification, equipment, tooling-processes, Forging operations, post forging heat treatment forging defects & applications, Forgeability, Comparison of forging with other manufacturing processes. Rolling: Scope and importance of rolling, Principles of rolling processes, classification, types of rolling mills, analysis of rolling load, torque and power, Form rolling, rolling defects, causes and remedies.	Lectures with whiteboard/PPT , Quiz, Group discussion	9
Unit 3	Extrusion and Drawing: Classification of extrusion processes, tool, equipment, and principle of these processes, Extrusion dies, Extrusion load analysis, defects and remedies, rod/wire drawing, tool, equipment and principle of processes, defects, Tube drawing and sinking processes. <u>Unconventional Metal Forming Process: Unconventional metal forming process such as explosive forming, electromagnetic, electro- hydraulic forming.</u>	Lectures with whiteboard/PPT , Quiz, Group discussion	7
Unit 4	Sheet metal forming: Presses and their classification, die and punch assembly and press work methods and process, formability of sheet metals- principle, process parameters, equipment and application of the following processes: deep drawing, spinning, stretch forming. cutting/punching mechanism, blanking versus piercing, compound and progressive die, coining, embossing etc.	Lectures with whiteboard/PPT , Quiz, Group discussion	6
Unit 5	Powder Metallurgy Powder metallurgy manufacturing process, preparation of powders, types & function of binders, green	Lectures with whiteboard/PPT , Quiz, Group discussion	6

	compaction, sintering process and its effect on the product, advantages and application of powder metallurgy products. Jigs and fixtures: locating and clamping devices, principles of jigs and fixtures, classification and application.		
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment 1	To study of forging process.	Experiments	BL2-Understand	2
Experiment 2	To perform the forging operations.	Experiments	BL5-Evaluate	2
Experiment 3	To study of hammer forging.	Experiments	BL2-Understand	2
Experiment 4	To study of rolling process.	Experiments	BL2-Understand	2
Experiment 5	To study of extrusion and drawing process.	Experiments	BL2-Understand	2
Experiment 6	To study of sheet metal working.	Experiments	BL2-Understand	2
Experiment 7	To perform the sheet metal forming operations.	Experiments	BL5-Evaluate	2
Experiment 8	To making a tray from the given sheet metal.	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Ghosh and Mallick Manufacturing Science East West Press, 2010 R. K. Jain Production Technology Khanna Publishers, 2001
Articles	
References Books	P. C. Pandey Production Engineering Science Standard Publishers, 2010 P. N. Rao Manufacturing Technology Mc Graw Hill, 2001 P M Groover Fundamental of modern manufacturing: Materials, Processes, and System John Wiley and Sons, 2010
MOOC Courses	https://www.mooc-list.com/tags/manufacturing
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	2	2	2	2	3	3	3	-	-	3	3	3
CO2	3	-	2	2	-	2	2	-	1	3	-	-	3	3	3
CO3	3	2	2	2	1	2	2	-	-	-	-	-	3	2	3
CO4	3	2	3	2	1	-	-	-	-	-	-	-	2	-	3
CO5	3	1	2	2	1	-	-	-	-	-	-	-	2	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Machine drawing
Course Code	MEP0302[P]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of engineering graphics and machine parts.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To get the fundamentals of machine drawing and its applications.(BL1-Remember) CO2- To understand the basic concept of machine drawing through real-life examples.(BL2-Understand) CO3- To implement the different machine drawing concepts over appropriate drawing dataset(BL3-Apply) CO4- To analyze the drawing performance of machine drawing techniques.(BL4-Analyze) CO5- To evaluate the drawing performance of machine drawing techniques on a corresponding object.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Drawing Conventions: Drawing standards, first angle projection, orthographic views, sectioning and its rules, BIS codes for dimensioning, limits, fits and tolerances, surface texture, bill of materials, product data, and production drawings.	Whiteboard, PPT, Drawing sheet	
Unit-2	Conventional Representation conventional representation of machine parts such as threads, slotted heads, square ends, ribs, slotted shafts, splined shafts, bearings, springs, gears, rivet heads and joints, welded joint representation. Assembly machine drawing - drawing types, assembly and blow up parts.	Whiteboard, PPT, Drawing sheet	
Unit-3	Drawing of fasteners: Nut, bolt and washers, locking arrangements, rivets and heads, drawing of various riveted joints, standard proportions, Cotter and Knuckle joints.	Whiteboard, PPT, Drawing sheet	
Unit-4	Assembly drawing of power transmission components: Muff and flange couplings, solid and bushed journal bearings, pedestal bearing, Plummer block, and pulleys. Assembly drawing of IC engine parts: Connecting rod assembly, piston and rod end assembly. Assembly drawing of machine tool parts: Drill spindle, lathe tailstock, lathe spindle assembly, four jaw chuck, and shaper tool head.	Whiteboard, PPT, Drawing sheet	
Unit-5	Computer aided drafting: Software, graphic screen, setting of blank sheet for drawing, draw commands, modify commands, display commands, object snap, dim and miscellaneous commands.	Whiteboard, PPT, Drawing sheet	

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment-1	To describe sectioning of materials	Experiments	BL2-Understand	2
Experiment-2	conventional representation of machine parts	Experiments	BL2-Understand	2
Experiment-3	drawing of various riveted joints, standard proportions, Cotter and Knuckle joints.	Experiments	BL3-Apply	4
Experiment-4	Assembly drawing of power transmission components and I C Engine parts.	Experiments	BL3-Apply	4
Experiment-5	To study of computer added drafting	Experiments	BL4-Analyze	4

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	1. N.D.Bhatt Machine Drawing Charotar Publication 2 P.S. Gill Engineering Drawing Kataria Publication 3 K C John Textbook of machine drawing EEE, PHI
Articles	
References Books	1 K. L. Narayana Machine Drawing New Age International 2 N Sidheswar Machine Drawing Tata Mcgraw Hill
MOOC Courses	https://nptel.ac.in/courses/112103019
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	2	2	1	-	-	2	2	2	1	-	-
CO2	1	2	2	2	1	2	2	-	-	-	2	2	3	3	3
CO3	2	1	2	-	-	-	2	2	-	-	-	2	3	-	3
CO4	1	2	2	3	2	-	2	1	-	-	2	2	3	2	2
CO5	-	2	1	2	2	3	2	-	-	-	-	-	3	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Object Oriented Programming Methodology (Python)
Course Code	CSP0401[P]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember the basic programming concept(BL1-Remember) CO2- Understand the basics of Python like python origin downloading and installing and basic concept of python(BL2-Understand) CO3- Apply the various conditional and looping statement and functional programming. (BL3-Apply) CO4- Explain various objects numbers and sequence in python Analyze the concept of regular expression.(BL4-Analyze) CO5- Evaluate the concept of object-oriented programming for better utilization of language.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Introduction to Python programming Introduction, origin of Python, Downloading, Installing and Running Python, Python Basics: Comment, Identifier, Indentations, Basic data types, conversions, operators, Build in functions. I/O Statements, Condition Statements & Loops: If, else, elif), conditional expressions, while, for, break continue	Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs	8
Unit 2	Data Structures in Python Lists: Introduction, Accessing list, Operations, Working with lists, Tuple: Introduction, Accessing tuples, Operations, Working with list, Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries, Set: Introduction ,Accessing set, Operations, Working with sets	Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs	8
Unit 3	Functions, Modules, File Handling Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous function, Global and local variables, Recursion. Modules: Creating modules, Importing module, Packages, File Handling :Opening and closing files, Reading and writing files	Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs	8
Unit 4	Exceptional Handling, Regular Expressions Exception Handling: Exception, Exception Handling, Try and Except clause, User Defined Exceptions, Exception handling in files). Regular Expressions: Introduction/motivation, special symbols and characters for REs , Match function, Search function., Matching VS Searching., Modifiers, Patterns.	Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs	9
Unit -5	Object Oriented Programming in Python Introduction, OOPS Basics: Class and object, Constructors, Need of Encapsulations, Attributes, default attributes, static attributes, static methods, initializing objects, Pass by reference , self. Relationships: Introduction, Aggregation, Dependency. Inheritance: Need of Inheritance, Overriding, Super, Types of Inheritance. Abstract Class, methods.	Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
unit 1-2	Practical Assignment	Experiments	BL2-Understand	7
1-5	Activity Based Learning	Experiments	BL3-Apply	10

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	100	60			
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	20	60	

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	1	2	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	2	2	1	-	1	-	-	-	-	-	-	-	3	2	3
CO4	2	2	-	3	1	-	-	-	-	-	-	-	3	3	3
CO5	2	2	-	2	1	-	-	-	-	-	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Energy Conversion Systems
Course Code	MEL0411[T]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have fundamental knowledge of thermodynamics, basic mathematics and physic.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Recall the concepts of Basic Thermodynamics(BL1-Remember) CO2- Understating the concept of Energy conversion systems(BL2-Understand) CO3- Applying the basic concept of Heat Transfer(BL3-Apply) CO4- Analyzing the working of boilers, turbines, condensers(BL4-Analyze) CO5- Evaluating the working of boilers, turbines, condensers(BL5-Evaluate)							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		SDG (Goals)	SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Thermodynamic Relation: Thermodynamic Coordinates, Exact differentials, Mathematical conditions for exact differentials, Maxwell relations, Clausius Clayborn equation, its applications, Joule Thomson coefficient, Inversion curve, coefficient of volume expansion, adiabatic and Isothermal Compressibility	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-2	Boilers: Definition, Classification, working of fire tube and water tube Boilers, Natural and forced Draught, Chimney height calculation, Mountings and accessories Air Preheater, feed water heater, super heater, Boiler efficiency, equivalent evaporation, Boiler trial, heat balance sheet.	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-3	Steam nozzles: Flow through nozzles, variation of velocity, area and specific volume, conditions for maximum discharge, choked flow, throat area, nozzle efficiency, effect of friction on nozzle, supe saturated flow. Condensers: Classification, Air leakage, performance, comparison, efficiency	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-4	Steam Engines and Turbines: Introduction of steam engines, Classification, working of steam engine, Indicator Diagram, Impulse and reaction turbine, staging, stage and overall efficiencies, reheat factor, Bleeding, velocity diagrams, simple impulse and reaction turbine, Work done, comparison with steam engines, losses in steam turbines, Governing of turbines, Vapour Power Cycles: Comparison of Carnot and Rankine cycles, Effect of pressure and temperature on Rankine cycle, Reheat cycle, Regenerative cycle	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-5	Gas turbines: Gas turbines classification, Brayton cycle, principles of gas turbine, gas turbine cycles with intercooling, reheat, regeneration and their combinations, stage efficiency, polytrophic efficiency, deviation of actual cycles from ideal cycle.	Lectures with white board/PPT, Quiz, Group discussion	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	Study of Babcock and Wilcox Boiler	Experiments	BL4-Analyze	2
Experiment -2	Study of Fire Tube Boiler	Experiments	BL4-Analyze	2
Experiment -3	Study of Boiler Mountings	Experiments	BL4-Analyze	2
Experiment -4	Study of Accessories of Boiler Economizer	Experiments	BL4-Analyze	2
Experiment -5	Study of Other Mountings of the boiler	Experiments	BL4-Analyze	2
Experiment -6	Study of The Locomotive Boiler	Experiments	BL4-Analyze	2
Experiment -7	Study of The Pelton Wheel Turbine	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	D. Text Books P.K. Nag "Basic and Applied Thermodynamics" Tata MC Graw Hill.
Articles	
References Books	D. S. Kumar "Engineering Thermodynamics" First edition (June 2012)
MOOC Courses	https://onlinecourses.nptel.ac.in/noc23_ch76/preview
Videos	<

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	-	1	3	3	1	2	2	2	-	2	-	3	3	3	2
CO4	1	2	3	3	2	-	3	2	-	-	2	1	3	2	2
CO5	-	1	-	-	2	3	-	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Theory of Machines
Course Code	MEL0416[P]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of velocity and acceleration.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember various types of mechanism, velocity, acceleration, terminology of cam, flywheel and governor. (BL1-Remember) CO2- To understand velocity and acceleration analysis of different types of mechanism. (BL2-Understand) CO3- To implement velocity and acceleration analysis to cam and different types of mechanism. (BL3-Apply) CO4- To analyze the different types of mechanism (BL4-Analyze) CO5- To evaluate the applications of kinematics of machine in various fields such as research and industries. (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Mechanism: Machine, Mechanism, Kinematics Links, Pairs, Chains, Degree of freedom. Mechanisms and its Inversions; Slider, Double Slider and 4 bar mechanism. Lower pair mechanisms: pantograph, Straight line motions. Davis and Ackerman Steering Mechanisms.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-2	Kinematic Analysis: Displacement, velocity and acceleration analysis of plane mechanisms; relative velocity, instantaneous centre, Kennedy's Theorem, Klein's construction methods. Coriolis component.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-3	Dynamic Analysis: D'Alembert's principle. Equivalent dynamic system, Graphical and analytical methods of dynamic forces, analysis of mechanisms and machines including reciprocating engines. Flywheel: Introduction, Turning-moment diagrams and Flywheel analysis.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-4	Cams: Introduction, classification of cams and followers, types of follower motion and their comparison, displacement diagram, nomenclature and graphical layout of cam profile, undercutting in cam profile, analytical treatment of tangent and circular cams with flat face and roller followers.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-5	Governors: Introduction, Types of governors, Various gravity and spring-controlled governors, governor characteristics, Effort and power of a governor, Controlling force diagrams, Coefficient of insensitiveness. Gyroscopes: Gyroscopic couple, Effect of Gyroscopic couple on the stability of four wheel and two-wheel vehicles, Aeroplanes and Naval ships, Gyrostabilisers.	Lectures with whiteboard/PPT, Quiz, Group discussion	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment-1	To Study of kinematics Link, pairs and Degree of freedom.	Experiments	BL2-Understand	2
Experiment-2	To Study of different types of mechanism.	Experiments	BL3-Apply	2
Experiment-3	To Study and demonstration of proell governor.	Experiments	BL3-Apply	2
Experiment-4	To Study and demonstration of porter governor.	Experiments	BL4-Analyze	2
Experiment-5	To Study of the cam and follower.	Experiments	BL2-Understand	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100					
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	SS Rattan Theory of Machine 4th Edition McGraw Hill Education India
Articles	
References Books	Thomas Beven Theory of Machines Longman's Green & Co., London W. G. Green Theory of Machines Blackie & Sons, London Gosh and Malik Theory of Mechanism and Machines East-west Pvt. Ltd. 1988
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3 - - - 2 2 - - 3 3 - - 3 2 2	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	1	2	2	2	1	2	2	2	1	1	-	3	2	3	2
CO4	1	3	2	3	2	-	3	2	-	-	2	2	2	2	2
CO5	-	1	1	2	2	3	3	-	-	-	2	-	1	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Theory of Machines
Course Code	MEL0416[T]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of velocity and acceleration			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- CO1-To remember various types of mechanism, velocity, acceleration, terminology of cam and governors(BL1-Remember) CO2- CO2-To understand velocity and acceleration analysis of different types of mechanism(BL2-Understand) CO3- CO3-To implement velocity and acceleration analysis to cam and different types of mechanism.(BL3-Apply) CO4- CO4-To analyze the different types of mechanism.(BL4-Analyze) CO5- CO5-To evaluate the applications of theory of machine in various fields such as research and industries.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	Mechanism: Machine, Mechanism, Kinematics Links, Pairs, Chains, Degree of freedom. Mechanisms and its Inversions; single Slider, Double Slider and 4 bar mechanism.	Lectures with white board/PPT, and animation of different mechanism, Recorded video/interactive videos	8
Unit-II	Kinematic Analysis: Displacement, velocity and acceleration analysis of plane mechanisms; relative velocity, instantaneous centre, Kennedy's Theorem, Klein's construction methods. Coriolis component.	Lectures with white board/PPT, and animation of different mechanism, Recorded video/interactive videos	8
Unit-III	Dynamic Analysis: D'Alembert's principle. Equivalent dynamic system, Graphical and analytical methods of dynamic forces, analysis of mechanisms and machines including reciprocating engines. Flywheel: Introduction, Turning-moment diagrams and Flywheel analysis.	Lectures with white board/PPT, and animation of different mechanism, Recorded video/interactive videos	8
Unit-IV	Cams: Introduction, classification of cams and followers, types of follower motion and their comparison, displacement diagram, nomenclature and graphical layout of cam profile, under cutting in cam profile, analytical treatment of tangent and circular cams with flat face and roller followers.	Lectures with white board/PPT, and animation of different mechanism, Recorded video/interactive videos	8
Unit-V	Governors: Introduction, Types of governors, Various gravity and spring-controlled governors, governor characteristics, Effort and power of a governor. Statics and Dynamics balancing: Introduction and balancing of several masses rotating in the same plane Artificial Intelligence: Application of AI in different mechanism, governors and static and dynamics balancing.	Lectures with white board/PPT, and animation of different mechanism, Recorded video/interactive videos	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	To Study kinematics pairs	Experiments	BL2-Understand	2
Experiment-II	To Study different types of mechanisms	Experiments	BL3-Apply	2
Experiment-III	To Study and demonstration of proell governor	Experiments	BL3-Apply	2
Experiment-4	To Study and demonstrate porter governor	Experiments	BL3-Apply	2
Experiment-5	To Study the cam and follower	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	20

Part E

Books	1.Rattan SS Theory of Machines TMH.
Articles	https://onlinecourses.nptel.ac.in/noc22_me25/preview
References Books	1. Ambekar A.G Mechanism and Machine Theory PHI 2. Ghosh A. and Mallick A. Theory of Mechanisms and Machines Affiliated East- K West Press. 3. Shigley J.E. and Uicker J.J Theory of Machines and Mechanisms McGraw-Hill.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	1	2	2	2	1	2	2	2	1	1	-	3	2	3	2
CO4	1	3	2	3	2	-	3	2	-	-	2	2	2	2	2
CO5	-	1	1	2	2	3	3	-	-	-	2	-	1	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Machining processes
Course Code	MEL0442[T]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Knowledge of material science and manufacturing processes			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To get the fundamentals of various machining operations.(BL1-Remember) CO2- To understand the basic concept of metal cutting mechanism.(BL2-Understand) CO3- To implement the mechanism of machining in different machines.(BL3-Apply) CO4- To analyze the different parameters used in machining operations.(BL4-Analyze) CO5- To evaluate different forces which act during the machining.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Metal Cutting: Economics of machines, introduction to machining processes, classification, mechanics of chip formation process, concept of shear angle, chip contraction and cutting forces in metal cutting, Merchant theory, tool wear, tool life, machinability. Fundamentals of measurement of cutting forces and chip tool interface temperature.	Lectures with whiteboard/PPT, Quiz, Group discussion	11
Unit 2	Cutting Tools: Types, geometry of single point cutting tool, twist drill and milling cutter, tool signature. Cutting Tool Materials: Classification of cutting tool materials and properties, tool insert, Selection of machining parameters. Coolants and lubricants: classification, purpose, function and properties.	Lectures with whiteboard/PPT, Quiz, Group discussion	10
Unit 3	Machine Tools Lathe: Classification, description and operations, kinematic scheme of lathe, and lathe attachments. Speed, feed and machine time calculations. Shaping And Planning Machine: Classification, description and operations. Milling Machine: Classification, description and operations, indexing devices, up milling and down milling.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit 4	Drilling Machine: Classification, description and operations. Speed, feed and machine time calculations. Boring Machine: Classification, description and operations. Broaching Machine: Classification, description and operations.	Lectures with whiteboard/PPT, Quiz, Group discussion	7
Unit 5	Grinding Machines: Classification, description and operations, grinding wheel composition, nomenclature of grinding wheels. <u>Jigs and Fixtures: Locating and clamping devices, principles of jigs and fixtures, classification and application.</u>	Lectures with whiteboard/PPT, Quiz, Group discussion	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment 1	Study of different parts of lathe machine	Experiments	BL2-Understand	2
Experiment 2	To perform Facing, Turning and Taper turning operations on the given work piece.	Experiments	BL5-Evaluate	2
Experiment 3	To perform thread cutting and knurling operation on the given work piece.	Experiments	BL5-Evaluate	2
Experiment 4	Study of different parts of Shaper machine	Experiments	BL2-Understand	2
Experiment 5	To perform the operations on Shaper machine.	Experiments	BL5-Evaluate	2
Experiment 6	Study of different parts of Milling machine	Experiments	BL2-Understand	2
Experiment 7	To perform the operations on Milling machine.	Experiments	BL5-Evaluate	2
Experiment 8	To perform the operations on Drilling machine.	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Ghosh and Mallick Manufacturing Science East West Press, 2010 Dr. P. C. Sharma Manufacturing Technology-II S. Chand & Company Ltd.
Articles	
References Books	P. C. Pandey Production Engineering Science Standard Publishers, 2010 P. N. Rao Manufacturing Technology Vol. II Tata McGraw–Hill, New Delhi, 2009 P M Groover Fundamental of modern manufacturing, Processes And System John Wiley and Sons, 2010
MOOC Courses	https://archive.nptel.ac.in/courses/112/104/112104290/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	2	1	2	2	3	3	3	-	-	3	3	3
CO2	3	-	2	2	-	2	2	-	1	3	-	-	3	3	3
CO3	3	2	2	2	1	2	2	-	-	-	-	-	3	2	3
CO4	3	2	3	2	1	-	1	-	-	-	-	-	2	-	3
CO5	3	1	2	2	1	-	1	-	-	-	-	-	2	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Evaluation of Industrial Training-II
Course Code	MED0502[P]

Part A

Year	3rd	Semester	5th	Credits	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Projects and Internship							
Pre-Requisite/s	subject knowledge of Mechanical Engineering			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility. (BL2-Understand) CO2- Identify the needs and problem of the community and involve them in problem solving. (BL2-Understand) CO3- Utilize their knowledge in finding practical solution to individual and community problem. (BL3-Apply) CO4- Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. (BL4-Analyze) CO5- Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-I	Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices.	Field work	BL4-Analyze	40 hrs
Module-II	It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings.	Field work	BL5-Evaluate	40 hrs

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	50				
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	-	1	-	-	-	-	-	-	-	2	2	2
CO2	1	-	2	-	2	-	-	-	-	-	-	-	1	2	1
CO3	1	2	-	2	1	-	-	-	-	-	-	-	2	2	1
CO4	1	1	-	2	-	-	-	-	01	-	-	-	2	2	1
CO5	-	-	-	-	1	-	-	-	-	01	-	-	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Machine Design-I
Course Code	MEL0515[T]

Part A

Year	3rd	Semester	5th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Prerequisites for the course "Machine Design" include a strong foundation in mechanical engineering fundamentals, understanding of materials science, proficiency in engineering mathematics, engineering mechanics and solid mechanics , and familiarity with manufacturing processes and mechanical systems analysis.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember the basic principle of Solid mechanics, Machine drawing, Engineering Mechanics, and stress- strain etc.(BL1-Remember) CO2- To understand the concept of design against static loading for mechanical components and suitable material for machine components.(BL2-Understand) CO3- To apply the concept of design against static loading for mechanical components(BL3-Apply) CO4- To analyze the safe dimensions of Welded Joints, Riveted Joints, Shat, Key, Coupling, Spring and Screw Jack under the static and dynamic load.(BL4-Analyze) CO5- To evaluate the applications of Machine design in various fields such as research and industries(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consupction and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit -1	Design process, Requirement for mechanical and other properties, Design procedure, and use of standards in design, preferred sizes, ergonomic and aesthetic considerations, Selection of materials, mechanical properties, designation for plain carbon steels, alloy steels, cast iron and their engineering usage. Design against static loads, modes of failure	Lecture with PPT, Audio/Video clips, group discussion, Physical model of gear, quiz	10
Unit -2	Stress concentration and its effect on ductile and brittle materials, stress concentration factor for various geometries, cyclic stresses, notch sensitivity, design for finite and infinite life, Soderberg, Goodman & Gerber criteria	Lecture with PPT, Audio/Video clips, group discussion, lecture with PPT, Review Analysis	6
Unit -3	Riveting methods, comparison of riveted joints with other joining methods, rivet materials, types of rivet heads, types of riveted joints, caulking and fullering, failure of riveted joints, efficiency of riveted joints, design of boiler joints, eccentric loaded riveted joint. Welded joints: Design of welded joints, butt welds, fillet welds-transverse and parallel fillet, eccentric load, fluctuating load on welded joints	Lecture with PPT, Audio/Video clips, group discussion, lecture with PPT, classroom presentations	8
Unit -4	Shafts: Cause of failure in shaft, materials for shaft, stress in shaft, and design of shafts subjected to twisting moment, bending moment and combined twisting and bending moments, shaft subjected to fatigue loads, design for rigidity. Keys: Types and selection, design of square and flat keys, splines. Couplings: Selection of couplings, design of rigid and flexible couplings.	Lecture with PPT, Audio/Video clips, group discussion, lecture with PPT, quiz	8
Unit -5	Mechanical Spring: Types, nomenclature of helical and leaf springs, spring materials, types of ends, design of helical springs subjected to static and fatigue loading, design of leaf springs. Power Screws: Forms of threads, multiple threads, efficiency of square threads, trapezoidal threads, stresses in screws, design of simple screw jack	Lecture with PPT, Audio/Video clips, group discussion, lecture with PPT, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	Material selection and relevant BIS nomenclature	Experiments	BL2-Understand	2
Experiment -2	development of series for new product	Experiments	BL2-Understand	2
Experiment -3	Examples of Production considerations	Experiments	BL2-Understand	2
Experiment -4	design of Knuckle & Cotter joints	Experiments	BL3-Apply	2
Experiment -5	Design of machine Components subjected to Fatigue Load	Experiments	BL3-Apply	2
Experiment -6	Design of Riveted joints	PBL	BL4-Analyze	2
Experiment -7	Design of welded joint	PBL	BL3-Apply	2
Experiment -8	Design of Keyed joints and shaft couplings	PBL	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	12	60	

Part E

Books	Bhandari, V. B. (2016). Design of Machine Elements. Tata McGraw-Hill Education. Shigley, J. E., Mischke, C. R., & Budynas, R. G. (2010). Mechanical Engineering Design (9th ed.). McGraw-Hill Education.
Articles	
References Books	Spotts, M. F., Shoup, T. E., & Hornberger, E. T. (2010). Design of Machine Elements (8th ed.). Pearson. Juvinal, R. C., & Marshek, K. M. (2011). Fundamentals of Machine Component Design (5th ed.). John Wiley & Sons. Norton, R. L. (2009). Design of Machinery (4th ed.). McGraw-Hill Education.
MOOC Courses	https://archive.nptel.ac.in/courses/112/105/112105124/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	1	2	3	2	1	2	2	2	2	1	-	3	3	3	2
CO4	1	3	3	3	2	-	3	2	-	-	2	2	3	2	2
CO5	-	2	2	2	2	3	3	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	IC Engines
Course Code	MEL0516[T]

Part A

Year	3rd	Semester	5th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Knowledge of basic thermal science.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember basic principles of thermal sciences. (BL1-Remember) CO2- To understand the basic concept of thermodynamics, heat engines and air standard cycles. (BL2-Understand) CO3- To implement the knowledge of thermodynamics in determining the engine parameters. (BL3-Apply) CO4- To analyze the thermal efficiency of various cycles and cooling and lubrication systems. (BL4-Analyze) CO5- To evaluate the findings of analysis of supercharging, cooling and lubrication systems within permissible limits of pollutants. (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		SDG (Goals)	SDG7(Affordable and clean energy)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	Introduction to IC Engines: Definition of engine; classification, Application of IC Engines, Air Standard Cycle and deviation from air standard cycle actual cycle, indicator diagram, MEP, Shaft Power, Indicated Power.	Lectures with whiteboard/PPT, Recorded video/interactive videos	8
Unit-II	Actual working of IC engine: Introduction to fuel air cycles and their significance, composition of cylinder gases, variable specific heats, comparison of air standards & fuel air cycles, effect of operating variable like compression ratio, fuel air ratio, actual cycles and their analysis; difference between actual and fuel-air cycle; actual and fuel-air cycles for S.I. and C.I. engines. Working of 4 stroke petrol & diesel engines and their valve timing diagram, working of 2-stroke petrol & diesel engines & their valve timing diagrams, comparison of two stroke & four stroke engines, actual working of 2 & 4 stroke gas engines and their valve diagram	Lectures with whiteboard/PPT, Recorded video/interactive videos	8
Unit-III	Fuel and Combustion: Fuels for SI and CI engine, Important qualities of SI and CI engines fuels, rating of SI engines, and CI engines fuels, Dopes, Combustion in CI engines, ignition delay, knock and its control, combustion chamber design for CI engines. Combustion in SI engine, detonation, additives, Gaseous fuels, LPG, CNG, Biogas, producer gas, alternatives fuels for IC engines.	Lectures with whiteboard/PPT, Recorded video/interactive videos	8
Unit-IV	Fuel Supply System: Fuel supply system and fuel pumps, properties of air fuel mixture, a sample carburetor an its working, actual air fuel ratio of single jet carburetor, supercharger, introduction to petrol injection, fuel injection systems for C.I., cooling and lubricants of IC engines. Classification of injection systems, injection pump, fuel injection systems, Fuel Injector, Nozzle, Injection of S.I. Engines, Fuel Filters.	Lectures with whiteboard/PPT, Recorded video/interactive videos	8
Unit-V	Measurement and Testing: Measurement of shaft power, indicated power, measurement of speed, air consumption, fuel consumption, heat carried by cooling water, heat carried by the exhaust gases, Morse	Lectures with whiteboard/PPT, Recorded video/interactive videos	8

	test heat balance sheet, governing of I.C. Engines, performance characteristics of I.C. Engines: Performance parameters, performance of S.I. Engines, performance of C.I. Engine. Recent trends in I C Engines: Rotary engines, Stratified charged engines, multi-fuel engines, concept of six-stroke engines and other recent automotive technologies. <u>Application of Artificial Intelligence:</u> <u>AI/ML and data driven optimization techniques in combination with Computational Fluid Dynamics (CFD), data driven optimization techniques for fuel formulations and vehicle control calibration.</u>	
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Study of working of Two stroke Petrol and diesel engine SOP: Working Models of the same will be displayed to students. Various components and process of strokes will be explained through the model. Learning outcome: Student will 1.observe varous parts of an engine and their mechanism interlinking while in operation. 2. learn the salient working features of parts and their materials, so that he/she may be able to design and fabricate the engine components.	Experiments	BL2-Understand	2
2	Study of working of four- stroke Petrol and Diesel engine SOP: Working Models of the same will be displayed to students. Various components and process of strokes will be explained through the model. Learning outcome: Student will 1.observe varous parts of an engine and their mechanism interlinking while in operation. 2. learn the salient working features of parts and their materials, so that he/she may be able to design and fabricate the engine components. 3. able to compare the 2-stroke and 4-stroke diesel and petrol engines.	Experiments	BL2-Understand	2
3	To determine the efficiency and heat balance of petrol engine SOP: Through the test rig of a Petrol engine, students will observe and note the readings of inlet and outlet temperatures at certain intervals of time. Then using thermodynamic	Experiments	BL3-Apply	2

	empirical relations, he/she may get the thermal efficiency and heat balance sheet of the engine. Learning Outcome: Students will 1. observe readings on thermocouple sensor indicators of inlet mixture and exhaust outlet in engine at various loading conditions. Eventually he/she may learn the changes in the efficiency of engine in accordance with the load changes. 2. learn to operate the engine and dynamometer to get the power output and torque of an engine.			
4	To determine the efficiency and heat balance of Diesel engine SOP: Through the working test rig of a Diesel engine, students will observe and note the readings of inlet and outlet temperatures at certain intervals of time. Then using thermodynamic empirical relations, he/she may get the thermal efficiency and heat balance sheet of the engine. Learning Outcome: Students will 1. observe readings on thermocouple sensor indicators of inlet mixture and exhaust outlet in engine at various loading conditions. Eventually he/she may learn the changes in the efficiency of engine in accordance with the load changes. 2. learn to operate the engine and dynamometer to get the power output and torque of an engine. 3. be able to compare the petrol and doesel engine efficiency and power output.	Experiments	BL3-Apply	2
5	Study of Jerk type Fuel injection Pump and nozzle. SOP: Students will be demonstrated the fuel pump through the dismantling and assembling various parts of the pump and nozzle. Learning outcome: student will	Experiments	BL2-Understand	2

	1. be able to understand, assemble and dismantle the various parts of the fuel injection pump and nozzle. 2. learn the operation and subsequently, be able to draw and design the components of the injection pump.			
6	To have internship in the automotive workshop in Gwalior region. SOP: 1. Students will get the permission through Dean/TAPcell to visit the workshop of an automotive company. 2. Duration of visit may be for one week. Learning Outcome: Students will 1. observe various maintenance cells to understand working of maintenance department. 2. observe and understand various parts of engine, also assembling and dismantling. 3. observe state of the art technology enhancements which are not possible through laboratory experiments.	Field work	BL3-Apply	2
7	To design and fabricate a test rig of petrol engine. SOP: 1. students will draw the dimensions of base/foundation for fixing the engine as per the engine size. 2. fabricate the base of the engine. 3. fix the engine on the base and then connect the engine with rope brake dynamometer existing in the lab after proper check of alignment and balancing. 4. also fabricate the air box and stand to fix the thermocouple sensors and manometer. Learning outcome: 1. he/she may learn the preliminary stage of drawing and design.	PBL	BL5-Evaluate	

	2. students will learn fabrication processes like welding, fitting and metal working. 3. students will be able to design and fabricate all the parts except engine through this PBL.			
8	Industrial visit to automotive industries- Jamna Auto/Railway Spring factory sitholi. SOP: 1. Due approval for visit will be sought through Hon'ble Vice Chancellor sir. 2. students will be taken to the plant by buses. 3. Visit will be of one day. Learning Outcome: 1. students will observe the variuos sections in the plant and learn the organization structure. 2. he/she may learn the design and manufacturing of parts. 3. students will learn the defects detection, hardness testing, strength testing in the labs existing in the plant.	Industrial Visit		

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	20	60	30
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	30

Part E

Books	1. Sharma and Mathur, Internal Combustion Engines, Dhanpat Rai Publ. 2. Balaji Mohan, Pinaki Pal, Sibendu Som, 2022 “Artificial Intelligence and Data Driven Optimization of Internal Combustion Engines”, Elsevier
Articles	1. Mengfei Liu (2024) Application and Characteristics of Hydrogen in Alternative Fuels for Internal Combustion Engines, Trends in Renewable Energy 10(2):229-238 2. Basara B., S. Steffen (2024) Numerical Analysis of Combustion Process in the Dual Fuel Internal Combustion Engine, SAE International Journal of Advances and Current Practices in Mobility. 3. Soteris A. (2003) Artificial intelligence for the modeling and control of combustion processes: a review, Elsevier 4. Koten Hasan, Nemar Mustafa (2023) Artificial intelligence in diesel engines, Elsevier 5. Kamath Rohit et al (2019) Application of Artificial Intelligence and Machine learning in Engine Management Systems for Gen-Next mobility
References Books	1 Heywood John, Fundamentals of IC Engines, McGraw Hill. 2 Ganeshan V. , Internal Combustion Engines Tata McGraw Hill 3 Domkundwar, Internal Combustion Engines, Dhanpath Rai & Sons
MOOC Courses	https://ocw.mit.edu/courses/2-61-internal-combustion-engines-spring-2017/
Videos	http://vlabs.iitkgp.ac.in/

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	3	3	1	-	1	3	3	1	1	1
CO2	3	3	3	1	-	3	3	1	-	1	3	3	1	1	1
CO3	3	3	3	2	2	3	3	1	-	-	3	3	2	2	2
CO4	3	3	2	3	2	3	3	2	2	2	3	3	3	3	3
CO5	3	3	3	3	2	3	3	2	2	2	3	3	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Fluid Machinery
Course Code	MEL0521[T]

Part A

Year	3rd	Semester	5th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	integral calculus and differential equations, so these courses are prerequisites. It also helps to have taken physics and thermodynamics prior to this course			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall concept of basic sciences and fluid mechanics(BL1-Remember) CO2- To Understand Components and operation; velocity triangles, work output(BL2-Understand) CO3- To apply fluid mechanics in Components and operation, velocity triangles and work output(BL3-Apply) CO4- To analyze Main elements and their functions; Various types and classification(BL4-Analyze) CO5- To evaluate new Components, working principle; pressure variations due to piston acceleration(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)	SDG7(Affordable and clean energy)				

Part B

Modules	Contents	Pedagogy	Hours
1	Euler's turbomachinery equation, Specific speed, impulse and reaction principle, impulseMomentum principle, jet impingementon stationary and moving flat plates and vanes, calculation for force exerted, work done and efficiency of jet, basic components of turbo machinery and its classification.	Lectures with white board and PPT, Assignment	10
2	Components and operations, velocity triangles, work output, effective head, available power and efficiency, design aspects such as mean diameter of a wheel, Jet ratio, number of jets, number of buckets with working proportion	Lectures with white board and PPT,Quiz, Seminar	10
3	Component and operations, velocity triangle and work output, working proportions and design parameters for Runner, degree of reaction, draft tubes, its function and types, function and brief description of commonly used surge tanks.	Lectures with white board and PPT,Assignment, Poster presentation	8
4	Main elements and their function, periods types and classification, pressure change in a pump, suction, delivery and manometric head, vane shape and its effect on head capacity relationships, Departure from Euler's theory and losses, pump output and efficiency, minimum starting speed and impeller diameters at the inner and Outer periphery	Lectures with white board and PPT,Assignment, quiz	8
5	Components, working principles, pressure variation due to piston acceleration, acceleration effect in suction and delivery pipe, work done against friction, maximum permissible vacuum during suction stroke, Air vessel.	Lectures with white board and PPT,Quiz, seminar, Assignment	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To verify momentum equation by impact of jet apparatus	Experiments	BL3-Apply	04
2	Study of Pelton turbine and perform experiment on Pelton turbine test rig	Experiments	BL4-Analyze	04
3	Study of Francis turbine	Experiments		04
4	Study of Kaplan turbine and perform experiment on Kaplan turbine test rig	PBL	BL6-Create	04
5	Study of centrifugal pump and perform the experiment on centrifugal pump test rig	Experiments	BL2-Understand	04
6	Study of Reciprocating pump and perform the experiment on reciprocation pump test rig	Experiments	BL5-Evaluate	04

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Hydraulic Turbines, Daughaty R L, McGraw Hill Book Co.. A Text book of Fluid Mechanics and Hydraulic Machines, Rajput, R.K., S. Chand and Co., New Delhi
Articles	https://archive.nptel.ac.in/courses/112/105/112105206/
References Books	Fluid Mechanics and Fluid Power Engineering by Kumar D S, S K Kataria and Sons, Delhi Hydraulic Machines by Jagdish Lal, Metropolitan Book Co Pvt. Ltd Fluid Mechanics and Hydraulic Machines, Bansal, R.K., Laxmi Publications, New Delhi
MOOC Courses	https://archive.nptel.ac.in/courses/112/105/112105206/
Videos	https://archive.nptel.ac.in/courses/112/105/112105206/

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	-	1	3	2	1	2	2	2	-	2	-	3	3	3	2
CO4	1	2	3	3	2	-	3	2	-	-	2	1	3	2	2
CO5	-	2	2	2	2	3	3	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Advanced Manufacturing
Course Code	MEL0522[T]

Part A

Year	3rd	Semester	5th	Credits	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Information about basic manufacturing processs.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall the concepts of manufacturing, material science, Production, Engineering Mechanics. (BL1-Remember) CO2- To understating the concept of advanced machining process i.e. USM, AJM, WJM, AWJM, ECM, EDM, EBM, and LBM. (BL2-Understand) CO3- To apply the concept of Advanced casting process i.e. Metal mould casting. (BL3-Apply) CO4- To analysis of Advanced welding process i.e. EBW, LBM, USW, Plasma arc welding. (BL4-Analyze) CO5- To evaluation of Advanced Metal Forming & Finishing Processes. (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Advanced Machining Processes Limitations of conventional manufacturing processes, Need and classification of unconventional or advanced manufacturing processes, Process Principle, Parametric analysis and applications of processes such as ultrasonic machining (USM), Abrasive jet machining (AJM), Water jet machining (WJM), Abrasive water jet machining (AWJM), Electrochemical machining (ECM), Electro discharge machining (EDM), Electron beam machining (EBM), Laser beam machining (LBM) Processes.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-2	Advanced Casting Processes Metal mould casting, Continuous Casting, Squeeze casting, Vacuum mould casting, Evaporative pattern casting, Ceramic shell casting, High pressure die casting process and study of injection chamber (HPDC).	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-3	Advanced Welding Processes Details of electron beam welding (EBW), laser beam welding (LBW), ultrasonic welding (USW), Plasma Arc Welding.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-4	Advanced Metal Forming Processes Details of high energy rate forming (HERF) process, electro- magnetic forming, explosive forming, Electro-hydraulic forming, Stretch forming, Contour roll forming,	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-5	Advanced Finishing Processes Need, classification, process principle and applications of Abrasive Flow Finishing, Magnetic Abrasive Flow Finishing (MAFF), Magnetic Abrasive Finishing (MAF).	Lectures with whiteboard/PPT, Quiz, Group discussion	8

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
			0		0

Part E

Books	Benedict G.F. Non-Traditional Manufacturing Processes Marcel Dekker
Articles	
References Books	Jain V. K. Advance Machining Processes, Allied Publisher.
MOOC Courses	https://archive.nptel.ac.in/courses/112/107/112107078/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	1	-	-	-	-	-	-	-	-	2	-	3
CO2	3	3	-	3	-	-	-	-	-	3	2	-	3	3	3
CO3	2	2	-	3	-	-	-	-	-	3	2	-	3	3	3
CO4	3	3	-	3	-	-	-	-	-	3	2	-	3	3	3
CO5	3	3	-	3	-	-	-	-	-	3	3	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Industrial Automation and Control
Course Code	MEL0523[T]

Part A

Year	3rd	Semester	5th	Credits	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student should have knowledge of kinematics of machine and basic mathematics.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- Recall the concepts of Kinematics of machines, Dynamics of machines.(BL1-Remember) CO2- Understating the concept of joints and links.(BL2-Understand) CO3- Applying the basic degree of freedom concept.(BL3-Apply) CO4- Determine the options of fixed or flexible automation.(BL4-Analyze) CO5- Determine the safe conditions of optimizing human and robots role.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Definition of an industrial automation, the advantages & disadvantages, Types of Automation, Automation in production system, Industrial Automation and Robotic Basic Concept Link and Joint Degree of freedom, Orientation Axes, Position Axes, Tool Centre Point (TCP), Work envelope/workspace. Speed, Payload, Repeatability, Accuracy, Settling Lectures with whiteboard/PPT, Quiz, Group discussion Time, Control Resolution, Coordinates, Accuracy and Repeatability, Control resolution, Payload Components, Applications, of Automation system.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-2	Mechanical System: Components, Dynamics and Modeling Elementary Mechanical Concepts Translation or Linear Motion Rotational Motion- Mechanical Work and power, Motion Conversion Rotary to Rotary Motion Conversion, Rotary to Linear Motion Conversion, Linkages, Couplers, The Concept of Power Transfer, Modelling of Mechanical System-Elements, Rules and Nomenclature, Translational Example, Rotational Example, Electrical Analog	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-3	Actuators--Flow Control Valves, Electric actuators, Relays, Power relays, - General purpose relay, -Hydraulic Actuators, - Pneumatic Actuators, Pneumatic Valves Stepper Motors-Principles of stepper motor operation, Half Step Mode Operation, Micro-step Mode, Methods of Damping Rotor Oscillations, Permanent Magnet Stepper Motors Stepper motor drives, Linear stepper, motors	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-4	Classification of sensors, Sensor generalities, Sensor characteristics, Angular and Linear Position Sensors, Velocity and Acceleration Sensors Tacho generator, Signac interferometer, micromechanical angular velocity and acceleration sensor, Contact sensor Piezoresistive and capacitive tactile sensors, optical tactile sensors, force measurement by deformation of contact sensors, principle and applications of strain gage sensors, Laser-Range Radar, Laser interferometric distance meter, Laser-Doppler Velocimeter, Pressure, Temperature, Flow measurement	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-5	Automation Design and process specifications, Mechanical Description of the automation, Motion Sequence, Motor and Drive Mechanism Selection, Encoder Selection, Control Structure: Programmable	Lectures with whiteboard/PPT, Quiz, Group discussion	8

	Logic Controller used for Industrial Automation. Lectures with whiteboard/PPT, Quiz, Group discussion		
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Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

Books	1. Dr. K. Shivanand and Dr. M. N. Shanmukha Swamy Industrial Automation and Engineering Approach CRC Press
Articles	
References Books	1 Stamatios Manesis George Nikolakopoulos Introduction to Industrial Automation CRC Press Taylor & Francis Group
MOOC Courses	https://onlinecourses.nptel.ac.in/noc20_me39/preview
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	-	2	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	-	2	3	2
CO3	1	3	2	3	-	-	-	-	-	3	-	-	2	3	3
CO4	1	3	2	3	1	-	3	-	-	3	3	-	3	3	3
CO5	-	3	2	3	-	-	-	-	-	3	3	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Minor Project
Course Code	MED0603[P]

Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					0	0	2	2
Course Type	Project							
Course Category	Projects and Internship							
Pre-Requisite/s	Knowledge of Mechanical engineering and interdisciplinary subjects.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To enhance writing skills and knowledge.(BL2-Understand) CO2- To increase their mental ability.(BL3-Apply) CO3- To inculcate the ability to express innovative opinion and thoughts(BL4-Analyze) CO4- To have Dissertation works as skills development in students.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module-I	Identification of a problem and formulation of a topic of project/thesis	PBL	BL3-Apply	15 hrs
Module-III	Dissertation and Viva-voci	PBL	BL5-Evaluate	20 hrs

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	50				
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2-	2	-	1	-	-	-	-	-	-	-	2	2	2
CO2	1	-	2	-	2	-	-	-	-	-	-	-	1	2	1
CO3	1	2	-	2	1	-	-	-	-	-	-	-	2	2	1
CO4	-	1	-	2	-	-	-	-	01	-	-	-	2	2	1
CO5	-	-	-	-	1	-	-	-	-	01	-	-	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Robotic Process Automation
Course Code	MEE0621

Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Knowledge of mechanical systems and computer science engineering			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To understand basic concept of Robotic process Automation(BL1-Remember) CO2- To introduce different platforms for RPA(BL2-Understand) CO3- To identify and apply Image, Text and Data Tables Automation(BL3-Apply) CO4- To analyze- how to handle the User Events and various types of Exceptions and strategies(BL4-Analyze) CO5- To evaluate the deployment of the Robotic automation.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	Introduction to Robotic Process Automation: Metal Cutting: Scope and techniques of automation, Benefits of RPA, Components of RPA, RPA platforms, The future of automation. RPA BASICS: History of Automation, RPA vs Automation, Processes& Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads, RPA Advanced Concepts, Standardization of processes, RPA Development methodologies, Robotic control flow, Risks & Challenges with RPA - RPA and emerging ecosystem.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-II	Overview of Robotic Process Automation Tools: Introduction to Robotic Process Automation Tools, Basic components in a RPA platform, Installation details of RPA tools, Types of Templates, User Interface, Domains in Activities, Workflow Files in the RPA platform	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-III	Process Components and Activities: Process Components and Activities: User Interface Automation Activities, System Activities, Variables, Arguments, Imports Panel and User Events	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-IV	App Integration, Recording and Scraping: App Integration, Recording, Scraping, Selector, Workflow Activities. Example of Automate login to your (web)Email account, recording mouse and keyboard actions to perform an operation, scraping data from website and writing to CSV.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-V	Data Manipulation and PDF Automation: Data Manipulation, Automation of Virtual Machines, Introduction to Native Citrix Automation, Text and Image Automation, PDF Automation Workflow Management Automation: RPA Orchestrator Overview, Orchestrator activities	Lectures with whiteboard/PPT, Quiz, Group discussion	8

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	UiPath by Alok Mani Tripathi Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool Packt Publishing, Mumbai, 2018.
Articles	
References Books	Tom Taulli The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems Apress publications, 2020.
MOOC Courses	https://www.coursera.org/courses?query=robotic%20process%20automation
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	1	-	-	-	-	-	1	1	1	1
CO2	1	1	1	-	-	1	-	-	-	-	-	1	1	1	1
CO3	1	2	2	-	-	1	-	-	-	-	1	1	2	2	2
CO4	2	3	3	2	2	1	-	-	-	-	1	1	3	3	3
CO5	2	3	3	2	2	1	-	-	-	-	1	1	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Electric Vehicle Engineering
Course Code	MEE0622

Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Knowledge of electrical engineering and automobile engineering.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall fundamental concepts of electric and automobile engineering (BL1-Remember) CO2- To understand fundamental concepts of electric vehicle propulsion systems(BL2-Understand) CO3- To implement advanced control strategies for optimizing electric vehicle efficiency and performance.(BL3-Apply) CO4- To analyze the performance characteristics of electric vehicle components(BL4-Analyze) CO5- To evaluate the impact of electric vehicles on sustainability and the environment(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	ELECTRIC VEHICLES: Introduction, Components, vehicle mechanics – Roadway fundamentals, vehicle kinetics, Dynamics of vehicle motion - Propulsion System Design.	Lectures with whiteboard/PPT, Quiz, Group discussion	
Unit-II	BATTERY: Basics – Types, Parameters – Capacity, Discharge rate, State of charge, state of Discharge, Depth of Discharge, Technical characteristics, Battery pack Design, Properties of batteries	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-III	Vehicle Mechanics: History of Vehicle Development, General Configuration of Automobile, Body and Chassis Fundamentals: General Packaging, Types of Structural System, Backbone Construction; Body and Chassis Materials. Automotive Powertrain Mechanical, Suspensions system, Steering System, NVH, Control System Integration and Implementation. Front-Wheel Drive (FWD) Powertrains, Rear-Wheel Drive Powertrains (RWD), Multi-Wheel Drive Powertrains (AWD and 4WD).	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-IV	Conversions and motors: Introduction of DC-DC, AC-AC, AC-DC, DC-AC, four-quadrant operation, Driver circuits. Principle and working of DC motor, Characteristics and Types of DC Motors- Overview (Speed torque characteristics) of Permanent Magnet motor, BLDC Motor, Induction motor. Comparison of all motors.	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8
Unit-V	Hybrid Powertrain: Series HEVs, Parallel HEVs, Series-Parallel HEVs, Complex HEVs, Operating Modes, Degree of Hybridization, Comparison of HEVs, Plug-in Hybrid Electric Vehicles (PHEVs) Real Life examples of HEVs, compare and contrast the performance of ICE vehicles, HEVs and EVs.	Lectures with whiteboard/PPT, Quiz, Group discussion	8

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	Iqbal Hussain, Electric & Hybrid Vehicles Design Fundamentals Second Edition, CRC Press, 2011. James Larminie Electric Vehicle Technology Explained John Wiley & Sons, 2003.
Articles	
References Books	Mehrdad Ehsani, Yimin Gao, Ali Emadi Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals CRC Press, 2010. Sandeep Dhameja Electric Vehicle Battery Systems Newnes, 2000
MOOC Courses	https://www.mooc-list.com/tags/electric-vehicles
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	1	-	-	-	-	-	-	1	1	1
CO2	1	-	-	-	-	1	-	-	-	-	-	-	1	1	2
CO3	1	1	1	2	1	1	3	-	-	-	1	-	2	2	2
CO4	1	2	2	2	2	1	3	1	-	-	2	1	3	3	3
CO5	1	2	3	3	3	1	3	1	-	-	3	1	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Tribology Engineering
Course Code	MEE0623

Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Knowledge of basic sciences, material science and machine design			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall the concepts of Engineering Mechanics and machine design(BL1-Remember) CO2- To understat the concept of tribology engineering(BL2-Understand) CO3- To apply the tribo design in various machine elements(BL3-Apply) CO4- To design the components through tribology in lubrication and wear mechanism(BL4-Analyze) CO5- To evaluate the results of designing which leads to reduction of power consumption in gears, bearings and other contacting parts of machinery(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	Introduction Introduction to tribology, History of tribology, Interdisciplinary Approach, Principles of tribo design, Tribological problems in machine design, Economic Benefits.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-III	Wear Wear Mechanisms, Adhesive Wear, Abrasive Wear, Corrosive Wear, Fretting Wear, Wear Analysis	Lectures with whiteboard and PPT, Quiz, Report writing	8
Unit-IV	Lubrication and Lubricants Importance of Lubrication, Boundary Lubrication, Mixed Lubrication, Full Fluid Film Lubrication ; Hydrodynamic, Elastohydrodynamic lubrication, Types & Properties of Lubricants, Lubricants Additives	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-V	Fluid film lubrication Fluid mechanics concepts, Equation of Continuity & Motion, Generalized Reynolds Equation with Compressible & Incompressible Lubricants. Application of Tribology- Introduction, Rolling Contact Bearings, Gears, Journal Bearings, Finite Bearings	Lectures with whiteboard/PPT, Quiz, Group discussion	

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	T.A. Stolarski Tribology in Machine Design Butterworth- Heinemann
Articles	
References Books	Dudley D.Fulier Theory and practice of Lubrication for Engineers New York Company, 1998 Moore, Desmond F. Principles and applications of Tribology Pergamon press, 1975 G W Stachowiak, A W Batchelor Engineering Tribology Elsevier publication 1993
MOOC Courses	https://onlinecourses.nptel.ac.in/noc20_mm12/preview
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	1	-	-	-	-	-	1	1	1	1
CO2	1	1	1	-	-	1	-	-	-	-	-	1	1	1	1
CO3	1	2	3	2	1	1	-	-	-	-	1	1	2	2	2
CO4	1	3	3	3	2	2	1	-	-	-	1	1	3	3	3
CO5	1	3	3	3	3	2	1	-	-	-	2	1	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Machine Design-II
Course Code	MEL0617[T]

Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Prerequisites for the course "Machine Design" include a strong foundation in mechanical engineering fundamentals, understanding of materials science, proficiency in engineering mathematics, knowledge of engineering mechanics, Solid Mechanics, Machine Desig-I and familiarity with manufacturing processes and mechanical systems analysis.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember the concepts of Machine Design, Solid mechanics, Machine drawing, Engineering Mechanics etc.(BL1-Remember) CO2- To understand the concept of design against static loading for mechanical components and suitable material for machine components.(BL2-Understand) CO3- To implement the concept of design against static loading for mechanical components(BL3-Apply) CO4- To analyse the safe dimensions of Gear, Clutch, IC Engine, Bearing and Brakes under the static and dynamic load.(BL4-Analyze) CO5- To evaluate the applications of Machine design in various fields such as research and industries.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG8(Decent work and economic growth) SDG12(Responsible consupction and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit -1	Classification of gears, standard gear tooth system, nomenclature for spur, helical and bevel gears, gear standards, force analysis for spur, helical, and bevel gears, gear failure modes, bending and contact stresses in gear tooth, gear material selection, Lewis and Buekingham equations, design of spur, helical and bevel gears, general design procedure for a fixed ratio gearbox	lecture with ppt, Physical model of gear, quiz, Audio/Video clips, group discussion,	10
Unit -2	Sliding Contact Bearing: Types of lubrication-hydro dynamic, hydro static and EHD lubrication, plain journal bearing, Petroff's equation and the bearing characteristic number, boundary and film lubrication, pressure distribution-eccentricity and minimum film thickness, heat generation and thermal equilibrium, design procedure Rolling Contact Bearing: Types of ball and roller bearings, thrust ball bearing, selection of radial ball and roller bearings, bearing life, dynamic equivalent load, reliability of bearing, lubrication and mounting of bearings.	lecture with ppt, Understand the design of Bearing from Physical model bearing, Review Analysis Audio/Video clips, group discussion	6
Unit -3	General design considerations, design of cylinder and cylinder head, piston, connecting rod and crank shaft	lecture with ppt, classroom presentations, Audio/Video clips, group discussion	8
Unit -4	Friction clutches and brakes, uniform pressure and uniform wear assumptions, design of disc and cone types of clutches and brakes, design of external contracting and internal expanding elements, band type clutches and brakes, centrifugal clutches	lecture with ppt, classroom presentations, Audio/Video clips, group discussion	8
Unit -5	<u>Drives: Belt Drives, Belt Constructions, Geometrical Relationships, Analysis of Belt Tension, Condition for Maximum Power, Chain Drives, Roller Chains, Geometric Relationships, Polygonal Effect, Power Rating of Roller Chain</u>	lecture with ppt, classroom presentations, Audio/Video clips, group discussion	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	Design of Spur gear	Experiments	BL3-Apply	2
Experiment -2	Design of Helical Gear	Experiments	BL3-Apply	2
Experiment -3	Design of Sliding contact bearing design	Experiments	BL3-Apply	2
Experiment -4	Design of Anti-friction bearing selection	Experiments	BL2-Understand	2
Experiment -5	Design of IC engine Components	Experiments	BL3-Apply	2
Experiment -6	Design of Clutches	Experiments	BL2-Understand	2
Experiment -7	Design of Brakes	Experiments	BL3-Apply	2
Experiment -8	Design of IC engine Components	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Bhandari, V. B. (2016). Design of Machine Elements. Tata McGraw-Hill Education. Shigley, J. E., Mischke, C. R., & Budynas, R. G. (2010). Mechanical Engineering Design (9th ed.). McGraw-Hill Education.
Articles	
References Books	Spotts, M. F., Shoup, T. E., & Hornberger, E. T. (2010). Design of Machine Elements (8th ed.). Pearson. Juvinal, R. C., & Marshek, K. M. (2011). Fundamentals of Machine Component Design (5th ed.). John Wiley & Sons. Norton, R. L. (2009). Design of Machinery (4th ed.). McGraw-Hill Education.
MOOC Courses	https://archive.nptel.ac.in/courses/112/106/112106137/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	1	2	3	2	1	2	2	2	2	1	-	3	3	3	2
CO4	1	3	3	3	2	-	3	2	-	-	2	2	3	2	2
CO5	-	2	2	2	2	3	3	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Heat and Mass Transfer
Course Code	MEL0619[T]

Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Heat Transfer uses calculus and differential equations, which are prerequisites, and taking a basic fluids course.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall the basic thermal science(BL1-Remember) CO2- To understand Mechanism of Heat Transfer, Conduction, Convection and Radiation, General Differential equation of Heat Conduction(BL2-Understand) CO3- To apply the Laws of Radiation, Stefan Boltzman Law, Kirchoff Law(BL3-Apply) CO4- To Analyse of Diffusion Mass Transfer, Fick's Law of Diffusion, Steady state Molecular Diffusion, Convective Mass Transfer, Momentum(BL4-Analyze) CO5- To evaluate Nusselts theory of condensation, pool boiling, flow boiling, correlations in boiling(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	Conduction: Mechanism of Heat Transfer, Conduction, Convection and Radiation, General Differential equation of Heat Conduction, Fourier Law of Conduction, Cartesian and Cylindrical Coordinates, One Dimensional Steady State Heat Conduction, Conduction through Plane Wall, Cylinders and Spherical systems, Composite Systems, Conduction with Internal Heat Generation, Extended Surfaces Unsteady Heat Conduction, critical thickness of insulation	Lectures with white board and PPT, Assignment	10
2	Convection Convective Heat Transfer Coefficients, Boundary Layer Concept, Types of Convection, Forced Convection, Dimensional Analysis, External Flow, Flow over Plates, Cylinders and Spheres, Internal Flow, Laminar and Turbulent Flow, Combined Laminar and Turbulent, Flow over Bank of tubes, Free Convection, Dimensional Analysis, Flow over Vertical Plate, Horizontal Plate, Inclined Plate, Cylinders and Spheres.	Lectures with white board and PPT, Quiz, Seminar,	10
3	Radiation: Laws of Radiation, Stefan Boltzman Law, Kirchoff Law, Black Body Radiation, Grey body radiation. <u>Wein displacement law, Shape factor-radiation exchange between surfaces - Radiation shields- Greenhouse effect.</u>	Lectures with white board and PPT, Assignment, Poster presentation	8
4	Mass Transfer Diffusion Mass Transfer, Fick's Law of Diffusion, Steady state Molecular Diffusion, Convective Mass Transfer, Momentum, Heat and Mass Transfer Analogy, Convective Mass Transfer Correlations	Lectures with white board and PPT, Assignment, quiz	8
5	Nusselts theory of condensation, pool boiling, flow boiling, correlations in boiling and condensation. Types of Heat Exchangers, LMTD Method of heat Exchanger Analysis, Effectiveness, NTU method of Heat Exchanger Analysis, Overall Heat Transfer Coefficient, Fouling Factors.	Lectures with white board and PPT, Quiz, seminar, Assignment	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Heat transfer through composite wall	Experiments	BL2-Understand	03
2	Thermal conductivity of insulation slab	Experiments	BL3-Apply	03
3	Heat transfer through a pin fin	Experiments	BL4-Analyze	03
4	Heat transfer by natural convection	Experiments	BL4-Analyze	03
5	Heat transfer by forced convection	Experiments	BL5-Evaluate	03
6	To perform experiment on Stefan Boltzman apparatus	Experiments	BL5-Evaluate	03
7	Drop Wise film condensation	Experiments	BL6-Create	03
8	LMTD of heat exchanger	Experiments	BL4-Analyze	03

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40		60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40		60	

Part E

Books	Sachdeva R. C., "Fundamentals of Engineering Heat and Mass Transfer" New Age International, 1995. D. S. Kumar, Heat and Mass Transfer, SK Kataria & Sons, 2009
Articles	
References Books	Nag P. K, "Heat Transfer", Tata McGraw-Hill, New Delhi, 2002 Holman J. P. "Heat and Mass Transfer" Tata McGraw-Hill, 2000. Kothandaraman C. P. "Fundamentals of Heat and Mass Transfer" New Age International, New Delhi Frank P. Incropera and David P. DeWitt, "Fundamentals of Heat and Mass Transfer", John Wiley Cengel, Yunus A., Heat Transfer- A practical approach, McGraw-Hill Rathore M. M., Comprehensive engineering heat transfer, New Delhi
MOOC Courses	https://www.mooc-list.com/tags/heat-transfer
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	2	2	1	3	3	1	-	3	3	3
CO3	1	2	3	2	1	2	2	2	2	1	-	3	3	3	2
CO4	1	3	3	3	2	-	3	2	-	-	2	2	3	2	2
CO5	-	2	2	2	2	3	3	-	-	-	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Operations Research
Course Code	MEL0626[T]

Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Basic knowledge of linear equation, Engineering mathematics and industrial engineering.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall the industrial engineering(BL1-Remember) CO2- To understand the Performance of queue, line balancing(BL2-Understand) CO3- To apply the queuing theory and game theory(BL3-Apply) CO4- To measures how effective production system (supply system)(BL4-Analyze) CO5- To evaluate the production system (supply system). (BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consupction and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Linear Programming Meaning of Linear Programming, General Mathematical Formulation of LPP, Graphical Analysis, Simplex Method, Two-phase Method, Big M-Method; Duality and Post Optimality Analysis Advantage and Limitations of LPP	Lectures with white board and PPT, Report writing	8
Unit-2	Transportation Model Mathematical Formulation, Initial Basic Feasible Solution, Vogel's Approximation Method, Optimization (Minimization and Maximization) Using Modified Distribution Method and Stepping Stone Method Assignment Problem Quiz, Seminar, Assignment Model as a Particular Case of Transportation Model, Formulation of Assignment Problems, Solution of Assignment Problems Using Hungarian Method (Minimization and Maximization) Route Allocation..	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8
Unit-3	Waiting Line Models Introduction, Scope in Management Decisions, Queuing Models M/M/1 (Infinite and Finite Population), Probability Calculations and Application of M/M/C (Infinite Population) Replacement Models Introduction Scope in Management, Single Equipment Replacement Model and Group Replacement	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8
Unit-4	Game Theory Introduction to Games, Maximin and Minimax Principles, Pure and Mixed Strategies, Solution of Games Using Algebraic and Graphical Methods; Linear programming approach for game theory Simulation & Computer Solutions Introduction to simulation, Monte Carlo Technique and Its Applications	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8
Unit-5	Inventory Models: Economic Order Quantity, Economic Production Order, Models with Price Breaks, Lead Times, Stockouts. Fixed time Period Models with Specified Probability of stock-outs & Service levels. Dynamic Programming Nature of Dynamic Programming Problem, Dynamic Programming Solutions for Knap Sack, Traveling Salesman (Stage Coach), Assignment of Salesmen to Sales Area and Capital Budgeting	Lectures with white board and PPT, Quiz, seminar, Poster and PPT	8

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	1. Gupta & Hira, Operations Research S. Chand & Company
Articles	
References Books	[1] Gupta & Hira, Operations Research, S. Chand & Company [2] Taha Operations Research, Pearson Education [3] Kedar Nath and Ram Nath, Operations Research, Publishers [4] Philips Ravindran, Operations Research, Solberg Wiley India Pvt. Limited.
MOOC Courses	https://onlinecourses.nptel.ac.in/noc22_ma48/preview
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	3	3	-	-	3	2	2
CO2	3	1	2	2	2	-	-	-	3	3	1	-	3	3	3
CO3	1	2	2	2	1	-	-	-	-	1	-	3	2	3	2
CO4	1	3	2	3	2	-	3	2	-	-	2	2	2	2	2
CO5	-	1	1	2	2	-	-	-	-	-	2	-	1	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Syllabus-2025-2026

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Additive Manufacturing
Course Code	MEL 0627[T]

Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Understanding of the concept of design knowledge of CAD. Understanding of the concept of material and manufacturingg.			Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To recall the fundamental principles of additive manufacturing.(BL1-Remember) CO2- To understand the fundamental principles of additive manufacturing.(BL2-Understand) CO3- To apply appropriate material selection criteria for different additive manufacturing applications.(BL3-Apply) CO4- To compare and contrast different additive manufacturing processes based on their strengths and weaknesses(BL4-Analyze) CO5- To evaluate strategies for integrating additive manufacturing into existing manufacturing systems for improved efficiency and productivity.(BL5-Evaluate)							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consupction and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Introduction and Basic Principles Rapid prototyping and tooling, prototype fundamentals-types of prototypes, History of RP system, development of rapid prototyping, fundamentals of rapid prototyping, Tooling. Three Phases of Development, advantages of rapid prototyping, direct benefits, indirect benefits. Trends in manufacturing, Conventional Machining, Processes- Development of a CAD model, Generation of STL Files, Slicing the STL fileSupport Structures, Manufacturing, Post processing. Fundamentals, need, advantages, disadvantages, benefits, Complexity, Accuracy, Geometry Additive Manufacturing, AM Parts, uses, The Generic AM Process, Layer-Based Manufacturing, 3D Printing, Benefits of AM, Distinction Between AM and CNC Machining, Practical Example AM Parts	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-2	Development of Additive Manufacturing Technology Introduction, Computers, Computer-Aided Design Technology, Other Associated Technologies, The Use of Layers, Classification of AM Processes, Metal Systems, Hybrid Systems, Milestones in AM Development,, AM Around the World, Rapid Prototyping ,Direct Digital Manufacturing	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-3	Liquid-Based Systems 3D Systems Stereolithography Apparatus (SLA), Models and Specifications, Advantages and Disadvantages, Process, Principle, Photopolymers, Photopolymerization, Layering Technology, Solid Ground Curing (SGC), Introduction, Highlights Process Machine Details Applications.	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-4	Solid-Based Rapid Prototyping Systems Fused Deposition Modelling. Modelling System Hardware, Software, Build Materials, The Extrusion Head, Drive Blocks, The Heating Chamber Tips Build Substrate Fused Deposition Modelling Operation Orientation/Positioning Slicing, Build Parameters Uses of Fused Deposition Modelling Parts Advantages and Disadvantages Key Terms Laminated Object Manufacturing, System Hardware, Laminated Object Manufacturing Operation, Software, Part Orientation Crosshatching System Parameters Laminated Object Manufacturing Build Technique, Finishing a Laminated Object Manufacturing Part, Uses of Laminated Object Manufacturing	Lectures with white board/PPT, Quiz, Group discussion	8

	Advantages and Disadvantages Materials Properties		
Unit-5	Powder-Based Rapid Prototyping Systems Selective Laser Sintering, Selective Laser Sintering Technology, Purpose, Current State, Advantages, High Throughput Capability, Self- Supporting Build Envelope, Purpose, applications, advantages, Disadvantages, Powder Bed Fusion Processes, Materials Various other Techniques	Lectures with white board/PPT, Quiz, Group discussion	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Experiment -1	Study of Rapid Prototyping and Tooling.	Experiments	BL4-Analyze	2
Experiment -2	Study of Layered Manufacturing (LM).	PBL	BL4-Analyze	2
Experiment -3	Study of Laminated Object Manufacturing (LOM).Laminated Object Manufacturing	Experiments	BL4-Analyze	2
Experiment -4	To study about selective laser sintering	Experiments	BL4-Analyze	2
Experiment -5	Study of Shape Deposition Manufacturing Process Description	Experiments	BL4-Analyze	2
Experiment -6	Study and demonstration of 3D	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	Chua C.K., Leong K.F., and Lim C.S Rapid prototyping: Principles and applications, Third edition, World Scientific Publishers, Gebhardt A Rapid prototyping Hanser Gardener Publications,
Articles	
References Books	Kamrani A.K. and Nasr E. A Rapid Prototyping: Theory and practice Springer Liou L.W. and Liou F.W Rapid Prototyping and Engineering applications: A tool box for prototype development CRC Press
MOOC Courses	https://www.coursera.org/courses?query=additive%20manufacturing
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	-	2	-	-	-	-	-	-	2	3	3	3
CO2	3	3	3	3	3	2	-	-	-	1	3	1	3	3	3
CO3	-	1	-	3	2	2	-	1	-	1	3	3	2	3	3
CO4	3	3	3	3	3	-	-	1	-	2	2	-	3	-	3
CO5	-	3	3	3	3	-	-	-	-	3	3	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

