Course Outcomes for Semester III & IV

Level: **5**	Course Code: **3ME201PC1**		Course Category: **PCC**		
Course Name	**Thermal Engineering -I**				
Credits	**03**	Total L:T:P etc. Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 3ME201PC1Thermal Engineering -I is a compulsory Program Core Course for Second Year B.Tech. Mechanical Engineering Program.

Course Objectives:
This course develops a strong understanding of thermodynamic principles and laws to analyze energy systems, interpret thermodynamic properties, and evaluate major power cycles for real life engineering applications.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME201PC1.1	Explain the basic concepts, laws, and properties related to thermodynamic systems and processes, with the purpose of building a strong foundational understanding of thermodynamics.	C-2
3ME201PC1.2	Interpret various forms of energy and apply the First Law of Thermodynamics to closed and open systems, in order to understand energy interactions and conservation principles in practical applications.	C-2
3ME201PC1.3	Describe steam properties and analyze steam formation processes using steam tables and diagrams, for the purpose of enabling accurate evaluation of steam-based thermodynamic systems.	C-2
3ME201PC1.4	Apply the First Law of Thermodynamics to steady-flow devices such as turbines, compressors, and nozzles, to develop the ability to analyze and solve real-world engineering problems.	C-3
3ME201PC1.5	Evaluate the performance of heat engines, refrigerators, and heat pumps using the Second Law of Thermodynamics, with the purpose of assessing efficiency and identifying performance improvements.	C-4
3ME201PC1.6	Analyze air standard and vapor cycles using thermodynamic principles and diagrams, for the purpose of selecting and optimizing cycles for engineering applications.	C-4

Level: **5**	Course Code: **3ME202PC1**		Course Category: **PCC**		
Course Name	**Fluid Mechanics**				
Credits	**02**	Total L:T:P etc. Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 3ME202PC1Fluid Mechanicsis a compulsory Program Core Course for Second Year B.Tech. Mechanical Engineering Program.

Course Objectives:
To impart fundamental knowledge of fluid properties and behaviour in various flow conditions, including hydrostatics, buoyancy, stability, boundary

layer concepts, and the application of mass, momentum, and energy equations to analyze flow systems and associated losses.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME202PC1.1	To enable students to understand the basic physical properties of fluids and apply principles of fluid statics and kinematics to describe fluid behavior at rest and in motion.	C-3
3ME202PC1.2	To develop the ability to evaluate buoyant forces, stability, and equilibrium conditions of bodies immersed in fluids for engineering applications.	C-5
3ME202PC1.3	To equip students with the analytical skills required to study fluid motion by applying kinematic and dynamic principles to real flow situations.	C-3
3ME202PC1.4	To enable students to calculate head losses and analyze energy dissipation in pipe flow systems for efficient design and operation.	C-3
3ME202PC1.5	To help students understand the effects of viscosity on fluid motion and analyze laminar and turbulent flow behavior in practical systems.	C-4
3ME202PC1.6	To develop competence in evaluating forces due to jet impingement and applying momentum principles in hydraulic and mechanical systems.	C-5

Level: **5**	Course Code: **3ME203PC1**		Course Category: **PCC**		
Course Name	**Strength of Materials**				
Credits	**03**	Total L:T:P etc. Hours	3:0:0 **45Hrs**	Total SL Hours	**45Hrs**
Total Credit Hours	**90Hrs**				
SEE Marks	**60**	SEE Time	**3Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 3ME203PC1 Strength of Materialsis a compulsory Program CoreCourse for Second Year B.Tech Mechanical Engineering.

Course Objectives:

The objective of this course is to develop the ability in students to understand the mechanical behaviour of materials and to analyze stresses, strains, internal forces, bending, torsion, principal stresses, and deflection in

structural and machine components, so that they can design safe and efficient engineering systems.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME203PC1.1	Explain stresses, strains, and material properties to understand the mechanical behavior of materials under different loading conditions.	C2
3ME203PC1.2	Construct shear force and bending moment diagrams for evaluating internal force distribution in beams.	C3
3ME203PC1.3	Apply bending theory to compute stresses and assess strength of beam cross-sections.	C3
3ME203PC1.4	Analyze torsion, springs, and impact loading to assess stress behavior in shafts and energy-absorbing elements.	C4
3ME203PC1.5	Determine principal stresses and strains for examining biaxial stress conditions in thin pressure vessels.	C4
3ME203PC1.6	Calculate slope and deflection of beams to evaluate deformation and serviceability under various boundary conditions.	C3

Level: **5**	Course Code: **3ME204MD1**		Course Category: **MDM**		
Course Name	**Foundation of Mechanical Engineering**				
Credits	**02**	Total L:T:P etc. Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks	**20**
EE Marks	**--**	PA Marks	**--**	Total Marks	**50**

Course Description:

Subject Code 3ME204MD1Foundation of Mechanical Engineering is a compulsory Multidisciplinary Minor Course offered by the department of Mechanical Engineering for other Second Year B. Tech., major disciplines.

Course Objectives:

The objective of the course is to introduce fundamental concepts of mechanical engineering, and to impart knowledge of energy, materials, manufacturing, and thermal-fluid sciences.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME204MD1.1	Apply the basic principles of thermodynamics and energy conversion to evaluate engineering systems and processes.	C-3
3ME204MD1.2	Identify materials and manufacturing processes relevant to engineering to select appropriate engineering materials and manufacturing processes based on functional requirements, performance, and economic considerations.	C-2
3ME204MD1.3	Apply fundamental concepts of fluid mechanics and heat transfer to analyze and design practical engineering systems.	C-3

Level:	**5**	Course Code:	**3SH205OE1**	Course Category:	**OE**
Course Name	**Soft Skills & Profile Building**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 3SH205OE1 Soft Skills & Profile Building is a compulsory Open Elective Course for Second Year B. Tech All Branch Students.

Course Objectives:
The objective of this course is to focus on developing advanced communication skills, leadership qualities and professional etiquette among engineering graduates.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3SH205OE1.1	Apply advanced interpersonal, analytical, and persuasive communication techniques in professional contexts for effective professional interactions.	C-3
3SH205OE1.2	Demonstrate professional workplace etiquette, business communication, and group discussion skills to enhance employability.	C-3 A-3

3SH205OE1.3	Analyze leadership styles, emotional intelligence, and team dynamics for effective collaboration.	C-4 A-3
3SH205OE1.4	Design a structured and realistic career plan aligned with industry expectations and personal goals for professional growth.	C-6
3SH205OE1.5	Create ATS-friendly résumés, professional portfolios, and digital profiles for personal branding.	C-6 P-4
3SH205OE1.6	Perform effectively in interviews, workplace simulations, and job-search processes with professional confidence for enhanced employability.	C-3 P-3 A-3

Level:	**5**	Course Code:	**3SH205OE2**	Course Category:	**OE**
Course Name	**Team Building & Management**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 3SH205OE2 Team Building & Management is a compulsory Open Elective Course for Second Year B. Tech All Branch Students.

Course Objectives:
The Objective of the course is to develop teamwork capabilities, leadership and managerial skills, collaborative problem-solving abilities, conflict management techniques, and effective decision-making skills required in professional and organizational settings.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3SH205OE2.1	Explain the principles and importance of effective team building in organizations to foster collaborative work culture.	C-2
3SH205OE2.2	Apply team dynamics and collaboration strategies to achieve common goals.	C-3 A-3
3SH205OE2.3	Analyze leadership styles and managerial roles for effective team performance.	C-4
3SH205OE2.4	Demonstrate conflict resolution, negotiation, and interpersonal management skills for effective team performance.	C-3 A-3
3SH205OE2.5	Apply motivation and performance management techniques in team-based environments for achieving organizational goals.	C-3
3SH205OE2.6	Perform effectively as a team member or leader in simulated managerial scenarios to develop leadership competencies	C-3 P-3 A-3

Level : **5**	Course Code: **3ME206PC1**		Course Category: **PCC**		
Course Name	**Thermal Engineering -ILab**				
Credits	**01**	Total L:T:P etc. Hours	0:0:2 **30 Hrs**	Total SL Hours	**--**
Total Credit Hours	**30 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:
Subject Code 3ME206PC1Thermal Engineering -I Lab is a compulsory Program Core Course for Second Year B.Tech. Mechanical Engineering Program.

Course Objectives:
The objective of this course is to offers hands-on experiments in thermodynamic systems, steam properties, gas laws, refrigeration, and engines to build skills in measurement, data analysis and performance evaluation.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME206PC1.1	Perform and analyze experiments related to basic thermodynamic systems, processes, and gas laws to develop practical understanding and strengthen fundamental concepts of thermodynamics.	C-3, P-3
3ME206PC1.2	Conduct experiments on refrigeration, steam processes, and apply thermodynamic principles to real-life equipment to understand their working and evaluate performance in practical scenarios.	C-3, P-3
3ME206PC1.3	Compare and evaluate performance parameters of SI and CI engines through experimentation and data analysis to interpret engine behavior and enhance data-driven decision-making skills.	C-3, P-2, A-4

Level : **5**	Course Code: **3ME207PC1**			Course Category: **PCC**	
Course Name	**Fluid Mechanics - Lab**				
Credits	**01**	Total L:T:P etc. Hours	0:0:2 **30 Hrs**	Total SL Hours	**--**
Total Credit Hours	**30 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:
Subject Code 3ME207PC1 Fluid Mechanics - Lab is a compulsory Program Core Course for Second Year B.Tech. Mechanical Engineering Program.

Course Objectives:
The objective of this course is to develop a clear understanding of the fundamental principles of fluid mechanics and to demonstrate the practical application of Bernoulli's equation. The course also aims to provide hands-on learning of the impact of jets on plane, inclined, and curved surfaces.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME207PC1.1	To enable students to comprehend the fundamental physical properties of fluids and apply principles of fluid statics and fluid kinematics to analyze fluid behavior under static and dynamic conditions encountered in engineering applications.	C-4, P-3
3ME207PC1.2	To develop students' ability to apply Bernoulli's equation and Reynolds number concepts for analyzing energy conservation in fluid flow and for classifying flow regimes (laminar or turbulent) in practical fluid flow systems.	C-3, P-3
3ME207PC1.3	To equip students with analytical skills to estimate energy losses due to friction in pipe flows and to evaluate forces generated by jet impingement, enabling effective analysis and design of hydraulic and mechanical systems.	C-5, P-2 & A-4

Level : **5**	Course Code: **3ME208PC1**			Course Category: **PCC**	
Course Name	**Strength of Material - Lab**				
Credits	**01**	Total L:T:P etc. Hours	0:0:2 **30 Hrs**	Total SL Hours	**--**
Total Credit Hours	**30 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:
Subject Code 3ME208PC1 Strength of Material - Lab is a compulsory Program CoreCourse for Second Year B.Tech Mechanical Engineering.

Course Objectives:
The objective of this course is to understand the fundamental mechanical properties of materials and their behavior under different types of loading, and to apply these concepts for analyzing stresses, strains, deflection, and failure in structural and machine components.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME208PC1	Explain mechanical properties of materials to understand material behavior through laboratory testing.	C2
3ME208PC2	Conduct standard material tests to determine strength and elastic properties experimentally.	C4, P3
3ME208PC3	Interpret experimental results to correlate theory with practice while following professional lab practices.	A5, C5

Level : **5**	Course Code: **3ME209EM1**		Course Category: **EEM**		
Course Name	**Entrepreneurship in Mechanical Engineering**				
Credits	**02**	Total L:T:P etc. Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**--**	PA Marks	**50**	Total Marks	**50**

Course Description:
Subject Code 3ME209EM1Entrepreneurship in Mechanical Engineering is a compulsory course for Second Year B. Tech in Mechanical Engineering program.

Course Objectives:
The objective of the course is to introduce the concept of entrepreneurship in the context of mechanical engineering and develop the ability to identify, plan, and manage engineering-based ventures.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME209EM1.1	Discuss entrepreneurial fundamentals and innovation process in Mechanical Engineering to develop creativity.	C-2
3ME209EM1.2	Apply business planning with engineering management skills to understand marketing strategies for engineering products.	C-3
3ME209EM1.3	Analyze financial, legal, environmental, and technological trends shaping Mechanical entrepreneurship to do Cost estimation, pricing, and break-even analysis.	C-4

Level: **5**	Course Code:		**3SH210VE1**	Course Category:	**VEC**
Course Name	**Constitutional Values and Fundamental Duties**				
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks		PA Marks	**50**	Total Marks	**50**

Course Description:
Subject Code 3SH210VE1 Constitutional Values and Fundamental Duties is a compulsory Values enhancement Course for Second Year B. Tech.

Course Objectives:
The objective of the course is to introduce the Indian Constitution, its historical background, fundamental values, rights, and duties.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3SH210VE1.1	Explain the historical background, making, and significance of the Indian Constitution to Understand the Constitution, Preamble, and core values.	C2
3SH210VE1.2	Interpret Fundamental Rights and Duties (Articles 12–35, 51A) to evaluate their implications through case studies in professional and civic life.	C3
3SH210VE1.3	Apply constitutional principles to engineering ethics, sustainability concerns (Articles 48A, 51A(g)), and demonstrate social commitment, innovation, and inclusive growth as nation builders.	C3

Level:	5	Course Code:	3ME400FP1	Course Category:	FP
Course Name	**Field Project**				
Credits	**02**	Total L:T:P Hours	0:0:4 **60 Hrs**	Total SL Hours	--
Total Credit Hours	**60 Hrs**				
SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:
Subject Code 3ME400FP1Field Projectis a compulsory Experiential Learning Course for Second Year B. Tech Mechanical Engineering

Course Objectives:
The objective of this course is to provide students real-world exposure to industrial, community, or field environments relevant to mechanical engineering. Also to develop problem-solving, teamwork, and communication skills through hands-on project work.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ME400FP1.1	Conduct field visits, collect relevant data, and analyze engineering problems to identify and define real-world problems related to mechanical or allied systems.	C-4, P-3
3ME400FP1.2	Develop feasible technical solutions or improvement strategies for identified problems andPrepare a project report with proper documentation, analysis, and presentation.	C-5, C-6, P-4
3ME400FP1.3	Demonstrate teamwork, professional ethics, and communication during project execution.	A-3

Level: **5**	Course Code: **3AL001NC1**		Course Category: **NC**		
Course Name	**Disaster Management and Preparedness**				
Credits	--	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours	--
Total Credit Hours	--				
SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	--	PA Marks	--	Total Marks	--

Course Description:
Subject Code 3CE001NC1 Disaster Management and Preparedness is a Compulsory Non-Credit course for Second Year B. Tech all disciplines.

Course Objectives:
The objective of this course is to provide students with a comprehensive understanding of disasters, their types, impacts, the complete disaster management cycle, and the roles of various agencies in Disaster Risk Reduction.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3CE001NC1.1	Identify the concepts of disaster, hazard, vulnerability and risk, and classify disasters to understand the basic nature, causes and profiles of disasters in India.	C-2
3CE001NC1.2	Analyze the disaster management cycle for risk assessment, mitigation, preparedness, response, recovery, and international disaster management frameworks.	C-4
3CE001NC1.3	Apply disaster management practices, including stakeholder roles, national policies, engineers' responsibilities, and preparedness measures for effective disaster risk reduction.	C-3

Level : **5**	Course Code: 3ME211DH1			Course Category: **DH**	
Course Name	**Principles of Robotics**				
Credits	**03**	Total L:T:P etc. Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 3ME211DH1Principles of Robotics is a for Double Minor / Double Minor / Course offered as Honours by department of Mechanical Engineering for Second Year B.Tech., for all Discipline.

Course Objectives:
The objective of the course is to introduce the fundamental concepts, terminology, and classifications of robots and robotic systems to develop an understanding of the kinematic and dynamic modeling of robotic manipulators.

CO	Course Outcome	Domain Level
3ME211DH1.1	Explain the fundamentals, classification, and historical evolution of robotics along with various robot configurations and their performance parameters	C-2
3ME211DH1.2	Identify and describe the structural elements of robots, including links, joints, end-effectors, actuators, and drive mechanisms used for different applications.	C-2
3ME211DH1.3	Demonstrate understanding of various types of sensors, feedback devices, and signal conditioning techniques used for robot perception and control.	C-3
3ME211DH1.4	Illustrate basic concepts of robot motion, degrees of freedom, workspace, trajectory planning, and simple motion control strategies for how to plan and control trajectories for precise and efficient task execution.	C-3
3ME211DH1.5	Develop simple robot programs for basic industrial tasks such as pick-and-place, assembly, and welding using standard programming approaches and simulation tools.To gain practical skills in programming robots for common industrial tasks	C-4
3ME211DH1.6	Analyze different industrial and service applications of robotics and discuss emerging trends such as AI, IoT, collaborative robots, and ethical issues in robotic automation.	C-5

Level : **5**	Course Code: 3ME211DH2		Course Category: **DH**		
Course Name	**Energy Resource, Environment and Economics**				
Credits	**03**	Total L:T:P etc. Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 3ME211DH2EnergyResource, Environment and Economics is a for Double Minor / Double Minor / Course offered as Honours by department of Mechanical Engineering for Second Year B.Tech., for all Discipline.

Course Objectives:
The objective of the course is to understand various conventional and renewable energy resources, their technologies, and patterns of energy utilization and apply economic principles to evaluate energy systems, including cost analysis, feasibility, and energy policy considerations.

CO	Course Outcome	Domain Level
3ME211DH2.1	Explain the classification of energy resources, energy systems, energy demand–supply dynamics, and energy planning concepts.	C-2
3ME211DH2.2	Describe the working principles, advantages, limitations, and challenges of conventional energy systems such as thermal, hydro, and nuclear power plants.	C-2
3ME211DH2.3	Analyze renewable and emerging energy technologies for sustainable energy applications.	C-4
3ME211DH2.4	Evaluate environmental impacts of energy systems using sustainability concepts and life-cycle assessment (LCA).	C-5
3ME211DH2.5	Apply engineering economic principles to perform cost analysis, life-cycle costing, and economic comparison of energy projects.	C-3
3ME211DH2.6	Assess energy policies, management strategies, and future energy transitions for sustainable development.	C-5

Level : **5**	Course Code: **4ME212PC1**		Course Category: **PCC**		
Course Name	**Manufacturing Processes**				
Credits	**03**	Total L:T:P etc. Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 4ME212PC1Manufacturing Processesis a Program Core Course offered to Second Year B.Tech Mechanical Engineering Program.

Course Objectives:

The objective of the course is to introduce fundamental manufacturing concepts and to impart knowledge of materials and various manufacturing processes.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME212PC1.1	Describe the principles and operations of casting processes, including pattern making, moulding, melting furnaces, and defect analysis for understanding the principles and operational steps of casting.	C-2
4ME212PC1.2	Explain the principles, operations, and applications of various welding and joining processes along with their defects and inspection methodsfor understanding the principles, operations, applications, of various welding and joining processes.	C-2
4ME212PC1.3	Understand the principles and applications of hot and cold working processes and various metal forming operations for understanding various metal forming operations used in manufacturing.	C-2
4ME212PC1.4	Identify the mechanics of metal cutting, tool geometry, and lathe operations involved in various machining processes for understanding mechanics of metal cutting & tool geometry.	C-2
4ME212PC1.5	Discuss the construction, working, and applications of drilling, milling, grinding, and finishing processes used in manufacturing for understanding the construction and working principles of different machines.	C-2
4ME212PC1.6	Understand the principles, processes, and applications of additive manufacturing technologies such as FDM, SLA, and SLS for understanding the principles and applications of additive manufacturing.	C-2

Level : **5**	Course Code: **4ME213PC1**		Course Category: **PCC**		
Course Name	**Material Science and Nano Technology**				
Credits	**02**	Total L:T:P etc. Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 4ME213PC1Material Science and Nano Technologyis a compulsory Program Core Course for Second Year B.Tech. Mechanical Engineering Program.

Course Objectives:
The objective of this course is to provide students with a comprehensive understanding of the structure, properties, and behavior of various engineering materials, and to introduce the fundamental concepts of nano-materials and nano-technology.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME213PC1.1	Explain the basic principles of process, physical, and mechanical metallurgy, and relate the structure and composition of metals and alloys to understand their properties using phase relationships and the lever rule.	**C2**
4ME213PC1.2	Interpret binary phase diagrams and the iron–carbon equilibrium diagram, identify critical temperatures and invariant reactions, and explain the advantages and applications of composite materials for effective material selection.	**C4**
4ME213PC1.3	Explain the purpose of alloying, classify alloy steels, and assess the effect of alloying elements on steel properties and to understand their engineering applications	**C2**
4ME213PC1.4	Compare the constitution, properties, and applications of cast irons and common non-ferrous alloys such as brass, bronze, and aluminium alloys for appropriate material selection.	**C2**
4ME213PC1.5	Explain metal-working processes including hot and cold working, work hardening, strain ageing, recovery, recrystallization, and grain growth, and assess their impact on microstructure and mechanical properties.	**C3**
4ME213PC1.6	Describe the applications of powder metallurgy and explain the fundamentals, properties, applications, and environmental and health aspects of nanotechnology and nanomaterials.	**C2**

Level: **5**	Course Code: **4ME214PC1**		Course Category: **PCC**		
Course Name	**Hydraulic and Pneumatic Systems**				
Credits	**02**	Total L:T:P etc. Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code4ME214PC1Hydraulic and Pneumatic Systemsis a compulsory Program Core Course for Second Year B.Tech. Mechanical Engineering Program.

Course Objectives:

The objective of this course is to provide fundamental knowledge of hydroelectric power plants and hydraulic machines—including turbines and pumps—along with an understanding of their working principles, performance characteristics, and the behaviour of compressible fluid flow.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME214PC1.1	To enable students to understand the working principles, classification, and basic operation of prime movers and hydraulic turbines used for energy conversion in mechanical systems.	C-2
4ME214PC1.2	To develop students' ability to analyze, design, and evaluate the performance characteristics of hydraulic turbines for efficient power generation and engineering applications.	C-4
4ME214PC1.3	To help students understand the operating principles, classification, and applications of water lifting devices used in hydraulic and irrigation systems.	C-2
4ME214PC1.4	To equip students with the capability to analyze, select, and apply centrifugal and reciprocating pumps for suitable industrial, municipal, and mechanical engineering applications.	C-4
4ME214PC1.5	To enable students to understand and apply basic principles of compressible fluid flow, including flow through nozzles and pipes, relevant to pneumatic and gas flow systems.	C-3
4ME214PC1.6	To develop students' ability to integrate hydraulics and pneumatics concepts in problem-solving, design, and mini-projects addressing real-world mechanical engineering challenges.	C-6

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Level : **5**	Course Code: **4ME215MD1**			Course Category: **MDM**	
Course Name	**Green Power Technologies**				
Credits	**02**	Total L:T:P etc. Hours	2:0:0 **30Hrs**	Total SL Hours	**30Hrs**
Total Credit Hours	**60Hrs**				
SEE Marks	**30**	SEE Time	**3Hrs**	CIA Marks	**20**
EE Marks	**--**	PA Marks	**--**	Total Marks	**50**

Course Description:
Subject Code 4ME215MD1 Green Power Technologies is a Multidisciplinary Minor offered bySecond Year B.Tech Mechanical Engineering program.

Course Objectives:
The objective of this course is to develop understanding of renewable and green energy systems, evaluate performance of different energy conversion technologies, and apply sustainable engineering principles for real-world applications and carbon-neutral solutions.

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Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME215MD1.1	Explain green and renewable energy technologies to understand working principles of solar, wind, and biomass systems.	C2
4ME215MD1.2	Evaluate renewable and emerging energy technologies to assess performance, efficiency, and environmental impact.	C4
4ME215MD1.3	Apply energy storage and sustainability concepts to design efficient and eco-friendly power solutions.	C3

Level: **5**	Course Code:		**4SH216OE1**	Course Category:	**OE**
Course Name	**Quantitative and Logical Reasoning**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 4SH216OE1Quantitative and Logical Reasoning is a compulsory Open Elective Course for Second Year B. Tech All Branch Students.

Course Objectives:
The Objective of the Course is to develop quantitative aptitude, logical reasoning, problem-solving efficiency, and decision-making skills for placements, competitive exams, and real-life applications

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4SH216OE1.1	Apply arithmetic and numerical techniques to solve quantitative problems accurately.	C-3
4SH216OE1.2	Solve algebraic and equation-based problems using simplification and approximation methods to improve problem-solving efficiency.	C-3
4SH216OE1.3	Analyze logical reasoning problems using structured and critical thinking approaches to improve decision-making skills.	C-4
4SH216OE1.4	Interpret and analyze data using graphical and tabular methods for decision making for strategic planning.	C-4
4SH216OE1.5	Solve complex logical puzzles and advanced reasoning problems efficiently for competitive examination success.	C-3
4SH216OE1.6	Demonstrate effective aptitude test strategies integrating quantitative and logical reasoning skills for career advancement opportunities.	C-3

Level:	**5**	Course Code:	**4SH216OE2**	Course Category:	**OE**
Course Name	**Critical Thinking & Decision Making**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 4SH216OE2 Critical Thinking & Decision Making is a compulsory Open Elective Course for Second Year B. Tech All Branch Students.

Course Objectives:
The objective of this course is to develop critical thinking and decision-making competencies by strengthening analytical reasoning and structured

problem-solving skills applicable to professional and real-world situations.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4SH216OE2.1	Apply critical thinking frameworks to analyze problems systematically.	C-3
4SH216OE2.2	Evaluate information, assumptions, and arguments for logical consistency and validity.	C-5
4SH216OE2.3	Analyze complex situations and identify feasible alternatives for decision making.	C-4
4SH216OE2.4	Design rational and ethical decision-making strategies under uncertainty to ensure sustainable organizational outcomes.	C-6 A-3
4SH216OE2.5	Apply quantitative and qualitative tools to support decision-making processes.	C-3
4SH216OE2.6	Demonstrate effective decision making in simulated professional and team-based scenarios to resolve workplace challenges effectively	C-3 P-3 A-3

Level : **5**	Course Code: **4ME217PC1**		Course Category: **PCC**		
Course Name	**Material Science & Nano Technology – Lab**				
Credits	**01**	Total L:T:P etc. Hours	0:0:2 **30 Hrs**	Total SL Hours	**--**
Total Credit Hours	**30 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:

Subject Code 4ME217PC1Material Science & Nano Technology - Lab is a compulsory Engineering Science Course for Second Year B. Tech. Mechanical Engineering.

Course Objectives:

To provide a practical understanding of the structure, properties, and behavior of engineering materials, and to develop skills in using metallurgical and material characterization equipment such as microscopes, while correlating theoretical material science concepts with experimental observations.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME217PC1.1	Demonstrate proficiency in using metallurgical microscope, and differentiate the microstructures of steels, cast irons, and non-ferrous alloys to interpret their material behavior.	C-4, P-3, A-3
4ME217PC1.2	Interpret the iron–carbon equilibrium diagram, analyse the effects of mechanical working and microstructural phenomena like recovery, recrystallization, and grain growth in metals.	C3, P4, A3
4ME217PC1.3	Describe the fundamentals of nanotechnology and classify nanomaterials based on properties and applications as well as study of Nanomaterials, classification, properties, and applications	C-2, P-1, A-2

Level : **5**	Course Code: **4ME218PC1**		Course Category: **PCC**		
Course Name	**Hydraulic and Pneumatic Systems- Lab**				
Credits	**01**	Total L:T:P etc. Hours	2:0:0 **30 Hrs**	Total SL Hours	**--**
Total Credit Hours	**30 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:

Subject Code 4ME218PC1Hydraulic and Pneumatic Systems - Labis a compulsory Program Core Course for Second Year B.Tech. Mechanical Engineering Program.

Course Objectives:

The objective of this Course is to understand the fundamental concepts of hydraulic machines, apply them in practical engineering scenarios, and recognize the importance of specialized water-lifting devices.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME218PC1.1	Demonstrate the basic concepts of prime movers and turbines to develop a strong understanding of energy conversion in mechanical systems.	C-3, P-3
4ME218PC1.2	Apply the knowledge of centrifugal and reciprocating pumps for selecting and implementing appropriate solutions in industrial and engineering applications.	C-3, P-3
4ME218PC1.3	Apply hydraulic and pneumatic principles to design and develop practical projects and problem-solving solutions in mechanical engineering contexts	C-3, P-2 & A-4

Level : **5**	Course Code: **4ME219VS1**			Course Category: **VSC**	
Course Name	**Manufacturing Processes - Lab**				
Credits	**02**	Total L:T:P etc. Hours	0:0:4 **60 Hrs**	Total SL Hours	**--**
Total Credit Hours	**60 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**--**	PA Marks	**50**	Total Marks	**50**

Course Description:
Subject Code 4ME219VS1 Manufacturing Processes Lab is a Vocational Skill Course. (VSC)offered to Second Year B.Tech Mechanical EngineeringProgram.

Course Objectives:
The objective of this course is to develop practical skills and understanding of various manufacturing processes including casting, welding, machining, and additive manufacturing.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME219VS1.1	Demonstrate and perform the basic casting processes including pattern making and mould preparation, for understanding and practically apply the fundamentals of casting by creating patterns and preparing moulds.	C-3,P-4
4ME219VS1.2	Demonstrate and perform various welding operations such as arc, gas, and TIG welding with an understanding of their applications, fordeveloping hands-on skills in arc, gas, and TIG welding and understand their appropriate applications in fabrication and joining processes.	C-3,P-4
4ME219VS1.3	Demonstrate and perform basic machine tools like lathe and milling machines and demonstrate modern manufacturing techniques such as 3D printing, for applying and understanding conventional machining operations on lathe and milling machines.	C-3,P-4

Level : **5**	Course Code:		**4SH220AE1**	Course Category:	**AEC**
Course Name	**Technical Writing**				
Credits	**02**	Total L:T:P Hours	1:0:2 **45 Hrs**	Total SL Hours	**15 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks		PA Marks	**50**	Total Marks	**50**

Course Description:
Subject Code 4SH220AE1 Technical Writing is common Ability Enhancement Course for Second Year B. Tech.

Course Objectives:
The objective of the course is to enhance students' ability to write effective technical documents, professional correspondence, and research-oriented content with clarity, accuracy, and ethical standards.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4SH220AE1.1	Apply principles of technical writing in engineering documents.	C-3 P-2 A-2
4SH220AE1.2	Apply technical writing skills to prepare professional documents.	C-4 P-2 A-2
4SH220AE1.3	Create ethical, well-structured technical and research documents using IEEE referencing for professional and academic communication.	C-3 P-3 A-3

Level: **5**		Course Code:	4SH221EM1	Course Category:	**EEM**
Course Name	**Fundamentals of Book Keeping and Accounting**				
Credits	**02**	Total L:T:P Hours	1:0:2 **45 Hrs**	Total SL Hours	**15 Hrs**
Total Credit Hours	**60 Hrs**				

SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	--	PA Marks	**50**	Total Marks	**50**

Course Description:

Subject Code 4SH221EM1 Fundamentals of Book Keeping and Accounting is an Ability Enhancement Course for Second Year B. Tech students that introduce basic accounting principles, bookkeeping processes, and financial statements for business applications.

Course Objectives:

The objective of the course is to develop students' skills in recording and analyzing financial transactions and to enable effective use of accounting information for decision-making.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4SH221EM1.1	Apply basic principles of bookkeeping and accounting for recording and maintaining financial transactions accurately.	C-3 P-2 A-2
4SH221EM1.2	Analyze financial statements such as income statement, balance sheet, and cash flow statement for supporting financial understanding and business decision-making.	C-4 P-2 A-2
4SH221EM1.3	Apply accounting tools and techniques for evaluating financial performance and improving business efficiency.	C-3 P-3 A-3

Level: **5**	Course Code: **4CE222VE1**			Course Category: **VEC**	
Course Name	**Environmental Science**				
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				

SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks	**20**
EE Marks	**--**	PA Marks	**--**	Total Marks	**50**

Course Description:
Subject Code 4CE222VE1 Environmental Science is a Value Education course for Second Year B. Tech Civil Engineering.

Course Objectives:
The objective of this course is to develop understanding of environmental systems, natural resource management, ecological balance, and sustainable development practices to promote awareness and responsibility toward environmental protection and societal well-being.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4CE222VE1.1	Analyze renewable and non-renewable natural resources and associated problems to promote sustainable utilization for future generations.	C-4
4CE222VE1.2	Analyze food chains, webs, and ecological pyramids to evaluate ecological interactions and succession processes.	C-4
4CE222VE1.3	Examine shift from unsustainable to sustainable development to promote responsible resource planning for society.	C-3

Level : **5**	Course Code: **4ME223DH1**			Course Category: **DH**	
Course Name	**Robotics and Automation**				
Credits	**04**	Total L:T:P etc. Hours	4:0:0 **60 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**120 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 4ME223DH1 Robotics and Automation is a for Double Minor / Double Minor / Course offered as Honours by department of Mechanical Engineering for Second Year B.Tech., for all Discipline.

Course Objectives:
The objective of this course is to provide foundational knowledge of robotics and automation, including structure, actuation, sensing, and modern advancements such as AI, IoT, and autonomous systems.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME223DH1.1	Explain the fundamentals, configurations, and components of robotics and automation systems. To understand the fundamentals, configurations, and components of robotics and automation systems	C-2
4ME223DH1.2	Describe the structure of robots including joints, links, end effectors, drive systems, and transmission mechanisms used in robotic actuation. To build a strong foundation for understanding how robotic and automation systems	C-2
4ME223DH1.3	Discuss the classification, working principles, and roles of internal/external sensors, signal conditioning, and basic feedback control systems used in robotics. To enable accurate sensing, monitoring, and control of robotic operations	C-2
4ME223DH1.4	Analyze kinematic relationships and motion control principles in robotic manipulators. To achieve precise positioning, motion planning, and control of robots.	C-4
4ME223DH1.5	Analyze degrees of freedom, workspace, kinematics, differential motion, and basic dynamics of robotic manipulators. To evaluate robot motion capability, performance, and dynamic behavior.	C-4
4ME223DH1.6	Evaluate current and emerging trends in robotics, automation, and Industry 4.0 technologies. To prepare for modern industrial applications and future advancements in intelligent automation.	C-5

Level : **5**	Course Code: **4ME223DH2**			Course Category: **DH**	
Course Name	**Fuels and Combustion**				
Credits	**04**	Total L:T:P etc. Hours	4:0:0 **60 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**120 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 4ME223DH2Fuels and Combustion is a for Double Minor / Double Minor / Course offered as Honours by department of Mechanical Engineering for Second Year B.Tech., for all Discipline.

Course Objectives:
The objective of this course is to analyze combustion processes using stoichiometry, thermochemistry, and efficiency calculations for practical engineering applications and to evaluate combustion equipment, emission control techniques, and energy optimization methods for safe, efficient, and environmentally responsible fuel utilization.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ME223DH2.1	Explain the classification, origin, and properties of solid, liquid, gaseous, and alternative fuels and their importance in energy systems.	C-2
4ME223DH2.2	Describe coal carbonization, petroleum refining, and production, handling, and safety measures for different fuels.	C-2
4ME223DH2.3	Analyze gaseous and alternative fuels, comparing energy content, storage, handling, and environmental impact.	C-4
4ME223DH2.4	Apply combustion stoichiometry and thermochemistry principles to calculate air–fuel ratio, adiabatic flame temperature, flue gas composition, and combustion efficiency.	C-3
4ME223DH2.5	Understand combustion equipment and furnace design, types of burners, and industrial applications including boilers, turbines, and IC engines.	C-2
4ME223DH2.6	Evaluate combustion emissions, control techniques, waste heat recovery, and strategies for efficient and environmentally sustainable fuel utilization.	C-5

Level : **5**	Course Code: **5ME224EC1**		Course Category: **EC**		
Course Name	**Lathe Machine**				
Credits	**4**	Total L:T:P etc. Hours	2:0:4 **90 Hrs**	Total SL Hours	**30Hrs**
Total Credit Hours	**120 Hrs**				
SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks	**20**
EE Marks	**25**	PA Marks	**25**	Total Marks	**100**

Course Description:
Subject Code 5ME224EC1Hands on Training on Lathe Machine is an exit course(L-5) for second year B.Tech in Mechanical Engineering program.

Course Objectives:
To provide students with foundational knowledge and hands-on experience on Lathe Machine to develop skills in performing various machining operations

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
5ME224EC1.1	Interpret the fundamentals of Lathe machine to perform the jobs.	C-2
5ME224EC1.2	Perform basic Lathe operations to fabricate the jobs.	P-4
5ME224EC1.3	Analyze Common lathe problems, causes, and remedies to do maintenance of Lathe machine.	C-4

Level : **5**	Course Code: **5ME225EC1**		Course Category: **EC**		
Course Name	**Casting Process**				
Credits	**4**	Total L:T:P etc. Hours	2:0:4 **90 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**120 Hrs**				
SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks	**20**
EE Marks	**25**	PA Marks	**25**	Total Marks	**100**

Course Description:
Subject Code 5ME225EC1Hands on Training on Casting Process is an exit course (L-5) for second year B.Tech in Mechanical Engineering program.

Course Objectives:
The objective of this course is to provide fundamental knowledge of operations involved in metal casting and develop hands-on skills in producing simple cast components.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
5ME225EC1.1	Interpret the basic principles of metal casting process to build a strong foundation in the fundamentals of Foundry.	C-2
5ME225EC1.2	Demonstrate knowledge of moulding materials, Core making and melting processes to perform moulding and casting operations.	C-3, P-4
5ME225EC1.3	Identify and analyze casting defects to perform inspection of castings using various testing methods.	C-4