

AMRUTVAHINI COLLEGE OF ENGINEERING, SANGAMNER
Department of Mechanical Engineering
Course Outcome (CO)

Final Year -2019 Course			
Course Code	Course Name	Course Outcomes	
Semester I			
402041	Heating Ventilation Air-Conditioning and Refrigeration	C401.1	Analyse different air-craft refrigeration systems and explain the properties, applications and environmental issues of different refrigerants.
		C401.2	Analyse multi pressure refrigeration system used for refrigeration applications
		C401.3	Discuss major components of refrigeration cycle along with safety controls and describe transcritical and ejector refrigeration systems.
		C401.4	Estimate cooling load for air conditioning systems used with concern of design conditions and indoor quality of air.
		C401.5	Design air distribution system-duct design along with consideration of ventilation and infiltration.
		C401.6	Explain the working of advanced air conditioning systems, desiccant-based air conditioning systems, evaporative, thermal storage, radiant cooling, clean room air conditioning systems.
402042	Dynamics of Machinery	C402.1	Apply balancing techniques to solve the static and dynamic balancing problems of rotary system, single cylinder and multi cylinder inline, radial and V engines.
		C402.2	Apply and analyse the effect of gyroscopic couple on aeroplane, ship, automobiles,
		C402.3	Develop the equation of motion to determine the natural frequency of undamped & damped freely vibrating longitudinal and torsional vibration systems of single degree freedom; Explain and find the effect of damping.
		C402.4	Apply the concept to find, the response of forced vibration due to harmonic excitation, excitation due to unbalanced forces and base excitation; transmissibility and critical speed of shaft.
		C402.5	Develop the equation of motion to find the natural frequencies and mode shapes of two degrees of freedom undamped free longitudinal and torsional vibratory systems.

		C402.6	Describe noise and vibration measuring instruments for industrial / real life applications along with suitable method for noise and vibration control.
402043	Turbomachinery	C403.1	Validate Impulse Momentum Principle by using flat, inclined and curved surfaces and investigate performance characteristics of hydraulic turbines.
		C403.2	Determine performance parameters of Impulse and Reaction steam turbines along with discussion of nozzles, governing mechanism and losses.
		C403.3	Measure performance parameters of single and multistage centrifugal pumps along with discussion of cavitation and selection
		C403.4	Explain performance parameters of centrifugal compressors along with discussion of theoretical aspects of axial flow compressors.
402044 A	Automobile Design (Elective III)	C404A.1	Comprehend the steps involved in the design process of Principal Engine Components.
		C404A.2	Design of Engine Sub-Systems.
		C404A.3	Understand steering geometry and able to design the Steering System and Differential.
		C404A.4	Select the tyres and wheels for automobile and able to design the automotive brakes.
		C404A.5	Understand types of suspension system and able to design vehicle suspension systems.
402044 C	Modern Machining Processes (Elective III)	C404C.1	Understand and analyze the mechanism, process parameters of mechanical assisted modern machining processes.
		C404C.2	Understand the mechanism, construction and working of laser, plasma and electron beam assisted machining.
		C404C.3	Classify and analyze the mechanism, process parameters of the chemical and electrochemical machining.
		C404C.4	Relate and analyze the mechanism and select process parameters electrical discharge machining for an application.
		C404C.5	Illustrate the application of micromachining processes.
		C404C.6	Suggest appropriate nanomachining process for the specific application.
402044 D	Industrial Engineering (Elective III)	C404D.1	Evaluate the productivity and Implement various productivity improvement techniques
		C404D.2	Apply work study techniques and Understands its importance for better productivity.
		C404D.3	Demonstrate the ability to Select plant location, appropriate layout and material handling equipment.

		C404D.4	Use of Production planning and control tools for effective planning, scheduling and managing the shop floor control.
		C404D.5	Plan inventory requirements and Exercise effective control on manufacturing requirements
		C404D.6	Apply Ergonomics and legislations for human comfort at work place and Understands the role of value engineering in improving productivity
402044 E	Internet of Things (Elective III)	C404E.1	Explain the Applications/Devices, Protocols and Communication Models of IoT
		C404E.2	Demonstrate small Mechanical Engineering IoT oriented applications using Sensors, Actuators, Microcontrollers and Cloud
		C404E.3	Select commonly used IoT Simulation Hardware platforms
		C404E.4	Application of Interfacing and Communication Technologies for IoT.
		C404E.5	Illustrate IoT Application Development and Security of IoT Ecosystem
		C404E.6	Evaluate Present and Future Domain specific Applications of IoT Ecosystem
402045 A	Product Design and Development (Elective IV)	C405A.1	Understand product design and product development processes
		C405A.2	Understand processes, tools and techniques for market survey & product specification finalization
		C405A.3	Understand processes, tools and techniques for concept inception, verification and selection
		C405A.4	Understand processes, tools and techniques for concept exploration & development
		C405A.5	Understand processes, tools and techniques for design verification and validation
		C405A.6	Understand and apply processes, tools and techniques for robust design and development
402045 C	Additive Manufacturing (Elective IV)	C405C.1	Use and Classify the fundamentals of Additive Manufacturing Technologies for engineering applications
		C405C.2	Identify and Categorize the methodology to manufacture the products using light-based photo-curing, LASER based technologies and Study their applications, benefits.
		C405C.3	Identify and Categorize the methodology to manufacture the products using extrusion-based deposition, inkjet-based technologies and Study their applications, benefits.
		C405C.4	Synthesize, Recommend and Design the suitable material and process for fabrication and build behavior of varieties of product

		C405C.5	Design and Construct the AM equipment's for appropriate applications and the input CAD model
		C405C.6	Develop the knowledge of additive manufacturing for various real-life applications
402045 D	Operations Research (Elective IV)	C405D.1	Evaluate various situations of games theory and decision techniques and apply them to solve them in real life for decision making.
		C405D.2	Select appropriate model for queuing situations and sequencing situations and find the optimal solutions using models for different situations.
		C405D.3	Formulate various management problems and solve them using linear programming using graphical method and simplex method.
		C405D.4	Formulate variety of problems such as transportation, assignment, travelling salesman and solve these problems using linear programming approach.
		C405D.5	Plan optimum project schedule for network models arising from a wide range of applications and for replacement situations find the optimal solutions using appropriate models for the situation.
		C405D.6	Apply concepts of simulation and dynamic programming
402045 E	Augmented Reality & Virtual Reality (Elective IV)	C405E.1	Understand fundamental concepts and techniques related to AR/VR.
		C405E.2	Understand geometric modelling techniques
		C405E.3	Understand the virtual environment
		C405E.4	Understand and apply vr systems & technologies
		C405E.5	Apply various types of hardware and software in virtual reality system
		C405E.6	Apply and analyze AR/VR applications
402046	Data Analytics Laboratory	C406.1	Understand the basics of data analytics using concepts of statistics and probability.
		C406.2	Apply various inferential statistical analysis techniques to describe data sets and withdraw useful conclusions from acquired data set.
		C406.3	Explore the data analytics techniques using various tools
		C406.4	Apply data science concept and methods to solve problems in real world context
		C406.5	Select advanced techniques to conduct thorough and insightful analysis and interpret the results
402047	Project (Stage - I)	C407.1	Identify the project that shall benefit through the solution to the society and also demonstrate concern for environment.

		C407.2	Engage in independent study to research literature in the identified domain and to consolidate the literature search to identify and formulate the engineering problem.
		C407.3	Define problem statement, objectives and to identify mathematical concepts, science concepts, engineering concepts, management principles and engineering tools/components for solving the identified engineering problem
		C407.4	Prepare the cost estimate and scheduling of the project work and designate responsibility of every member in the team.
		C407.5	Ability to perform in the team, contribute to the team and mentor/lead the team.
		C407.6	Ability to engage in effective oral communication through presentation of the project stage-1 work, demonstration of the project concept, effective written stage-1 report. communication through the project
402048	Computer Integrated Manufacturing	C408.1	Explain CIM and factory automation
		C408.2	Understand the integration of hardware and software elements for CIM
		C408.3	Understand the integration of hardware and software elements for CIM
		C408.4	Analyze processes planning, quality and mrp integrated with computers.
		C408.5	Interpret flexible, cellular manufacturing and group technology
		C408.6	Analyze the effect of IoT, industry-4.0 and cloud base manufacturing.
402049	Energy Engineering	C409.1	Explain the power generation scenario, layout the components of thermal power plant and analyse the improved Rankine cycle
		C409.2	Analyse the performance of steam condenser ,cooling tower system, and recognise environmental impact of energy system and methods to control the same
		C409.3	Explain the layout ,components details of diesel engine plant, Hydel and Nuclear energy system
		C409.4	Analyse gas and improved power cycles
		C409.5	Explant the basic principles of energy management ,storage and economics of power generation
		C409.6	Expalin the fundamental of renewable energy system
402050 A	Quality and Reliability	C410A.1	Understand basic concepts of quality and relate various quality tools

	Engineering (Elective V)	C410A.2	Develop analytical competencies to solve problems on control charts and process capability.
		C410A.3	Understand fundamental concepts of reliability.
		C410A.4	Evaluate system reliability.
		C410A.5	Identify various failure modes and create fault tree diagram.
		C410A.6	Understand the concept of reliability centered maintenance and apply reliability tests methods.
402050 B	Energy Audit and Management (Elective V)	C410B.1	Awareness about importance of Energy, its conservation, Renewable Energy and energy efficiency in day to day life as well as for future planning.
		C410B.2	Understand and analyze the Indian and Global Energy Scenario and issues of concern like Climate Change and Energy Security.
		C410B.3	Carry out Energy Audit of their residence/society/College/Industry where they are studying & training and working
		C410B.4	Assess the Energy Conservation performance of thermal and electrical utilities
		C410B.5	Assess the Energy Conservation opportunities using energy economics.
		C410B.6	Evaluate the energy performance improvement by Cogeneration and WHR method.
402050 D	Engineering Economics and Financial Management (Elective V)	C410D.1	Understand the business environment, concepts of economics and demand-supply scenario.
		C410D.2	Apply the concepts of costing and pricing to evaluate the pricing of mechanical components.
		C410D.3	Understand accounting systems and analyze financial statements using ratio analysis.
		C410D.4	Select and prepare the appropriate type of budget and understand the controlling aspects of budget.
		C410D.5	Understand the international business and trade system functioning.
		C410D.6	DEMONSTRATE understanding of financing decisions of new ventures and performance.
402051 B	Renewable Energy Technologies (Elective VI)	C411B.1	Describe fundamentals, needs and scopes of renewable energy systems.
		C411B.2	Explain performance aspects of flat and concentric solar collectors along with applications.
		C411B.3	Design solar photovoltaic system for residential applications.
		C411B.4	Design and Analysis of wind energy conversion system.

		C411B.5	Apply Installation practices of Wind and Solar Photovoltaic Systems for grid connection.
		C411B.6	Determine performance parameters of bio-energy conversion systems.
402051 C	Automation and Robotics (Elective VI)	C411C.1	Understand the basic concepts of automation of production systems
		C411C.2	Understand the robot configuration and anatomy
		C411C.3	Identify and compare appropriate drive for robotic applications
		C411C.4	Compare and select end-effectors and sensors as per application
		C411C.5	Apply the mathematical modeling approaches of robot
		C411C.6	Describe the fundamentals of robot applications and its performance
402051 E	Electrical and Hybrid Vehicle (Elective VI)	C411E.1	Understand the basics related to e-vehicle
		C411E.2	Classify the different hybrid vehicles
		C411E.3	Identify and evaluate the prime movers, energy storage and controllers
		C411E.4	Discover and categorize the electric vehicle configuration with respect to propulsion, power distribution and drive-train topologies
		C411E.5	Develop body frame with appropriate suspension system and testing of for evehicle
		C411E.6	Classify and evaluate battery charging techniques and management.
402052	Mechanical Systems Analysis Laboratory	C412.1	Develop an understanding of the systems engineering process and the range of factors that influence in the product development.
		C412.2	Illustrate the concepts and use the developed skill-set of computational tools to automate the complete product development process.
		C412.3	Evaluate the knowledge of new developments and innovations in technological systems.
		C412.4	Appraise how technologies have transformed people's lives and can be used to solve challenges associated with human life.
		C412.5	Prioritize the concept of quality and standards, including systems reliability, safety and fitness for the intended purpose.
		C412.6	Invent yourself to face the challenges of future technologies and their associated problems
402053	Project (Stage - II)	C413.1	Transform the design solution(s) for the identified engineering problem into a full- scale

			model/prototype/virtual model using CAD tools by following manufacturing process sheets/CAD tool procedure for virtual model creation.
		C413.2	Demonstrate compliance to the prescribed standards/safety norms through implementation of the identified engineering problem.
		C413.3	Analyze and interpret results of testing and validation of full-scale model/prototype/virtual model and to arrive at valid conclusions.
		C413.4	Perform the optimum utilization resources for project (e.g. cost, power, area, weight, size, etc.)
		C413.5	Abide by the norms of professional ethics. and work in Team
		C413.6	Engage in effective oral communication through presentation of the project stage-II work, demonstration of the project full-scale model/prototype/virtual model, effective written communication through the project stage-II report, journal publication and the one-page poster presentation of the project work.
402054	Audit Course VII	C414.1	Understand the basic principles of stress management
		C414.2	Recognize stress triggers and how to manage them
		C414.3	Develop proactive responses to stressful situations
		C414.4	Learn to manage stress
		C414.5	Develop a long term action plan to minimize and better manage stress
402055	Audit Course VIII	C415.1	Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness.
		C415.2	Analyze and evaluate various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments
		C415.3	Develop aggregate capacity plans and MPS in operation environments.
		C415.4	Plan and implement suitable materials handling principles and practices in the operations.
		C415.5	Plan and implement suitable quality control measures in Quality Circles to TQM.