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

Third Year -2019 Course			
Course Code	**Course Name**	**Course Outcomes**	
Semester I			
302041	**Numerical & Statistical Methods**	C301.1	SOLVE system of equations using direct and iterative numerical methods.
		C301.2	ESTIMATE solutions for differential equations using numerical techniques
		C301.3	DEVELOP solution for engineering applications with numerical integration
		C301.4	DESIGN and CREATE a model using a curve fitting and regression analysis
		C301.5	APPLY statistical Technique for quantitative data analysis.
		C301.6	DEMONSTRATE the data, using the concepts of probability and linear algebra
302042	**Heat & Mass Transfer**	C302.1	Analyze and apply the modes of heat transfer equations for one dimensional thermal systems
		C302.2	Design a thermal system considering fins, thermal insulation and transient heat conduction.
		C302.3	Evaluate the heat transfer rate in natural and forced convection and validate with experimental results.
		C302.4	Interpret heat transfer by radiation between objects with simple geometries, for black and gray surfaces.
		C302.5	Ability to analyze the rate of mass transfer by using Fick's law of Diffusion and understand mass diffusion in different coordinate systems.
		C302.6	Design and analysis of heat transfer equipment and investigation of its performance.

302043	**Design of Machine Elements**	C303.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading
		C303.2	DESIGN shafts, keys and couplings under static loading conditions
		C303.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack
		C303.4	EVALUATE dimensions of machine components under fluctuating loads.
		C303.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
		C303.6	APPLY the design and development procedure for different types of springs.
302044	**Mechatronics**	C304.1	Understand the knowledge of different sensors and Actuators, for different industrial application
		C304.2	Recognize key elements of Mechatronics system, representation into block diagram & Understand concept of transfer function, block diagram reduction and analysis.
		C304.3	Understand interfacing of sensor and actuator with DAQ & microcontroller to apply this knowledge for different industrial application.
		C304.4	Able to do the system modeling and analysis in time domain and frequency domain.
		C304.5	Apply the knowledge of control actions such as Proportional, derivative and integral in different industrial Processes.
		C304.6	Understand the concept of PLC system and its ladder programming, and significance of PLC systems in industrial application.
302045B	**Machining Science and**	C305B.1	Understand metal cutting principles and mechanics of metal cutting and tool life

	Technology (Ele I)	C305B.2	Describe features of gear and thread manufacturing process
		C305B.3	Select appropriate grinding wheel and demonstrate the various surface finishing process
		C305B.4	Select appropriate Jigs /Fixtures and to draw the process plan for given component
		C305B.5	Select and evaluate various parameters of process planning
		C305B.6	Generate CNC programme for Turning /Milling processes and generate tool path using CAM software
302046	**Digital Manufacturing Laboratory**	C306.1	CREATE a given component using conventional machines, CNC machines and Additive Manufacturing Techniques
		C306.2	ANALYZE cutting tool parameters for machining given job
		C306.3	UNDERSTAND simulation of manufacturing process using Digital Manufacturing Tools.
		C306.4	SELECT and DESIGN jigs and Fixtures for any given component
		C306.5	CREATE program for selection of cutting parameters
		C306.6	UNDERSTAND parameters for CNC retrofitting and reconditioning.
302047	**Skill Development**	C307.1	Apply and demonstrate procedure of assembly & disassembly of various machines.
		C307.2	Design and develop a working/model of machine parts or any new product.
		C307.3	Evaluate fault with diagnosis on the machines, machine tools and home appliances.
		C307.4	Identify and demonstrate the various activities performed in an industry such as maintenance, design of components, material selection

302048	**Audit course V**	C308.1	UNDERSTAND the entrepreneurship, intellectual property rights and role of IP strategy in entrepreneurship.
		C308.2	UNDERSTAND the nature, scope and differences of IP, its different utilities and approaches.
		C308.3	LEARN to manage and strategize IP lifecycle effectively throughout the journey of start-up.
		C308.4	UNDERSTAND government initiatives related to entrepreneurship and IP.
		C308.5	EXPLAIN and UNDERSTAND the entrepreneurship and IP strategy through case studies.
Semester II			
302049	**Artificial Intelligence & Machine Learning**	C309.1	DEMONSTRATE fundamentals of artificial intelligence and machine learning.
		C309.2	APPLY feature extraction and selection techniques.
		C309.3	APPLY machine learning algorithms for classification and regression problems.
		C309.4	DEVISE AND DEVELOP a machine learning model using various steps.
		C309.5	EXPLAIN concepts of reinforced and deep learning.
		C309.6	To learn to establish relation between flow parameters.
302050	**Computer Aided Engineering**	C310.1	UNDERSTAND the basic concepts of Computer Aided Engineering (CAE) and CHARACTERISTICS of various elements required for analysis.
		C310.2	NURTURE students about the discretization process and criteria for quality mesh.
		C310.3	UNDERSTAND the approaches of Finite Element Method (FEM) and to find displacement and stresses over the body
		C310.4	DEVELOP the knowledge and skills needed to effectively evaluate the results using Finite Element Analysis (FEA).

		C310.5	APPLY computational technique to solve complex solid mechanics problems and its loading states.
		C310.6	STUDY the applications of CAE in the various domains of the Mechanical Engineering.
302051	**Design of Transmission Systems**	C311.1	Design spur and helical gears based on beam strength, wear strength by estimating dynamic tooth load by velocity factor and Buckingham's equation.
		C311.2	Design Straight Bevel Gear based on Beam Strength, Wear strength by estimating effective load based on Velocity factor (Barth factor) and Buckingham's equation and Design worm and worm gear based on Strength and Wear ratings.
		C311.3	Select rolling contact bearings from manufacturer's catalogue by calculating static and dynamic load carrying capacities and study parameters of sliding contact bearing design.
		C311.4	DESIGN Clutch and Brake system used in automobile.
		C311.5	DESIGN Machine Tool Gear box for different applications.
		C311.6	ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.
302052A	**Composite Materials (Elective II)**	C312A.1	Define and compare composites with traditional materials
		C312 A.2	Identify and Estimate different parameters of the polymer Matrix Composite
		C312A.3	Categorise and apply metal matrix process from possessions landscape
		C312A.4	Determine volume /weight fraction and strength of composite
		C312A.5	Select appropriate testing and inspection method for composite materials
		C312A.6	Select composites materials for various applications

302052B	**Surface Engineering (Elective II)**	C312B.1	Define the basic's principle & mechanism of surface degradation.
		C312B.2	Analyse & select correct corrosion prevention techniques for a different service condition.
		C312B.3	Demonstrate the role of surface engineering of materials to modify/improve the surface properties.
		C312B.4	Select the suitable surface heat treatments to improve the surface properties.
		C312B.5	Apply the surface modification technique to modify surface properties.
		C312B.6	Analyse & evaluate various surface coating defects using various testing/characterization method.
302053	**Measurement Laboratory**	C313.1	ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations.
		C313.2	EVALUATE causes of errors in Vernier calipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement.
		C313.3	EXAMINE surface Textures, surface finish using equipment's like Talysurf and analyze surface finish requirements of metrological equipment's like gauges, jaws of Vernier calipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.
		C313.4	MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time.
		C313.5	PERFORM Testing of Flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic

			trainers, lathe machine etc. to increase repeatability and reproducibility.
		C313.6	COMPILE the information of opportunities of entrepreneurships/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report.
302054	**Fluid Power & Control Laboratory**	C314.1	Define working principle of components used in hydraulic and pneumatic systems.
		C314.2	Identify & explain various applications of hydraulic and pneumatic systems.
		C314.3	Select an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.
		C314.4	Simulate & analyse various hydraulic and pneumatic systems for industrial/mobile applications
		C314.5	Design a hydraulic and pneumatic system for the industrial applications.
		C314.6	Design & demonstrate various IoT, PLC based controlling system using hydraulics and pneumatics
302055	**Internship/Mini project**	C315.1	To DEMONSTRATE the ability to integrate the theory and practical.
		C315.2	To USE the work experience or skilled gained during internship to develop Mechanical knowledge and professional competence.
		C315.3	To CHOOSE appropriate technology and tools to solve given problem in the field of internship.
		C315.4	To LEARN to identify the industry requirements, new developments in the field of internship.
		C315.5	To LEARN professional ethics, responsibilities and norms of the engineering practice.
		C315.6	To UNDERSTAND effective report writing and presentations.
302056	**Audit course - VI**	C316.1	Understand importance of managing information systems in any organizations

		C316.2	Understand and manage digital networks and network security
		C316.3	Analyze recent innovations and developments in technology
		C316.4	Understand the steps involved in software development and challenges
		C316.5	Explore key challenges and decisions to be made while innovating with crowdsourcing and open source.
		C316.6	Understand social and ethical implications of IT.