PRATHYUSHA ENGINEERING COLLEGE
DEPARTMENT OF MECHANICAL ENGINEERING

REGULATION 2013

Course	Sem	Course Code	Course Title
			FIRST YEAR - SEMESTER I (THEORY)
C101	**1**	**HS6151**	**Technical English-I**
		CO1	Apply the collaborative and social aspects of research and writing processes.
		CO2	Comprehend that research and writing is a series of tasks, including accessing, retrieving, evaluating, analyzing and synthesizing appropriate data and information from sources that vary in content, format, structure and scope
		CO3	Use appropriate technologies to organize, present and communicate information to address a range of audiences, purposes and genres.
		CO4	Explain the relationships among language, knowledge and power including social, cultural, historical and economic issues related to information, writing and technology.
		CO5	Demonstrate the role of a variety of technologies/ media in accessing, retrieving, managing and communicating information.

Course	Sem	Course Code	Course Title
C102	**1**	**MA6151**	**Mathematics-I**
		CO1	Find the Eigen values and eigen vectors to diagonalise and reduce a matrix to quadratic form.
		CO2	Check the converges, diverges of infinite series.
		CO3	Obtain the evaluate and envelopes of a given curves by means of radius and centre
		CO4	of curvature.
		CO5	Calculate the maxima and minima value functions of two variables

Course	Sem	Course Code	Course Title
C103	**1**	**PH6151**	**Engineering Physics-I**
		CO1	Classify the Bravais lattices and different types of crystal structures and growth technique
		CO2	Demonstrate the properties of elasticity and heat transfer through objects.
		CO3	Explain black body radiation, properties of matter waves and Schrodinger wave equations.
		CO4	Illustrate the acoustic requirements, production and application of ultrasonics
		CO5	Examine the characteristics of laser and optical fiber.

Course	Sem	Course Code	Course Title
C104	**1**	**CY6151**	**Engineering Chemistry-I**
		CO1	To analyse the boiler water requirements, related problems and water treatment techniques
		CO2	To understand the phase rule and its application
		CO3	To anlayse the properties and applications of engineering materials
		CO4	To use the calorific value calculations, manufacutre of solid, liquid and gaseous fuels
		CO5	To understand the generation of energy in batteries, nuclear reacotrs, solar cells, wind mills and fuel cells.

Course	Sem	Course Code	Course Title
C105	**1**	**GE6151**	**Computer Programming**
		CO1	To write algorithmic problem solving
		CO2	To read and write C programs using condition and loops
		CO3	To write programs using functins
		CO4	To write programs in data structures - lists, Array, Stack.
		CO5	To write programs perform input and output operation with files

C106	1	GE6152	**Engineering Graphics**
		CO1	To write algorithmic problem solving
		CO2	To read and write C programs using condition and loops
		CO3	To write programs using functins
		CO4	To write programs in data structures - lists, Array, Stack.
		CO5	To write programs perform input and output operation with files

			FIRST YEAR - SEMESTER I (PRACTICAL)
C107	1	GE6161	**Computer Practice Laboratory**
		CO1	To write, test and debug C programs.
		CO2	To implement C programs with conditional and loops.
		CO3	To develop C programs with functions.
		CO4	To develop programs using Python lists, tuples and dictionaries.
		CO5	To read and write data from/to files

C108	1	GE6162	**Engineering Practices Laboratory**
		CO1	Ability to fabricate carpentry components.
		CO2	ability to use welding equipments to join the structures
		CO3	To Analyse the basic electronic components , gates and soldering practices
		CO4	evaluate the pipe connections including plumbing works
		CO5	Estimate the plumbing works by the given material.

C109	1	GE6163	**Physics & Chemistry Laboratory**
		CO1	To perform and verify different experiments to understand the physics concepts applied in optical and thermal physics
		CO2	To analyze and verify the basic physics concepts applied in properties of matter and liquids
		CO3	Analyse water quality parameters through volumetric analysis
		CO4	Estimate the strength and amount of acids using various instruments
		CO5	Demonstrate to calculate the amount of metallic ions by Spectrophotometer and Flame photometer.

			FIRST YEAR - SEMESTER II (THEORY)
C110	2	HS6251	**Technical English II**
		CO1	Modify technical texts and able to write area-specific text in an effortless manner.
		CO2	Analyse lectures and talks which are to their area of specialisation triumphantly.
		CO3	Interpret varied formal and informal life contexts in an appropriate and effective way.
		CO4	Formulate various kinds of reports and framing excellent job applications required by the industries.

		CO5	Evaluate by reading technical articles and words and thereby gaining sound technical knowledge which will be very useful in their work field.

C111	**2**	**MA6251**	**Mathematics II**
		CO1	Evaluate Eigen values and Eigen vectors, Diagonalization of Matrix, symmetric matrices, positive definite matrices and similar matrices
		CO2	Analyse and to solve the problem of vector differentiation and vector integration
		CO3	Analyse and to solve problems of Analytic functions, conformal mapping and bilinear transformation
		CO4	Evaluate real integrals by applying concept of complex integration
		CO5	Analyse and apply the knowledge of Laplace transforms in solving ordinary differential equations

C112	**2**	**PH6251**	**Engineering Physics II**
		CO1	To anlayse the characteristics of classical and quantum electron theories and energy band structures
		CO2	To analyse the semicondutor characteristics and its applications in various devices
		CO3	To analyse the characteristics of magnetic and dielectric properties of materials
		CO4	To analyse the functions of optical materials for optoelectronics
		CO5	To analyse the characteristics of quanatum strucutres

C113	**2**	**CY6251**	**Engineering Chemistry II**
		CO1	To make the students conversant with boiler feed water requirements, related problems and water treatment
		CO2	Principles of electrochemical reactions, redox reactions in corrosiion of materials and methods for corrosion
		CO3	Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
		CO4	Preparation, properties and applications of engineering materials.
		CO5	Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

C114	**2**	**GE6252**	**Basic Electrical & Electronics Engineering**
		CO1	Ability to identify the electrical components explain the characteristics of electrical machines.
		CO2	Ability to identify electronics components and use of them to design circuits.

C115	**2**	**GE6253**	**Engineering Mechanics**
		CO1	Illustrate the vectorial and scalar representation of forces and moments
		CO2	Analyse the rigid body in equilibrium
		CO3	Evaluate the properties of surfaces and solids
		CO4	Calculate dynamic forces exerted in rigid body
		CO5	Analyse the friction and the effects by the laws of friction

		FIRST YEAR - SEMESTER II (PRACTICAL)	
C116	**2**	**GE 6261**	**Computer Aided Drafting and Modeling Laboratory**
		CO1	Ability to use the software packers for drafting and modeling
		CO2	Ability to create 2D and 3D models of Engineering Components
		CO3	Ability to test materials by using their knowledge of applied physics principles in optics and properties of matter.

C117	**2**	**GE6262**	**Physics & Chemistry Laboratory II**
		CO1	To analyse the influence of elastic properties in engineering applications.
		CO2	To analyse the influence of thermal properties in engineering applications.
		CO3	To analyse the influence of water conservation in engineering applications.
		CO4	To determine the water quality parameters through volumetric and instrumental analysis.
		CO5	To determine the corrosion measurement and cement analysis

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Course	Sem	Course Code	Course Title
			SECOND YEAR - SEMESTER III (THEORY)
C201	3	MA6351	**Transforms And Partial Differential Equation**
		CO1	Explain how to solve standard PDE
		CO2	Solve the DE using Fourier series analysis which plays a vital role in engineering applications
		CO3	Apply Fourier series techniques to solving one & two dimensional heat flow problems & two dimensional wave equations
		CO4	Analyze the transforms & PDE to solve the physical problems of engineering
		CO5	Analyze the solutions of PDE by using Z-transform techniques for discrete time systems

C202	3	CE6402	**Strength of Materials**
		CO1	Explain the concept of elastic theory, importance of Hooke's law in elastic design.
		CO2	Estimate the strength and mechanical properties of the structure.
		CO3	Develop the Shear force and Bending Moment diagrams for different type of beams subjected to various loads.
		CO4	Analysis the elements and determine the slope and deflection of the beams.
		CO5	Develop the stress distribution for the normal and shear stresses

C203	3	ME6301	**Engineering Thermodynamics**
		CO1	Apply the first law of thermodynamics for simple open and closed system under steady and unsteady conditions.
		CO2	Apply Second law of thermodynamics to open and closed system and calculate entropy and availability
		CO3	Apply Rankine cycle to steam power plant and compare few cycle improvement methods
		CO4	Derive simple thermodynamic relations of ideal and real gases
		CO5	Calculate the propertiesof gas mixtures and moist air and its use in psychometric processes

C204	3	ME6451	**Fluid Mechanics and Machinery**
		CO1	Ability to define and apply mathematical knowledge to predict fluid properties values and characteristics
		CO2	Able to analyse the various losses occurs in pipe flow & boundary layer concept
		CO3	Able to evaluate nature of physical quantities, & analysis of model and prototype
		CO4	Able to Design and analyse of various types of pumps and its performance
		CO5	Able to Design and analyse of various types of turbines and its performance

C205	3	ME6302	**Manufacturing Technology I**
		CO1	Explain different metal casting processes, associated defects, merits and demerits
		CO2	Compare different metal joining processes
		CO3	Summarize various hot working and cold working methods of metals
		CO4	Explain various sheet metal making processes
		CO5	Distinguish various methods of manufacturing plastic components

C206	3	EE6351	**Electrical Drives and Control**
		CO1	Explain different metal casting processes, associated defects, merits and demerits
		CO2	Compare different metal joining processes
		CO3	Summarize various hot working and cold working methods of metals
		CO4	Explain various sheet metal making processes
		CO5	Distinguish various methods of manufacturing plastic components

			SECOND YEAR - SEMESTER III (PRACTICAL)
C207	3	ME6311	**Manufacturing Technology Lab I**
		CO1	Able to demonstrate fabricate different
		CO2	types of components using the machine tools
		CO3	Able to cutting the component by thread
		CO4	Able to selection for appropriate turning
		CO5	Able to selection for appropriate milling

			Fluid Mechanics and Machinery Laboratory
C208	3	CE6461	
		CO1	Ability to use the measurement equipments for flow measurement
		CO2	Ability to do performance trust on different fluid machinery
		CO3	Ability to design the required turbine load
		CO4	Ability to analyses the fluid machinery equipments
		CO5	Design the selection of fluid machinery with requirement of load

			Electrical Engineering Laboratory
C209	3	EE6365	
		CO1	Ability to perform speed characteristic of different electrical machine
		CO2	Ability to perform load characteristic of different electrical machine
		CO3	Ability to selection of motor with requiremen
		CO4	To apply various types of motor to applications
		CO5	Design the electrical machine for special applications

			SECOND YEAR - SEMESTER IV (THEORY)
C210	4	MA6452	**Statistics and Numerical Methods**
		CO1	To explain the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and Eigen value problem of a matrix can be obtained numerically where analytical methods fail to
		CO2	To explain when to use interpolation and extrapolation
		CO3	To explain the application of numerical differentiation and integration in engineering problems
		CO4	To apply various statistical models and methods for drawing conclusions and making decisions under uncertainty in engineering contexts.

			Kinematics of Machinery
C211	4	ME6401	
		CO1	To apply layout of linkages in the assembly of a system /machine
		CO2	Principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.
		CO3	Design few linkage mechanisms and cam mechanisms for specified output motions.
		CO4	Design the toothed gearing and kinematics of gear trains
		CO5	Design the frictional elements for special application

C212	5	ME6402	**Manufacturing Technology – II**
		CO1	Able to understand and compare the functions and applications of different metal cutting tools
		CO2	Able to analyze the turning machine components
		CO3	Design the parts for milling and gear cutting machine
		CO4	Ability to use the application of abrasive process
		CO5	Ability to write the CNC programming for complex parts

C213	4	EE6365	**Engineering Materials and Metallurgy**
		CO1	Interpret of phase diagram of diffrent alloys and Iron-Iron carbon diagram and types of steel
		CO2	Evaluate the types of heat treatment process ,strengthening mechanism and Isothermal transformation
		CO3	Analyse the effect of alloying elements on ferrous and non ferrous metals
		CO4	Analyse the properties and application of non metallic materials
		CO5	Analyse the deformation mechanism and mechanical properties of metal by various testing methods.

C214	4	GE6351	**Environmental Science & Engineering**
		CO1	Interpret of phase diagram of diffrent alloys and Iron-Iron carbon diagram and types of steel
		CO2	Evaluate the types of heat treatment process ,strengthening mechanism and Isothermal transformation
		CO3	Analyse the effect of alloying elements on ferrous and non ferrous metals
		CO4	Analyse the properties and application of non metallic materials
		CO5	Analyse the deformation mechanism and mechanical properties of metal by various testing methods.

C215	4	GE6404	**Thermal Engineering**
		CO1	To analyse the Gas power cycles and its performance of the cycles
		CO2	Analyse the performance of internal combustion engines and types
		CO3	Analyse the flow of functions of different types of steam nozzles and turbines
		CO4	Analyse the performance of air compressors and understand its performance through calculations.
		CO5	Analyse the co efficient of performance of various type of refrigeration , air-conditioning system

SECOND YEAR - SEMESTER IV (PRACTICAL)			
C216	4	GE6411	**Manufacturing Technology Lab – II**
		CO1	Ability to use different machine tools to manufacturing gears.
		CO2	Ability to use different machine tools for finishing operations
		CO3	Effectively communicate and explain the experimental analysis
		CO4	Ability to manufacture tools using cutter grinder
		CO5	Develop CNC part programming

C217	4	GE6412	**Thermal Engineering Laboratory-I**
		CO1	Ability to conduct experiment on IC engine
		CO2	Ability to analyses the characteristic and performance of IC design/ steam turbines
		CO3	Ability to calculate the steam produced form steam generator
		CO4	Ability to analyze the types of engine
		CO5	Evaluate the timing and P-V diagram in engine

C218	4	CE6401	**Strength of Materials Laboratory**
		CO1	Ability to perform different destructive testing
		CO2	Ability to characteristic materials
		CO3	Evaluate the hardness test on various indenter
		CO4	Evaluate the stress and strain in tensile testing machine
		CO5	Design the testing fixture for new material testing

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Course	Sem	Course Code	Course Title
THIRD YEAR - SEMESTER V (THEORY)			
C301	5	ME6501	**Computer Aided Design**
		CO1	To apply the knowledge of Design processes & 2D transformations in Design model creation
		CO2	To analyse the curve,surface & solid modeling generation techniques in Design Engineering
		CO3	To represent the solid design model with better visualization effects
		CO4	To examine the assembly of parts for checking the interference of Position & orientation
		CO5	To justify the various CAD standards file formats suitable for exchanging of Design and geometric data to other user systems .

C302	5	ME6502	**Heat & Mass Transfer**
		CO1	Ability to analyse the different modes of heat transfer and nature of flow.
		CO2	Ability to analyse the Hydrodynamic and thermal boundary layer concepts.
		CO3	To analyse the phenomenon of boiling and its regimes and heat exchangers
		CO4	To analyze the adiation for distinct materials and medium
		CO5	To analyse mass transfer and its correlation with convection

C303	5	ME6503	**Design of Machine Elements**
		CO1	To formulate and analyze stress in machine elements subject to various loads
		CO2	To analyze and design compound for power transmitting like shaft and coupling
		CO3	To analyze and design structural joint such as welding rivet
		CO4	To analyze and design machine spring and bearing
		CO5	To analyze rotating elements for support the component

C304	5	ME6504	**Metrology and Measurement**
		CO1	Provides knowledge on fundamental and basics of metrology
		CO2	Enable to understanding of the working principle of various measuring instruments and its application.
		CO3	Provides latest technology in the field of metrology.
		CO4	Deals with instruments/ device used for the specific type of product
		CO5	Elabrately explain the metrology used for the measurement of mechnical properties

C305	5	ME6505	**Dynamics of Machines**
		CO1	Apply knowledge of static and dynamic forces of mechanisms
		CO2	Development of solution for the balancing masses and their location of reciprocating masses
		CO3	Compute the frequency of free vibration
		CO4	Apply knowledge the frequency of forced vibration and damping coefficient
		CO5	Evaluate the speed and lift of the governor

C306	5	ME6075	**Professional Ethics in Engineering**
		CO1	To enable the students to create an awareness on Engineering Ethics and Human Values.
		CO2	To instill Moral and Social Values and Loyalty and to appreciate the rights of others.
		CO3	Analyse the various engineering ethical law and social responsibilities
		CO4	Analyse safety measures and Risk assessment
		CO5	To apply ethics in society, discuss the ethical issues related to engineering and realize the

				THIRD YEAR - SEMESTER V (PRACTICAL)
C307	5	ME6511		**Dynamics Laboratory**
			CO1	Review the various types of gears, gear trains, kinematic mechanisms, and universal joints.
			CO2	Estimate the mass moment of inertia of axisymmetric objects using Turn table apparatus, bi-filar suspension, compound pendulum and natural frequency for single and double rotor systems, equivalent spring mass system and transverse
			CO3	Inspect the critical speed of shaft under the given load conditions and the gyroscopic effect and couple on motorized gyroscope.
			CO4	Sketch the characteristic curves of Watt, Porter, Proell and Hartnell governors and motion curves for the given cam follower setup.
			CO5	Examine the balancing of rotating masses in dynamic balancing machine.

				Thermal Engineering Laboratory II
C308	5	ME6512		**Thermal Engineering Laboratory II**
			CO1	Review the various types of gears, gear trains, kinematic mechanisms, and universal joints.
			CO2	Estimate the mass moment of inertia of axisymmetric objects using Turn table apparatus, bi-filar suspension, compound pendulum and natural frequency for single and double rotor systems, equivalent spring mass system and transverse
			CO3	Inspect the critical speed of shaft under the given load conditions and the gyroscopic effect and couple on motorized gyroscope.
			CO4	Sketch the characteristic curves of Watt, Porter, Proell and Hartnell governors and motion curves for the given cam follower setup.
			CO5	Examine the balancing of rotating masses in dynamic balancing machine.

				Metrology & Measurements Laboratory
C309	5	ME6513		**Metrology & Measurements Laboratory**
			CO1	To acquire knowledge on the basics of standards, measurements and its industrial applications
			CO2	To conceive the details about the construction and working of various measuring instruments
			CO3	To acquire knowledge on the latest technologies and advances in the field metrology.
			CO4	To have adequate knowledge on various measuring instruments and devices used in Industries
			CO5	To interpret the measurement of field variables

				THIRD YEAR - SEMESTER VI (THEORY)
C310	6	ME6601		**Design of Transmission Systems**
			CO1	Apply multidimensional static failure criteria in the analysis and design of mechanical components.
			CO2	Analyze and design power transmission shafts carrying various elements with geometrical features.
			CO3	Tolerance analysis and specify appropriate tolerances for machine design applications
			CO4	Apply multidimensional fatigue failure criteria in the analysis and design of mechanical components.
			CO5	Acquainted with standards, safety, reliability, importance of dimensional parameters and manufacturing aspects in mechanical design

				Principles of Management
C311	6	MG6851		**Principles of Management**
			CO1	To describe and discuss the elements of effective management.
			CO2	To impart Knowledge on the principles of management.
			CO3	To make understandable of the managerial functions.
			CO4	To explain various theories related to the development of leadership skills, motivation techniques, teamwork.
			CO5	To communicate effectively through both oral and written presentation.

				Automobile Engineering
C312	6	ME6602		**Automobile Engineering**
			CO1	Analyze the fuel injection system,lighting,lubrication, steering system and cooling process of a automobile.
			CO2	Apply the knowedge of flyweel,clutch,gear box ,universal joint in a automobile
			CO3	Analyze the knowledge of suspension system and design of the front and rare axle of automobile.
			CO4	Evaluate the power system of automobile
			CO5	Understand about the maintainance of automobile

C313	6	ME6603	**Finite Element Analysis**
		CO1	To implement the concept of FEM by Variational approach in Structural problem
		CO2	To analyse the bar,truss,beam elements for stress & starin calcuation
		CO3	To investigate the traingular,quadrilateral elements for various stress strain components
		CO4	To examine the axisymmetric elements for stiffness matrix,stress strain matrix calculation
		CO5	To apply the concept of isoparametric elements analysis in Design engineering field of industrial applications.

C314	6	ME6604	**Gas Dynamics and Jet Propulsion**
		CO1	Apply governing equations to practical problems involving compressible fluid flow
		CO2	Analyze compressible flow through variable area duct critically
		CO3	Analyze compressible flow having Normal shock by using different relations
		CO4	Apply governing equations to compressible flow through constant area duct with friction and flow through constant area duct with heat transfer
		CO5	Interpret propulsive systems for their working and application

C315	6	ME6004	**Unconventional Machining Processes**
		CO1	To classify the mechanism of Mechanical machining processes, economic considerations in Ultrasonic machining
		CO2	To differentiate Thermal Metal Removal Processes, characteristics of spark eroded surface, machine tool selection
		CO3	To interpret Electro Chemical machining process, economic aspects of ECM and problems on estimation
		CO4	To relate Generation and control of electron beam for machining, laser beam machining and comparison
		CO5	Application of these machining methods in various fields

THIRD YEAR - SEMESTER VI (PRACTICAL / MINI PROJECT)			
C316	6	ME6611	**CAD / CAM Laboratory**
		CO1	Ability to the underlying theory of modeling and the usage of models in different engineering applications
		CO2	Create transformations for 2D geometric modeling and also to understand the basics of Finite Element Methods in the context of modelling
		CO3	Analyze Computer Aided Designing systems; Geometric modeling, solid modeling, and feature-based design modeling.
		CO4	Understand the basic concepts of CNC programming and machining
		CO5	Ability to develop 2D and 3D models using modeling software's.

C317	6	ME6612	**Design & Fabrication Project**
		CO1	Identify a topic in advanced areas of Mechanical Engineering
		CO2	Ability to review literature to identify gaps and define objectives & scope of the work
		CO3	Generate and implement innovative ideas for social benefit.
		CO4	Develop a prototypes/models, experimental set-up and software systems necessary to meet the objectives.
		CO5	Ability to fabricate any components using different manufacturing tools.

C318	6	GE6563	**Communication Skills - Laboratory based**
		CO1	Ability to presentations and Participate in Group Discussions.
		CO2	Ability to write international examination such as IELTS and TOEFL
		CO3	Ability to answer questions in interviews.
		CO4	Ability to speak fluently
		CO5	Ability to communicate professionally

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Course	Sem	Course Code	Course Title
FINAL YEAR - SEMESTER VII (THEORY)			
C401	7	ME6701	**Power Plant Engineering**
		CO1	Analyse the different types of power plant and their accessories with funtions
		CO2	Evaluate the performance of Gas turbines and benefits of combined cycle power plant
		CO3	Analyse the principal components and nuclear reactors used in nuclear power plant
		CO4	Design and Analyse the power generation from renewable source and alternative fuels
		CO5	Analyse and solve Energy and Economic related issues in power sector

C402	7	ME6702	**Mechatronics**
		CO1	Apply role of Mechatronics in the basic areas of Mechanical engineering
		CO2	Apply the knowledge of frequency domain, time domain and frequency time domain to evaluate various types of signals.
		CO3	Construct mathematical models for various simple mechanical and electrical systems and apply the basics of control systems.
		CO4	Apply the fundamentals of Electronics and explain the working of various sensors and transducers.
		CO5	Design and construct simple Mechatronics systems.

C403	7	ME6703	**Computer Integrated Manufacturing Systems**
		CO1	To make use of basic concepts of CAD and CAM, manufacturing planning and control, CIM concepts and types of production system and to evaluate the production performance
		CO2	To apply the concept of process planning, production planning, shop floor control, MRP, ERP and inventory control
		CO3	To appraise the concepts of parts classification and coding, production flow analysis and to analyze the practical problems in cellular manfucaturing
		CO4	To appraise the concepts of flexible manufacturing systems (FMS), Automated Guided Vehicle Systems(AGVS) and to analyze the practical problems in FMS
		CO5	To appraise the robot control control systems and to construct the robot.

C404	7	ME6757	**Total Quality Management**
		CO1	Prioritize quality goals based on customer expectations & competition
		CO2	Identify improvement areas based on cost of poor quality
		CO3	Organize for quality and development of quality culture through small group activities
		CO4	Able to enlist the customer requirements and technical/ design requirements and draw and justify the house of quality and quality function deployment
		CO5	Able to enlist and justify the four levels of benchmarking and/ or enlist and brief seven step benchmarking model

C405	7	ME6005	**Process Planning & Cost Estimation**
		CO1	Student will have the knowledge to interpret the overlay output,evaluate and select the material equipments
		CO2	To able to prepare documents of process planning economically by quality assurance methods
		CO3	To understand the importance of estimation of costing and estimating procedure
		CO4	To estimate the product in forging shop,welding, foundry shop.
		CO5	Students can able to calculate the machining time in lathe, Milling, Grinding and shaping.

C406	7	ME6012	**Maintenance Engineering**
		CO1	Analysis the principles and practices of maintenance planning
		CO2	Analysis the maintenance policies and preventive maintenance
		CO3	Evaluate the performance of condition monitoring by different method
		CO4	Analysis the repair methods for basic machine elements
		CO5	Calculate Machining Time for different operations in lathe,shaper,planer,milling & grinding machine

			FOURTH YEAR - SEMESTER VII (PRACTICAL)
C407	7	ME6711	**Simulation & Analysisn Laboratory**
		CO1	Able to appreciate the utility of the tools like ANSYS or FLUENT in solving real time problems and day to day problems
		CO2	Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their employment
		CO3	calculate the natural frequency and mode shape analysis of 2D components and beams.
		CO4	simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB
		CO5	analyze the stresses and strains induced in plates, brackets and beams and heat transfer problems.

C408	7	ME6712	**Mechatronics Lab**
		CO1	Design and analyse a pneumatic circuits by basic components, PLC, electro pneumatic controllers.
		CO2	To generate and simulate the output of pneumatic circuits for sequencing of two cylinders by PLC,Electro pneumatic controller
		CO3	To generate and simulate the output of hydraulic circuits for sequencing of two cylinders by using PLC,Electro pneumatic controller
		CO4	To control the step rotation of stepper motor
		CO5	by 8051 micro controller& traffic light

C409	7	ME6713	**Comprehension**
		CO1	To show enhanced competence in communication skills and technical communication
		CO2	To develop awareness of attitude formation and behavioural appropriateness
		CO3	To gain self-confidence and perform better in their academic and professional life.
		CO4	Participate confidently and appropriately in conversations both formal and informal

			FINAL YEAR - SEMESTER VIII (THEORY)
C410	**8**	**MG6853**	**Engineering Economics**
		CO1	Apply the knowledge of principles in Engg Economics, Law of supply & Demand, elements of cost & design selection
		CO2	Analyze complex engg problems pertaining to make or buy decisions & Time value of mone
		CO3	Analyze complex engg problems pertaining to comparision of alternative
		CO4	Design solution for complex engg problems pertaining to replacement maintanance analysis
		CO5	Design solution for complex engg. problems pertaining to depreciation, evaluation of public alternative

			Production Planning & Control
C411 A	**8**	**IE6605**	**Production Planning & Control**
		CO1	Recognize the objectives, functions, applications of PPC and forecasting techniques.
		CO2	To students able to explain different Inventory control techniques.
		CO3	To Analyse and Solve routing and scheduling problems.
		CO4	To Summarize various aggregate production planning techniques.
		CO5	Students able to Describe way of integrating different departments to execute PPC functions

			Advanced I.C. Engines
C412 A	**8**	**ME616**	**Advanced I.C. Engines**
		CO1	Analysis of diesel fuel injection system and combustuin chamber
		CO2	Understand components of multi point
		CO3	Analysis formation of carbon mono oxide
		CO4	study of alchol hydrogen compresssed natural gas
		CO5	Study of hybrid vehicle

			PROJECT
C413	**8**	ME6811	**Project Work**
		CO1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

Prepared by   **Checked by**   **Approved by**