



S J P N Trust's

Hirasugar Institute of Technology, Nidasoshi.

Inculcating Values, Promoting Prosperity

Approved by AICTE, Recognized by Govt. of Karnataka and Affiliated to VTU Belagavi.

ME

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Course Outcomes

2017-18

Course Outcomes of all the courses from 3rd semester to 8th semester

Subject: Engg. Mathematics-III

Sub Code: 10MAT31

CO	After studying this course, students will be able to:
C201.1	Obtain the whole or half range Fourier series of a simple function.
C201.2	Define the function of time, space or some other variable.
C201.3	Explain the Two dimensional Laplace's equation by the method of separation of variables
C201.4	Solve linear programming problems by using Simplex and graphical method .
C201.5	Apply various techniques to find the approximate solution of the given problems .
C201.6	Apply the different numerical methods for interpolation, differentiation, integration and solve the algebraic equations ,linear and non linear equations.
C201.7	Reduce higher dimensional problems into a sequence of one dimensional problem.
C201.8	Apply the knowledge of difference equations in order to solve linear difference equations by using z-transform engineering problems.

SUB: Material Science and Metallurgy

Sub Code: 10ME32A/42A

CO	After studying this course, students will be able to:
C202.1	Appreciate the structure of materials, basic concepts of crystalline materials and atomic diffusion.
C202.2	Illustrate the concepts of mechanical behavior of materials and analysis of the same.
C202.3	Identify the causes of failure due to fracture, fatigue and creep.
C202.4	Explain the mechanism of solidification; identify the basic terminologies associated with metallurgy and analysis of phase diagrams.
C202.5	Interpret the Iron-Carbon equilibrium diagrams.
C202.6	Choose the appropriate heat treatment process to improve the material properties.
C202.7	Know the composition, properties and applications of ferrous and non-ferrous metals.
C202.8	Discuss the types and applications of composite material.



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Course_Outcomes

2017-18

SUB: Mechanical Measurements and Metrology

Sub Code: 10ME42B

CO	After studying this course, students will be able to:
C203.1	Illustrate the principle of operation and calibration of an instrument.
C203.2	Compare engineering measuring instruments for a particular application.
C203.3	Know the concepts of limits, fits, tolerance and make use of measuring instruments.
C203.4	Make use of concepts of interferometer and screw thread measurement methods.
C203.5	Explain the concepts of measurement and measurement systems.
C203.6	Demonstrate the working of intermediate modifying and terminating devices.
C203.7	Interpret the working of force, torque and pressure measuring devices.
C203.8	Demonstrate the working of temperature and strain measuring devices.

SUB: Basic Thermodynamics

Sub Code: 10ME33

CO	After studying this course, students will be able to:
C204.1	Define the basic terms of thermodynamics and relate Zeroth law to temperature scale.
C204.2	Compare heat and work interactions between the system and surroundings.
C204.3	Interpret and apply first law of thermodynamics to flow and non flow processes.
C204.4	Interpret and apply the second law of thermodynamics to heat pump and heat engine.
C204.5	Explain the concept of entropy for reversible and irreversible processes
C204.6	Identify Quality, Quantity and Thermodynamic properties of pure substance
C204.7	Analyze the derived thermodynamic relationships and evaluations of forms of energy and properties
C204.8	Compare the properties of mixture of ideal and real gases



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Course Outcomes

2017-18

SUB: Mechanics Of Materials

Sub Code: 10ME34

CO	After studying this course, students will be able to:
C205.1	Explain the fundamental concepts of stress and strain, engineering properties of materials and determine stress and strain using principle of superposition.
C205.2	Evaluate deformations, elastic constants and volumetric strain in a bars of varying cross sections subjected to normal and thermal loads.
C205.3	Analyze principal stresses and maximum shear stresses using analytical and Mohr's circle methods in a plane stress system.
C205.4	Determine the strain energy of beams/bars using Energy methods and stress distribution in thick and thin cylinders.
C205.5	Construct and analyze the shear force and bending moment diagrams subjected to point load, UDL and UVL in various beams.
C205.6	Determine cross sectional dimensions and bending and shear stress distribution in beams of circular, rectangular, symmetrical I and T sections subjected to point loads and UDL.
C205.7	Determine deflections and slopes at various locations on beams subjected to UDL, UVL, Point loads and couples.
C205.8	Analyze torsion of circular shafts and elastic stability of columns for various end conditions.

SUB: Manufacturing process I

Sub Code: 10ME35

CO	After studying this course, students will be able to:
C206.1	Understand fundamentals of foundry
C206.2	Understand sand molding process and use foundry machines and equipments.
C206.3	Identify various melting Furnaces and understand their operation principles and inspection methods of moulds.
C206.4	Understand the fundamentals, types, techniques and metallurgical aspects of welding.
C206.5	Understand the fundamentals of brazing and soldering and non destructive testing.



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SUB: Computer Aided Machine Drawing Sub Code: 10ME46A

CO	After studying this course, students will be able to:
C207.1	Have hands on experience on mechanical modeling software.
C207.2	Draw true shape of sections of polyhedrons.
C207.3	Visualize and draw orthographic views of simple machine components.
C207.4	Understand and draw various thread forms.
C207.5	Understand and draw orthographic views of assembly of fasteners as per BIS.
C207.6	Understand and draw orthographic views of various riveted joints, cotter/knuckle joints and couplings as per BIS.
C207.7	Visualize and prepare models of given detailed parts of machine component and its assembly with bill of materials and specifications.

SUB: Fluid Mechanics

Sub Code: 10ME36/46B

CO	After studying this course, students will be able to:
C208.1	Define the properties of fluids.
C208.2	Understand the concepts of fluid statics
C208.3	Understand the effect of buoyancy for floating and submerged body.
C208.4	Interpret and apply the principles of fluid kinematics and dynamics.
C208.5	Compare and analyze the fluid flow measuring devices and apply dimensional analysis for fluid flow problems
C208.6	Estimate the major and minor losses in flow through pipes through formulation.
C208.7	Formulate and evaluate fluid properties and viscous effects of benchmark flows problems.
C208.8	Explain the concept of aerodynamic forces, boundary layer and compressible flow basics.



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SUB: M&MT Lab**SUB CODE: 10MEL37A**

CO	After studying this course, students will be able to:
C209.1	Determine the hardness of the various materials by different hardness test methods.
C209.2	Evaluate the impact strength of materials by izod and charpy test.
C209.3	Evaluate the strength of different materials on universal testing machine.
C209.4	Determine the torsional strength of the given mild steel specimen on torsional test rig.
C209.5	Identify the metals based on their microstructure.
C209.6	Modify the properties of metal specimens by heat treatment processes.
C209.7	Evaluate the Progressive loss of the material & coefficient of friction on wear test rig.
C209.8	Conduct non destructive tests on given metal specimens.

SUB:MMM Lab**SUB CODE:10MEL37B**

CO	After studying this course, students will be able to:
C210.1	Select the set of combination of slip gauge height based on given dimensions.
C210.2	Calibrate the Thermocouple, Load cell and LVDT to measure physical quantities.
C210.3	Find major and minor diameters using Two or Three wire method and Angle of screw thread using Toolmaker's microscope.
C210.4	Measure slope or angle of the given work piece using Sine bar, Sine center and Bevel protractor.
C210.5	Measure width and height of gear tooth at pitch circle diameter using Gear tooth vernier calipers
C210.6	Demonstrate using autocollimator and optical flats to measure the straightness and flatness of the surface.

SUB: Foundry and Forging Lab**SUB CODE: 10MEL38A**

CO	After studying this course, students will be able to:
C211.1	Demonstrate the applications of basic Foundry and Forging processes.
C211.2	Conduct test to determine tensile, compression and Shear strength of Sand Specimen by UTSM.
C211.3	Evaluate the sand properties by conducting permeability, core and mould hardness, clay content and sieve analysis tests.
C211.4	Apply sand molding process through preparation of moulds using two molding boxes with or without patterns.
C211.5	Calculate the length of the raw material required and produce the forged models involving upsetting, drawing and bending operations.



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SUB: Machine Shop Lab

Sub Code: 10ME38B

CO	After studying this course, students will be able to:
C212.1	Demonstrate basic Lathe, Milling and Shaping machine operations
C212.2	Prepare the jobs using lathe which include Facing, Turning, Knurling and Thread cutting operations
C212.3	Prepare the jobs using Milling machine to cut gear teeth by Indexing method
C212.4	Prepare the jobs using Shaper to cut dovetail/ rectangular/V-grooves



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SUB: Engg. Mathematics-IV**Sub Code: 10MAT41**

CO	After studying this course, students will be able to:
C213.1	Use Runge -Kutta and predictor-corrector formula to integrate single order systems of ODE's. Approximate the solution of a differential equation using Euler's, or Picard's, or Taylor's, or Runge-Kutta's methods.
C213.2	Use Runge-Kutta and predictor-corrector formula to integrate second order systems of ODE's.
C213.3	Use Cauchy-Riemann equations to calculate the derivative and applications of different types of potentials.
C213.4	Discuss bi linear transformation and complex line integrals.
C213.5	Explain how special functions arise in the solution of boundary and initial value problems in mathematics. Undertake problem identification, formulation and solution.
C213.6	Explain the concepts of random variables, distributions, experiments, outcomes, sample spaces, events, the role of set theory in probability and the law of total probability and Bayes theorem.
C213.7	Explain the theory of random variables and their applications in discrete random variables, continuous random variables, cumulative distribution functions and their properties; normal, binomial, Poisson exponential distributions.
C213.8	Explain the concept of sampling theory and tests of hypotheses. Determine the mean and standard error in sampling distribution.

SUB: Applied thermodynamics**Sub Code: 10ME43**

CO	After studying this course, students will be able to:
C214.1	Define the combustion parameters
C214.2	Understand working cycles used for I.C. Engines
C214.3	Examine the performance parameters of I.C. Engines
C214.4	Analyze Rankine cycle for the improvement in performance of steam power plant.
C214.5	Understand the thermodynamic analysis of reciprocating air compressors
C214.6	Analyze Gas Turbine cycle for the improvement in performance of Gas Turbine Power Plant.
C214.7	Compare the working principles and applications of different refrigeration systems.
C214.8	Evaluate the psychometric properties of air conditioning systems.



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SUB: Kinematics of Machines

SUB CODE: 10ME44

CO	After studying this course, students will be able to:
C215.1	Appreciate kinematic chains & their inversions & calculate mobility of the mechanism.
C215.2	Describe and differentiate mechanisms such as Quick-return, Straight line & Intermittent motion mechanism
C215.3	Identify and examine for velocity and acceleration of different mechanisms by graphical methods.
C215.4	Identify, interpret and examine for velocity and acceleration of different mechanisms by Instantaneous centre, Klein's construction, Complex and vector algebra methods
C215.5	Define gear terminology, types of gears and describe law of gearing, interference, gear tooth profiles and its modifications.
C215.6	Identify gear trains and examine for velocity ratio, tooth load and torque by algebraic and tabular column method.
C215.7	Define cam terminology, types of cams and followers and construct their relative motion profiles.

SUB: Manufacturing Process II

SUB CODE: 10ME45

CO	After studying this course, students will be able to:
C216.1	Know the importance of single point cutting tool nomenclature, merchant circle diagram, tool failure criteria and derive shear angle relationship, Taylor's tool life equation.
C216.2	Perceive the types of cutting tool materials and their desired properties.
C216.3	Compare different type of lathes, the constructional features and their working principles.
C216.4	Distinguish and demonstrate the principles of different drilling machines and CNC machines with manual part programming.
C216.5	Distinguish different milling machines, its constructional features and related operations.
C216.6	Identify different types of abrasives, structure of grinding wheel, and explain constructional features of grinding machine.
C216.7	Categorize the different types of broaching machine and its applications.
C216.8	Appreciate the use of non-traditional machining processes.



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SUB: Management & Entrepreneurship

SUB CODE: 10AL51

CO	After studying this course, students will be able to:
C301.1	Outline the basic management concepts, administration, managerial skills, levels and development of management thoughts.
C301.2	Explain the planning and decision making process.
C301.3	Classify and explain the nature, purpose, principles and types of organization and staffing selection process.
C301.4	Choose appropriate leadership styles, motivation theories, communication and sound controlling systems.
C301.5	Interpret the meaning of entrepreneur, entrepreneurship and role of entrepreneurs in economic development in India.
C301.6	Know the information about government policies and steps involved in starting a small scale industry.
C301.7	List the various agencies, institutes, banks, boards of central and state government support to start an enterprise.
C301.8	Identify new ideas, prepare a project report and carry out feasibility studies.

Sub: Design of Machine Elements I

Sub Code:10ME52

CO	After studying this course, students will be able to:
C302.1	Recognize types of stress, mechanical behavior of engineering materials, material codes and standards for design of machine elements.
C302.2	Analyze machine elements based on static and impact loads using theories of failure.
C302.3	Analyze machine elements under fluctuating loading conditions to determine fatigue life cycle by using S-N diagrams.
C302.4	Design and select threaded fasteners subjected to static, dynamic, impact loading conditions and bolted joints under eccentric loading conditions.
C302.5	Design the shaft based on strength and rigidity for combined and fluctuating loading conditions.
C302.6	Design cotter and knuckle joints, keys and couplings.
C302.7	Design riveted and welded joints.
C302.8	Design power screws.



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SUB:Energy Engineering

SUB CODE:10ME53

CO	After studying this course, students will be able to:
C303.1	List the various equipment used in steam power plant.
C303.2	Illustrate the steam generators with accessories.
C303.3	Outline the diesel engine power plant with auxiliaries.
C303.4	Illustrate and analyze the hydro electric power plant with components.
C303.5	Classify and compare the working principle of nuclear reactors.
C303.6	Analyze solar and wind energy systems.
C303.7	Discuss the latest trends in OTEC, GTEC and Tidal energy technology of harnessing the renewable energy sources
C303.8	Explain the construction and working principle of different types of biogas plant and Gasifiers.

SUB: Dynamics Of Machine

SUB CODE:10ME54

CO	After studying this course, students will be able to:
C304.1	Analyze magnitude and direction of couples using static force analysis of translating and reciprocating mechanisms.
C304.2	Analyze the dynamic forces of translating and reciprocating mechanisms using D'Alembert's principle and develop turning moment diagram of flywheel.
C304.3	Explain the importance of laws of friction. Estimate the power loss in bearings and calculate dimensions of belt considering friction.
C304.4	Analyze static and dynamic balancing of rotating masses in same and different planes.
C304.5	Contrast inertia effect in single cylinder engine and Analyze the primary and secondary unbalanced forces to balance reciprocating parts in multi-cylinder inline, v and radial engines.
C304.6	Explain importance of governor and to determine the performance parameters of Porter and Hartnell governors.
C304.7	Analyze gyroscopic effects in aerospace, marine and automobiles.
C304.8	Analyze Tangent cam with roller follower and Circular arc cam operating flat faced and roller followers. Undercutting in Cams.

**Sub: Manufacturing Process III****Sub Code: 10ME55**

CO	After studying this course, students will be able to:
C305.1	Discuss different metal working processes and the stresses developed.
C305.2	Explain the different parameters like temperature, strain rate, friction and lubrication.
C305.3	Elaborate the forging processes and forging machines.
C305.4	Discuss the rolling processes of rolling mills.
C305.5	Explain the drawing process and solve the die design problems.
C305.6	Describe extrusion processes and their defects.
C305.7	Discuss sheet metal forming process and its applications.
C305.8	Know the concept of powder metallurgy and high energy rate forming methods.

SUB :Turbo Machines**SUB Code: 10ME56**

CO	After studying this course, students will be able to:
C306.1	List the different types of Turbo machine.
C306.2	Compare the various efficiencies of turbo machines for expansion and compression processes.
C306.3	Apply Euler's turbine equation to determine the power/ head developed.
C306.4	Analyze the energy transfer across the turbo machines.
C306.5	Construct velocity triangle to determine power developed by steam turbine.
C306.6	Compare the performance and working principle of different hydraulic turbines.
C306.7	Analyze the effect of blade angle on the performance of centrifugal pump.
C306.8	Develop the expression for pressure developed in compressors.

SUB :Fluid mechanics and machinery lab**SUB Code: 10MEL57**

CO	After studying this course, students will be able to:
C307.1	Calibrate and determine the flow rate using flow measuring devices.
C307.2	Measure the loss of head in flow through pipes.
C307.3	Determine the force exerted by a jet on the vanes
C307.4	Conduct the performance of Pelton, Francis and Kaplan Turbines.
C307.5	Conduct the performance of reciprocating and centrifugal pumps.
C307.6	Determine the different efficiencies of reciprocating compressors
C307.7	Conduct the Performance test on air blower.

SUB :Energy Conversion Engineering Lab**SUB Code: 10MEL58**

CO	After studying this course, students will be able to:
C308.1	Measure the flash point & fire point of given oil sample.
C308.2	Determine the calorific value of solid, liquid and gaseous fuels.
C308.3	Determine the viscosity of given oil sample.
C308.4	Demonstrate valve/port timing diagram of IC engine.
C308.5	Estimate the irregular plane surface area by using planimeter.
C308.6	Determine the performance of single cylinder, multi cylinder and VCR engine.
C308.7	Draw the heat balance sheet on I.C. Engines

**SUB : Computer Integrated Manufacturing****SUB CODE: 10ME61**

COs	After studying this course, students will be able to:
C309.1	Explain the importance of CIM & automation in industries.
C309.2	Illustrate how practically the material is transferred from one end to other end with different flow lines.
C309.3	Justify how buffer storage is used in between the segments.
C309.4	Solve the manual assembly line balancing problem.
C309.5	Analyze problems regarding automated assembly line and AGV & its controlling.
C309.6	Categorize CAPP, MRP, and CRP in Flexible Manufacturing system.
C309.7	Write part program for milling, turning and drilling operations.
C309.8	Describe an Industrial robot & to make a robot (model) to study its motions and control systems.

SUB : DOME-II**SUB Code: 10ME62**

CO	After studying this course, students will be able to:
C310.1	Design and analyze behavior of stresses in curved beams and compound cylinders.
C310.2	Design and select belts, ropes and chains for power transmission.
C310.3	Analyze and design helical and leaf springs subjected to static and dynamic loads.
C310.4	Analyze and design Spur and helical Gears based on strength, dynamic and wear loads.
C310.5	Analyze and design Bevel and worm Gears based on strength, dynamic and wear loads.
C310.6	Analyze and design the types of brakes and clutches. Check for heat generation and dissipation in brakes.
C310.7	Select suitable lubricants and analyze performance of hydrodynamic and hydrostatic bearings.
C310.8	Design piston, connecting rod and crank shaft of IC Engine.

SUB :Heat and Mass Transfer**SUB Code: 10ME63**

CO	After studying this course, students will be able to:
C311.1	Understand the modes and laws of heat transfer
C311.2	Compute temperature distribution through fins and insulations for various applications
C311.3	Determine the temperature distribution and rate of heat flow in solids during transient heat transfer.
C311.4	Make use of various correlations for determining the heat transfer coefficients for natural and forced convection heat transfer applications.
C311.5	Determine the rate of heat transfer for internal and external flows over the surfaces.
C311.6	Analyze heat exchangers using LMTD and NTU methods.
C311.7	Estimate the heat transfer coefficient for boiling and condensation processes.
C311.8	Determine the radiation heat transfer between two surfaces



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SUB : FEM

SUB CODE: 10ME64

CO	After studying this course, students will be able to:
C312.1	Illustrate the equilibrium equations, stress-strain relations of an elastic body.
C312.2	Explain general steps in FEM, application, limitations and have skill to solve for stiffness matrix for bar element using principle of minimum potential energy, Raleigh's Ritz and Galerkin's method.
C312.3	Choose interpolation polynomial equation and formulate shape function, nodal load vector, strain displacement matrix, and Jacobian for triangular and rectangular element
C312.4	Solve displacements, reactions and stresses by using penalty approach, elimination approach and Gauss-elimination technique for 1D elements.
C312.5	Formulate shape functions using Langrange's interpolation method for higher order 1D and 2D elements.
C312.6	Solve problems on trusses by using stiffness matrix.
C312.7	Formulate stiffness matrix and Hermite shape functions to solve numerical on beam elements SUB jected to different loads.
C312.8	Solve the 1D heat transfer problems with conduction and convection boundary conditions using Galerkin's approach .

SUB : Mechatronics & Microprocessor

SUB CODE: 10ME65

CO	After studying this course, students will be able to:
C 313.1	Describe the microprocessor based measurement and control systems.
C 313.2	Explain the basic theory of sensors and transducers and their applications.
C 313.3	Apply knowledge of electrical actuators to control a mechatronic system.
C 313.4	Utilize signal conditioning systems.
C 313.5	Explain the basic concepts of programming of microprocessors.
C 313.6	Describe the basic functioning of 8085A microprocessor and microcontroller.
C 313.7	Write simple basic programs to microprocessor.
C 313.8	Explain the I/O interface concepts of the central processing unit of microprocessor.



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SUB: Non-Traditional Machining SUB CODE: 10ME665

CO	After studying this course, students will be able to:
C320.1	Classify and relate conventional with non conventional machining processes along with its importance in metal working.
C320.2	Describe ultrasonic machining process and its applications.
C320.3	Describe abrasive jet machining process and its applications.
C320.4	Describe electro-chemical machining process and its applications.
C320.5	Describe chemical machining process and its applications.
C320.6	Describe electrical discharge machining process and its applications.
C320.7	Describe plasma arc machining process and its applications.
C320.8	Describe laser beam and electron beam machining process and its applications.

SUB : Statistical Quality Control

SUB CODE: 10ME688

CO	After studying this course, students will be able to:
C323.1	Describe the fundamental concept of quality.
C323.2	Solve problems on measure of central tendency.
C323.3	Explain chance and assignable causes, control limits and control charts.
C323.4	Solve problems on control charts for variables.
C323.5	Analyze the manufacturing process and capability.
C323.6	Solve problems on control charts for attributes.
C323.7	Design sampling method for quality control.
C323.8	Draw CUSUM/ EWMA charts.



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SUB :Heat and Mass Transfer Lab

SUB . Code:10MEL67

CO	After studying this course, students will be able to:
C324.1	Determine the thermal conductivity of the metal rod and composite slab.
C324.2	Determine the effectiveness of pin-fin for natural and forced convection heat transfer processes.
C324.3	Determine the heat transfer coefficients for natural and forced convection heat transfer processes
C324.4	Determine the emissivity of the given test plate and Prove Stefan Boltzmann law of radiation.
C324.5	Conduct and measure the overall heat transfer coefficient, effectiveness of parallel and counter flow heat exchangers.
C324.6	Estimate the heat transfer coefficient for film wise and drop wise condensation processes.
C324.7	Demonstrate the working of Refrigeration and Air-conditioning system.
C324.8	Determine the transient heat transfer rate.

SUB : CAMA Lab

SUB Code: 10MEL68

CO	After studying this course, students will be able to:
C325.1	Analyze concepts of FEA to the bar, beam and truss elements using ANSYS software.
C325.2	Compare and analyze stress concentration in a plate with hole using continuum method and FEM.
C325.3	Analyze heat transfer through one dimensional fins and composite walls by conduction, convection using ANSYS software.
C325.4	Conduct the vibration analysis of beam element with different end conditions using ANSYS software.



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SUB : Engineering Economics

SUB CODE: 10ME71

CO	After studying this course, students will be able to:
C401.1	Comprehend and apply engineering economic decision making, interest factors and cash flow diagram to obtain equivalent values.
C401.2	Solve financial problems using present, future worth and equivalent annual worth comparisons.
C401.3	Evaluate the depreciation, income taxes, inflation and price change in engineering economic problems.
C401.4	Apply the knowledge of estimating, costing and evaluation of projects.
C401.5	Prepare and analyze the basic financial statements in financial organisations.
C401.6	Explain and solve the different types of financial ratio and associated problems.
C401.7	Estimate financial and profit planning for preparation of different budget reports.

SUB : Mechanical Vibration

SUB Code: 10ME72

CO	After studying this course, students will be able to:
C402.1	Explain the importance of vibrations, Simple Harmonic Motion (S.H.M), principle of super position applied to Simple Harmonic Motions. Beats, Fourier theorem and simple problems.
C402.2	Formulate linear vibratory models of dynamic systems with single and multi degree freedom system.
C402.3	Formulate linear mathematical models of damped vibrations in mechanical engineering systems.
C402.4	Differentiate and analyze vibrations of single and multi-degree freedom linear systems under forced vibrations.
C402.5	Appreciate the importance of vibration measuring instrument and analyze vibration parameters by formulated mathematical models
C402.6	Compute mode shape and natural frequencies for two degree freedom system without damping.
C402.7	Compute natural frequencies of multi degree freedom system by different numerical methods.
C402.8	Use mechatronics approach to measure the response of vibratory systems.



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Course_Outcomes

2017-18

SUB :Hydraulics and Pneumatics**SUB Code: 10ME73**

CO	After studying this course, students will be able to:
C403.1	Define the basics of hydraulics
C403.2	Understand the hydraulic actuators and motors
C403.3	Apply the control components in hydraulic circuit systems
C403.4	Analyze the hydraulic circuit design for different applications
C403.5	Understand the maintenance of hydraulic system
C403.6	Define the basics of the pneumatic system and pneumatic actuators
C403.7	Illustrate the control components in pneumatic system and signal processing elements
C403.8	Explain the advancement in hydraulic and electro pneumatic systems

SUB : Operations Research**SUB Code: 10ME74**

CO	After studying this course, students will be able to:
C404.1	Apply the theory of operations research to formulate a real world problem as linear programming model.
C404.2	Make use of simplex method to arrive at optimal solution.
C404.3	Formulate a transportation & assignment models to find optimal solution.
C404.4	Solve integer LPP using cutting plane & branch-bound method.
C404.5	Construct network diagrams to determine time and cost of projects by PERT & CPM.
C404.6	Analyze the variety of performance measures of a queuing system.
C404.7	Select the optimal strategies to solve game theory problems.
C404.8	Evaluate minimum elapsed time with optimal sequence for 'n' jobs on 'm' machines

SUB : Non- Conventional Energy Sources**SUB Code: 10ME754**

CO	After studying this course, students will be able to:
C408.1	Recall the different energy sources and their utilization.
C408.2	Evaluate solar radiation and its parameters.
C408.3	Explain the various solar collectors and thermal energy converters.
C408.4	Evaluate the Performance Analysis of Liquid Flat Plate Collectors.
C408.5	Illustrate the Photovoltaic energy Conversion systems and Wind Energy.
C408.6	Understand the OTEC, GTEC and Tidal energy technology
C408.7	Understand biomass energy conversion and its applications.
C408.8	Discuss the storage and transportation methods used for hydrogen energy.



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ME

NAAC

Course_Outcomes

2017-18

SUB : Total Quality Management

SUB Code: 10ME758

CO	After studying this course, students will be able to:
C412.1	Define TQM & list its benefits & limitations.
C412.2	Identify the role of leader & leadership which helps for their future.
C412.3	Explain the methods to satisfy the customer, employee involvement and motivation techniques.
C412.4	Identify the contributions of TQM Gurus and elaborate tools and techniques for continuous process improvement.
C412.5	Construct different graphs/charts to study the quality management.
C412.6	Plan, delegate, organize and execute all facts of business by SPC tools & methods.
C412.7	Develop organizational culture, change management, ISO 9000 implementation steps, Baldrige and six sigma concepts.
C412.8	Summarize the importance & design of six-sigma.

SUB : Product Life Cycle Management

SUB Code: 10ME769

CO	After studying this course, students will be able to:
C421.1	Explain life cycle model, threads, needs, components and benefits of PLM.
C421.2	Elaborate the characteristics, environments driving PLM, conceptualization, design and development stages.
C421.3	Appreciate the PDM system concepts, metadata, life cycle and work flow concepts.
C421.4	Explain CPD, engineering vaulting, product reuse, change management, BOM and process consistency.
C421.5	Make use of tools of communication for collaborative product development.
C421.6	Illustrate the significance of parameterization of design.
C421.7	Describe digital manufacturing technique.
C421.8	Know about strategy, development, implementation and infrastructure assessment.



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NAAC

Course_Outcomes

2017-18

SUB : DESIGN Lab

SUB CODE: 10MEL77

CO	After studying this course, students will be able to:
C422.1	Determine natural frequency of single degree of freedom vibrating systems.
C422.2	Identify and analyze the balancing of rotating masses under static and dynamic loads.
C422.3	Perform experimental stress analysis using Polariscope apparatus in different photo elastic materials.
C422.4	Determine equilibrium speed, sensitiveness, controlling force, power and effort of Porter and Proell governors.
C422.5	Determine pressure distribution in Journal bearing.
C422.6	Describe the gyroscopic effect at constant speed of the rotor at different loads.
C422.7	Determine critical speed of the rotating shaft.

SUB : CIM & Automation Lab

SUB Code: 10MEL78

CO	After studying this course, students will be able to:
C423.1	Appreciate NC & CNC machines & its practical use in industry.
C423.2	Distinguish between absolute & incremental coordinate system.
C423.3	Make use of computer assisted part programming software to perform milling, drilling and turning operations in design, simulation and manufacturing.
C423.4	Write manual part programs for milling, turning operations.
C423.5	Explain what is FMS & ASRS
C423.6	Develop the robot program by using basic commands.
C423.7	Read and explain Electro Hydraulics & Pneumatic circuits.



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ME

NAAC

Course_Outcomes

2017-18

SUB : Operational Management

SUB Code:10ME81

CO	After studying this course, students will be able to:
C424.1	Define operations management, productivity and its importance in business organizations and classification of production systems.
C424.2	Make use of decision making process and its analysis using different models to draw decision tree.
C424.3	Select the forecasting process by using common approaches for time series analysis.
C424.4	Discuss the importance of capacity decisions and its measurements to decide the best plan for making location decisions.
C424.5	Apply aggregate planning, master production Schedule and their techniques in production organization.
C424.6	Solve inventory management problems by considering various costs incurred.
C424.7	Apply MRP principles to the provision of services and distribution of inventories.
C424.8	Identify the nature of supply chain for service providers as well as for manufactures.

SUB : Control Engineering

SUB Code: 10ME82

CO	After studying this course, students will be able to:
C425.1	Explain elements and working of automatic control systems.
C425.2	Formulate mathematical models of automatic control systems.
C425.3	Evaluate overall transfer function by block reduction and mason's gain formula.
C425.4	Evaluate first & second order system response for standard inputs.
C425.5	Test for stability of control system using Routh's- Hurwitz criterion.
C425.6	Draw frequency response plots based on different criterion.
C425.7	Show the region of stability using root locus method.
C425.8	Find variable characteristics of linear systems and series and feedback compensation system.



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Course_Outcomes

2017-18

SUB : Tribology

SUB Code: 10ME831

CO	After studying this course, students will be able to:
C426.1	Appreciate Properties of oils and equation of flow: Viscosity, Newton's Law of viscosity, Hagen-Poiseuille Law, Flow between parallel stationary plane, viscosity measuring apparatus and lubrication principles
C426.2	Evaluate optimal parameters of hydrodynamic lubrication.
C426.3	Compute operating parameters of idealized journal bearing by using Sommerfeld's number.
C426.4	Compute dimensions of slider bearing with a fixed and pivoted shoe.
C426.5	Describe mechanism of oil flow and thermal equilibrium of journal bearing.
C426.6	Evaluate optimal parameters of hydrostatic lubrication.
C426.7	List out commonly used bearing material, properties of typical bearing material and its advantage and disadvantages.
C426.8	Explain the effect of speed, temperature and pressure on ceramic materials due to friction and wear and Tribological measures.

SUB : Power plant Engineering

SUB Code: 10ME833

CO	After studying this course, students will be able to:
C428.1	Summarize combustion mechanism, equipments and firing methods used for steam power plant.
C428.2	Illustrate coal and ash handling methods and steam generators with mountings and accessories,
C428.3	Estimate the height of chimney calculations to obtain given draught.
C428.4	Explain the layout of diesel engine power plant with auxiliaries.
C428.5	Illustrate the hydroelectric power plant with components and analyze hydro graphs, flow duration and mass duration curves.
C428.6	Classify and understand the working principle of nuclear reactors.
C428.7	Apply the knowledge of various parameters for site selection and installation of power plant.
C428.8	Evaluate the cost of energy production and electrical energy tariffs.



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ME

NAAC

Course_Outcomes

2017-18

SUB : Foundry Technology

SUB Code:10ME838

CO	After studying this course, students will be able to:
C433.1	Understand various metallurgical aspects of liquid metals
C433.2	Demonstrate a holistic understanding on the working principle and capability of different manufacturing technologies. Justify appropriate manufacturing processes for specific product requirement.
C433.3	Apply design consideration for the design of castings.
C433.4	Visualize the changes occurring at the various stages of solidification of casting.
C433.5	Understand the special moulding techniques for ferrous and non ferrous metals.
C433.6	Acquaintance of modernization and mechanization of foundry practice for current industrial requirement.

SUB :Biomass Energy Systems

SUB Code:10ME843

CO	After studying this course, students will be able to:
C436.1	Recall various biomass energy sources and its characteristics
C436.2	summarize Biomass energy conversion methods
C436.3	Explain physical and agrochemical conversion techniques
C436.4	Illustrate biomass gasification and pyrolysis
C436.5	Understand the basics of Biogas production and calculation for sizing of biogas plant
C436.6	Analyze the use of ethanol as automobile fuel
C436.7	Explain the production methods of biodiesel and discuss the performance of I. C. engine using bio diesel
C436.8	Discuss the Bio power generation routes and basic thermodynamics cycles



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SUB :Automotive engineering

SUB Code:10ME844

CO	After studying this course, students will be able to:
C437.1	List the functions of important components of I C Engines.
C437.2	Understand the fuel and fuel feed systems for I C Engines.
C437.3	Explain the need and functions of supercharges and turbo charger.
C437.4	Explain the function of various ignition system used in I C engine.
C437.5	Illustrate the necessity of transmission system and general arrangement of power trains.
C437.6	Elaborate important components and their functions of a steering system.
C437.7	Explain the requirement and functions of suspension and braking system of an automotive.
C437.8	Explain the various emission control methods.