



**Graduate School of
Technology**

RISE WITH EDUCATION

DEPARTMENT OF MECHANICAL ENGINEERING

Course Outcomes

SE: III SEM (REV- 2019 'C' Scheme)

Subject- Engineering Mathematics-III, Course Code- MEC 301

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| CO1 | Apply the concept of Laplace transform to solve the real integrals in engineering problems. |
| CO2 | Apply the concept of inverse Laplace transform of various functions in engineering problems. |
| CO3 | Expand the periodic function by using Fourier series for real life problems and complex engineering problems |
| CO4 | Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory. |
| CO5 | Apply Matrix algebra to solve the engineering problems. |
| CO6 | Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations |

Subject- Strength of Materials, Course Code- MEC302

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| CO1 | Demonstrate fundamental knowledge about various types of loading and stresses induced |
| CO2 | Draw the SFD and BMD for different types of loads and support conditions |
| CO3 | Analyse the bending and shear stresses induced in beam |
| CO4 | Analyse the deflection in beams and stresses in shaft. |
| CO5 | Analyse the stresses and deflection in beams and Estimate the strain energy in mechanical elements |
| CO6 | Analyse buckling phenomenon in columns. |

Subject- Production Processes, Course Code- MEC303

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| CO1 | Demonstrate an understanding of casting process |
| CO2 | Illustrate principles of forming processes. |
| CO3 | Demonstrate applications of various types of welding processes. |
| CO4 | Differentiate chip forming processes such as turning, milling, drilling, etc. |
| CO5 | Illustrate the concept of producing polymer components and ceramic components |
| CO6 | Illustrate principles and working of non-traditional manufacturing |
| CO7 | Understand the manufacturing technologies enabling Industry 4.0 |

Subject- Materials and Metallurgy, Course Code- MEC304

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| CO1 | Identify the various classes of materials and comprehend their properties |
| CO2 | Apply phase diagram concepts to engineering applications |
| CO3 | Apply particular heat treatment for required property development |
| CO4 | Identify the probable mode of failure in materials and suggest measures to prevent them |
| CO5 | Choose or develop new materials for better performance |
| CO6 | Decide an appropriate method to evaluate different components in service |

Subject- Thermodynamics, Course Code- MEC305

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| CO1 | Demonstrate application of the laws of thermodynamics to a wide range of systems |
| CO2 | Compute heat and work interactions in thermodynamic systems |
| CO3 | Demonstrate the interrelations between thermodynamic functions to solve practical problems |
| CO4 | Compute thermodynamic interactions using the steam table and Mollier chart |
| CO5 | Compute efficiencies of heat engines, power cycles. |
| CO6 | Apply the fundamentals of compressible fluid flow to the relevant systems |

Subject- Materials Testing, Course Code- MEL301

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| CO1 | Prepare metallic samples for studying its microstructure following the appropriate procedure |
| CO2 | Identify effects of heat treatment on microstructure of medium carbon steel and hardenability of steel using Jominy end Quench test |
| CO3 | Perform Fatigue Test and draw S-N curve |
| CO4 | Perform Tension test to Analyze the stress - strain behaviour of materials |
| CO5 | Measure torsional strength, hardness and impact resistance of the material |
| CO6 | Perform flexural test with central and three point loading conditions |

Subject- Machine Shop Practice, Course Code- MEL302

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| CO1 | Know the specifications, controls and safety measures related to machines and machining operations |
| CO2 | Use the machines for making various engineering jobs |
| CO3 | Perform various machining operations |
| CO4 | Perform Tool Grinding |
| CO5 | Perform welding operations |

Subject- CAD –Modeling, Course Code- MESBL301

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|-----|---|
| CO1 | Illustrate basic understanding of types of CAD model creation |
| CO2 | Visualize and prepare 2D modeling of a given object using modeling software |
| CO3 | Build solid model of a given object using 3D modeling software |
| CO4 | Visualize and develop the surface model of a given object using modeling software |
| CO5 | Generate assembly models of given objects using assembly tools of a modeling software |
| CO6 | Perform product data exchange among CAD systems. |

Subject- Mini Project – 1 A, Course Code- MEPBL301

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|-----|---|
| CO1 | Identify problems based on societal /research needs |
| CO2 | Apply Knowledge and skill to solve societal problems in a group |
| CO3 | Develop interpersonal skills to work as member of a group or leader. |
| CO4 | Draw the proper inferences from available results through theoretical/ experimental/simulations |
| CO5 | Analyze the impact of solutions in societal and environmental context for sustainable Development |
| CO6 | Use standard norms of engineering practices |
| CO7 | Excel in written and oral communication. |
| CO8 | Demonstrate capabilities of self-learning in a group, which leads to life long learning. |
| CO9 | Demonstrate project management principles during project work. |

SE: IV SEM (REV- 2019 ‘C’ Scheme)

Subject- Engineering Mathematics-IV, Course Code- MEC 401

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| CO1 | Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green’s theorem, Stoke’s theorem & Gauss Divergence theorem |
| CO2 | Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. |
| CO3 | Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science |
| CO4 | Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities |
| CO5 | Apply the concept of probability distribution to engineering problems & testing hypothesis of small samples using sampling theory |
| CO6 | Apply the concepts of parametric and nonparametric tests for analyzing practical problems |

Subject- Fluid Mechanics, Course Code- MEC402

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|-----|---|
| CO1 | Define properties of fluids, classify fluids and evaluate hydrostatic forces on various surfaces |
| CO2 | Illustrate understanding of dimensional analysis of Thermal and Fluid systems |
| CO3 | Differentiate velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow |
| CO4 | Formulate and solve equations of the control volume for fluid flow systems and Apply Bernoulli's equation to various flow measuring devices |
| CO5 | Calculate pressure drop in laminar and turbulent flow, evaluate major and minor losses in pipes. |
| CO6 | Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces. |

Subject- Kinematics of Machinery, Course Code- MEC403

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|-----|--|
| CO1 | Identify various components of mechanisms |
| CO2 | Develop mechanisms to provide specific motion |
| CO3 | Draw velocity and acceleration diagrams of various mechanisms |
| CO4 | Choose a cam profile for the specific follower motion |
| CO5 | Predict condition for maximum power transmission in the case of a belt drive |
| CO6 | Illustrate requirements for an interference-free gear pair |

Subject- CAD/CAM, Course Code- MEC404

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|-----|---|
| CO1 | Identify suitable computer graphics techniques for 3D modeling. |
| CO2 | Transform, manipulate objects & store and manage data |
| CO3 | Develop 3D model using various types of available biomedical data. |
| CO4 | Create the CAM Toolpath for specific given operations |
| CO5 | Build and create data for 3D printing of any given object using rapid prototyping and tooling processes |
| CO6 | Illustrate understanding of various cost effective alternatives for manufacturing products |

Subject- Industrial Electronics, Course Code- MEC405

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|-----|--|
| CO1 | Illustrate construction, working principles and applications of power electronic Switches. |
| CO2 | Identify rectifiers and inverters for dc and ac motor speed control. |
| CO3 | Develop circuits using OPAMP and Timer IC 555. |
| CO4 | Identify digital circuits for industrial applications. |
| CO5 | Demonstrate the knowledge of basic functioning of microcontrollers. |
| CO6 | Analyze speed-torque characteristics of electrical machines for speed control. |

Subject- Industrial Electronics, Course Code- MEL401

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|-----|---|
| CO1 | Demonstrate characteristics of various electrical and electronics components. |
| CO2 | Develop simple applications built around these components. |
| CO3 | Identify use of different logic gates and their industrial applications. |
| CO4 | Built and demonstrate parameter measurements using microcontroller. |
| CO5 | Test and Analyze speed-torque characteristics of electrical machines for speed Control. |

Subject- Kinematics of Machinery, Course Code- MEL402

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|-----|---|
| CO1 | Draw velocity diagram using Instantaneous Centre method |
| CO2 | Find velocity and acceleration of a point on a four-bar mechanism by using Relative method. |
| CO3 | Analyze velocity and acceleration of a specific link of a slider crank mechanism using graphical approach by Relative method. |
| CO4 | Plot displacement-time, velocity-time, and acceleration-time diagrams of follower motion. |
| CO5 | Draw cam profile for the specific follower motion. |
| CO6 | Develop and build mechanisms to provide specific motion. |

Subject- Python Programming, Course Code- MESBL403

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|-----|--|
| CO1 | Demonstrate understand of basic concepts of python programming. |
| CO2 | Identify, install and utilize python packages. |
| CO3 | Develop and execute python programs for specific applications. |
| CO4 | Develop and build python program to solve real-world engineering problems. |
| CO5 | Prepare a report on case studies selected. |

Subject- CNC and 3-D Printing, Course Code- MESBL401

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|-----|--|
| CO1 | Develop and execute part programming for any given specific operation. |
| CO2 | Build any given object using various CNC operations. |
| CO3 | Demonstrate CAM Tool path and prepare NC- G code. |
| CO4 | Develop 3D model using available biomedical data. |
| CO5 | Build any given real life object using 3D printing process. |
| CO6 | Convert 2D images into 3D model. |

Subject - Mini Project – 1 B, Course code- MEPBL401

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|-----|--|
| CO1 | Identify problems based on societal /research needs. |
| CO2 | Apply Knowledge and skill to solve societal problems in a group. |
| CO3 | Develop interpersonal skills to work as member of a group or leader. |
| CO4 | Draw the proper inferences from available results through theoretical/ Experimental/simulations. |
| CO5 | Analyse the impact of solutions in societal and environmental context for Sustainable development. |
| CO6 | Use standard norms of engineering practices |
| CO7 | Excel in written and oral communication. |
| CO8 | Demonstrate capabilities of self-learning to leads to life long Learning. |

TE :V SEM (REV- 2019 'C' Scheme)

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|---------------------|--|
| Course Code: | MEC501 |
| Course: | Mechanical Measurements and Controls |
| CO-1 | Handle, operate and apply the precision measuring instruments / equipment's |
| CO-2 | Analyze simple machined components for dimensional stability & functionality |
| CO-3 | Classify various types of static characteristics and types of errors occurring in the system |
| CO-4 | Classify and select proper measuring instrument for displacement, pressure, flow and temperature measurements |
| CO-5 | Design mathematical model of system/process for standard input responses and analyse error and differentiate various types of control systems and time domain specifications |
| CO-6 | Analyze the problems associated with stability |

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|---------------------|---|
| Course Code: | MEC502 |
| Course: | Thermal Engineering |
| CO-1 | Analyze the three modes of heat transfer in engineering application |
| CO-2 | Develop mathematical models for different modes of heat transfer |
| CO-3 | Analyze performance parameters of different types of heat exchangers |
| CO-4 | Identify and analyze the Transient heat Transfer in engineering applications |
| CO-5 | Explain construction and working of different components of internal combustion engines |
| CO-6 | Evaluate engine performance and emission characteristics |

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|---------------------|---|
| Course Code: | MEC503 |
| Course: | Dynamics of Machinery |
| CO-1 | Demonstrate working Principles of different types of governors and Gyroscopic effects on the mechanical systems |
| CO-2 | Illustrate basic of static and dynamic forces |
| CO-3 | Determine natural frequency of element/system |
| CO-4 | Determine vibration response of mechanical elements / systems |
| CO-5 | Design vibration isolation system for a specific application |
| CO-6 | Demonstrate basic concepts of balancing of forces and couples |



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| Course Code: | MEC504 |
| Course: | Finite Element Analysis |
| CO-1 | Solve differential equations using weighted residual methods. |
| CO-2 | Develop the finite element equations to model engineering problems governed by second order differential equations. |
| CO-3 | Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements. |
| CO-4 | Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements. |
| CO-5 | Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system. |
| CO-6 | Use commercial FEA software, to solve problems related to mechanical engineering. |

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| Course Code: | MEDLO5011 |
| Course: | Optimization Technique (Elective) |
| CO-1 | Identify the types of optimization problems and apply the calculus method to single variable problems. |
| CO-2 | Formulate the problem as Linear Programming problem and analyse the sensitivity of a decision variable. |
| CO-3 | Apply various linear and non-linear techniques for problem solving in various domain. |
| CO-4 | Apply multi-objective decision making methods for problem in manufacturing environment and other domain. |
| CO-5 | Apply multi criterion decision making methods for problem in manufacturing environment and other domain. |
| CO-6 | Apply Design of Experiments method for Optimization. |

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| Course Code: | MEDLO5012 |
| Course: | Design of Experiment (Elective) |
| CO-1 | Understand concept and get an overview of design of experiments. |
| CO-2 | Understand and interpret full factorial design. |
| CO-3 | Understand and interpret two and three level fractional factorial design. |
| CO-4 | Understand and interpret robust design. |
| CO-5 | Understand and interpret response surface methodology. |
| CO-6 | Understand and interpret experimental design according to shainin, multi-variate charts, components search, paired comparisons. |



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| Course Code: | MEL501 |
| Course: | Thermal Engineering |
| CO-1 | Estimate thermal conductivity of engineering materials. |
| CO-2 | Evaluate performance parameters of extended surfaces. |
| CO-3 | Analyze heat transfer parameters in various engineering applications |
| CO-4 | Measure emissivity of grey body. |
| CO-5 | Evaluate the performance of material under unsteady state heat transfer. |
| CO-6 | Analyze engine performance and emission parameters at different operating condition. |

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|---------------------|---|
| Course Code: | MEL502 |
| Course: | Dynamics of Machinery |
| CO-1 | Plot and analyze governor characteristics. |
| CO-2 | Analyze gyroscopic effect on laboratory model. |
| CO-3 | Estimate natural frequency of mechanical systems. |
| CO-4 | Analyze vibration response of mechanical systems. |
| CO-5 | Determine damping coefficient of a system. |
| CO-6 | Balance rotating mass. |

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| Course Code: | MEL503 |
| Course: | Finite Element Analysis |
| CO-1 | Select appropriate element for given problem. |
| CO-2 | Select suitable meshing and perform convergence test. |
| CO-3 | Select appropriate solver for given problem. |
| CO-4 | Interpret the result. |
| CO-5 | Apply basic aspects of FEA to solve engineering problems. |
| CO-6 | Validate FEA solution. |

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| Course Code: | MESBL501 |
| Course: | Professional communication and ethics –II |
| CO-1 | Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles. |
| CO-2 | Strategize their personal and professional skills to build a professional image and meet the demands of the industry. |
| CO-3 | Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations. |
| CO-4 | Deliver persuasive and professional presentations. |
| CO-5 | Develop creative thinking and interpersonal skills required for effective professional communication. |
| CO-6 | Apply codes of ethical conduct, personal integrity and norms of organizational behavior. |



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| Course Code: | MEPBL501 |
| Course: | Mini Project – 2 A |
| CO-1 | Breadth and depth of literature survey |
| CO-2 | Clarity of objectives and scope |
| CO-3 | Quality of presentation and report preparation. |
| CO-4 | Clarity of problem definition and feasibility. |
| CO-5 | Analyze the impact of solutions in societal and environmental context for sustainable development. |
| CO-6 | Use standard norms of engineering practices. |

TE : VI SEM (REV- 2019 'C' Scheme)

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| Course Code: | MEC601 |
| Course: | Machine Design |
| CO-1 | Use design data book/standard codes to standardize the designed dimensions. |
| CO-2 | Design Knuckle Joint, cotter joint and Screw Jack. |
| CO-3 | Design shaft under various conditions and couplings. |
| CO-4 | Select bearings for a given applications from the manufacturers catalogue |
| CO-5 | Select and/or design belts and flywheel for given applications |
| CO-6 | Design springs, clutches and brakes. |

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| Course Code: | MEC602 |
| Course: | Turbo Machinery |
| CO-1 | Define various parameters associated with steam generators and turbo machines. |
| CO-2 | Identify various components and mountings of steam generators with their significance. |
| CO-3 | Identify various turbo machines and explain their significance. |
| CO-4 | Apply principles of thermodynamics and fluid mechanics to estimate various parameters like mass flow rate power, torque, efficiency, temperature, etc. |
| CO-5 | Evaluate performance of SG and Turbo machines and apply various techniques to enhance performance. |
| CO-6 | Evaluate various phenomena related to performance like cavitations, choking, surging. |



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| Course Code: | MEC603 |
| Course: | Heating, Ventilation, Air Conditioning and Refrigeration |
| CO-1 | Illustrate the fundamental principles and applications of refrigeration and air conditioning systems. |
| CO-2 | Identify various HVAC&R components. |
| CO-3 | Evaluate performance of various refrigeration system |
| CO-4 | Estimate cooling and heating loads for an air conditioning system. |
| CO-5 | Select air handling unit and design air distribution system. |
| CO-6 | Apply the knowledge of HVAC for the sustainable development of refrigeration and air conditioning system. |

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| Course Code: | MEC604 |
| Course: | Automation and Artificial Intelligence |
| CO-1 | Demonstrate understanding of fundamentals of industrial automation and AI. |
| CO-2 | Design & develop pneumatic / hydraulic circuits. |
| CO-3 | Design and develop electro pneumatic circuits and PLC ladder logics. |
| CO-4 | Demonstrate understanding of robotic control systems and their applications |
| CO-5 | Demonstrate understanding of various AI and machine learning technologies |

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| Course Code: | MEDLO6021 |
| Course: | Press Tool Design |
| CO-1 | Demonstrate various press working operations for mass production of sheet metal parts. |
| CO-2 | Identify press tool requirements to build concepts pertaining to design of press tools. |
| CO-3 | Prepare working drawings and setup for economic production of sheet metal components. |
| CO-4 | Select suitable materials for different elements of press tools. |
| CO-5 | Illustrate the principles and blank development in bent & drawn components. |
| CO-6 | Understand safety aspects and automation in press working. |

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| Course Code: | MEDLO6023 |
| Course: | Metal Forming Technology |
| CO-1 | Understand the concept of different metal forming process |
| CO-2 | Approach metal forming processes both analytically and numerically. |
| CO-3 | Design metal forming processes. |
| CO-4 | Develop approaches and solutions to analyze metal forming processes and the associated problems and flaws |



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|--------------|---|
| Course Code: | MEL601 |
| Course: | Machine Design |
| CO-1 | Design shaft under various conditions. |
| CO-2 | Design Knuckle Joint / cotter joint. |
| CO-3 | Design Screw Jack. |
| CO-4 | Design Flexible flange couplings/ Leaf spring. |
| CO-5 | Convert design dimensions into working/manufacturing drawing. |
| CO-6 | Use design data book/standard codes to standardise the designed dimensions. |

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|--------------|---|
| Course Code: | MEL602 |
| Course: | Turbo Machinery |
| CO-1 | Differentiate boiler, boiler mountings and accessories. |
| CO-2 | Conduct a trial on reciprocating compressor / centrifugal compressor. |
| CO-3 | Conduct a trial on impulse turbine and analyze its performance. |
| CO-4 | Conduct a trial on reaction turbine and analyze its performance. |
| CO-5 | Conduct a trial on Centrifugal pump and analyze its performance. |
| CO-6 | Conduct a trial on Reciprocating pump and analyze its performance. |
| CO-7 | Conduct a trial on gear pump. |

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|--------------|--|
| Course Code: | MEL603 |
| Course: | Heating, Ventilation, Air Conditioning and Refrigeration |
| CO-1 | Aware of the roles and ethics of s eh & y engineers in related industries. |
| CO-2 | Present the impact of professional engineering solutions in societal and environmental contexts. |
| CO-3 | Evaluate performance of HVAC & R system. |
| CO-4 | Develop awareness of the engineering and technological aspects in the s eh & y industries. |
| CO-5 | Communicate effectively through the preparation of report and practical presentation. |
| CO-6 | Analyze design aspects of HVAC & R system in various applications. |

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| Course Code: | MESBL601 |
| Course: | Measurements and Automation |
| CO-1 | Apply inspection gauge to check or measure surface parameters. |
| CO-2 | Measure surface parameters using precision measurement tools and equipment. |
| CO-3 | Measure different mechanical parameters by using sensors. |
| CO-4 | Analyse the response of a control systems. |
| CO-5 | Demonstrate use of automated controls using pneumatic and hydraulic systems. |
| CO-6 | Implement program on PLC system and demonstrate its application. |

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Sri Chandrasekarendra Saraswati Vidyapuram, Sector V, Nerul, Navi Mumbai - 400 706.

Tel: 6108 2400 / 6108 2402 • Fax : 2771 8779 • E-mail : principalgst@sies.edu.in / principal@siesgst.ac.in

www.siesgst.edu.in

BE: VII SEM (REV- 2016 ‘CBCGS’ Scheme)

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| Course Code: | MEC701 |
| Course: | Machine Design-II |
| CO-1 | Design appropriate gears for power transmission on the basis of given load and speed |
| CO-2 | Design bearings for given application from the manufacturing catalogue |
| CO-3 | Design hydro dynamic bearings for given application from the manufacturing catalogue |
| CO-4 | Design Cam follower and clutches for the given application |
| CO-5 | Design belts for the given applications |
| CO-6 | Design clutches based on uniform pressure theory and uniform wear theory consideration. |

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| Course Code: | MEC702 |
| Course: | CAD/CAM/CAE |
| CO-1 | Identify proper computer graphics techniques for geometric modelling. |
| CO-2 | Apply Transformation, manipulation techniques to different objects |
| CO-3 | Prepare part programming applicable to CNC machines |
| CO-4 | Use rapid prototyping and tooling concepts in any real life applications |
| CO-5 | Identify the tools for Analysis of a complex engineering component |
| CO-6 | Recognise the need of CIM systems, Socio -techno- economic aspects of CIM |

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|---------------------|---|
| Course Code: | MEC703 |
| Course: | Production Planning and Control |
| CO-1 | Illustrate production planning functions and manage manufacturing functions in a better way |
| CO-2 | Develop competency in scheduling and sequencing of manufacturing operations |
| CO-3 | Forecast the demand of the product and prepare an aggregate plan |
| CO-4 | Develop the skills of Inventory Management and cost effectiveness |
| CO-5 | Create a logical approach to Line Balancing in various production systems |
| CO-6 | Implement techniques of manufacturing planning and control |



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| Course Code: | MEDLO7032 |
| Course: | Automobile Engineering |
| CO-1 | Illustrate the types and working of clutch and transmission system. |
| CO-2 | Demonstrate the working of different types of final drives, steering gears and braking systems |
| CO-3 | Illustrate the constructional features of wheels, tyres and suspension systems |
| CO-4 | Describe the understanding of types of storage, charging and starting systems |
| CO-5 | Identify and explain the type of body and chassis of an automobile |
| CO-6 | Comprehend the different technological advances in automobile |

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|---------------------|--|
| Course Code: | MEDLO7033 |
| Course: | Pumps, Compressore and Fans |
| CO-1 | Comprehend Construction and working different types of pumps |
| CO-2 | Evaluate performance of centrifugal pumps and analyse characteristic curves of pumps |
| CO-3 | Evaluate the performance of reciprocating Pump |
| CO-4 | Describe different types of compressors |
| CO-5 | Evaluate the performance of Centrifugal Compressor and Axial Compressor |
| CO-6 | Describe the types of Fans & blower and Analyse their performance |

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| Course Code: | ILO7011 |
| Course: | Product Lifecycle Management |
| CO-1 | Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation |
| CO-2 | Illustrate various approaches and techniques for designing and developing products. |
| CO-3 | Apply product engineering guidelines / thumb rules in designing products for moulding, machining, sheet metal working etc. |
| CO-4 | Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant |
| CO-5 | Apply enviornmental aspects in product design. |
| CO-6 | Iliustrate various approaches and techniques in Life Cycle cost Assessment and Analysis. |



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| Course Code: | ILO7015 |
| Course: | Operation Research |
| CO-1 | Apply OR techniques to formulate and solve real-world problem. |
| CO-2 | Develop an integrated framework for strategic thinking and problem solving |
| CO-3 | Identify mathematical tools that are needed to solve optimisation problems |
| CO-4 | Identify appropriate decision making approaches and apply tools to be used. |
| CO-5 | Analyse situations in manufacturing environment and optimizing the solution |
| CO-6 | Identify features of operations and production management and provide solution . |

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|---------------------|---|
| Course Code: | MEL701 |
| Course: | Machine Design-II |
| CO-1 | Design gears based on the given conditions |
| CO-2 | Design gearbox for a given application |
| CO-3 | Design cam & followers for a given condition |
| CO-4 | Design clutches for a given application |
| CO-5 | Design brakes for given condition |
| CO-6 | Select bearings for a given applications from the manufacturers catalogue |

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|---------------------|--|
| Course Code: | MEL702 |
| Course: | CAD/CAM/CAE |
| CO-1 | Identify proper computer graphics techniques for geometric modelling. |
| CO-2 | Transform, manipulate objects as well as store and manage data |
| CO-3 | Create CAM Toolpath and prepare NC- G code |
| CO-4 | Apply rapid prototyping and tooling concepts in any real life applications |
| CO-5 | Identify the tools for Analysis of a complex engineering component. |
| CO-6 | Develop 3D models by using CAD software |

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|---------------------|--|
| Course Code: | MEL703 |
| Course: | Production Planning and Control |
| CO-1 | Prepare a process sheet |
| CO-2 | Prepare a Gantt Chart |
| CO-3 | Forecast the demand of the product and prepare an aggregate plan |
| CO-4 | Perform ABC analysis of a given problem |
| CO-5 | Develop the skills of Inventory Management and cost effectiveness |
| CO-6 | Create a logical approach to Line Balancing for various production systems |



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|---------------------|---|
| Course Code: | MEP701 |
| Course: | Project-I |
| CO-1 | Literature survey / industrial visit and identify the problem |
| CO-2 | Apply basic engineering fundamental in the domain of practical applications |
| CO-3 | Cultivate the habit of working in a team |
| CO-4 | Attempt a problem solution in a right approach |
| CO-5 | Correlate the theoretical and experimental/simulations results and draw the proper inferences |
| CO-6 | Prepare report as per the standard guidelines. |

BE : VIII SEM (REV- 2016 'CBCGS' Scheme)

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|---------------------|--|
| Course Code: | MEC801 |
| Course: | Design of Mechanical Systems |
| CO-1 | Apply the concept of system design. |
| CO-2 | Design material handling systems such as hoisting mechanism of EOT crane, |
| CO-3 | Design belt conveyor systems |
| CO-4 | Design engine components such as cylinder, piston, connecting rod and crankshaft |
| CO-5 | Design pumps for the given applications |
| CO-6 | Prepare layout of machine tool gear box and select number of teeth on each gear |

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| Course Code: | MEC802 |
| Course: | Industrial Engineering and Management |
| CO-1 | Identify the need for optimization of resources and its significance in manufacturing industries |
| CO-2 | Demonstrate the concept of value engineering and value analysis with its relevance. |
| CO-3 | Describe the different concepts involved in method study and understanding of work content in different situations. |
| CO-4 | Describe different aspects of work system design pertinent to manufacturing industries. |
| CO-5 | Recommend the possible ways of facility design for better utilization of available resources. |
| CO-6 | Comprehend concepts of Agile manufacturing, Lean manufacturing and Flexible manufacturing. |



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| Course Code: | MEC803 |
| Course: | Power Engineering |
| CO-1 | Compute heat interactions in combustion of reactive mixtures |
| CO-2 | Differentiate boilers, boiler mountings and accessories |
| CO-3 | Calculate boiler efficiency and assess boiler performance |
| CO-4 | Demonstrate working cycles of gas turbines |
| CO-5 | Draw velocity triangles of impulse/reaction turbines and calculate performance parameters/efficiency |
| CO-6 | Demonstrate basic working of pumps |

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| Course Code: | MEDLO8041 |
| Course: | Power Plant Engineering |
| CO-1 | Comprehend various equipment/systems utilized in power plants. |
| CO-2 | Demonstrate site selection methodology, construction and operation of Hydro Electric Power Plants |
| CO-3 | Discuss working, site selection, advantages, and disadvantages of steam power plants. |
| CO-4 | Discuss operation of Combined Cycle Power Plants |
| CO-5 | Discuss types of reactors, waste disposal issues in nuclear power plants. |
| CO-6 | Illustrate power plant economics |

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| Course Code: | MEDLO8043 |
| Course: | Renewable Energy Sources |
| CO-1 | Demonstrate need of different renewable energy sources and their importance. |
| CO-2 | Calculate and analyse utilization of solar energy. |
| CO-3 | Calculate and analyse utilization wind energy. |
| CO-4 | Illustrate design of biogas plant. |
| CO-5 | Illustrate concept of geothermal energy and energy from the ocean. |
| CO-6 | Illustrate concepts of hydrogen energy. |

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| Course Code: | MEL801 |
| Course: | Design of Mechanical Systems |
| CO-1 | Apply the concept of system design. |
| CO-2 | Design of hoisting mechanism of EOT crane, |
| CO-3 | Design belt conveyor systems |
| CO-4 | Design pumps for the given applications |
| CO-5 | Design engine components such as cylinder, piston, connecting rod and crankshaft |
| CO-6 | Design of machine tool gearbox |



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| Course Code: | MEI802 |
| Course: | Power Engineering |
| CO-1 | Differentiate boilers |
| CO-2 | Differentiate boiler mountings and accessories |
| CO-3 | Conduct a trial on impulse turbine and analyse its performance |
| CO-4 | Conduct a trial on reaction turbine and analyse its performance |
| CO-5 | Conduct a trial on Centrifugal pump and analyse its performance |
| CO-6 | Conduct a trial on Reciprocating pump and analyse its performance |

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| Course Code: | ILO8021 |
| Course: | Project Management |
| CO-1 | Gain project management foundation and various organizational structures knowledge. |
| CO-2 | Apply selection criteria and select an appropriate project from different options. |
| CO-3 | Write work break down structure for a project and develop schedule based on it. |
| CO-4 | Identify opportunities and threats to the project and decide an approach to deal with them strategically. |
| CO-5 | Use Earned value technique and determine & predict status of the project. |
| CO-6 | Capture lessons learned during project phases and document them for future reference. |

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| Course Code: | ILO8022 |
| Course: | Finance Management |
| CO-1 | Students should be able to explain the importance and components of the Indian Financial System |
| CO-2 | Students should be able to estimate the risk & returns and present / future value of various investments |
| CO-3 | Students should be able to describe corporate finance and significance of financial statements & ratio analysis |
| CO-4 | Students should be able to calculate capital budgeting using various investment appraisal criterias & also the working capital requirements |
| CO-5 | Students should be able to explain the various sources of finance and capital structure theories & approaches |
| CO-6 | Students should be able to describe the dividend policy theories & approaches |



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| Course Code: | ILO8028 |
| Course: | Digital Business Management |
| CO-1 | Summarize drivers of digital business. |
| CO-2 | Illustrate various approaches and techniques for E-business and management. |
| CO-3 | Explain different digital business support services and technologies in E infrastructure. |
| CO-4 | Explain various ethics and societal impacts of ecommerce. |
| CO-5 | Identify the need of security and summarize various security techniques. |
| CO-6 | Develop E-business plan. |

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| Course Code: | ILO8029 |
| Course: | Environmental Management |
| CO-1 | Identify environmental Issues relevant to India and Global concerns. |
| CO-2 | Understand and apply the concept of Environment Management and Sustainable development. |
| CO-3 | Relate to the scope of Environment Management and identify career opportunities |
| CO-4 | Understand the concept of ecology, Ecosystem, its interdependence and food chain. |
| CO-5 | Demonstrate awareness of environment related legislations. |
| CO-6 | Develop awareness of EMS and ISO-14000. |

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| Course Code: | MEP801 |
| Course: | Project-II |
| CO-1 | Literature review, design and drawing for the selected problem. |
| CO-2 | Cultivate the habit of working in a team . |
| CO-3 | Fabrication of the model. |
| CO-4 | Experimentation and testing of the model. |
| CO-5 | Analysis and inferences on the test result. |
| CO-6 | Prepare report as per the standard guidelines. |