SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING
ACADEMIC YEAR: 2019-20

YEAR: II **SEMESTER: I** **REGULATION: R18**

Subject Name: Probability and Statistics &complex variables **SubjectCode:MA153BP**

At the end of the Course, Students will be able to	
CO1	Distinguish between discrete and continuous probability Distributions
CO2	Solve problems involving random variablesAnalyze and interpret statistical data using appropriate probability distributions.
CO3	Apply suitable test to accept or reject a given hypothesis for small and large sampels
CO4	Analyze complex functions with reference to theiranalyticity using Cauchy's Riemann equations
CO5	Find the Taylors and Laurent's series expansion of complex functions, integrating using Cauchy's integral and residue theorems

Subject Name: Mechanics of Solids **SubjectCode:ME302PC**

At the end of the Course, students will be able to	
CO1	Determine stresses, strains, elastic constants of solid bodies under various types of loads.
CO2	Construct SFD&BMD in various loaded beams and also obtain relation S.F,B.M and rate of loading
CO3	Derive the bending equation and also determine the flexural and shear stresses for various sections.
CO4	Explain the theories of failures and analyze the compatibility of various design parameters.
CO5	Solve the problems related to torsion of shafts and thin cylinders

Subject Name: Metallurgy and Material Science **SubjectCode:ME303PC**

At the end of the Course, students will be able to	
CO1	Illustrate crystallization of metals and constitution of alloys
CO2	Construct the equilibrium diagrams to describe the different phases of metals and alloys
CO3	Understand different heat treatment processes
CO4	Explain different types of cast irons, steels, non-ferrous metals and alloys with their applications
CO5	Illustrate ceramics, polymers and composites

Subject Name: Production Technology **SubjectCode:ME304PC**

At the end of the Course, students will be able to	
CO1	Explain the various types of castings.
CO2	Discuss the different weld joints and welding processes.
CO3	Explain advanced welding processes like Inert gas, laser welding process, Brazing and Soldering process and their defects.
CO4	Distinguish Hot and Cold working of metals in Rolling, Extrusion and Forging operations.
CO5	Describe the operations of coining, embossing, spinning and different sheet metal operations.

Subject Name: Thermodynamics **SubjectCode:ME305PC**

At the end of the Course, students will be able to	
CO1	Describe the basics of thermodynamics along with temperature concept
CO2	Discuss the significance of thermodynamics laws with applications
CO3	Explain the Properties of pure substances and behavior perfect gas
CO4	Describe the behavior of real gases, gas mixtures and Psychrometric processes
CO5	Analyze the performance of Air standard, Gas, Vapor power and refrigeration cycles

Subject Name: Production Technology Lab **SubjectCode:ME306PC**

At the end of the Course, students will be able to	
CO1	Produce different casting models using sand casting and prepare patterns considering allowances using wood working lathe.
CO2	Practice Arc, Spot and Plasma welding techniques.
CO3	Use TIG welding process to produce different joints.
CO4	Use different sheet metal operations using different press dies.
CO5	Produce plastic components using injection & blow molding machines.

Subject Name: Machine Drawing Practice Lab **SubjectCode:ME307PC**

At the end of the Course, students will be able to	
CO1	Understand the representation of different material conventions used in machine drawing.
CO2	Draw the machine elements like keys, couplings, cotters, riveted, bolted and Welded joints.
CO3	Construct an assembly drawing using part drawings of machine components.
CO4	Sketch the orthographic views of assembly drawings.
CO5	Understand the representation of different material conventions used in machine drawing.

Subject Name: Material science and Mechanics of Solids Lab **SubjectCode:ME308PC**

At the end of the Course, students will be able to	
CO1	Compare crystal models of simple cubic, BCC, FCC and HCP and Prepare the specimen using rough grinding, finish grinding and polishing.
CO2	Use different types of etchants to expose the microstructure of metal and alloys and Understand the procedure to improve hardness.
CO3	Find the hardness of various heat treated and untreated carbon steels.
CO4	Determine the properties of materials like Young's modulus , shear modulus, hardness number and impact strength of metals by Izod and Charpy test
CO5	Conduct the experiment on UTM to find tensile and compressive strength of given specimen.

YEAR: II **SEMESTER: II** **REGULATION: R18**

Subject Name: Kinematics of Machinery **SubjectCode:ME402PC**

At the end of the Course, students will be able to	
CO1	Explain various types of links, mechanisms and its inversions
CO2	Find the velocity and acceleration of links in various mechanisms.
CO3	Describe various straight line motion, steering gear mechanisms and hook's joint
CO4	Compute the maximum velocity and acceleration during outward and return stroke during different types of follower motion in cams.
CO5	Explain the different types of gears, gear trains and their applications.

Subject Name: Thermal Engineering - I **SubjectCode:ME403PC**

At the end of the Course, students will be able to	
CO1	Classify the IC Engines and explain various systems in it.
CO2	Analyze the combustion process in both SI &CI engines.
CO3	Find the various performance parameters of IC Engines and compressors
CO4	Distinguish various types of compressors and discuss their working principles.
CO5	Evaluate the performance of Gas turbine cycles along with applications

Subject Name: Fluid Mechanics and Hydraulic Machines **SubjectCode:ME404PC**

At the end of the Course, students will be able to	
CO1	Explain various fluid properties and pressure measuring devices
CO2	Identify type of fluid flow patterns and describe continuity equation
CO3	Demonstrate the boundary layer concept and analyze a variety of practical fluid flows and measuring devices
CO4	Explain turbo machinery, hydraulic turbines and estimate the performance characteristic curves of hydraulic turbines
CO5	Determine the performance characteristics of centrifugal and reciprocating pumps

Subject Name: Instrumentation and Control system **SubjectCode:ME405PC**

At the end of the Course, students will be able to	
CO1	Describe the various elements of generalized measurement system.
CO2	Describe the Working principle of various devices for the measurement of temperature, Displacement and pressure.
CO3	Illustrate the working of level indicator devices, speed measurement devices, vibrometer, accelerometer pick-ups and flow measurement Devices.
CO4	Explain the working of electrical strain, resistant and dew point meters. .
CO5	Describe the open and closed servo mechanisms control systems

Subject Name: Basic Electrical and Electronics Engineering **SubjectCode:EE401ES**

At the end of the Course, students will be able to	
CO1	Able to Recall fundamentals of electrical circuits and outline measuring instruments
CO2	Able to Discuss DC generators and types of DC motors
CO3	Able to Explain the working of transformers and AC machines
CO4	Able to Analyze characteristics of diodes rectifiers and transistors
CO5	Able to Explain construction of cathode ray oscilloscope

Subject Name: Instrumentation and Control system Lab **SubjectCode:ME307PC**

At the end of the Course, students will be able to	
CO1	Calibration of instruments like pressure gauge and strain gauge
CO2	Calibration of instruments like micro meter and tacho meter
CO3	Demonstrate the use of seismic pick up to study mechanical vibrations.

Subject Name: Fluid Mechanics and Hydraulic Machines Lab **SubjectCode:ME308PC**

At the end of the Course, students will be able to	
CO1	Estimate the performance parameters of hydraulic turbines
CO2	Analyze the performance of centrifugal pumps and reciprocating pumps by drawing its performance curves
CO3	Calculate the co-efficient of discharge for venturimeter and orifice meter
CO4	Estimate major and minor losses in a pipe flow
CO5	Apply momentum equation to determine impact of jet on vanes and demonstrate the Bernoulli's theorem

Subject Name: Basic Electrical and Electronics Engineering Lab **SubjectCode:EE409ES**

At the end of the Course, students will be able to	
CO1	Able to analyze and solve electrical circuits using network laws and theorems
CO2	Able to understand and analyze basic Electric and Magnetic circuits.
CO3	Able to study the working principles of Electrical Machines
CO4	Able to understand components of Low Voltage Electrical Installations
CO5	Able to identify and characterize diodes and various types of transistors

YEAR: III **SEMESTER: I** **REGULATION: R16**

Subject Name: Design of Machine Members-I **SubjectCode:ME501PC**

At the end of the Course, students will be able to	
CO1	Describe theories of failures in design considerations, importance of fatigue loading in machine elements
CO2	Design of fasteners, rivets, welded joints
CO3	Design keys, cotters, knuckle joints
CO4	Design shaft for complex loading condition
CO5	Analyze and design helical compression and tension springs for static, dynamic and fatigue

Subject Name: Thermal Engineering-I **SubjectCode:ME502PC**

At the end of the Course, students will be able to	
CO1	Classify the IC Engines and explain various systems in it.
CO2	Analyze the combustion process in both SI &CI engines.
CO3	Find the various performance parameters of IC Engines and compressors
CO4	Distinguish various types of compressors and discuss their working principles.
CO5	Evaluate the performance of various types of refrigeration cycles and Explain the basics of air conditioning.

Subject Name: Metrology and Machine Tools **SubjectCode:ME503PC**

At the end of the Course, students will be able to	
CO1	Understand the principle of material removing process and geometry of cutting tools
CO2	Understand working of lathe, drilling, boring, shaping, slotting, planing and milling machines
CO3	Understand the various surface finishing machines and the different operations performed
CO4	Explain the basic concepts of Limits, Fits and tolerances and describe different standards of measuring instruments
CO5	surface roughness and geometric features of parts

Subject Name: Renewable energy sources **SubjectCode:ME853EE**

At the end of the Course, students will be able to	
CO1	Describe the principles of solar radiation and its measuring instruments
CO2	Illustrate the types of solar energy collectors, storage methods and applications.
CO3	Explain sources and Conversion Principles of Wind, Bio mass and Geothermal Energy sources.
CO4	Explain Ocean, Tidal and Wave Energy Sources with their Conversion principles.
CO5	Summarize various direct energy conversion technologies

Subject Name: Fundamentals of Management **SubjectCode:SM504MS**

At the end of the Course, students will be able to	
CO1	Understand the significance of Management in their profession.
CO2	Explore the management practices in their domain area.
CO3	Describe the various management functions like planning, organizing, staffing, leading, motivation and control aspects are learnt.

Subject Name: Thermal Engineering Lab **SubjectCode:ME505PC**

At the end of the Course, students will be able to	
CO1	Estimate the performance and draw the characteristic curves for diesel and petrol engines
CO2	Demonstrate the heat balance sheet by conducting experiments on petrol and diesel engines
CO3	Study the working principle of water and fire tube boilers
CO4	Determine the isothermal and volumetric efficiencies of reciprocating compressor
CO5	Draw the valve and port timing diagrams for two stroke and four stroke IC engines.

Subject Name: Machine Tools Lab **SubjectCode:ME506PC**

At the end of the Course, students will be able to	
CO1	Use lathe machine to perform step turning, taper turning, thread cutting and knurling operations for the given specimen.
CO2	Understand and perform the various operations on driling, milling,grinding machines
CO3	Understand and perform the various operations on slotting, planning.

Subject Name: Engineering Metrology Lab **SubjectCode:ME507PC**

At the end of the Course, students will be able to	
CO1	Measure length, height, gear thickness, diameters using vernier gauges and micrometers.
CO2	Measure angles using bevel protractor and sine bar.
CO3	Use different methods for the measurement of screw thread.

YEAR: III **SEMESTER: II** **REGULATION: R16**

Subject Name: Thermal Engineering-II **SubjectCode:ME601PC**

At the end of the Course, students will be able to	
CO1	Describe the steam power cycle with P-V, T-S diagrams and state various methods to improve cycle efficiency.
CO2	Distinguish Fire tube and water tube boilers and Describe the steam flow through nozzle thermodynamically
CO3	Explain the working principle steam turbines and compute the work done and efficiency of these turbines by using velocity triangles
CO4	Discuss various types of gas turbine cycles
CO5	Classify the jet engines and explain working principles of rocket engines

Subject Name: Design of Machine Members-II **SubjectCode:ME602PC**

At the end of the Course, students will be able to	
CO1	Design journal, ball and roller bearings under static and dynamic loadings
CO2	Design IC engine elements for maximum strength
CO3	Design power transmission elements like belt drive, rope drive and chain drives.
CO4	Design and analyze spur, helical, bevel and worm gears with respect different loading conditions.
CO5	Design power screws for possible failure modes.

Subject Name: Heat Transfer **SubjectCode:ME603PC**

At the end of the Course, students will be able to	
CO1	Describe various modes of heat transfer and derive governing equations for conduction
CO2	Solve problems on 1D steady and transient state heat conduction
CO3	Compute heat transfer coefficients for natural convection and forced convection in external and internal flows.
CO4	Discuss heat transfer with phase change and Calculate radiation heat transfer in space between black and grey bodies.
CO5	Understand the heat exchangers performance by LMTD and NTU methods.

Subject Name: Machine Tool Design **SubjectCode:ME613PE**

At the end of the Course, students will be able to	
CO1	Understand the basics of machine tool motions and kinematic mechanisms of various machines.
CO2	Describe the feed and speed for different types of machines and design the gear box for various applications.
CO3	Describe the basic requirements of machine tool structure, design principles and their functions.
CO4	Understand the concepts of design of guideways, power screw and splines and its functions in Machine tool.
CO5	Calculate the various tests involved in the machine tool to analyse the static and dynamic vibrations.

Subject Name: Entrepreneurship and Small Business Enterprises **SubjectCode:PE623OE**

At the end of the Course, students will be able to	
CO1	Understand the basic concepts of Entrepreneurship
CO2	To illustrate the new venture creation
CO3	Explain the management of MSMEs and Sick enterprises
CO4	Explain the importance of Managing Marketing and Growth in Enterprises
CO5	Discuss the Strategic perspectives in Entrepreneurship

Subject Name: Heat Transfer Lab **SubjectCode:ME604PC**

At the end of the Course, students will be able to	
CO1	Demonstrate steady and transient state conduction experiments to estimate thermal conductivity of different materials.
CO2	Obtain temperature distribution along the length of the pin fin under forced and free convection.
CO3	Determine Stefan Boltzmann constant and emissivity by radiation principles.
CO4	Demonstrate the heat pipe applications and Calculate the critical heat flux by performing experiment
CO5	Determine the effectiveness and overall heat transfer coefficient of parallel and counter flow heat exchanger.

Subject Name: CADD and MATLAB **SubjectCode:ME605PC**

At the end of the Course, students will be able to	
CO1	Apply computer methods for solving a wide range of engineering problems.
CO2	Able to use computer engineering software to solve and present problem solutions in a technical format.
CO3	Able to utilize computer skills to enhance learning and performance in other engineering and science courses.
CO4	Able to demonstrate professionalism in interactions with Colleagues, faculty, and staff.

Subject Name: Advanced Engineering Communication Skills Lab **SubjectCode:EN606HS**

At the end of the Course, students will be able to	
CO1	Develops confidence to use relevant vocabulary, using apt kinesics or body language in communication.
CO2	Infer the meaning of the text easily through comprehension techniques like, skimming, scanning and effective reading through proper vocabulary.
CO3	Exhibit the writing skills through letters, reports and resume writing from the text and use for all professional settings.
CO4	Gather ideas, information and organize them relevantly in making presentations.
CO5	Self assured to organize and deliver discussions, presentations and strategies to face the interviews effectively.

YEAR: IV **SEMESTER: I** **REGULATION: R16**

Subject Name: CAD/CAM **SubjectCode:ME701PC**

At the end of the Course, students will be able to	
CO1	Outline the significance of CAD/CAM in present days.
CO2	Apply the concept of geometric modeling, surface modeling and solid modeling to create different models.
CO3	Develop NC and CNC programming codes for different machining operations.
CO4	Describe the concept of group technology, computer aided process planning, manufacturing resources planning and ERP.
CO5	Explain the concept of FMS, computer aided quality control and CIM.

Subject Name: Instrumentation and Control System **SubjectCode:ME702PC**

At the end of the Course, students will be able to	
CO1	Develops confidence to use relevant vocabulary, using apt kinesics or body language in communication.
CO2	Infer the meaning of the text easily through comprehension techniques like, skimming, scanning and effective reading through proper vocabulary.
CO3	Exhibit the writing skills through letters, reports and resume writing from the text and use for all professional settings.
CO4	Gather ideas, information and organize them relevantly in making presentations.
CO5	Self assured to organize and deliver discussions, presentations and strategies to face the interviews effectively.

Subject Name: CAD/CAM Lab **SubjectCode:ME703PC**

At the end of the Course, students will be able to	
CO1	Develop 2D and 3D models using AutoCAD, Pro-E Softwares.
CO2	Solve the structural and heat transfer problems using Ansys software.
CO3	Produce mechanical components on CNC machine.
CO4	Explain CNC part programs to perform various machining operations.
CO5	Make use of CAM software to develop different process sheets and tool management system.

Subject Name: Instrumentation and Control system Lab **SubjectCode:ME704PC**

At the end of the Course, students will be able to	
CO1	Calibration of instruments like pressure gauge and strain gauge
CO2	Calibration of instruments like micro meter and tacho meter
CO3	Demonstrate the use of seismic pick up to study mechanical vibrations.

Subject Name: Industry oriented mini project **SubjectCode:ME705PC**

At the end of the Course, students will be able to	
CO1	Adopt the skills to communicate effectively and to present ideas clearly and coherently to specific audience
CO2	learn on their own, reflect on their learning and take appropriate actions to improve it
CO3	Build skills through working in a team to achieve common goals

Subject Name: Seminar **SubjectCode:ME706PC**

At the end of the Course, students will be able to	
CO1	Find the relevant topics related to Mechanical Engineering
CO2	Evaluate the topics in a planned manner
CO3	Utilize technical resources

Subject Name: Operation Research **SubjectCode:ME724PE**

At the end of the Course, students will be able to	
CO1	Understand the evolution and applications of Operations Research in various fields. Mathematically formulate a real-world problem as linear programming problems and solve those using different techniques to get an optimal solution.
CO2	Solve transportation problems to minimize cost or maximize profit and understand the Principles of assignment of jobs and find optimal assignment.
CO3	Solve problems of sequencing to get minimum idle as well as total elapsed time. Evaluate the best timings for Individual and Group replacement.
CO4	Use Game theory to identify the optimal strategies for players. Analyze the inventory and apply them in domain specific situations.
CO5	Model a dynamic system as a queuing model and compute important performance measures. Understand how to model and solve problems using dynamic programming. Use simulation techniques to solve queuing and inventory problems.

Subject Name: Robotics **SubjectCode:ME733PE**

At the end of the Course, students will be able to	
CO1	Identify the components of industrial robot and describe their functions.
CO2	Analyze different types of transformations in robot motion.
CO3	Solve the basic problems on forward, inverse kinematics and dynamics of robot.
CO4	Explain trajectory planning, actuators and feedback components of robot.
CO5	Describe the applications of robot in manufacturing, material handling, assembly and inspection.

Subject Name: Advanced Manufacturing Technology **SubjectCode:ME744PE**

At the end of the Course, students will be able to	
CO1	Describe various CAD issues for 3D printing and rapid prototyping and related
CO2	Operations for STL model manipulation.
CO3	Formulate and solve typical problems on reverse engineering for surface reconstruction from physical prototype models through digitizing and spline-based surface fitting.
CO4	Formulate and solve typical problems on reverse engineering for surface reconstruction from digitized mesh models through topological modelling and subdivision surface fitting.
CO5	Explain and summarize the principles and key characteristics of additive manufacturing technologies and commonly used 3D printing and additive manufacturing systems.

YEAR: IV **SEMESTER: II** **REGULATION: R16**

Subject Name: Production Planning and Control **SubjectCode:ME854PE**

At the end of the Course, students will be able to	
CO1	Describe objectives, functions of PPC and various types of production.
CO2	Understand the importance of forecasting techniques in production problems
CO3	Explain the functions of inventory, selective inventory control techniques and inventory control systems.
CO4	Solve problems of production scheduling using line balancing, aggregate planning.
CO5	Understand the activities of dispatching, follow up and applications of computer in PPC.

Subject Name: Unconventional Machining Process **SubjectCode:ME863PE**

At the end of the Course, students will be able to	
CO1	Differentiate conventional and unconventional machining processes.
CO2	Explain the constructional details and working of USM, AJM, WJM and AWJ, ECG, ECM.
CO3	Explain the constructional details, working of EDM, EDG and EDWC machining processes and calculate the machining time, metal removal rate.
CO4	Understand the working of EBM, LBM and Plasma arc cutting process.
CO5	Compare various finishing processes in unconventional machining processes.

Subject Name: Renewable Energy Sources **SubjectCode:MT831OE**

At the end of the Course, students will be able to	
CO1	Analyze the demand and resources of various energy systems
CO2	Illustrate the principles of solar radiation along with solar collectors, storage methods and applications.
CO3	Explain sources and Conversion Principles of Wind energy and Bio mass
CO4	Explain sources and Conversion Principles of hydel and geothermal energy
CO5	Describe Ocean, Tidal and Wave Energy Sources with their Conversion principles.

Subject Name: Major Project **SubjectCode:ME801PC**

At the end of the Course, students will be able to	
CO1	Students will acquire the skills to communicate effectively and to present ideas clearly in industry domain
CO2	Apply the theoretical knowledge of courses to resolve the problems in exist systems or develop a new system
CO3	Develop collaborative skills through working in a team to achieve common goals
CO4	Build physical prototypes to execute technical concepts