DNR COLLEGE OF ENGINEERING & TECHNOLOGY
BHIMAVARAM, W.G.Dist., A.P., PIN-534202
DEPARTMENT OF MECHANICAL ENGINEERING

Program Name:	B.TECH-MECHANICAL ENGINEERING	**Academic Year**	2020-21
Regulation	R16	**Class / Sem**	IV/I

COURSE OUTCOMES (Cos):

Upon completion of the course, students will be able to:

Course code	**CO Statement -Mechatronics**	**Taxonomy level**
CO3411.1	Identify the different functions of the Mechatronic, sensors, actuators and control systems	Remember
CO3411.2	Explain the Mechatronics, hydraulic, pneumatic and electric systems.	Understand
CO3411.3	Different types of semiconductor electronic equipment, operational amplifiers and fluid systems.	Apply
CO3411.4	Summaries the functionality of the programmable logical controller.	Apply
CO3411.5	Uses of dynamic and analogous models.	Apply
CO3411.6	Describe the interface and data acquisition systems.	Understand

Course code	**CO Statement-CAD/CAM**	**Taxonomy level**
CO3412.1	Express the concept of CAD/CAM/CIM and Other terminologies used in the Understand development and manufacturing of a product.	Understand
CO3412.2	Describe the mathematical basis in the technique of representation of Understand geometric entities including points, lines, and parametric curves, surfaces and solid	Apply
CO3412.3	Describe the technique of transformation of geometric entities using transformation matrix.	Understand
CO3412.4	Express the concept of Group Technology, Flexible Manufacturing System.	Apply
CO3412.5	Describe the use of GT and CAPP for the product development	Apply
CO3412.6	Incorporate ergonomics, Identify the various elements and their activities in the ApplyingComputer Integrated Manufacturing Systems.	Apply

Course code	**CO Statement-Finite Element Methods**	**Taxonomy level**
CO3413.1	Implement numerical methods to formulate and solve axially loaded bar problems	Apply
CO3413.2	Understand to apply coordinate systems, boundary conditions, meshing and interpolation functions.	Understand
CO3413.3	Formulate and analyze truss and beams	Create
CO3413.4	Implement the formulation techniques to solve two-dimensional problems and Axi-symmetric three-dimensional problems using triangle elements	Apply
CO3413.5	Formulate and solve four noded quadrilateral isoparametric elements and numerical integration.	Create
CO3413.6	Formulate and solve one-dimensional heat transfer problems, lumped matrices and free vibrations.	Create

Course code	CO Statement-Power Plant Engineering	Taxonomy level
CO3414.1	Basic knowledge of Different types of Power Plants, site selection criteria of each one of them.	Apply
CO3414.2	Understanding of Thermal Power Plant Operation, turbine overning, different types of high pressure boilers including supercritical and supercharged boilers, Fluidized bed combustion systems.	Understand
CO3414.3	Design of chimney in thermal power plants, knowledge of cooling tower operation, numerical on surface condenser design.	Create
CO3414.4	Basic knowledge of Different types of Nuclear power plants including Pressurized water reactor, Boiling water reactor, gas cooled reactor, liquid metal fast breeder reactor.	Apply
CO3414.5	Understanding of Power Plant Economics, Energy Storage including compressed air Energy and pumped hydro etc.	Understand
CO3414.6	Discussing environmental and safety aspects of power plant operation	Apply

Course code	CO Statement-Additive Manufacturing	Taxonomy level
CO341C.1	Describe the basics of rapid manufacturing techniques in manufacturing	Understand
CO341C.2	Apply the liquid and solid based rapid prototyping system in suitable applications	Apply
CO341C.3	Apply powder based rapid prototyping system in suitable applications	Apply
CO341C.4	Solve different problems in STL file formats using different rapid prototyping software	Apply
CO341C.5	Explain and summarize typical rapid tooling processes for quick batch production of plastic and metal parts.	Understand
CO341C.6	Apply the new technologies in rapid prototyping for various applications	Apply

Course code	CO Statement –Advanced Materials	Taxonomy level
CO341D.1	Explain various types of matrix and reinforced composites,	Understand
CO341D.2	Select the fiber compositions and polymer compositions with respect to manufacturing applications.	Analyze
CO341D.3	Identify various advanced manufacturing methods.	Remember
CO341D.4	Examine the reduction of hooks law	Apply
CO341D.5	Illustrate the laminate and laminate codes	Analyze
CO341D.6	Select suitable material for different applications.	Analyze

Course code	CO Statement –CAD/CAM Lab	Taxonomy level
CO3417.1	Utilize standard software tools to create part, assemblies and check for clearances.	Apply
CO3417.2	Modify 2d drafting to 3d using modelling software.	Apply
CO3417.3	Summarize the modern control in manufacturing systems (Fanuc, siemens)	Understand
CO3417.4	Utilize the concepts of g and m codes and manual part programming for modern manufacturing technology.	Apply
CO3417.5	Utilize Capp in machining and turning center	Apply
CO3417.6	Apply modern tools in design, manufacture and planning	Apply

Course code	CO Statement –Mechatronics Lab	Taxonomy level
CO3418.1	Identification of key elements of mechatronics system and its representation in terms of block diagram	Remember
CO3418.2	Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O	Understand
CO3418.3	Interfacing of Sensors, Actuators using appropriate DAQ micro-controller	Understand
CO3418.4	Time and Frequency domain analysis of system model (for control application)	Analyze
CO3418.5	PID control implementation on real time systems	Analyze
CO3418.6	Development of PLC ladder programming and implementation of real-life system.	Apply

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Program Name:	B.TECH-MECHANICAL ENGINEERING	**Academic Year**	2020-21
Regulation	R16	**Class / Sem**	III/I

COURSE OUTCOMES (Cos):

Upon completion of the course, students will be able to:

Course code	**CO Statement -Dynamics of Machinery**	**Taxonomy level**
CO3311.1	Analyze the effect of a gyroscope on ships, aero planes and automobile	Analyze
CO3311.2	Explain the working of important machine elements like clutches, brakes, flywheels, governors	Understand
CO3311.3	Analyze the dynamic forces in slider crank mechanism and fluctuation of energy in fly wheels and their design.	Analyze
CO3311.4	Explain the working of Watt, porter and proell governors, spring loaded governors.	Understand
CO3311.5	Analyze the theory involved in balancing of rotating and reciprocating members and Estimate the unbalanced forces in a multi-cylinder reciprocating engine	Analyze
CO3311.6	Understand longitudinal, transverse and torsional vibrations so as to avoid resonance	Understand

Course code	**CO Statement-Metal Cutting & Machine Tools**	**Taxonomy level**
CO3312.1	Apply cutting mechanics to metal machining based on cutting force and power consumption.	Apply
CO3312.2	Operate lathe, milling machines, drill press, grinding machines, etc.	Apply
CO3312.3	Select cutting tool materials and tool geometries for different metals	Analyze
CO3312.4	Select appropriate machining processes and conditions for different metals	Analyze
CO3312.5	Learn machining economics	Evaluate
CO3312.6	Design jigs and Fixtures for simple parts.	Create

Course code	**CO Statement-Design of Machine Members–II**	**Taxonomy level**
CO3313.1	To understand and apply principles of gear design to spur gears and industrial spur gear boxes.	Understand
CO3313.2	To become proficient in Design of Helical and Bevel Gear	Create
CO3313.3	To develop capability to analyze Rolling contact bearing and its selection from manufacturer's Catalogue.	**Create**
CO3313.4	To learn a skill to design worm gear box for various industrial applications.	Create
CO3313.5	To inculcate an ability to design belt drives and selection of belt, rope and chain drives.	Apply
CO3313.6	To achieve an expertise in design of Sliding contact bearing in industrial applications.	Evaluate

Course code	CO Statement-Operations Research	Taxonomy level
CO3314.1	Illustrate general Linear Programming problem.	Apply
CO3314.2	Find optimum solution for the Transportation problems.	Analyze
CO3314.3	Determine the optimal solution for Assignment problems.	Apply
CO3314.4	Determine the best strategy and value of the given game model.	Apply
CO3314.5	Identify replacement policy and general cost function	Remember
CO3314.6	Understand the need of inventory management	Understand

Course code	CO Statement –Thermal Engineering -II	Taxonomy level
CO3315.1	Explain the working of Rankine cycle, get knowledge about fuels and their combustion	Understand
CO3315.2	Classify the types of boilers, discuss their working, compare the draught systems	Analyze
CO3315.3	Describe the types and working and calculations of their performance in steam nozzles and steam turbines	Apply
CO3315.4	Discuss the types and working and analyzing the performance of steam condensers	Apply
CO3315.5	Explain the types and compare the working of gas turbines	Analyze
CO3315.6	Explain the performance of different types of jets and rockets	Understand

Course code	CO Statement –Theory of Machines Lab	Taxonomy level
CO3316.1	Relate to fundamental knowledge of dynamics of machines like dynamic balancing, flywheel analysis, gyroscopic forces and moments.	Analyze
CO3316.2	Experiment with the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain.	Understand
CO3316.3	Analyze the applications of cams and their working principles.	Analyze
CO3316.4	Test vibrations and its significance on engineering design.	Evaluate
CO3316.5	Understand the applications of screw Jack mechanism	Understand
CO3316.6	Illustrate gears, power transmission through different types of gears including gear profiles	Apply

Course code	CO Statement –Machine Tools Lab	Taxonomy level
CO33171.	Demonstrate step turning and Taper turning operations on Lathe machine.	Apply
CO3317.2	Demonstrate knurling and thread cutting, drilling operations on lathe machine.	Apply
CO3317.3	Demonstrate drilling operations in drilling machine.	Apply
CO3317.4	Grove a key way on a work piece using shaping machine.	Create

CO3317.5	Demonstrate skills in slotting operations in slotter.	Apply
CO3317.6	Performing milling operation on gear wheel.	Create

Course code	CO Statement –Thermal Engineering Lab	Taxonomy level
CO3318.1	Apply their knowledge to draw VTD & PTD of I.C Engines	Apply
CO3318.2	Calculate the friction power by using Morse, Retardation, Motoring tests in I.C Engines	Apply
CO3318.3	Conduct performance test, Heat balance test, Economical speed test in I.C Engines	Evaluate
CO3318.4	Conduct Performance test in Reciprocating Air compressor and conduct experiments for testing of fuels	Evaluate
CO3318.5	Explain the working of Steam Boilers, its mountings & accessories	Understand
CO3318.6	Show assembly and disassembly of 2-wheeler,3 wheeler,4 wheeler engines	Create

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Program Name:	B.TECH-MECHANICAL ENGINEERING	**Academic Year**	2020-21
Regulation	R19	**Class / Sem**	II/I

COURSE OUTCOMES (Cos):

Upon completion of the course, students will be able to:

Course code	**CO Statement -Vector Calculus & Fourier Transforms**	**Taxonomy level**
CO3211.1	Calculate directional derivative and gradient.	Apply
CO3211.2	Explain the concept of greens, strokes and gauss divergence theorem.	Understand
CO3211.3	Apply the Laplace transform for solving ordinary differential equations.	Apply
CO3211.4	Understand the concept of Fourier series expansion.	Understand
CO3211.5	Solve the sine and cosine transforms.	Apply
CO3211.6	Discuss partial differential equations of both first and second order.	Understand

Course code	**CO Statement-Mechanics of Solids**	**Taxonomy level**
CO3212.1	Analyze the given designed member is enough to resist the forces which it is subjected	Analyze
CO3212.2	Able to identify the serviceability requirements of designed structure member	Remember
CO3212.3	Determine the properties of given materials is acceptable to make sure that the design structure will remain serviceable and will not fail under applied loads with a suitable factor of safety	Apply
CO3212.4	It also teaches us how to make effective and economical use of engineering materials	Create
CO3212.5	To analyze and design thin & thick cylinders	Analyze
CO3212.6	Analyze the different loads on buckling and stability	Analyze

Course code	**CO Statement-Material Science & Metallurgy**	**Taxonomy level**
CO3213.1	Identify the properties of metals with respect to crystal structure and grain size	Remember
CO3213.2	Interpret the phase diagrams of materials	Understand
CO3213.3	Classify and Distinguish different types of cast irons	Analyze
CO3213.4	Describe the concept of heat treatment of steels & strengthening mechanisms	Apply
CO3213.5	Explain the powder metallurgy process	Understand
CO3213.6	Explain the use of ceramics and composites in engineering applications	Apply

Course code	CO Statement-Production Technology	Taxonomy level
CO3214.1	Illustrate the basic principles of foundry practices and special casting processes, their advantages, limitations and applications.	Analyze
CO3214.2	Categorize welding processes according to welding principle and material.	Analyze
CO3214.3	Understand requirements to achieve sound welded joint while welding different similar and dissimilar engineering materials.	Understand
CO3214.4	Student will estimate the working loads for the processes like pressing, forging, wire drawing etc.	Apply
CO3214.5	Recommend appropriate part manufacturing processes when provided a set of functional requirements and product development constraints.	Apply
CO3214.6	Describe the modern machining processes	Understand

Course code	CO Statement-Thermodynamics	Taxonomy level
CO3215.1	State and Apply Basic Concepts Of Thermodynamics.	Apply
CO3215.2	State and apply the first law of thermodynamics for closed and open systems undergoing different thermodynamic processes.	Apply
CO3215.3	Establish the increase of entropy principle. Apply the same to evaluate the feasibility of a thermodynamic process	Apply
CO3215.4	Illustrate the T-v, P-T diagrams and P-v-T surfaces of pure substances.	Analyze
CO3215.5	Analyze the processes on T-v diagrams to solve advanced engineering problems.	Analyze
CO3215.6	Evaluation of properties of perfect gas mixtures.	Evaluate

Course code	CO Statement –Machine Drawing	Taxonomy level
CO3216.1	Draw different types of bearings and threads showing different components.	Create
CO3216.2	Apply limits and tolerances to assemblies and choose appropriate fits.	Apply
CO3216.3	Recognize machining and surface finish symbols.	Understand
CO3216.4	Assemble components of a machine part and draw the sectional assembly drawing showing the dimensions of all the components of the assembly as per bill of materials.	Apply
CO3216.5	Identify the national and international standards pertaining to machine drawing.	Remember
CO3216.6	Explain fastening arrangements such as welding, riveting the different styles of attachment for shaft.	Understand

Course code	CO Statement –Metallurgy & Mechanics of Solids Lab	Taxonomy level
CO3217.1	Understand basic concepts of stress, strain and their relations based on linear elasticity. Material behaviors due to different types of loading will be discussed	Understand
CO3217.2	Calculate stresses and deformation of a bar due to an axial loading under uniform and non-uniform conditions.	Apply
CO3217.3	Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.	Analyze
CO3217.4	Undertake problem identification, formulation and solution using a range of analytical methods. Calculate normal and shear stresses on any cross-section of a beam	Remember
CO3217.5	Characterize the microstructures of different ferrous and non-ferrous metals.	Analyze
CO3217.6	Identify the effect of heat treatment and cooling rates on the properties of steels	Remember

Course code	CO Statement –Production Technology Lab	Taxonomy level
CO3218.1	Understand the Pattern design and making	Understand
CO3218.2	Set up the different casting techniques	Create
CO3218.3	Determine the properties of sand	Apply
CO3218.4	Demonstrate different welding techniques	Apply
CO3218.5	Understand Hydraulic press deep drawing and extrusion operation.	Understand
CO3218.6	Understand the Bending and other operation	Analyze

Course code	CO Statement –Environmental Science	Taxonomy level
CO3219.1	Understand and evaluate the global scale of environmental problems.	Understand
CO3219.2	Recognize different types of resources like land, water, mineral and energy and also about the effects of environment by the usage of these resources.	Understand
CO3219.3	Describe the ecosystem diversity, its values and also about the importance of the endemic species and different techniques involved in its conservation	Analyze
CO3219.4	Identify different types of pollutions and their control technologies, Waste water treatment, Bio medical waste management etc.,	Remember
CO3219.5	Explain various environmental acts and disaster management	Analyze
CO3219.6	Discuss environmental assessment and the stages involved in EIA and the environmental audit	Analyze

Course code	CO Statement –Socially Relevant Project	Taxonomy level

CO32110.1	Identify right problem and come with abstract for the proposed problem.	Remember
CO32110.2	Build a prospective solution based on recent literature survey and data gathering.	Create
CO32110.3	Identify the various resources and components required to complete project.	Remember
CO32110.4	Develop a simulation model to apply a software tool to solve the problem	Create
CO32110.5	Fabricate a working model.	Create
CO32110.6	Prepare a thesis as per given university guidelines for the project taken up.	Create

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Regulation	R16	**Class / Sem**	IV/II

COURSE OUTCOMES (Cos):

Upon completion of the course, students will be able to:

Course code	**CO Statement -Production Planning and Control**	**Taxonomy level**
CO3421.1	Understand the role Production Planning and control activities in Manufacturing and Services.	Understand
CO3421.2	Understand and perform various Forecasting techniques and problems	Analyze
CO3421.3	Understand and perform various Inventory Management techniques and apply in real manufacturing scenario/How to use MRP/ERP	Analyze
CO3421.4	Demonstrate various Scheduling procedures/Balancing concepts	Apply
CO3421.5	Understand and Evaluate Dispatching procedures	Understand
CO3421.6	Describe way of integrating different departments to execute PPC functions	Remember

Course code	**CO Statement-Unconventional Machining Processes**	**Taxonomy level**
CO3422.1	Differentiation between convention and unconventional machining process	Understand
CO3422.2	Determine the principle of working, mechanism of metal removal in the various unconventional machining process	Apply
CO3422.3	Describe the process parameters, their effect and applications of different processes.	Remember
CO3422.4	Demonstrate the Electrical energy based unconventional machining process.	Apply
CO3422.5	Demonstrate the Thermal energy based unconventional machining processes.	Apply
CO3422.6	Compare the concept of machining hard materials using chemical energy and electro chemical energy	Analyze

Course code	**CO Statement-Automobile Engineering**	**Taxonomy level**
CO3423.1	Understand various components in four-wheel automobile.	Understand
CO3423.2	Differentiate between different types of transmission systems used in automobile.	Understand
CO3423.3	Examine steering geometry and steering systems used in automobile.	Apply
CO3423.4	Interpret suspension, breaking and electrical systems in automobile.	Apply
CO3423.5	Understand various safety and emission control processes systems used in automobile.	Analyze
CO3423.6	Practice engine service for different components in automobile.	Apply

Course code	**CO Statement –Non-Destructive Evaluation**	**Taxonomy level**

CO342B.1	Importance of different non-destructive techniques and underlying principles	Apply
CO342B.2	Understand ultrasonic testing and apply its principles to find defects	Understand
CO342B.3	Use the principles of Magnetic particle testing on different work pieces	Apply
CO342B.4	Explain the process of Dye penetration tests	Understand
CO342B.5	Apply the principles of Eddy Current testing to find defects	Apply
CO342B.6	List the applications of Non-destructive testing in different industries.	Remember

Course code	CO Statement-Seminar	Taxonomy level
CO3425.1	Knew the advances in the areas of mechanical engineering	Apply
CO3425.2	Ability to collect the technical data	Analyze
CO3425.3	Analyze data based on literature survey	Analyze
CO3425.4	Ability to develop the oral and written presentation skills.	Create
CO3425.5	Knew the concept of novelty of work	Analyze
CO3425.6	Develop technical writing skills	Create

Course code	CO Statement –Project	Taxonomy level
CO3426.1	Identify right problem and come with abstract for the proposed problem.	Remember
CO3426.2	Build a prospective solution based on recent literature survey and data gathering.	Create
CO3426.3	Identify the various resources and components required to complete project.	Remember
CO3426.4	Solve the problem by creating a working model implementation or simulation study using a tool.	Apply
CO3426.5	Justify the project work progress to a panel of experts in the form of written report and presentation.	Evaluate
CO3426.6	Conduct Experimental or simulation studies and take observations, analyze and conclude the results.	Evaluate
CO3426.7	Develop a simulation model to apply a software tool to solve the problem	Create
CO3426.8	Fabricate a working model.	Analyze
CO3426.9	Prepare a thesis as per given university guidelines for the project taken up.	Create
CO3426.10	Plan the tasks required the for the project and split among team for execution and complete the project within the stipulated time.	Remember
CO3426.11	Expressthe contribution towards the project as a team member while submitting the report.	Understand
CO3426.12	Participate in competitions or expos or technical publications to demonstrate the project outcomes.	Apply

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Regulation	R16	**Class / Sem**	III/II

COURSE OUTCOMES (Cos):

Upon completion of the course, students will be able to:

Course code	**CO Statement -Metrology**	**Taxonomy level**
CO3321.1	Inspection of engineering parts with various precision instruments.	Analyze
CO3321.2	Design of part, tolerances and fits.	Create
CO3321.3	Principles of measuring instruments and gauges and their uses.	Evaluate
CO3321.4	Evaluation and inspection of surface roughness.	Evaluate
CO3321.5	Inspection of spur gear and thread elements.	Analyze
CO3321.6	Machine tool testing to evaluate machine tool quality.	Evaluate

Course code	**CO Statement-Instrumentation & Control Systems**	**Taxonomy level**
CO3322.1	Identify the various measurements, instrumentation and control systems.	Remember
CO3322.2	Discuss different types of fundamentals and operating principle.	Understand
CO3322.3	Understand the static and dynamic properties of the instrument	Understand
CO3322.4	Analyze the stress and strain measurements.	Analyze
CO3322.5	Analyze for errors so as to determine correction factors for each instrument.	Analyze
CO3322.6	Use of basic principles, work, benefits, drawbacks and applications of various control systems.	Apply

Course code	**CO Statement-Refrigeration & Air-Conditioning**	**Taxonomy level**
CO3323.1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system	Apply
CO3323.2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems	Evaluate
CO3323.3	Present the properties, applications and environmental issues of different refrigerants	Analyze
CO3323.4	Obtain the concept of Steam Jet Refrigeration System	Evaluate
CO3323.5	Calculate cooling load for air conditioning systems used for various	Apply
CO3323.6	Operate and analyze the refrigeration and air conditioning systems.	Analyze

Course code	**CO Statement –Heat Transfer**	**Taxonomy level**

CO3324.1	Define and Explain modes of heat transfer and solve 1D heat conduction problems with and without heat generation	Remember
CO3324.2	Develop heat transfer relations for different fin configurations and solve 1D transient heat conduction problems	Create
CO3324.3	Distinguish hydrodynamic and thermal boundary layers formed on a flat plate and to do the related problems	Apply
CO3324.4	Analyze different correlations developed for the natural convection heat transfer	Analyze
CO3324.5	Discuss various regimes of pool boiling and condensation heat transfer ,classify and analyze different heat exchangers	Understand
CO3324.6	State and Discuss various laws of radiation heat transfer.	Understand

Course code	**CO Statement-Green Engineering System**	**Taxonomy level**
CO332D.1	Differentiate the renewable and non-renewable sources of energy	Understand
CO332D.2	Examine the working principle of various solar energy systems	Apply
CO332D.3	Determine the applications of different renewable energy sources like ocean, wind thermal, hydro, geothermal energy etc	Apply
CO332D.4	Assess different energy sources in their ability to deliver clean and reliable electricity and heating/cooling utilities.	Evaluate
CO332D.5	Illustrate basic principles of green engineering applied to product design and manufacturing processes.	Apply
CO332D.6	Learn to modify processes and products to make them green safe and economically acceptable.	Create

Course code	**CO Statement –Heat Transfer Laboratory**	**Taxonomy level**
CO3326.1	Estimate heat transfer coefficients in forced convection, free convection, condensation and Correlate with theoretical values.	Evaluate
CO3326.2	Determine surface emissivity of a test plate.	Apply
CO3326.3	Calculatetemperaturedistributionofstudyandtransientheatconductionthroug h plane wall, cylinder and fin using numerical approach.	Apply
CO3326.4	Conductexperimentstodetermineconvectiveheattransfercoefficientforfree and forced convection and correlate with theoretical values.	Apply
CO3326.5	Perform experiments to determine the thermal conductivity of a metal rod, Solar cell	Create
CO3326.6	Perform Experiment To Determine The Overall Heat Transfer Coefficient In Heat Exchanger.	Create

Course code	**CO Statement –Metrology & Instrumentation Laboratory**	**Taxonomy level**
CO3327.1	Develop quality standards of engineering products in industries.	Create

CO3327.2	Demonstrate work in quality control departments of industries and to ensure quality of products.	Apply
CO3327.3	Analyze the measurement of the surface roughness and perform alignment tests.	Analyze
CO3327.4	Develop the ability to apply the principles in instruments and measuring techniques.	Create
CO3327.5	Demonstrate work in designing the instrumentation for a particular purpose and special purpose devices	Apply
CO3327.6	Evaluate the surface quality of a given specimen which is important in all kind of manufacturing.	Evaluate

Course code	**CO Statement –Computational Fluid Dynamics Laboratory**	**Taxonomy level**
CO3328.1	Develop mathematical models for flow phenomena.	Create
CO3328.2	Analyze mathematical and computational methods for fluid flow and heat transfer simulations.	Analyze
CO3328.3	Solve computational problems related to fluid flows and heat transfer.	Apply
CO3328.4	Evaluate the grid sensitivity and analyze the accuracy of a numerical solution.	Evaluate
CO3328.5	Evaluate flow parameters in internal and external flows.	Evaluate
CO3328.6	Develop flow simulation code for fluid flow and heat transfer problems.	Create

Course code	**CO Statement –Professional Ethics & Human Values.**	**Taxonomy level**
CO3329.1	Recollect the human, moral values and ethics.	Remember
CO3329.2	Illustrate the principles to being harmony among I, we and nature by focusing on human duties, rights, and dignity.	Apply
CO3329.3	Describe the various Engineering Ethics and social issues that are encountered by every professional in discharging professional duties.	Understand
CO3329.4	Describe the Engineers' Responsibilities towards Safety and Risk and based on this make analysis on designing to keep safety measure**.**	Understand
CO3329.5	Demonstrate the professional ethics and techniques for collegiality and problem solving?	Apply
CO3329.6	Discuss the globalization and MNC issues like – cross culture , business ethics and research ethics etc.	Analyze

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Regulation	R19	**Class / Sem**	II/II

COURSE OUTCOMES (Cos):

Upon completion of the course, students will be able to:

Course code	**CO Statement -Complex Variables & Statistical Methods**	**Taxonomy level**
CO3221.1	Apply the concept and consequences of analyticity and the Cauchy-Riemann equations	Apply
CO3221.2	Use Cauchy's integral theorem and formula to compute line integral	Apply
CO3221.3	Classify singularities, compute the residue of a function and able to apply the concepts of the calculus of residues in the evaluation of integrals	Apply
CO3221.4	Understand the concept of discrete and continuous random variables	Understand
CO3221.5	Apply the necessary sampling techniques based on the objective	Apply
CO3221.6	Discuss the definitions and properties of chi-square, t and F-distributions	Understand

Course code	**CO Statement-Kinematics Of Machinery**	**Taxonomy level**
CO3222.1	Define the purpose of kinematics, Kinematic joint and mechanism	Remember
CO3222.2	Explain various mechanisms for straight line motion and their applications including steering mechanism.	Understand
CO3222.3	Make use of the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain.	Create
CO3222.4	Explain the theories involved in cams show the applications of cams and their working principles	Apply
CO3222.5	Analyze gears, power transmission through different types of gears including gear profiles and its efficiency.	Analyze
CO3222.6	Summarize merits and demerits of each drive and understand various power transmission mechanisms and methodologies and working principles.	Understand

Course code	**CO Statement-Applied Thermodynamics**	**Taxonomy level**
CO3223.1	Recognize the basic working of steam power cycles and also identifies the importance of individual components in a cycle.	Understand
CO3223.2	Illustrate Principles of combustion, stoichiometry and flue gas analysis	Apply
CO3223.3	Demonstrate the operations of different types of steam boilers and draught systems.	Apply
CO3223.4	Analyze the functional operation of different components of nozzles, impulse and reaction turbines and condensers.	Analyze
CO3223.5	Analyze the losses and efficiency of nozzles, impulse and reaction turbines and condensers.	Analyze
CO3223.6	Explain the various types of compressors, and there principles of working and their performance evaluation.	Understand

Course code	CO Statement –Fluid Mechanics & Hydraulic Machines	Taxonomy level
CO3224.1	Explain the effect of fluid properties on a flow system	Understand
CO3224.2	Identify type of fluid flow patterns and describe continuity equation.	Remember
CO3224.3	Analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design	Analyze
CO3224.4	Understand the concept of boundary layer theory and flow separation.	Understand
CO3224.5	Analyze an appropriate turbine with reference to given situation in power plants.	Analyze
CO3224.6	Estimate performance parameters and evaluation of a given Centrifugal and Reciprocating pump.	Evaluate

Course code	CO Statement-Metal Cutting & Machine Tools	Taxonomy level
CO3225.1	Learn the fundamental knowledge and principals in material removal process.	Analyze
CO3225.2	Acquire the knowledge on operations in conventional, automatic, Capstan and turret lathes	Analyze
CO3225.3	Capable of understanding the working principles and operations of shaping, slotting, planning, drilling and boring machines.	Understand
CO3225.4	Able to make gear and keyway in milling machines and understand the indexing mechanisms	Create
CO3225.5	Understand the different types of unconventional machining methods and principles of finishing processes	Understand
CO3225.6	Design jigs and Fixtures for simple parts.	Create

Course code	CO Statement –Design of Machine Members-I	Taxonomy level
CO3226.1	Understand the design standards and codes to analyze the stresses induced in the various components having different cross-section based on the type of load and their direction.	Understand
CO3226.2	Design threaded fasteners subjected to static, dynamic and fatigue loading together with eccentric loads and to solve problems using factor of safety for different components.	Create
CO3226.3	Understand the Design and analyze the shafts subjected to fluctuating and combined loads, keys, as well as cotter and knuckle joints.	Apply
CO3226.4	Understand and design riveted joints, brackets and welded joints subjected to eccentric load and also to demonstrate the engineering solutions related to the design problems encountered.	Understand
CO3226.5	Analyze and design of coupling subjected to various loads	Analyze
CO3226.6	Analyze and design of springs subjected to various loads	Analyze

Course code	CO Statement –Fluid Mechanics & Hydraulic Machines Laboratory	Taxonomy level

CO3227.1	Determine the coefficient of discharge of flow measuring devices (orifice meter and venturi meter)	Apply
CO3227.2	Calibrate flow measuring devices (orifice meter and venturi meter)	Apply
CO3227.3	Evaluate the losses in pipes	Evaluate
CO3227.4	Estimate performance parameters of a given centrifugal and reciprocating pump.	Evaluate
CO3227.5	Understand the characteristic curves of different types of pumps and turbines	Understand
CO3227.6	Estimate performance parameters of a given turbines	Evaluate

Course code	**CO Statement –Machine Tools Laboratory**	**Taxonomy level**
CO3228.1	Demonstrate step turning and Taper turning operations on Lathe machine.	Apply
CO3228.2	Demonstrate knurling and thread cutting, drilling operations on lathe machine.	Apply
CO3228.3	Demonstrate drilling operations in drilling machine.	Apply
CO3228.4	Grove a key way on a work piece using shaping machine.	Create
CO3228.5	Demonstrate skills in slotting operations in slotter.	Apply
CO3228.6	Performing milling operation on gear wheel.	Remember

Course code	**CO Statement –Essence Of Indian Traditional Knowledge**	**Taxonomy level**
CO3229.1	Identify the concept of Basic knowledge of Traditional knowledge and its importance to develop the physical and social changes.	Remember
CO3229.2	Distinguish the importance of protecting traditional knowledge to communicate the traditional knowledge information.	Understand
CO3229.3	Illustrate the various enactments related to the protection of traditional knowledge.	Apply
CO3229.4	Interpret the concepts of Intellectual property to protect (IPR) the traditional knowledge.	Understand
CO3229.5	Explain the importance of Traditional knowledge in Agriculture and Medicine.	Analyze
CO3229.6	Examine the sustainability and development of environment for standardizing the food security and traditional knowledge of the country.	Analyze