



R K COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada & SBTET, Amaravati)

(An ISO 9001:2015 Certified Institution)

Kethanakonda (V), Ibrahimpatnam (M), Vijayawada, AMARAVATI - AP - 521456

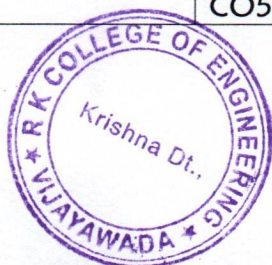


DEPARTMENT OF MECHANICAL ENGINEERING

COURSE OUTCOMES (COs)

Course Outcomes (COs) describe what students can able to do after completion of the course.

S.No	Year-Sem	Course Code	Course Name	Course Outcomes After completion of the course student can able to
1	II-I	BSE-5	Vector Calculus, Fourier Transforms And PDE (M-III)	CO1: Interpret the physical meaning of different operators such as gradient, curl and divergence
				CO2: Estimate the work done against a field, circulation and flux using vector calculus
				CO3: Apply the Laplace transform for solving differential equations
				CO4: Find or compute the Fourier series of periodic signals
				CO5: I expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms. Identify solution methods for partial differential equations that model physical processes
2	II-I	PCC-I	Mechanics Of Solids	CO1: Model & Analyze the behavior of basic structural members subjected to various loading and support conditions based on principles of equilibrium
				CO2: Understand then apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, moment and tensional moment.
				CO3: Analyze beams and draw correct and complete shear and bending moment diagrams for beams.
				CO4: understanding of the loads, stresses, and strains acting on a structure and their relations in the elastic behavior.
				CO5: Design and analysis of Industrial



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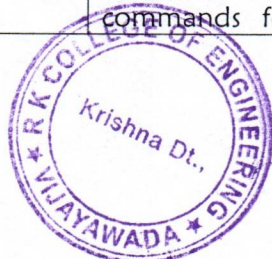


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				components like pressure vessels.
3	II-I	PCC-2	Fluid Mechanics & Hydraulic Machines	CO1: Understand The basic concepts of fluid properties
				CO2: Explain The mechanics of fluids in static and dynamic conditions.
				CO3: Explain Boundary layer theory, flow separation and dimensional analysis.
				CO4: Calculate Hydrodynamic forces of jet on vanes in different positions.
				CO5: Explain Working Principles and Evaluate performance of hydraulic pump and turbines.
4	II-I	PCC-3	Production Technology	CO1: Able to design the patterns and core boxes for metal casting processes
				CO2: Able to design the gating system for different metallic components
				CO3: Know the different types of manufacturing processes
				CO4: Be able to use forging, extrusion processes
				CO5: Learn about the different types of welding processes used for special fabrication
5	II-I	PCC-4	Kinematics Of Machinery	CO1: Contrive a mechanism for a given plane motion with single degree of freedom.
				CO2: Suggest and analyze a mechanism for a given straight line motion and automobile steering motion.
				CO3: Analyze the motion (velocity and acceleration) of a plane mechanism.
				CO4: Suggest and analyze mechanisms for a prescribed intermittent motion like opening and closing of IC engine valves etc.
				CO5: Select a power transmission system for a given application and analyze motion of different transmission systems
6	II-I	PCC-L1	Computer Aided Engineering Drawing Practice	CO1: Student get exposed on working of sheet metal with help of development of surfaces
				CO2: Student understands how to know the hidden details of machine components with the help of sections and interpenetrations of solids.
				CO3: Student shall exposed to modeling commands for generating 2D and 3D objects



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				using computer aided drafting tools which are useful to create machine elements for computer aided analysis.
7	II-I	PCC-L2	Fluid Mechanics & Hydraulic Machines Lab	CO1: Understand the principles of kinematics with specific emphasis on application of continuity equation, stream function etc.
				CO2: Apply the principles of Bernoulli's equation in measurement of discharge in pipes, and in other pipe flow problems.
				CO3: Understand the working principle of pumps and turbines.
8	II-I	PCC-L3	Production Technology Lab	CO1: The student will be able to develop simplified manufacturing processes with the aim of reduction of cost and manpower.
				CO2: The student will be able to identify/control the appropriate process parameters, and possible defects of manufacturing processes so as to remove them.
				CO3: Operate arc welding, gas welding and resistance welding equipment
9	II-I	SOC-1	Drafting And Modeling Lab	CO1: Understand the benefits of computer aided design
				CO2: Understand the computer aided manufacturing of machine elements.
				CO3: Students learn modeling 3d Drawings
10	II-I	MC-3	Essence Of Indian Traditional Knowledge	CO1: Understand the concept of Traditional knowledge and its importance
				CO2: Know the need and importance of protecting traditional knowledge
				CO3: Know the various enactments related to the protection of traditional knowledge
				CO4: Understand the concepts of Intellectual property to protect the traditional knowledge
11	II-II	BSC-6	Complex Variables And Statistical Methods	CO1: Apply various functions in order to determine whether a given continuous function is analytic
				CO2: Find the differentiation and integration of complex functions used in engineering problems
				CO3: Make use of the Cauchy residue theorem to evaluate certain integrals



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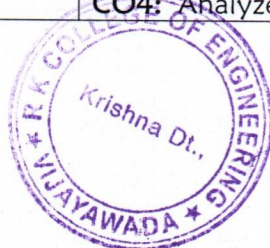


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				<p>CO4:Apply discrete and continuous probability distributions. design the components of a classical hypothesis test</p> <p>CO5:Infer the statistical inferential methods based on small and large sampling tests</p>
12	II-II	ESC-6	Materials Science & Metallurgy	<p>CO1: Understand the crystalline structure of different metals and study the stability of phases in different alloy systems.</p> <p>CO2:Study the behavior of ferrous and non-ferrous metals and alloys and their application in different domains</p> <p>CO3:Able to understand the effect of heat treatment, addition of alloying elements on properties of ferrous metals</p> <p>CO4:Grasp the methods of making of metal powders and applications of powder metallurgy</p> <p>CO5: Comprehend the properties and applications of ceramic, composites and other advanced methods.</p>
13	II-II	PCC-5	Dynamics Of Machinery	<p>CO1:Illustrate frictional losses, torque transmission of mechanical systems</p> <p>CO2: Analyze dynamic force analysis of slider crank mechanism and design of flywheel.</p> <p>CO3:Explain different types of governors involved in dynamics of Machinery</p> <p>CO4:Understand balancing of reciprocating and rotary masses</p> <p>CO5: Determine the Vibrations developed in beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method, torsion vibrations.</p>
14	II-II	PCC-6	Thermal Engineering - I	<p>CO1: Derive the actual cycle from fuel-air cycle and air- standard cycle for all practical applications.</p> <p>CO2:Explain working principle and various components of IC engine</p> <p>CO3: Explain combustion phenomenon of CI and SI engines and their impact on engine variables.</p> <p>CO4: Analyze the performance of an IC engine</p>



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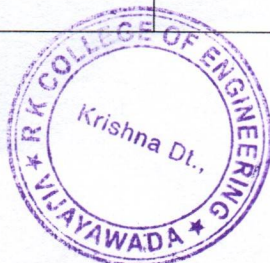


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				based on the performance parameters.
				CO5: Explain the cycles and systems of a gas turbine and determine the efficiency of gas turbine.
15	II-II	HSC-2	Industrial Engineering And Management	CO1: Design and conduct experiments, analyze, interpret data and synthesize valid conclusions
				CO2: Design a system, component, or process, and synthesize solutions to achieve desired needs
				CO3: Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints
				CO4: Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management
				CO5: Evaluate the valuation of building for different specifications and create new technologies to develop concrete estimating methods.
16	II-II	ESC-L4	Mechanics Of Solids And Metallurgy Lab	CO1: Study of the Micro Structures of Cast Irons.
				CO2: Study of the Micro Structures of Non-Ferrous alloys.
				CO3: Study of the Micro structures of Heat treated steels.
17	II-II	PCC-L6	Machine Drawing Practice	CO1. Draw and represent standard dimensions of different mechanical fasteners and joints and Couplings.
				CO2. Draw different types of bearings showing different components.
				CO3. 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
				CO4. Select and represent fits and geometrical form of different mating parts in assembly drawings.
				CO5: To prepare manufacturing drawings indicating fits, tolerances, surface finish and



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				surface treatment requirements.
18	II-II	PCC-L7	Theory Of Machines Lab	CO1: To study the static and dynamic balancing using rigid blocks.
				CO2: To study simple and compound screw jack and determine the mechanical advantage , velocity ratio and efficiency
				CO3: To study various types of gears- Spur, Helical, Worm and Bevel Gears
19	II-II	SOC-2	Python Programming Lab	CO1: Solve the different methods for linear, non-linear and differential equations
				CO2: Learn the PYTHON Programming language
				CO3: Familiar with the strings and matrices in PYTHON
				CO4: Write the Program scripts and functions in PYTHON to solve the methods
20	III-I	PCC-ME	Mechanical Measurements & Metrology	CO1: To gain fundamental knowledge of machining processes
				CO2: To understand the principles of lathe, shaping, slotting and planning machines.
				CO3: To demonstrate the principles of drilling, milling and boring processes.
				CO4: To understand the concepts of finishing processes and the system of limits and fits.
				CO5: To gain knowledge about the concepts of surface roughness and optical measuring instruments
21	III-I	HSIMS	Managerial Economics And Financial Analysis	CO1: The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product.
				CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
				CO3: The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
				CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting



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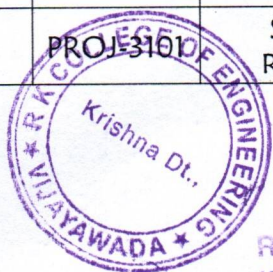


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				tools for Analysis. CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
22	III-I	PCC-ME	IC Engines And Gas Turbines	CO1: Derive the actual cycle from fuel-air cycle and air- standard cycle for all practical applications. CO2: Explain working principle and various components of IC engine CO3: Explain in depth a combustion phenomenon of CI and SI engines and their impact on engine variables. CO4: Analyze the performance of an IC engine based on the performance parameters. CO5: Explain the cycles and systems of a gas turbine and determine the efficiency of gas turbine.
23	III-I	PCC	Thermal Engineering Lab	CO1: Identify the various fuel characterizations through experimental testing. CO2: Analyze the performance characteristics of an internal combustion engines CO3: Evaluate the performance parameters of refrigeration systems CO4: Analyze the air compressor characteristics
24	III-I	PCC	Theory Of Machines Lab	CO1: The student can identify different areas of Theory of Machines. CO2: Can find the applications of all the areas in day to day life. CO3: Analyze Influence of Inertia Upon Velocity & Acceleration
25	III-I	PCC	Mechanical Measurements & Metrology Lab	CO1: Demonstrate and use different length measuring instruments like vernier calipers and micrometers CO2: Explain different angle measuring instrument like universal bevel protractor, sine bar CO3: Formulate some unknown quantity or parameter of engineering interest
26	III-I	PCC	Socially Relevant	CO1: Learn Water Conservation Related Works CO2: Understand Teaching Rural Kids (Sarva



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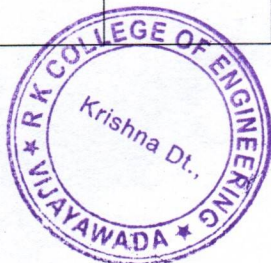


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			Project	siksha Abhiyan) CO3: LEARN E- policing & cyber solution
27	III-II	PCC	Operations Research	CO1:Formulate the resource management problems and identify appropriate methods to solve them CO2:Apply LPP, transportation and assignment models to optimize the industrial resources CO3:Solve decision theory problems through the application of game theory CO4:Apply the replacement and queuing models to increase the efficiency of the system CO5:Model the project management problems through CPM and PERT
28	III-II	PCC	Heat Transfer	CO1: Compute rate of heat transfer for 1D, steady state composite systems without heat generation. CO2: Analyze the system with heat generation, variable thermal conductivity, fins and 1D transient conduction heat transfer problems. CO3: Develop the empirical equations for forced convection problems by using Buckingham's pi theorem. CO4: Compute the rate of heat transfer for natural convection systems and design and analysis of heat exchangers. CO5: Solve the heat transfer systems with phase change and radiation.
29	III-II	PCC-ME	CAD/CAM	CO1:Understand the basic fundamentals of computer aided design and manufacturing, various types of Transformations involved in CAD CO2:To understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc. and to visualize how the components look like before its manufacturing or fabrication CO3:To learn the part programming, importance of group technology, computer aided process planning, computer aided quality control CO4:Explain the process involved in the Flexible manufacturing system, tool management system CO5:Determine the process involved in the



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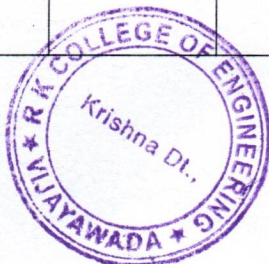


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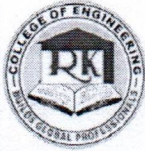
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				computer aided quality control and computer integrated manufacturing systems
30	III-II	PEC-ME1	Unconventional Machining Processes	CO1: Explain the types, needs and application of unconventional machining process
				CO2: Discuss the various mechanical energy-based machining methods
				CO3: Distinguish the chemical and electro chemical energy-based machining processes.
				CO4: Explain the principle and working of thermal energy-based machining methods.
				CO5: Understand the principle and working of laser beam, plasma machining processes.
31	III-II	PEC-ME2	Mechatronics	CO1: Explain mechatronics design process and outline appropriate sensors and actuators for engineering applications
				CO2: Develop a simulation model for simple physical systems
				CO3: Write simple microcontroller programs
				CO4: Explain linearization of nonlinear systems and elements of data acquisition
				CO5: Explain various applications of design of mechatronic systems
32	III-II	PCC	Simulation Of Mechanical Systems Lab	CO1: Understand Mechanical System with Translational Friction
				CO2: Understand Mechanical System with Translational Hard stop
				CO3: Understand Mechanical Rotational System with stick-slip motion
33	III-II	PCC	Heat Transfer Lab	CO: The student should be able to evaluate the amount of heat exchange for plane
				CO2: Evaluate cylindrical & spherical geometries
				CO3: to compare the performance of extended surfaces and heat exchangers
34	III-II	PCC	CAD/CAM Lab	CO1: The student will be able to appreciate the utility of the modeling tools in creating 2D and 3D drawings.
				CO2: Use of these tools for any engineering and real time applications
				CO3: Acquire knowledge on utilizing these tools



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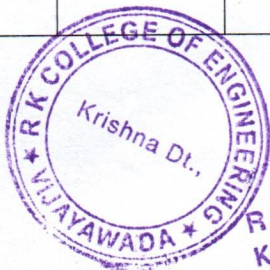


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				for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their Employment
35	IV-I		Mechatronics	CO1: Explain mechatronics design process and outline appropriate sensors and actuators for engineering applications
				CO2: Develop a simulation model for simple physical systems
				CO4: Explain linearization of nonlinear systems and elements of data acquisition
				CO5: Explain various applications of design of mechatronic systems
36	IV-I		CAD/CAM	CO6: Knowledge on dynamic models and process controllers
				CO1: Understand the basic fundamentals of computer aided design and manufacturing and to learn 2d & 3d transformations of the basic entities like line, circle, ellipse etc.
				CO2: Understand the different geometric modeling techniques like solid modeling, surface modeling, feature based modeling etc.
				CO3: Learn the part programming, importance of group technology, computer aided process planning and computer aided quality control.
				CO4: Describe the use of group technology and Capp for the product development
				CO5: Study the fundamentals and types of inspection methods and equipment
37	IV-I		Finite Element Methods	CO6: Learn the overall configuration and elements of computer integrated
				CO1: Apply direct stiffness, Rayleigh-Ritz to solve engineering problems and outline the requirements for convergence.
				CO2: Understand the concepts of Nodes and elements and Formulate simple problems into finite elements.
				CO3: Formulate and solve two dimensional structural problem involving beam and truss.
				CO4: Understand the application of 2D structural



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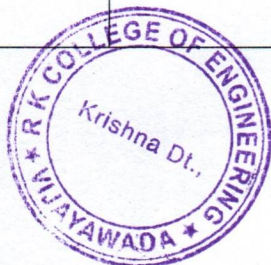


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			<p>problems using CST element and analyze the axis-symmetric problems with triangular elements.</p> <p>CO5:Apply FEA software to solve complex structural problems for stress analysis</p> <p>CO6:Solve 1D heat conduction and convection heat transfer problems and evaluate the Eigen values and Eigenvectors</p>
38	IV-I	Power Plant Engineering	<p>CO1: Knowledge On the steam power plant and their different parts.</p> <p>CO2: Understand the diesel and gas turbine power plants.</p> <p>CO3: Learn nuclear and hydro power plants.</p> <p>CO4:Understand the power plant instrumentation and control</p> <p>CO5: Understand the principle of operation and performance of respective prime movers along with their economics and their impact on environment.</p> <p>CO6:Knowledge on power plants economics and demand load Factor</p>
39	IV-I	Additive Manufacturing	<p>CO1:Knowledge on rapid prototyping and its applications</p> <p>CO2:Learn about SOLID-BASED RAPID PROTOTYPING SYSTEMS and its specifications</p> <p>CO3:Understand the Selective laser sintering (SLS) and perform the case studies on POWDER BASED RAPID PROTOTYPING SYSTEMS</p> <p>CO4:Introduction about rapid tooling (RT) manufacturing of products</p> <p>CO5:Perform RAPID PROTOTYPING SOFTWARE'S to improve the manufacturing</p> <p>CO6:Analyze the applications of rapid prototyping in day-to-day life</p>
40	IV-I	Advanced Materials	<p>CO1: Understand the mechanics of different materials.</p> <p>CO2: Understand the manufacturing processes of different composite materials.</p> <p>CO3:Enhance practical exposure on different manufacturing methods</p> <p>CO4:Impart practical exposure on relationship of</p>



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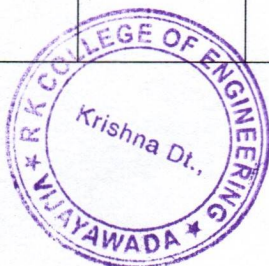


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				<p>compliance and stiffness matrix to engineering elastic constants</p> <p>CO5: Know the basic concepts of functionally graded materials & shape memory alloy with preparation and properties</p> <p>CO6: Study the properties and applications of Nano materials in comparison with the bulk materials.</p>
41	IV-I		CAD/CAM LAB	<p>CO1: The student will be able to appreciate the utility of the modeling tools in creating 2D and 3D drawings.</p> <p>CO2: Use of these tools for any engineering and real time applications</p> <p>CO3: Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their Employment</p>
42	IV-I		Mechatronics Lab	<p>CO1: Develop PLC programs for control of traffic lights, water level, lifts and conveyor belts.</p> <p>CO2: Simulate and analyze PID controllers for a physical system using MATLAB.</p> <p>CO3: Develop pneumatic and hydraulic circuits using Automaton studio.</p>
43	IV-II		Production Planning And Control	<p>CO1: Demonstrate the knowledge on basics of production planning and control like objectives and functions, elements</p> <p>CO2: Understand the concept and importance of different techniques of fore casting for established and new products.</p> <p>CO3: Knowledge of inventory management - functions, costs of inventory and different systems and analysis.</p> <p>CO4: Acquire the concept of routing and scheduling and it's sheets, factors affecting procedures, bill of material</p> <p>CO5: understand the scheduling policies- techniques and it's standard methods, line balancing and types of planning</p> <p>CO6: Understand the Dispatching, activities of</p>



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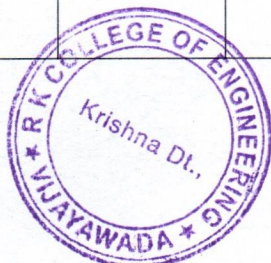


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				dispatcher, follow-up, applications of computer in PPC
44	IV-II		Unconventional Machining Processes	CO1: Knowledge about need of nontraditional machining methods and classifications, comparison with traditional machining methods. Study of ultrasonic machining, elements, and mrr process parameters.
				CO2: Study and applications of abrasive jet machining, mechanism of material removal, mrr.
				CO3: Understand electrochemical machining, electrochemical grinding, electrochemical honing and debarring
				CO4: Understand thermal metal removal process by electric discharge machining, electric discharge grinding, mechanism of metal removal, selection of tool electrodes and dielectric fluids.
				CO5: Understand basic principle and theory electron beam machining and laser beam machining, process parameters, efficiency, accuracy and applications.
				CO6: Understand the plasma arc machining, metal removal mechanism, process parameters, efficiency, accuracy and applications, magnetic abrasives finishing, abrasives flow finishing, electro stream drilling.
45	IV-II		Automobile Engineering	CO1: Explain about the layout of automobile and different types of automobile engine
				CO2: Knowledge on the Concept of transmission system (clutch, gear box) and different types of wheels and tyres.
				CO3: Basic knowledge of steering geometry and mechanism.
				CO4: Explain about working principle of suspension system. Braking system, electrical systems
				CO5: Gaining the knowledge of engine specifications and safety.
				CO6: Explain about engine emission mechanism, types of pollutants and should know the vehicle trouble shooting



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R K COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada & SBTET, Amaravati)

(An ISO 9001:2015 Certified Institution)

Kethanakonda (V), Ibrahimpatnam (M), Vijayawada, AMARAVATI - AP - 521456



46	IV-II	Non Destructive Evaluation	CO1: Write the theory based understanding of techniques and methods of NDT. Explain about radiography test
			CO2: Describe principles of wave propagation and explain about the ultrasonic test
			CO3: Demonstrate the working principle of liquid penetrate test
			CO4: Explain about principle, working, applications of magnetic practical test
			CO5: Demonstrate the working principle, applications of eddy current test.
			CO6: Apply methods knowledge of NDT to evaluate products of railways, automobiles, aircrafts, and chemical industries.
47	IV-II	Seminar	CO1: Argumentative Skills and Critical Thinking
			CO2: Engaging with Big Questions.
			CO3: Questioning, Presentation Skills
48	IV-II	Project	CO1: Demonstrate a sound technical knowledge of their selected project topic.
			CO2: Design engineering solutions to complex problems utilizing a systems approach
			CO3: Communicate with engineers and the community at large in written an oral forms.

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