

SCHOOL OF ENGINEERING AND TECHNOLOGY DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- Effectuating success in careers by exploring with the design, digital and computational I. analysis of engineering systems, experimentation and testing, smart manufacturing, technical services, and research.
- Amalgamating effectively with stakeholders to update and improve their core competencies II. and abilities to ethically compete in the ever-changing multicultural global enterprise.
- To encourage multi-disciplinary research and development to foster advanced technology, III. and to nurture innovation and entrepreneurship in order to compete successfully in the global economy.
- To globally share and apply technical knowledge to create new opportunities that proactively IV. advances our society through team efforts and to solve various challenging environmental and societal problems.
- V. To create world class mechanical engineers capable of practice engineering ethically with a solid vision to become great leaders in academia, industries and society.

PROGRAM OUTCOMES (POs)

PO

GRADUATE ATTRIBUTE

- Engineering knowledge: Apply the knowledge of mathematics, science, engineering 1 fundamentals, and an engineering specialization to the solution of complex engineering problems.
- Problem analysis: Identify, formulate, review research literature, and analyse complex 2 engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- Design/development of solutions: Design solutions for complex engineering problems 3 and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- Conduct investigations of complex problems: Use research-based knowledge 4 and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- Modern tool usage: Create, select, and apply appropriate techniques, resources, and 5 modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- The engineer and society: Apply reasoning informed by the contextual knowledge to 6 assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Department of Mechanical Engineering

Ponnaiyeh Ramajayam Institute of Science & Technology (PRIST) Unstitution Deemed to be University 's 3 of the UGC act 1956) NJAVUR - 613 405, FAMIL NADU.

School of Engineering and Teck. Pennsiyah Ramajayam Institute of Science and Technology (PRIST)

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- Environment and sustainability: Understand the impact of the professional engineering 7 solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and 8 norms of the engineering practice.
- Individual and team work: Function effectively as an individual, and as a member or 9 leader in diverse teams, and in multidisciplinary settings.
- Communication: Communicate effectively on complex engineering activities with the 10 engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- Project management and finance: Demonstrate knowledge and understanding of the 11 engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- Life-long learning: Recognize the need for, and have the preparation and ability to 12 engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

On successful completion of the Mechanical Engineering Degree programme, the Graduates shall exhibit the following:

- Apply the knowledge gained in Mechanical Engineering for design and development and 1. manufacture of engineering systems.
- Apply the knowledge acquired to investigate research-oriented problems in mechanical 2. engineering with due consideration for environmental and social impacts.
- Use the engineering analysis and data management tools for effective management of 3. multidisciplinary projects.

PEO / PO MAPPING:

						P	Os							PSOs	
PEOs	1	2	3	4	5	6	7	8	9	10	. 11	12	1	2	3
l.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
II.	3	2	2	2	2	1	1	1	3		2	1	2	3	3
III.	3	1	2	1	2	2	1		1	2		3	3	2	2
IV.	2	2	2	2	2		2				1	2	2	3	3
٧.	3	2	2	2	1	3	2	2	2	1	1	3	3	2	2

Department of Mechanical Engineering Ponnaiyah Ramalayam Institute of Science & Technology (PRIST) (Institution Deemed to be University

is 3 of the UGC Act.1958) THANJAVUR - 613 403, TAMIL NA. 15.

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Vallam, Thanjavur-613



SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

B.TECH - FULL TIME (UG - 2019)

COURSE CODE	COURSE TITLE	СО	COURSE OUTCOMES	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
		CO1	Read articles of a general kind in magazines and newspapers.							√		
19147S11	COMMUNICATIVE ENGLISH	CO2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.							√		
	ENGLISH	CO3	Comprehend conversations and short talks delivered in English							~		
		CO4	Write short essays of a general kind and personal letters and emails in English.							>		
		CO1	Use both the limit definition and rules of differentiation to differentiate functions.	✓								
		CO2	Apply differentiation to solve maxima and minima problems.		√							
19148S12	ENGINEERING MATHEMATICS – I	CO3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.			✓						
		CO4	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and				✓					✓

			change of variables.							
		CO5	Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.				✓			
		CO6	Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.	√						
		CO7	Apply various techniques in solving differential equations.					✓		
		CO1	the students will gain knowledge on the basics of properties of matter and its applications,	✓						
		CO2	the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,		✓					
19149S13	ENGINEERING PHYSICS	CO3	the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,			✓				
		CO4	the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling							✓

			microscopes, and						
		CO5	the students will understand the basics of crystals, their structures and different crystal growth techniques.			✓			
19149814	ENGINEERING CHEMISTRY	CO1	The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.			✓			
		CO1	familiarize with the fundamentals and standards of Engineering graphics	~					
		CO2	perform freehand sketching of basic geometrical constructions and multiple views of objects.		✓				
19154S15	ENGINEERING GRAPHICS	СОЗ	project orthographic projections of lines and plane surfaces.					✓	
		CO4	draw projections and solids and development of surfaces.		✓				
		CO5	visualize and to project isometric and perspective sections of simple solids.			✓			
19150816	PROBLEM SOLVING AND PYTHON PROGRAMMING	CO1	Develop algorithmic solutions to simple computational problems				✓		

		CO2	Read, write, execute by hand simple Python programs.					✓		
		CO3	Structure simple Python programs for solving problems.					✓		
		CO4	Decompose a Python program into functions.					✓		
		CO5	Represent compound data using Python lists, tuples, dictionaries.					✓		
		CO6	Read and write data from/to files in Python Programs.					✓		
		CO1	Write, test, and debug simple Python programs.			✓				
	PROBLEM SOLVING	CO2	Implement Python programs with conditionals and loops.					√		
19150L17	AND PYTHON PROGRAMMING LABORATORY	CO3	Develop Python programs step- wise by defining functions and calling them.				✓			
		CO4	Use Python lists, tuples, dictionaries for representing compound data.		✓					
		CO5	Read and write data from/to files in Python.	✓						
19150L18	PHYSICS AND CHEMISTRY LABORATORY	CO1	apply principles of elasticity, optics and thermal properties for engineering applications.			✓				
19147821	TECHNICAL ENGLISH	CO1	Read technical texts and write area- specific texts effortlessly.						✓	

		CO2	Listen and comprehend lectures and talks in their area of specialisation successfully.					✓	
		CO3	Speak appropriately and effectively in varied formal and informal contexts.					✓	
		CO4	Write reports and winning job applications.					✓	
		CO1	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.	✓					
		CO2	Gradient, divergence and curl of a vector point function and related identities.		✓				
19148S22	ENGINEERING MATHEMATICS – II	СОЗ	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.			✓			
		CO4	Analytic functions, conformal mapping and complex integration.					✓	
		CO5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.						✓

		CO1	the students will have knowledge on the various phase diagrams and their applications	✓			
		CO2	the students will acquire knowledge on Fe-Fe ₃ C phase diagram, various microstructures and alloys	✓			
19149S23C	MATERIALS SCIENCE	CO3	the students will get knowledge on mechanical properties of materials and their measurement			✓	
		CO4	the students will gain knowledge on magnetic, dielectric and superconducting properties of materials			~	
		CO5	the students will understand the basics of ceramics, composites and nanomaterials.			✓	
19149S24A	ENVIRONMENTAL SCIENCE AND ENGINEERING	CO1	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.	✓			
		CO2	Public awareness of environmental is at infant stage.	✓			
		CO3	Ignorance and incomplete knowledge has lead to misconceptions	√			

		CO4	Development and improvement in std. of living has lead to serious environmental disasters				✓				
	BASIC ELECTRICAL	CO1	Understand electric circuits and working principles of electrical machines				√				
19153S25D	ELECTRONICS AND INSTRUMENTATION	CO2	Understand the concepts of various electronic devices				✓				
	ENGINEERING	CO3	Choose appropriate instruments for electrical measurement for a specific application							✓	
		CO1	illustrate the vectorial and scalar representation of forces and moments	✓							
		CO2	analyse the rigid body in equilibrium		✓						
19154S26D	ENGINEERING MECHANICS	CO3	evaluate the properties of surfaces and solids						✓		
		CO4	calculate dynamic forces exerted in rigid body							✓	
		CO5	determine the friction and the effects by the laws of friction								✓
		CO1	fabricate carpentry components and pipe connections including plumbing works.			~					
19154L27	ENGINEERING PRACTICES LABORATORY	CO2	use welding equipments to join the structures.			✓					
	LADORATORI	соз	Carry out the basic machining operations			✓					
		CO4	Make the models using sheet			✓					

			metal works						
		CO5	Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings			✓			
		CO6	Carry out basic home electrical works and appliances			✓			
		CO7	Measure the electrical quantities			✓			
		CO8	Elaborate on the components, gates, soldering practices.			✓			
	BASIC ELECTRICAL, ELECTRONICS AND	CO1	Ability to determine the speed characteristic of different electrical machines			✓			
19153L28D	INSTRUMENTATION ENGINEERING	CO2	Ability to design simple circuits involving diodes and transistors			~			
	LABORATORY	CO3	Ability to use operational amplifiers			✓			
		CO1	Understand how to solve the given standard partial differential equations.	√					
19148S31C	TRANSFORMS AND PARTIAL DIFFERENTIAL	CO2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.		√				
	EQUATIONS	CO3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.			√			

		CO4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.						✓	
		CO5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.							✓
		CO1	Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.	✓						
		CO2	Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.		~					
19154C32	ENGINEERING THERMODYNAMICS	CO3	Apply Rankine cycle to steam power plant and compare few cycle improvement methods			✓				
		CO4	Derive simple thermodynamic relations of ideal and real gases					✓		
		CO5	Calculate the properties of gas mixtures and moist air and its use in psychometric processes						√	
19154C33	FLUID MECHANICS AND MACHINERY	CO1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.	√						

		CO2	Can analyse and calculate major and minor losses associated with pipe flow in piping networks.		✓						
		CO3	Can mathematically predict the nature of physical quantities			✓					
		CO4	Can critically analyse the performance of pumps				✓				
		CO5	Can critically analyse the performance of turbines.					✓			
		CO1	Explain different metal casting processes, associated defects, merits and demerits			✓					
		CO2	Compare different metal joining processes.				✓				
19154C34	PRODUCTION TECHNOLOGY – I	CO3	Summarize various hot working and cold working methods of metals.					~			
		CO4	Explain various sheet metal making processes.						~		
		CO5	Distinguish various methods of manufacturing plastic components.							✓	
19154C35	ELECTRICAL DRIVES AND CONTROLS	CO1	Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance	✓							
19154L36	PRODUCTION TECHNOLOGY LABORATORY – I	CO1	Demonstrate the safety precautions exercised in the mechanical workshop.			✓					

		CO2	Make the workpiece as per given shape and size using Lathe.			✓				
		CO3	Join two metals using arc welding.				✓			
		CO4	Use sheet metal fabrication tools and make simple tray and funnel.					✓		
		CO5	Use different moulding tools, patterns and prepare sand moulds.						✓	
	COMPUTER AIDED	CO1	Follow the drawing standards, Fits and Tolerances		✓					
19154L37	MACHINE DRAWING	CO2	Re-create part drawings, sectional views and assembly drawings as per standards			√				
19154L38	ELECTRICAL ENGINEERING LABORATORY	CO1	Ability to perform speed characteristic of different electrical machine		✓					
	INTERPREDICAL I	CO1	Listen and respond appropriately.		✓					
19154L39	INTERPERSONAL SKILLS/LISTENING	CO2	Participate in group discussions		✓					
19101209	& SPEAKING	CO3	Make effective presentations		✓					
		CO4	Participate confidently and appropriately in conversations both formal and informal		✓					
19148C41D	STATISTICS AND NUMERICAL METHODS	CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	✓						

		CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.		✓					
		CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.			✓				
		CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.				✓			
		CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications					✓		
		CO1	Discuss the basics of mechanism	✓						
19154C42	THEORY OF	CO2	Calculate velocity and acceleration in simple mechanisms		✓					
19154C42	MACHINES-I	CO3	Develop CAM profiles			✓				
		CO4	Solve problems on gears and gear trains					✓		
		CO5	Examine friction in machine elements					✓	 	
19154C43	PRODUCTION TECHNOLOGY - II	CO1	Explain the mechanism of material removal processes.	✓						

		CO2	Describe the constructional and operational features of centre lathe and other special purpose lathes.		✓					
		соз	Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines.			✓				
		CO4	Explain the types of grinding and other super finishing processes apart from gear manufacturing processes.				✓			
		CO5	Summarize numerical control of machine tools and write a part program.						✓	
	ENGINEERING METALLURGY	CO1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.					✓		
		CO2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.					✓		
19154C44		CO3	Clarify the effect of alloying elements on ferrous and non-ferrous metals					✓		
		CO4	Summarize the properties and applications of non metallic materials.					✓		
		CO5	Explain the testing of mechanical properties					✓		

		CO1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.	√						
19154C45	STRENGTH OF MATERIALS FOR	CO2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.		✓					
	MECHANICAL ENGINEERS	CO3	Apply basic equation of simple torsion in designing of shafts and helical spring			✓				
		CO4	Calculate the slope and deflection in beams using different methods.				✓			
		CO5	Analyze and design thin and thick shells for the applied internal and external pressures.					✓		
		CO1	Apply thermodynamic concepts to different air standard cycles and solve problems.	✓						
		CO2	Solve problems in single stage and multistage air compressors		✓					
19154C46	THERMAL ENGINEERING - I	CO3	Explain the functioning and features of IC engines, components and auxiliaries.					✓		
		CO4	Calculate performance parameters of IC Engines.			✓				
		CO5	Explain the flow in Gas turbines and solve problems.				✓			

		CO1	use different machine tools to manufacturing gears	✓				
19154L47	PRODUCTION TECHNOLOGY	CO2	Ability to use different machine tools to manufacturing gears.	~				
19154L47	LABORATORY – II	CO3	Ability to use different machine tools for finishing operations	✓				
		CO4	Ability to manufacture tools using cutter grinder	✓				
		CO5	Develop CNC part programming	✓				
	STRENGTH OF MATERIALS AND	CO1	Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.		✓			
19154L48	MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY	CO2	Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.		✓			
		СОЗ	Use the measurement equipments for flow measurement.		✓			
		CO4	Perform test on different fluid machinery.		✓			
19154L 49	ADVANCED READING AND	CO1	Write different types of essays.			✓		
	WRITING	CO2	Write winning job applications.			✓		
		CO3	Read and evaluate texts critically.					✓

		CO4	Display critical thinking in various professional contexts.							✓
		CO1	Solve problems in Steam Nozzle	✓						
		CO2	Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters.		✓					
19154C51	THERMAL ENGINEERING – II	CO3	Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems.				✓			
		CO4	Summarize the concept of Cogeneration, Working features of Heat pumps and Heat Exchangers						√	
		CO5	Solve problems using refrigerant table / charts and psychrometric charts						✓	
		CO1	Explain the influence of steady and variable stresses in machine component design.		✓					
	DESIGN OF	CO2	Apply the concepts of design to shafts, keys and couplings.			✓				
19154C52	MACHINE ELEMENTS	CO3	Apply the concepts of design to temporary and permanent joints.					✓		
		CO4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.						✓	

		CO5	Apply the concepts of design to bearings.								✓
		CO1	Describe the concepts of measurements to apply in various metrological instruments	✓							
		CO2	Outline the principles of linear and angular measurement tools used for industrial Applications			✓					
19154C53	METROLOGY AND MEASUREMENTS	CO3	Explain the procedure for conducting computer aided inspection				✓				
		CO4	Demonstrate the techniques of form measurement used for industrial components						✓		
		CO5	Discuss various measuring techniques of mechanical properties in industrial applications							√	
		CO1	Understand the types of data models.								
19155OE54B	GEOGRAPHIC INFORMATION	CO2	Get knowledge about data input and topology.								
	SYSTEM	соз	Gain knowledge on data quality and standards.								
		CO4	Understand data management functions and data output		_						
19154C55	THEORY OF MACHINES-II	CO1	Calculate static and dynamic forces of mechanisms.	✓							

		CO2	Calculate the balancing masses and their locations of reciprocating and rotating masses.		✓				
		CO3	Compute the frequency of free vibration.			✓			
		CO4	Compute the frequency of forced vibration and damping coefficient.				~		
		CO5	Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.					✓	
		CO1	Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments.	✓					
19154L56	THEORY OF MACHINES LABORATORY	CO2	Determine mass moment of inertia of mechanical element, governor effort and range sensitivity, natural frequency and damping coefficient, torsional frequency, critical speeds of shafts, balancing mass of rotating and reciprocating masses, and transmissibility ratio.		✓				
19154L57	THERMAL 7 ENGINEERING LABORATORY	CO1	conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.	✓					
17134L37		CO2	conduct tests on natural and forced convective heat transfer apparatus and evaluate heat		✓				

			transfer coefficient.							
		CO3	conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.			✓				
		CO4	conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.				✓			
		CO5	conduct tests to evaluate the performance of refrigeration and airconditioning test rigs.					✓		
19154L58	METROLOGY AND MEASUREMENTS LABORATORY	CO1	Measure the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque and vibration.	√						
		CO2	Calibrate the vernier, micrometer and slip gauges and setting up the comparator for the inspection.		✓					
19154C61	DESIGN OF TRANSMISSION	CO1	apply the concepts of design to belts, chains and rope drives.		✓					
	SYSTEMS	CO2	apply the concepts of design to spur, helical gears.				✓			

		соз	apply the concepts of design to worm and bevel gears.						✓	
		CO4	apply the concepts of design to gear boxes .						✓	
		CO5	apply the concepts of design to cams, brakes and clutches							✓
		CO1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics		✓					
	COMPUTER AIDED DESIGN AND	CO2	Explain the fundamentals of parametric curves, surfaces and Solids			✓				
19154C62		CO3	Summarize the different types of Standard systems used in CAD				✓			
	WILLIAM TO TO KING	CO4	Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines					✓		
	HEAT AND MASS TRANSFER	CO5	Summarize the different types of techniques used in Cellular Manufacturing and FMS			✓				
		CO1	Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems	✓						
19154C63		CO2	Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve		✓					

			problems							
		CO3	Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat			✓				
			exchanger configurations and solve problems							
		CO4	Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to				√			
			solve problems							
		CO5	Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications						√	
		CO1	Summarize the basics of finite element formulation.	✓						
	FINITE ELEMENT	CO2	Apply finite element formulations to solve one dimensional Problems.		✓					
19154C64	ANALYSIS	СОЗ	Apply finite element formulations to solve two dimensional scalar Problems.				√			
		CO4	Apply finite element method to solve two dimensional Vector problems.							√

		CO5	Apply finite element method to solve problems on iso parametric element and dynamic Problems.							✓
		CO1	Explain the Fluid power and operation of different types of pumps.	√						
		CO2	Summarize the features and functions of Hydraulic motors, actuators and Flow control Valves		✓					
19154C65	HYDRAULICS AND PNEUMATICS	CO3	Explain the different types of Hydraulic circuits and systems				✓			
		CO4	Explain the working of different pneumatic circuits and systems						~	
		CO5	Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.						✓	
		CO1	recognize the various parts of the automobile and their functions and materials.	✓						
		CO2	discuss the engine auxiliary systems and engine emission control.		~					
19154E66A	AUTOMOBILE ENGINEERING	СОЗ	distinguish the working of different types of transmission systems.			✓				
		CO4	explain the Steering, Brakes and Suspension Systems.				✓			
		CO5	predict possible alternate sources of energy for IC Engines.	✓						

	CAD / CAM	CO1	Draw 3D and Assembly drawing using CAD software	✓							
19154L67	LABORATORY	CO2	Demonstrate manual part programming with G and M codes using CAM		√						
19154L68	DESIGN AND FABRICATION	CO1	design and Fabricate the machine element or the mechanical product.						✓		
1910 1200	PROJECT	CO2	demonstrate the working model of the machine element or the mechanical product.							√	
		CO1	Make effective presentations				✓				
101741 (0	PROFESSIONAL COMMUNICATION	CO2	Participate confidently in Group Discussions.					✓			
19154L69		CO3	Attend job interviews and be successful in them.						✓		
		CO4	Develop adequate Soft Skills required for the workplace							✓	
		CO1	Explain the layout, construction and working of the components inside a thermal power plant.	√							
19154C71	POWER PLANT ENGINEERING	CO2	Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.		√						
		CO3	Explain the layout, construction and working of the components inside nuclear power plants.			✓					

		CO4	Explain the layout, construction and working of the components inside Renewable energy power plants. Explain the applications of power				✓			
		CO5	plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.						✓	
		CO1	select the process, equipment and tools for various industrial products.	✓						
	PROCESS PLANNING AND COST ESTIMATION	CO2	prepare process planning activity chart.		✓					
19154C72		CO3	explain the concept of cost estimation.			✓				
		CO4	compute the job order cost for different type of shop floor.				✓			
		CO5	calculate the machining time for various machining operations.						✓	
19154C73	MECHATRONICS	CO1	Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical andComputer Systems for the Control of Mechanical, Electronic Systems and sensor technology.	✓						
		CO2	Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of		√					

			Microprocessor and Microcontroller.							
		СОЗ	Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device Interfacing			✓				
		CO4	Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.				*			
		CO5	Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies				✓			
		CO1	Discuss the importance and Economics of renewable Energy	✓						
		CO2	Discuss the method of power generation from Solar Energy		✓					
19154E75A	RENEWABLE SOURCES OF ENERGY	CO3	Discuss the method of power generation from Wind Energy			√				
	DIVINO I	CO4	Explain the method of power generation from Bio Energy						✓	
		CO5	Explain the Tidal energy, Wave Energy, OTEC, Hydro energy, Geothermal Energy, Fuel							✓

		CO1	Cells and Hybrid Systems.	✓						
		CO2	Illustrate the different types of robot drive systems as well as robot end effectors.		√					
19154E76A	ROBOTICS	CO3	Apply the different sensors and image processing techniques in robotics to improve the ability of robots.			✓				
19134E/0A	ROBOTICS	CO4	Develop robotic programs for different tasks and familiarize with the kinematics motions of robot.				✓			
		CO5	Examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.						✓	
		CO1	Will have knowledge about adsorption and oxidation process.	✓						
19155FE74B	WASTE WATER TREATMENT	CO2	Will gain idea about various methods available for water treatment.		√					
		CO3	Will appreciate the necessity of water and acquire knowledge of preliminary treatment.			✓				
19154L77	SIMULATION AND ANALYSIS LABORATORY	CO1	simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.	✓						

		CO2	analyze the stresses and strains induced in plates, brackets and beams and heat transfer problems.				✓			
		СОЗ	calculate the natural frequency and mode shape analysis of 2D components and beams.						✓	
19154L78	MECHATRONICS	CO1	Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.	√						
	LABORATORY	CO2	Demonstrate the functioning of control systems with the help of PLC and microcontrollers.		✓					
19154L79	TECHNICAL SEMINAR	CO1	To enrich the communication skills of the student and presentations of technical topics of interest, this course is introduced.	✓						
19154S81	PRINCIPLES OF MANAGEMENT	CO1	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management					~		
19154E82A	PRODUCTION PLANNING AND CONTROL	CO1	Upon completion of this course, the students can able to prepare production planning and control activities such as work	√						

			study, product planning, production scheduling, Inventory Control.						
		CO2	They can plan manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).		√				
19154P83	PROJECT WORK	CO1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	√					

DEPARTMENT OF MECHANICAL ENGINEERING

B.TECH - PART TIME (UG - 2019)

COURSE CODE	COURSE TITLE	СО	COURSE OUTCOMES	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
	TID A NOTICE DAME A NID	CO 1	Understand how to solve the given standard partial differential equations.	✓								
19148C11P	TRANSFORMS AND PARTIAL DIFFERENTIAL	CO 2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.		~							
	EQUATIONS	CO 3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems			✓						

			and one dimensional wave equations.							
		CO 4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.						✓	
		CO 5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.							√
19153C12P	ELECTRICAL DRIVES AND CONTROLS	CO 1	Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance	✓						
		CO 1	Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.	√						
19154C13P	THERMODYNAMICS	CO 2	Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.		√					
		CO 3	Apply Rankine cycle to steam power plant and compare few cycle improvement methods			✓				

		CO 4	Derive simple thermodynamic relations of ideal and real gases							✓		
		CO 5	Calculate the properties of gas mixtures and moist air and its use in psychometric processes								✓	
		CO 1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.	√								
	FLUID MECHANICS AND MACHINERY	CO 2	Can analyse and calculate major and minor losses associated with pipe flow in piping networks.		√							
19154C14P		CO 3	Can mathematically predict the nature of physical quantities			✓						
		CO 4	Can critically analyse the performance of pumps				✓					
		CO 5	Can critically analyse the performance of turbines.					✓				
		CO 1	Explain different metal casting processes, associated defects, merits and demerits			~						
		CO 2	Compare different metal joining processes.				✓					
19154C15P	FOUNDRY AND WELDING TECHNOLOGY	CO 3	Summarize various hot working and cold working methods of metals.					✓				
		CO 4	Explain various sheet metal making processes.						✓			
		CO 5	Distinguish various methods of manufacturing plastic components.								√	

		CO 1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	✓						
		CO 2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.		✓					
19148S21P	NUMERICAL METHODS	CO 3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.			√				
		CO 4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.				✓			
		CO 5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications					~		
		CO 1	Explain the mechanism of material removal processes.	✓						
19154C22P	MACHINE TOOL TECHNOLOGY	CO 2	Describe the constructional and operational features of centre lathe and other special purpose lathes.			✓				
		CO 3	Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines.				✓			

		CO 4 CO 5	Explain the types of grinding and other super finishing processes apart from gear manufacturing processes. Summarize numerical control of machine tools and write a part program.					✓		✓	
		CO 1	Apply thermodynamic concepts to different air standard cycles and solve problems.	✓							
		CO 2	Solve problems in single stage and multistage air compressors		✓						
19154C23P	THERMAL ENGINEERING	CO 3	Explain the functioning and features of IC engines, components and auxiliaries.					√			
		CO 4	Calculate performance parameters of IC Engines.			✓					
		CO 5	Explain the flow in Gas turbines and solve problems.				✓				
		CO 1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.	√							
19154C24P	STRENGTH OF MATERIALS	CO 2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.		✓						
	(CO 3	Apply basic equation of simple torsion in designing of shafts and helical spring			✓					

		CO 4	Calculate the slope and deflection in beams using different methods.			✓			
		CO 5	Analyze and design thin and thick shells for the applied internal and external pressures.				✓		
		CO 1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.					✓	
	The hyperbal of	CO 2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.					✓	
19154C25P	ENGINEERING MATERIALS AND METALLURGY	CO 3	Clarify the effect of alloying elements on ferrous and non-ferrous metals					✓	
	METALLECKGT	CO 4	Summarize the properties and applications of non metallic materials.					✓	
		CO 5	Explain the testing of mechanical properties					✓	
19148S31CP	PROBABILITY AND STATISTICS	CO 1	The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.	✓					
10154C22D	KINEMATICS OF	CO 1	Discuss the basics of mechanism	✓					
19154C32P	MACHINERY	CO 2	Calculate velocity and acceleration in simple mechanisms		✓				

		CO 3	Develop CAM profiles			✓				
		CO 4	Solve problems on gears and gear trains					✓		
		CO 5	Examine friction in machine elements					✓		
19154C33P	PRODUCTION PLANNING AND	CO 1	Upon completion of this course, the students can able to prepare production planning and control activities such as work study, product planning, production scheduling, Inventory Control.	✓						
	CONTROL	CO 2	They can plan manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).		✓					
		CO 1	Describe the concepts of measurements to apply in various metrological instruments	✓						
19154C34P	ENGINEERING METROLOGY AND	CO 2	Outline the principles of linear and angular measurement tools used for industrial Applications			✓				
171340341	MEASUREMENTS	CO 3	Explain the procedure for conducting computer aided inspection				✓			
		CO 4	Demonstrate the techniques of form measurement used for industrial components						✓	

		CO 5	Discuss various measuring techniques of mechanical properties in industrial applications							✓	
	COMPUTER AIDED	CO 1	simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.	✓							
19154L35P	SIMULATION AND ANALYSIS LABORATORY	CO 2	analyze the stresses and strains induced in plates, brackets and beams and heat transfer problems.					✓			
		CO 3	calculate the natural frequency and mode shape analysis of 2D components and beams.						✓		
		CO 1	Explain the layout, construction and working of the components inside a thermal power plant.	√							
19154C41P	POWER PLANT	CO 2	Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.		✓						
191340411	ENGINEERING	CO 3	Explain the layout, construction and working of the components inside nuclear power plants.			✓					
		CO 4	Explain the layout, construction and working of the components inside Renewable energy power plants.				✓				

		CO 5	Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.							√	
		CO 1	Discuss the basics of mechanism	✓							
		CO 2	Calculate velocity and acceleration in simple mechanisms		✓						
19154C42P	DYNAMICS OF MACHINERY	CO 3	Develop CAM profiles			✓					
		CO 4	Solve problems on gears and gear trains					✓			
		CO 5	Examine friction in machine elements					✓			
		CO 1	Explain the influence of steady and variable stresses in machine component design.		√						
		CO 2	Apply the concepts of design to shafts, keys and couplings.				✓				
19154C43P	DESIGN OF MACHINE ELEMENTS	CO 3	Apply the concepts of design to temporary and permanent joints.						✓		
		CO 4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.							✓	
		CO 5	Apply the concepts of design to bearings.								✓
19154E44DP	RENEWABLE SOURCES OF ENERGY	CO 1	Understand the need of energy conversion and the various methods of energy storage	✓							

		CO 2	Identify Winds energy as alternate form of energy and to know how it can be tapped		✓				
		CO 3	Understand the Geothermal &Tidal energy, its mechanism of production and its applications			✓			
		CO 1	Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments.	√					
19154L45P	DYNAMICS LABORATORY	CO 2	Determine mass moment of inertia of mechanical element, governor effort and range sensitivity, natural frequency and damping coefficient, torsional frequency, critical speeds of shafts, balancing mass of rotating and reciprocating masses, and transmissibility ratio.		√				
	HEAT AND MASS	CO 1	Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems	√					
19154C51P	TRANSFER	CO 2	Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems		✓				

		CO 3	Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems			✓					
		CO 4	Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems				√				
		CO 5	Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications							✓	
		CO 1	apply the concepts of design to belts, chains and rope drives.		✓						
	DEGLEM OF	CO 2	apply the concepts of design to spur, helical gears.				✓				
19154C52P	DESIGN OF TRANSMISSION SYSTEMS	CO 3	apply the concepts of design to worm and bevel gears.						√		
	0101111	CO 4	apply the concepts of design to gear boxes .						✓		
		CO 5	apply the concepts of design to cams, brakes and clutches								<
19154C53P	AUTOMOBILE	CO 1	recognize the various parts of the automobile and their functions and materials.	✓							
19134C33P	ENGINEERING	CO 2	discuss the engine auxiliary systems and engine emission control.		✓						

		CO 3	distinguish the working of different types of transmission systems.			✓				
		CO 4	explain the Steering, Brakes and Suspension Systems.				✓			
		CO 5	predict possible alternate sources of energy for IC Engines.	✓						
		CO 1	Demonstrate knowledge of industrial robots, characteristics, end effectors and actuators.							
		CO 2	Apply spatial transformation to obtain forward and inverse kinematics							
19154E54CP	ROBOTICS	CO 3	Solve robot dynamics problems, generate joint trajectory for path planning							
		CO 4	Describe working principle of various sensors and program different operations							
		CO 5	Appreciate applications of robots in industry.							
		CO 1	conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.	✓						
19154L55P	HEAT TRANSFER LABORATORY	CO 2	conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.		✓					
		CO 3	conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.			✓				

		CO 4 CO 5	conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor. conduct tests to evaluate the performance of refrigeration and airconditioning test rigg.			√	✓		
		CO 1	airconditioning test rigs. Summarize the basics of finite element formulation.	✓					
	61P FINITE ELEMENT ANALYSIS	CO 2	Apply finite element formulations to solve one dimensional Problems.		✓				
19154C61P		CO 3	Apply finite element formulations to solve two dimensional scalar Problems.			√			
		CO 4	Apply finite element method to solve two dimensional Vector problems.						✓
		CO 5	Apply finite element method to solve problems on iso parametric element and dynamic Problems.						✓
19154C62P	MECHATRONICS	CO 1	Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical andComputer Systems for the Control of Mechanical, Electronic Systems and sensor technology.	✓					
		CO 2	Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of		√				

		CO 3	Microprocessor and Microcontroller. Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device Interfacing		~				
		CO 4	Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.			√			
		CO 5	Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies			✓			
		CO 1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics	√					
19154C63P	COMPUTER INTEGRATED MANUFACTURING	CO 2	Explain the fundamentals of parametric curves, surfaces and Solids		~				
		CO 3	Summarize the different types of Standard systems used in CAD			✓			
		CO 4	Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines				✓		

		CO 5	Summarize the different types of techniques used in Cellular Manufacturing and FMS			✓				
19154E64AP	PRINCIPLES OF MANAGEMENT	CO 1	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management					\		
19154L65P	MECHATRONICS	CO 1	Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.	√						
	LABORATORY	CO 2	Demonstrate the functioning of control systems with the help of PLC and microcontrollers.		✓					
		CO 1	To get familiarized with the basic concept and framework of Total Quality management							
19160S71P	TOTAL QUALITY	CO 2	To Understand the contribution of Quality Gurus in TQM Journey							
19100S/IP	MANAGEMENT	CO 3	To grasp the nature and importance of various components that constitute TQM							
		CO 4	To describe and discuss the role of techniques used in TQM							
19154C72P	PROCESS PLANNING AND COST ESTIMATION	CO 1	select the process, equipment and tools for various industrial products.	✓						

		CO 2	prepare process planning activity chart.		✓					
		CO 3	explain the concept of cost estimation.			√				
		CO 4	compute the job order cost for different type of shop floor.				✓			
		CO 5	calculate the machining time for various machining operations.						✓	
		CO 1	Explain the Fluid power and operation of different types of pumps.	✓						
		CO 2	Summarize the features and functions of Hydraulic motors, actuators and Flow control Valves		✓					
19154C73P	APPLIED HYDRAULICS AND PNEUMATICS	CO 3	Explain the different types of Hydraulic circuits and systems				✓			
	TREUMATICS	CO 4	Explain the working of different pneumatic circuits and systems						✓	
		CO 5	Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.						✓	
	UNCONVENTIONAL	CO 1	Explain the need for unconventional machining processes and its classification	✓						
19154E74CP	MACHINING PROCESSES	CO 2	Compare various thermal energy and electrical energy based unconventional machining processes.		✓					

		CO 3	Summarize various chemical and electro-chemical energy based unconventional machining processes.		✓				
		CO 4	Explain various nano abrasives based unconventional machining processes.					\	
		CO 5	Distinguish various recent trends based unconventional machining processes.						✓
19154P75P	PROJECT WORK	CO 1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	√					

DEPARTMENT OF MECHANICAL ENGINEERING

M.TECH - FULL TIME (PG - 2019)

COURSE CODE	COURSE TITLE	СО	COURSE OUTCOMES	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
19248S11E	ADVANCED ENGINEERING	CO 1	Understand Finite differences, interpolation techniques, Numerical differentiation and Integration and apply it to various practical problems	✓								
	MATHEMATICS	CO 2	Apply Numerical methods to solve first order ordinary differential equations and Algebraic and Transcendental equations		✓							

		CO 3	Illustrate Laplace transform and its application in different fields			✓					
		CO 4	Apply Fourier transforms and its applications to solve Ordinary and Partial differential equations				✓				
		CO 5	Use Z-transform and its applications to solve difference equations					✓			
		CO 1	Apply cutting mechanics to metal machining based on cutting force and power consumption.	✓							
		CO 2	Operate lathe, milling machines, drill press, grinding machines, etc.		✓						
19254C12	THEORY OF METAL CUTTING	CO 3	Select cutting tool materials and tool geometries for different metals.	✓				✓			
		CO 4	Select appropriate machining processes and conditions for different metals.						✓		
		CO 5	Learn machine tool structures and machining economics.						✓		
19254C13	ADVANCED MANUFACTURING	CO 1	Able to understand different types of composite material characteristics, types of micro & macro machining processes.	√							
	PROCESSES	CO 2	Understand the e-manufacturing & nano materials.		✓						
19254C14	MECHANICAL METALLURGY	CO 1	Identify the properties of metals with respect to crystal structure and grain size			✓					

		CO 2	Interpret the phase diagrams of materials					✓		
		CO 3	Classify and Distinguish different types of cast irons, steels and non ferrous alloys	√						
		CO 4	Describe the concept of heat treatment of steels & strengthening mechanisms	✓						
		CO 5	Explain the powder metallurgy process, types and manufacturing of composite materials							✓
	AUTOMATED	CO 1	to produce useful research output in computer integrated manufacturing				✓			
19254C15	COMPUTER INTEGRATED MANUFACTURING	CO 2	use this knowledge to develop computer techniques			✓				
	SYSTEMS	CO 3	Application of this knowledge to functionalise computer aided planning.		√					
		CO 1	Understanding basics of materials management					✓		
	MATERIALS	CO 2	Understanding requirement analysis for material planning	✓						
19254E16A	MANAGEMENT AND LOGISTICS	CO 3	Ability to apply inventory management models	✓						
		CO 4	Understanding purchasing practices			✓				
		CO 5	Understanding storage in warehouse			✓				
19254CRS	RESEARCH LED SEMINAR	CO 1	Understand research problem			✓				

			formulation.						
		CO 2	Analyze research related information		✓				
		CO 3	Follow research ethics		✓				
		CO 4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular					✓	
		CO 5	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity				~		
19254L17	CIM LAB	CO 1	To impart the knowledge on training the students in the area of CAD/CAM			✓			
		CO 1	Understand the role of operations management in achieving organizational competitiveness		✓				
19254C21	PRODUCTION MANAGEMENT	CO 2	Appreciate the concepts of lean production and maintenance management in operations	✓					
		CO 3	Comprehend key decision areas of operations and analyze data for effective decision making in operations management.		✓				

		CO 1	Ability to understand the operation of micro devices, micro systems and their applications	✓						
19254C22	MEMS AND NANO	CO 2	Ability to design the micro devices, micro systems using the MEMS fabrication process.	✓						
	TECHNOLOGY	CO 3	Gain a knowledge of basic approaches for various sensor design		√					
		CO 4	Gain a knowledge of basic approaches for various actuator design			✓				
19254C23	MANUFACTURING METROLOGY AND QUALITY CONTROL	CO 1	They can choose appropriate method and instruments for inspection of various gear elements and thread elements. They can understand the standards of length, angles, they can understand the evaluation of surface finish and measure the parts with various comparators. The quality of the machine tool with alignment test can also be evaluated by them.				√			
19254E24B	LEAN MANUFACTURING	CO 1	The student will be able to practice the principles of lean manufacturing like customer focus, reduction of MUDA, just in time, Jidoka and Hoshin planning.	√						

		CO 1	Explain maintenance objectives and functions, factors influencing Plant Availability, Need for maintenance plan and organization, Functions of maintenance control and determine Failure probability, Survival probability and Age specific failure rates of equipments and components.		✓					
19254E25B	MAINTENANCE MANAGEMENT	CO 2	Determine the optimal overhaul/repair/replacement maintenance policy for an equipment subject to breakdown and optimal interval between preventive replacements for individual and group replacement of equipments.			✓				
		CO 3	Explain different maintenance systems and the steps involved in establishing a maintenance plan and designing a technically sound preventive maintenance and lubrication program. (Comprehend)				✓			
		CO 4	Determine the optimal inspection frequency for maximization of profit and minimization of down time and the critical path using CPM and PERT	✓						

		CO 5	Explain the NUCREC method of prioritizing maintenance work, classification of spares and the costs associated with spares inventory, perform EOQ computations, explain MUSIC - 3D approach to spares management, determine the optimal number of spares to satisfy given service level and apply simulation technique for spares inventory.	✓						
19254CRM	RESEARCH METHODOLOGY	CO 1	After completion of the syllabus students will able to get knowledge about the different research techniques and research report.	✓						
19254CBR	PARTICIPATION IN BOUNDED RESEARCH	CO 1	After completion of the syllabus students will able to get knowledge about the project report.		✓					
		CO 1	To perform documentation			✓				
19254L26	AUTOMATION LAB	CO 2	To perform accounting operations				✓			
		CO 3	To perform presentation skills					✓		
102/FECW/D	TECHNICAL	CO 1	Make effective presentations			✓				
192TECWR	WRITING/SEMINAR	CO 2	Participate confidently in Group Discussions.			✓				

		CO 3	Attend job interviews and be successful in them.	✓						
		CO 4	Develop adequate Soft Skills required for the workplace		✓					
		CO 1	Determine major process/processes of manufacturing used for given application.			✓				
		CO 2	Explain when and why metal forming is chosen compared to other compatible methods				✓			
19254C31	METAL FORMING PROCESS	CO 3	Analyze effect of parameters influencing metal forming and compare hot working and cold working with applications	√						
		CO 4	Explain capabilities and applications of bulk metal forming processes and sheet metal work.	✓						
		CO 5	Outline tooling and equipments required for important metal forming processes.	√						
19254E32B	INSTRUMENTATION AND CONTROL ENGINEERING	CO 1	Ability to understand and analyse process control engineering problems.				✓			
19254E33B	FLUID POWER AUTOMATION	CO 1	At the end of this course the students are familiarized in the area of hydraulics, pneumatic and fluid power components and its functions.					✓		

19254E34A	ADVANCED MATERIAL TECHNOLOGY	CO CO 2	To impart knowledge on material selection methods and basics of advanced engineering materials. To introduce the basics of smart materials, composite materials, ceramics and glasses and modern				✓	✓	
19254CSR	DESIGN PROJECT /SOCIO TECHNICAL PROJECT (SCAFFOLDED RESEARCH)	CO 1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.						✓
19254P35	PROJECT WORK PHASE I	CO 1	On Completion of the project work students will be in a position to take up any challenging practical problems	√					
19254P41	PROJECT WORK PHASE II	CO 1	On Completion of the project work students will be in a position to take up any challenging practical problems	√					

DEPARTMENT OF MECHANICAL ENGINEERING

M.TECH - PART TIME (PG - 2019)

COURSE CODE	COURSE TITLE	СО	COURSE OUTCOMES	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
19248S11EP	ADVANCED ENGINEERING MATHEMATICS	CO 1	Understand Finite differences, interpolation techniques, Numerical differentiation and Integration and apply it to various practical problems	✓								

		CO 2	Apply Numerical methods to solve first order ordinary differential equations and Algebraic and Transcendental equations		✓						
		CO 3	Illustrate Laplace transform and its application in different fields			✓					
		CO 4	Apply Fourier transforms and its applications to solve Ordinary and Partial differential equations				✓				
		CO 5	Use Z-transform and its applications to solve difference equations					✓			
		CO 1	Apply cutting mechanics to metal machining based on cutting force and power consumption.	✓							
		CO 2	Operate lathe, milling machines, drill press, grinding machines, etc.		✓						
19254C12P	THEORY OF METAL CUTTING	CO 3	Select cutting tool materials and tool geometries for different metals.	✓				✓			
		CO 4	Select appropriate machining processes and conditions for different metals.						✓		
		CO 5	Learn machine tool structures and machining economics.						✓		
19254C13P	ADVANCED MANUFACTURING PROCESSES	CO 1	Able to understand different types of composite material characteristics, types of micro & macro machining processes.	√							

		CO 2	Understand the e-manufacturing & nano materials.		✓				
19254L14P	CIM LAB	CO 1	To impart the knowledge on training the students in the area of CAD/CAM			✓			
		CO 1	Understand research problem formulation.			✓			
		CO 2	Analyze research related information		✓				
		CO 3	Follow research ethics		✓				
19254CRSP	RESEARCH LED SEMINAR	CO 4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular					✓	
		CO 5	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity				*		
19254C21P	PRODUCTION	CO 1	Understand the role of operations management in achieving organizational competitiveness		✓				
	MANAGEMENT	CO 2	Appreciate the concepts of lean production and maintenance management in operations	✓					

		CO 3	Comprehend key decision areas of operations and analyze data for effective decision making in operations management.		✓					
		CO 1	Ability to understand the operation of micro devices, micro systems and their applications	✓						
19254C22P	MEMS AND NANO	CO 2	Ability to design the micro devices, micro systems using the MEMS fabrication process.	✓						
	TECHNOLOGY	CO 3	Gain a knowledge of basic approaches for various sensor design		√					
		CO 4	Gain a knowledge of basic approaches for various actuator design			✓				
19254E23BP	LEAN MANUFACTURING	CO 1	The student will be able to practice the principles of lean manufacturing like customer focus, reduction of MUDA, just in time, Jidoka and Hoshin planning.	✓						
		CO 1	To perform documentation			✓				
19254L24P	AUTOMATION LAB	CO 2	To perform accounting operations				✓			
		CO 3	To perform presentation skills					✓		
192TECWR	TECHNICAL	CO 1	Make effective presentations			✓				
P	WRITING/SEMINAR	CO 2	Participate confidently in Group Discussions.			✓				

		CO 3	Attend job interviews and be successful in them.	✓						
		CO 4	Develop adequate Soft Skills required for the workplace		✓					
19254CRMP	RESEARCH METHODOLOGY	CO 1	After completion of the syllabus students will able to get knowledge about the different research techniques and research report.	√						
19254CBRP	PARTICIPATION IN BOUNDED RESEARCH	CO 1	After completion of the syllabus students will able to get knowledge about the project report.		✓					
		CO 1	Identify the properties of metals with respect to crystal structure and grain size			✓				
		CO 2	Interpret the phase diagrams of materials					✓		
19254C31P	MECHANICAL METALLURGY	CO 3	Classify and Distinguish different types of cast irons, steels and non ferrous alloys	√						
		CO 4	Describe the concept of heat treatment of steels & strengthening mechanisms	✓						
		CO 5	Explain the powder metallurgy process, types and manufacturing of composite materials							√
19254C32P	AUTOMATED COMPUTER INTEGRATED	CO 1	to produce useful research output in computer integrated manufacturing				~			

	MANUFACTURING SYSTEMS	CO 2	use this knowledge to develop computer techniques			✓			
		CO 3	Application of this knowledge to functionalise computer aided planning.		,	/			
		CO 1	Understanding basics of materials management				✓		
	MATERIALS	CO 2	Understanding requirement analysis for material planning	✓					
19254E33AP	MANAGEMENT AND LOGISTICS	CO 3	Ability to apply inventory management models	✓					
		CO 4	Understanding purchasing practices			✓			
		CO 5	Understanding storage in warehouse			✓			
19254CSRP	DESIGN PROJECT /SOCIO TECHNICAL PROJECT (SCAFFOLDED RESEARCH)	CO 1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.						√
19254C41P	MANUFACTURING METROLOGY AND QUALITY CONTROL	CO 1	They can choose appropriate method and instruments for inspection of various gear elements and thread elements. They can understand the standards of length, angles, they can understand the evaluation of surface finish and measure the parts with various comparators. The quality of the machine tool			✓			

			with alignment test can also be evaluated by them.					
19254E43BP	MAINTENANCE MANAGEMENT	CO 1	Explain maintenance objectives and functions, factors influencing Plant Availability, Need for maintenance plan and organization, Functions of maintenance control and determine Failure probability, Survival probability and Age specific failure rates of equipments and components.	√				
		CO ₂	Determine the optimal overhaul/repair/replacement maintenance policy for an equipment subject to breakdown and optimal interval between preventive replacements for individual and group replacement of equipments.		~			

		CO 3	Explain different maintenance systems and the steps involved in establishing a maintenance plan and designing a technically sound preventive maintenance and lubrication program. (Comprehend)			1			
		CO 4	Determine the optimal inspection frequency for maximization of profit and minimization of down time and the critical path using CPM and PERT	✓					
		CO 5	Explain the NUCREC method of prioritizing maintenance work, classification of spares and the costs associated with spares inventory, perform EOQ computations, explain MUSIC - 3D approach to spares management, determine the optimal number of spares to satisfy given service level and apply simulation technique for spares inventory.	✓					
19254C42P	METAL FORMING	CO 1	Determine major process/processes of manufacturing used for given application.		✓				
	PROCESS	CO 2	Explain when and why metal forming is chosen compared to other compatible methods			✓			

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		CO 3	Analyze effect of parameters influencing metal forming and compare hot working and cold working with applications	✓						
	•	CO 4	Explain capabilities and applications of bulk metal forming processes and sheet metal work.	~						
		CO 5	Outline tooling and equipments required for important metal forming processes.	✓				4		
19 254P44P	PROJECT WORK PHASE I	CO 1	On Completion of the project work students will be in a position to take up any challenging practical problems	✓						
19254E51BP	INSTRUMENTATION AND CONTROL ENGINEERING	CO 1	Ability to understand and analyse process control engineering problems.			~				
19254E52BP	FLUID POWER AUTOMATION	CO 1	At the end of this course the students are familiarized in the area of hydraulics, pneumatic and fluid power components and its functions.		45		~			
19254E53AP	ADVANCED	CO 1	To impart knowledge on material selection methods and basics of advanced engineering materials.					1		
	MATERIAL TECHNOLOGY	CO 2	To introduce the basics of smart materials, composite materials, ceramics and glasses and modern		J.				1	
19254P61P	PROJECT WORK PHASE II	CO 1	On Completion of the project work students will be in a position to take up any challenging practical problems	~						

Department of Mechanical Engineering Ponnaiyah Ramaiayam Institute of Science & Technology (PRIST) (Institution Deemed to be University 6 3 of the UGC Act 1956)

DEAN
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