

PRIST
DEEMED TO BE
UNIVERSITY
NAAC ACCREDITED
THANJAVUR – 613 403 - TAMIL NADU

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- I. Effectuating success in careers by exploring with the design, digital and computational analysis of engineering systems, experimentation and testing, smart manufacturing, technical services, and research.
- II. Amalgamating effectively with stakeholders to update and improve their core competencies and abilities to ethically compete in the ever-changing multicultural global enterprise.
- III. To encourage multi-disciplinary research and development to foster advanced technology, and to nurture innovation and entrepreneurship in order to compete successfully in the global economy.
- IV. To globally share and apply technical knowledge to create new opportunities that proactively advances our society through team efforts and to solve various challenging technical, 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
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems 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.
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.


HOD

Department of Mechanical Engineering
Ponnalyah Ramalayam Institute of
Science & Technology (PRIST)
(Institution Deemed to be University
is 3 of the UGC Act 1956)
Thanjavur - 613 403, TAMIL NADU.



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Varam, Thanjavur-613,4, N.

- 7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10 **Communication:** Communicate effectively on complex engineering activities with the 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.
- 11 **Project management and finance:** Demonstrate knowledge and understanding of the 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.
- 12 **Life-long learning:** Recognize the need for, and have the preparation and ability to 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:

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

PEO / PO MAPPING:

PEOs	POs												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
I.	3	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	3
III.	3	1	2	1	2	2	1		1	2		3	3	2	2	2
IV.	2	2	2	2	2		2				1	2	2	3	3	3
V.	3	2	2	2	1	3	2	2	2	1	1	3	3	2	2	2


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SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

B.TECH - FULL TIME (UG - 2019)

COURSE CODE	COURSE TITLE	CO	COURSE OUTCOMES	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
19147S11	COMMUNICATIVE ENGLISH	CO1	Read articles of a general kind in magazines and newspapers.							✓		
		CO2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in 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.							✓		
19148S12	ENGINEERING MATHEMATICS – I	CO1	Use both the limit definition and rules of differentiation to differentiate functions.	✓								
		CO2	Apply differentiation to solve maxima and minima problems.		✓							
		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				✓					✓

			microscopes, and										
		CO5	the students will understand the basics of crystals, their structures and different crystal growth techniques.				✓						
19149S14	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.				✓						
19154S15	ENGINEERING GRAPHICS	CO1	familiarize with the fundamentals and standards of Engineering graphics		✓								
		CO2	perform freehand sketching of basic geometrical constructions and multiple views of objects.			✓							
		CO3	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.				✓						
19150S16	PROBLEM SOLVING AND PYTHON PROGRAMMING	CO1	Develop algorithmic solutions to simple computational problems					✓					

19149S23C	MATERIALS SCIENCE	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				✓					
		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				✓					
19153S25D	BASIC ELECTRICAL ELECTRONICS AND INSTRUMENTATION ENGINEERING	CO1	Understand electric circuits and working principles of electrical machines				✓					
		CO2	Understand the concepts of various electronic devices				✓					
		CO3	Choose appropriate instruments for electrical measurement for a specific application								✓	
19154S26D	ENGINEERING MECHANICS	CO1	illustrate the vectorial and scalar representation of forces and moments	✓								
		CO2	analyse the rigid body in equilibrium		✓							
		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									✓
19154L27	ENGINEERING PRACTICES LABORATORY	CO1	fabricate carpentry components and pipe connections including plumbing works.			✓						
		CO2	use welding equipments to join the structures.			✓						
		CO3	Carry out the basic machining operations			✓						
		CO4	Make the models using sheet			✓						

		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.					✓					
19154C34	PRODUCTION TECHNOLOGY – I	CO1	Explain different metal casting processes, associated defects, merits and demerits			✓							
		CO2	Compare different metal joining processes.				✓						
		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	Describe the constructional and operational features of centre lathe and other special purpose lathes.			✓							
		CO3	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.								✓		
19154C44	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.							✓			
		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. .								✓		

			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 SYSTEMS	CO1	apply the concepts of design to belts, chains and rope drives.		✓								
		CO2	apply the concepts of design to spur, helical gears.				✓						

19154L67	CAD / CAM LABORATORY	CO1	Draw 3D and Assembly drawing using CAD software	✓								
		CO2	Demonstrate manual part programming with G and M codes using CAM		✓							
19154L68	DESIGN AND FABRICATION PROJECT	CO1	design and Fabricate the machine element or the mechanical product.					✓				
		CO2	demonstrate the working model of the machine element or the mechanical product.						✓			
19154L69	PROFESSIONAL COMMUNICATION	CO1	Make effective presentations				✓					
		CO2	Participate confidently in Group Discussions.					✓				
		CO3	Attend job interviews and be successful in them.						✓			
		CO4	Develop adequate Soft Skills required for the workplace							✓		
19154C71	POWER PLANT ENGINEERING	CO1	Explain the layout, construction and working of the components inside a thermal power plant.	✓								
		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.				✓					
		CO5	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.							✓		
19154C72	PROCESS PLANNING AND COST ESTIMATION	CO1	select the process, equipment and tools for various industrial products.	✓								
		CO2	prepare process planning activity chart.		✓							
		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 and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.	✓								
		CO2	Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of		✓							

			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	CO	COURSE OUTCOMES	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
19148C11P	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	CO 1	Understand how to solve the given standard partial differential equations.	✓								
		CO 2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.		✓							
		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	✓									
19154C13P	ENGINEERING THERMODYNAMICS	CO 1	Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.	✓									
		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	Explain the types of grinding and other super finishing processes apart from gear manufacturing processes.					✓				
		CO 5	Summarize numerical control of machine tools and write a part program.								✓	
19154C23P	THERMAL ENGINEERING	CO 1	Apply thermodynamic concepts to different air standard cycles and solve problems.	✓								
		CO 2	Solve problems in single stage and multistage air compressors		✓							
		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.				✓					
19154C24P	STRENGTH OF MATERIALS	CO 1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.	✓								
		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.					✓					
19154C25P	ENGINEERING MATERIALS AND METALLURGY	CO 1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.							✓			
		CO 2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.							✓			
		CO 3	Clarify the effect of alloying elements on ferrous and non-ferrous metals								✓		
		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.	✓									
19154C32P	KINEMATICS OF MACHINERY	CO 1	Discuss the basics of mechanism	✓									
		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 CONTROL	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.	✓									
		CO 2	They can plan manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).		✓								
19154C34P	ENGINEERING METROLOGY AND MEASUREMENTS	CO 1	Describe the concepts of measurements to apply in various metrological instruments	✓									
		CO 2	Outline the principles of linear and angular measurement tools used for industrial Applications			✓							
		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										✓	
19154L35P	COMPUTER AIDED SIMULATION AND ANALYSIS LABORATORY	CO 1	simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.	✓										
		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.							✓				
19154C41P	POWER PLANT ENGINEERING	CO 1	Explain the layout, construction and working of the components inside a thermal power plant.	✓										
		CO 2	Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.		✓									
		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 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			✓							
19154L45P	DYNAMICS LABORATORY	CO 1	Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments.	✓									
		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.			✓							
19154C51P	HEAT AND MASS TRANSFER	CO 1	Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems	✓									
		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	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.	✓									
19154E54CP	ROBOTICS	CO 1	Demonstrate knowledge of industrial robots, characteristics, end effectors and actuators.										
		CO 2	Apply spatial transformation to obtain forward and inverse kinematics										
		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.										
19154L55P	HEAT TRANSFER LABORATORY	CO 1	conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.	✓									
		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	conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.				✓					
		CO 5	conduct tests to evaluate the performance of refrigeration and airconditioning test rigs.					✓				
19154C61P	FINITE ELEMENT ANALYSIS	CO 1	Summarize the basics of finite element formulation.	✓								
		CO 2	Apply finite element formulations to solve one dimensional Problems.		✓							
		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 and Computer 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		✓							

			Microprocessor and Microcontroller.										
		CO 3	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					✓					
19154C63P	COMPUTER INTEGRATED MANUFACTURING	CO 1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics		✓								
		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 LABORATORY	CO 1	Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.	✓									
		CO 2	Demonstrate the functioning of control systems with the help of PLC and microcontrollers.		✓								
19160S71P	TOTAL QUALITY MANAGEMENT	CO 1	To get familiarized with the basic concept and framework of Total Quality management										
		CO 2	To Understand the contribution of Quality Gurus in TQM Journey										
		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 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	CO	COURSE OUTCOMES	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
19248S11E	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					✓					
19254C12	THEORY OF METAL CUTTING	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.		✓								
		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 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.		✓								
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									✓
19254C15	AUTOMATED COMPUTER INTEGRATED MANUFACTURING SYSTEMS	CO 1	to produce useful research output in computer integrated manufacturing					✓				
		CO 2	use this knowledge to develop computer techniques				✓					
		CO 3	Application of this knowledge to functionalise computer aided planning.			✓						
19254E16A	MATERIALS MANAGEMENT AND LOGISTICS	CO 1	Understanding basics of materials management						✓			
		CO 2	Understanding requirement analysis for material planning	✓								
		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				✓					
19254C21	PRODUCTION MANAGEMENT	CO 1	Understand the role of operations management in achieving organizational competitiveness		✓							
		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 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.		✓								
19254L26	AUTOMATION LAB	CO 1	To perform documentation			✓							
		CO 2	To perform accounting operations				✓						
		CO 3	To perform presentation skills					✓					
192TECWR	TECHNICAL WRITING/SEMINAR	CO 1	Make effective presentations			✓							
		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		✓								
19254C31	METAL FORMING PROCESS	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				✓						
		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.					✓					

		CO 3	Comprehend key decision areas of operations and analyze data for effective decision making in operations management.		✓								
19254C22P	MEMS AND NANO TECHNOLOGY	CO 1	Ability to understand the operation of micro devices, micro systems and their applications	✓									
		CO 2	Ability to design the micro devices, micro systems using the MEMS fabrication process.	✓									
		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.	✓									
19254L24P	AUTOMATION LAB	CO 1	To perform documentation			✓							
		CO 2	To perform accounting operations				✓						
		CO 3	To perform presentation skills					✓					
192TECWR P	TECHNICAL WRITING/SEMINAR	CO 1	Make effective presentations			✓							
		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.		✓									
19254C31P	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											✓
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.			✓						
19254E33AP	MATERIALS MANAGEMENT AND LOGISTICS	CO 1	Understanding basics of materials management					✓				
		CO 2	Understanding requirement analysis for material planning	✓								
		CO 3	Ability to apply inventory management models	✓								
		CO 4	Understanding purchasing practices				✓					
		CO 5	Understanding storage in warehouse				✓					
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.									✓
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)				✓						
		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 PROCESS	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				✓						

		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.	✓														
19254P44P	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.						✓									
19254E53AP	ADVANCED MATERIAL TECHNOLOGY	CO 1	To impart knowledge on material selection methods and basics of advanced engineering materials.							✓								
		CO 2	To introduce the basics of smart materials, composite materials, ceramics and glasses and modern														✓	
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	✓														



HOD

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