# 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. |

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Deemed to be University
Vallam, Thanjavur - 613 403.

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:**

| | POs | | | | | | | | | | | | PSOs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PEOs** | **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 |
| **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 |
| **V.** | 3 | 2 | 2 | 2 | 1 | 3 | 2 | 2 | 2 | 1 | 1 | 3 | 3 | 2 | 2 |

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**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF MECHANICAL ENGINEERING**

**B.TECH - FULL TIME (UG - 2020)**

| COURSE CODE | COURSE TITLE | CO | COURSE OUTCOMES | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20147S11 | 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. | | | | | | | ✓ | | |
| 20148S12 | 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. | | ✓ | | | | | | | |

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| | | **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. | | | | | ✓ | | | | |
| **20149S13** | **ENGINEERING PHYSICS** | **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 | | ✓ | | | | | | | |

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| | | | optics, | | | | | | | | | |
| | | **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. | | | | ✓ | | | | | |
| **20149S14** | **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. | | | | ✓ | | | | | |
| **20154S15** | **ENGINEERING GRAPHICS** | **CO1** | familiarize with the fundamentals and standards of Engineering | | ✓ | | | | | | | |

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| | | | 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. | | | | ✓ | | | | | |
| **20150S16** | **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 | | | | | ✓ | | | | |

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| | | | Programs. | | | | | | | | | |
| **20150L17** | **PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY** | **CO1** | Write, test, and debug simple Python programs. | | | ✓ | | | | | | |
| | | **CO2** | Implement Python programs with conditionals and loops. | | | | | ✓ | | | | |
| | | **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. | ✓ | | | | | | | | |
| **20149L18** | **PHYSICS AND CHEMISTRY LABORATORY** | **CO1** | apply principles of elasticity, optics and thermal properties for engineering applications. | | | ✓ | | | | | | |
| **20147S21** | **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 | | | | | | | ✓ | | |

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| | | | contexts. | | | | | | | | | |
| | | **CO4** | Write reports and winning job applications. | | | | | | | ✓ | | |
| **20148S22** | **ENGINEERING MATHEMATICS – II** | **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. | | ✓ | | | | | | | |
| | | **CO3** | 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. | | | | | | | | | ✓ |

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| **20149S23C** | **MATERIALS SCIENCE** | **CO1** | the students will have knowledge on the various phase diagrams and their applications | | | | ✓ | | | | | |
| | | **CO2** | the students will acquire knowledge on Fe-$Fe_3C$ 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. | | | | | | | | ✓ | |
| **20149S24A** | **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 | | | | ✓ | | | | | |

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| | | | stage. | | | | | | | | | |
| | | **CO3** | Ignorance and incomplete knowledge has lead to misconceptions | | | | ✓ | | | | | |
| | | **CO4** | Development and improvement in std. of living has lead to serious environmental disasters | | | | ✓ | | | | | |
| **20153S25D** | **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 | | | | | | | | ✓ | |
| **20154S26D** | **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 | | | | | | | | | ✓ |

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| **20154L27** | **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 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. | | | ✓ | | | | | | |
| **20153L28D** | **BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY** | **CO1** | Ability to determine the speed characteristic of different electrical machines | | | ✓ | | | | | | |
| | | **CO2** | Ability to design simple circuits involving diodes and transistors | | | ✓ | | | | | | |
| | | **CO3** | Ability to use operational amplifiers | | | ✓ | | | | | | |

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| **20148S31C** | **TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS** | **CO1** | Understand how to solve the given standard partial differential equations. | ✓ | | | | | | | | |
| | | **CO2** | Solve differential equations using Fourier series analysis which plays a vital role in engineering applications. | | ✓ | | | | | | | |
| | | **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. | | | | | | | | | ✓ |

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| **20154C32** | **ENGINEERING THERMODYNAMICS** | **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. | | ✓ | | | | | | | |
| | | **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 | | | | | | | | ✓ | |
| **20154C33** | **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 | | | ✓ | | | | | | |

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| | | **CO4** | Can critically analyse the performance of pumps | | | | ✓ | | | | | |
| | | **CO5** | Can critically analyse the performance of turbines. | | | | | ✓ | | | | |
| **20154C34** | **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. | | | | | | | | ✓ | |
| **20154C35** | **ELECTRICAL DRIVES AND CONTROLS** | **CO1** | Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance | ✓ | | | | | | | | |
| **20154L36** | **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. | | | | | ✓ | | | | |

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| | | **CO4** | Use sheet metal fabrication tools and make simple tray and funnel. | | | | | | ✓ | | | |
| | | **CO5** | Use different moulding tools, patterns and prepare sand moulds. | | | | | | | | ✓ | |
| **20154L37** | **COMPUTER AIDED MACHINE DRAWING** | **CO1** | Follow the drawing standards, Fits and Tolerances | | | ✓ | | | | | | |
| | | **CO2** | Re-create part drawings, sectional views and assembly drawings as per standards | | | | ✓ | | | | | |
| **20154L38** | **ELECTRICAL ENGINEERING LABORATORY** | **CO1** | Ability to perform speed characteristic of different electrical machine | | | ✓ | | | | | | |
| **20154L39** | **INTERPERSONAL SKILLS/LISTENING & SPEAKING** | **CO1** | Listen and respond appropriately. | | | ✓ | | | | | | |
| | | **CO2** | Participate in group discussions | | | ✓ | | | | | | |
| | | **CO3** | Make effective presentations | | | ✓ | | | | | | |
| | | **CO4** | Participate confidently and appropriately in conversations both formal and informal | | | ✓ | | | | | | |
| **20148C41D** | **STATISTICS AND NUMERICAL METHODS** | **CO1** | Apply the concept of testing of hypothesis for small and large samples in real life problems. | ✓ | | | | | | | | |

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| | | **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 | | | | | ✓ | | | | |
| **20154C42** | **THEORY OF MACHINES-I** | **CO1** | Discuss the basics of mechanism | ✓ | | | | | | | | |
| | | **CO2** | Calculate velocity and acceleration in simple mechanisms | | ✓ | | | | | | | |
| | | **CO3** | Develop CAM profiles | | | ✓ | | | | | | |
| | | **CO4** | Solve problems on gears and gear trains | | | | | ✓ | | | | |
| | | **CO5** | Examine friction in | | | | | ✓ | | | | |

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| | | | machine elements | | | | | | | | | |
| **20154C43** | **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. | | | ✓ | | | | | | |
| | | **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. | | | | | | | | ✓ | |
| **20154C44** | **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. | | | | | | | ✓ | | |

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| | | **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. . | | | | | | | ✓ | | |
| **20154C45** | **STRENGTH OF MATERIALS FOR MECHANICAL ENGINEERS** | **CO1** | Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes. | ✓ | | | | | | | | |
| | | **CO2** | Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment. | | ✓ | | | | | | | |
| | | **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. | | | | | ✓ | | | | |

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| **20154C46** | **THERMAL ENGINEERING - I** | **CO1** | Apply thermodynamic concepts to different air standard cycles and solve problems. | ✓ | | | | | | | | |
| | | **CO2** | Solve problems in single stage and multistage air compressors | | ✓ | | | | | | | |
| | | **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. | | | | ✓ | | | | | |
| **20154L47** | **PRODUCTION TECHNOLOGY LABORATORY – II** | **CO1** | use different machine tools to manufacturing gears | | | ✓ | | | | | | |
| | | **CO2** | Ability to use different machine tools to manufacturing gears. | | | ✓ | | | | | | |
| | | **CO3** | Ability to use different machine tools for finishing operations | | | ✓ | | | | | | |
| | | **CO4** | Ability to manufacture tools using cutter grinder | | | ✓ | | | | | | |
| | | **CO5** | Develop CNC part programming | | | ✓ | | | | | | |

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| **20154L48** | **STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY** | **CO1** | Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials. | | | | | ✓ | | | | |
| | | **CO2** | Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials. | | | | | ✓ | | | | |
| | | **CO3** | Use the measurement equipments for flow measurement. | | | | | ✓ | | | | |
| | | **CO4** | Perform test on different fluid machinery. | | | | | ✓ | | | | |
| **20154L 49** | **ADVANCED READING AND WRITING** | **CO1** | Write different types of essays. | | | | | | ✓ | | | |
| | | **CO2** | Write winning job applications. | | | | | | ✓ | | | |
| | | **CO3** | Read and evaluate texts critically. | | | | | | | | | ✓ |
| | | **CO4** | Display critical thinking in various professional contexts. | | | | | | | | | ✓ |
| **20154C51** | **THERMAL ENGINEERING – II** | **CO1** | Solve problems in Steam Nozzle | ✓ | | | | | | | | |
| | | **CO2** | Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters. | | ✓ | | | | | | | |

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| | | **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 | | | | | | | | ✓ | |
| **20154C52** | **DESIGN OF MACHINE ELEMENTS** | **CO1** | Explain the influence of steady and variable stresses in machine component design. | | ✓ | | | | | | | |
| | | **CO2** | Apply the concepts of design to shafts, keys and couplings. | | | | ✓ | | | | | |
| | | **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. | | | | | | | | | ✓ |
| **20154C53** | **METROLOGY AND MEASUREMENTS** | **CO1** | Describe the concepts of measurements to apply in various metrological instruments | ✓ | | | | | | | | |

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| | | **CO2** | Outline the principles of linear and angular measurement tools used for industrial Applications | | | ✓ | | | | | | |
| | | **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 | | | | | | | | ✓ | |
| **20155OE54B** | **GEOGRAPHIC INFORMATION SYSTEM** | **CO1** | Understand the types of data models. | | | | | | | | | |
| | | **CO2** | Get knowledge about data input and topology. | | | | | | | | | |
| | | **CO3** | Gain knowledge on data quality and standards. | | | | | | | | | |
| | | **CO4** | Understand data management functions and data output | | | | | | | | | |
| **20154C55** | **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. | | ✓ | | | | | | | |

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| | | **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. | | | | | | | ✓ | | |
| **20154L56** | **THEORY OF MACHINES LABORATORY** | **CO1** | Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments. | ✓ | | | | | | | | |
| | | **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. | | ✓ | | | | | | | |
| **20154L57** | **THERMAL ENGINEERING LABORATORY** | **CO1** | conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials. | ✓ | | | | | | | | |
| | | **CO2** | conduct tests on natural and forced convective heat transfer apparatus and | | ✓ | | | | | | | |

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| | | | 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. | | | | | ✓ | | | | |
| **20154L58** | **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. | | ✓ | | | | | | | |

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| **20154C61** | **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. | | | | ✓ | | | | | |
| | | **CO3** | 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 | | | | | | | | | ✓ |
| **20154C62** | **COMPUTER AIDED DESIGN AND MANUFACTURING** | **CO1** | Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics | | ✓ | | | | | | | |
| | | **CO2** | Explain the fundamentals of parametric curves, surfaces and Solids | | | ✓ | | | | | | |
| | | **CO3** | Summarize the different types of Standard systems used in CAD | | | | | ✓ | | | | |
| | | **CO4** | Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines | | | | | | ✓ | | | |
| | | **CO5** | Summarize the different types of techniques used in Cellular Manufacturing and FMS | | | ✓ | | | | | | |

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| **20154C63** | **HEAT AND MASS TRANSFER** | **CO1** | Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems | ✓ | | | | | | | | |
| | | **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 | | | | | | | | ✓ | |

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| **20154C64** | **FINITE ELEMENT ANALYSIS** | **CO1** | Summarize the basics of finite element formulation. | ✓ | | | | | | | | |
| | | **CO2** | Apply finite element formulations to solve one dimensional Problems. | | ✓ | | | | | | | |
| | | **CO3** | 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. | | | | | | | | | ✓ |
| **20154C65** | **HYDRAULICS AND PNEUMATICS** | **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 | | ✓ | | | | | | | |
| | | **CO3** | Explain the different types of Hydraulic circuits and systems | | | | ✓ | | | | | |
| | | **CO4** | Explain the working of different pneumatic circuits and systems | | | | | | | | ✓ | |

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| | | **CO5** | Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems. | | | | | | | | ✓ | |
| **20154E66A** | **AUTOMOBILE ENGINEERING** | **CO1** | recognize the various parts of the automobile and their functions and materials. | ✓ | | | | | | | | |
| | | **CO2** | discuss the engine auxiliary systems and engine emission control. | | ✓ | | | | | | | |
| | | **CO3** | 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. | ✓ | | | | | | | | |
| **20154L67** | **CAD / CAM LABORATORY** | **CO1** | Draw 3D and Assembly drawing using CAD software | ✓ | | | | | | | | |
| | | **CO2** | Demonstrate manual part programming with G and M codes using CAM | | ✓ | | | | | | | |
| **20154L68** | **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 | | | | | | | ✓ | | |

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| | | | product. | | | | | | | | | |
| **20154L69** | **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 | | | | | | | ✓ | | |
| **20154C71** | **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. | | | | ✓ | | | | | |

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| | | **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. | | | | | | | | ✓ | |
| **20154C72** | **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. | | | | | | | | ✓ | |
| **20154C73** | **MECHATRONICS** | **CO1** | Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical andComputer Systems for the Control of Mechanical, Electronic Systems and sensor technology. | ✓ | | | | | | | | |

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| | | **CO2** | Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller. | | ✓ | | | | | | | |
| | | **CO3** | 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 | | | | | ✓ | | | | |
| **20154E75A** | **RENEWABLE SOURCES OF ENERGY** | **CO1** | Discuss the importance and Economics of renewable Energy | ✓ | | | | | | | | |
| | | **CO2** | Discuss the method of power generation from Solar Energy | | ✓ | | | | | | | |

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| | | **CO3** | Discuss the method of power generation from Wind Energy | | | ✓ | | | | | | |
| | | **CO4** | Explain the method of power generation from Bio Energy | | | | | | | | ✓ | |
| | | **CO5** | Explain the Tidal energy, Wave Energy, OTEC, Hydro energy, Geothermal Energy, Fuel | | | | | | | | | ✓ |
| **20154E76A** | **ROBOTICS** | **CO1** | Cells and Hybrid Systems. | ✓ | | | | | | | | |
| | | **CO2** | Illustrate the different types of robot drive systems as well as robot end effectors. | | ✓ | | | | | | | |
| | | **CO3** | Apply the different sensors and image processing techniques in robotics to improve the ability of robots. | | | ✓ | | | | | | |
| | | **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. | | | | | | | | ✓ | |
| **20155FE74B** | **WASTE WATER TREATMENT** | **CO1** | Will have knowledge about adsorption and | ✓ | | | | | | | | |

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| | | | oxidation process. | | | | | | | | | |
| | | **CO2** | Will gain idea about various methods available for water treatment. | | ✓ | | | | | | | |
| | | **CO3** | Will appreciate the necessity of water and acquire knowledge of preliminary treatment. | | | ✓ | | | | | | |
| **20154L77** | **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. | | | | | ✓ | | | | |
| | | **CO3** | calculate the natural frequency and mode shape analysis of 2D components and beams. | | | | | | | ✓ | | |
| **20154L78** | **MECHATRONICS LABORATORY** | **CO1** | Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems. | ✓ | | | | | | | | |

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| | | **CO2** | Demonstrate the functioning of control systems with the help of PLC and microcontrollers. | | ✓ | | | | | | | |
| **20154L79** | **TECHNICAL SEMINAR** | **CO1** | To enrich the communication skills of the student and presentations of technical topics of interest, this course is introduced. | ✓ | | | | | | | | |
| **20154S81** | **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 | | | | | | ✓ | | | |
| **20154E82A** | **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 | | ✓ | | | | | | | |

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| | | | manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP). | | | | | | | | | |
| **20154PW83** | **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. | ✓ | | | | | | | | |

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