**COURSE OUTCOMES**

| FE Semester-I | | |
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| FE-2015 | COs | Coure Outcome |
| 102006<br>Engineering<br>Graphics I | 102006-1 | To develop imagination of Physical Objects to be represented on Paper for EngineeringCommunication. |
| | 102006-2 | To develop the manual drawing Skill, drawing interpretation Skill |
| | 102006-3 | To develop the physical realisation of the dimension of the objects |
| 111007<br>Workshop<br>Practice | 111007 | Introduction to different materials in engineering practices with respect to their workability, formability & machinability with hand tools & power tools and to develop skills through hands on experience. |

| FE Semester-II | | |
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| FE-2015 | COs | Coure Outcome |
| 102013<br>Basic Mechanical<br>Engineering | 102013-1 | This course will help the student to acquire knowledge of mechanical engineering |
| | 102013-2 | Describe the scope of mechanical engineering with multidisciplinary industries. |
| | 102013-3 | Understand and identify common machine elements with their functions and power transmission devices. |
| | 102013-4 | Learn conventional machine tools and understand the concept of design in mechanicaJ engineering. |
| | 102013-5 | Imparl knowledge of basic concepts of thermodynamics applied to industrial applications. |
| | 102013-6 | Understand laying principles of energy conversion systems and power plants. |
| 102014<br>Engineering<br>Graphics II | 102014-1 | To develop imagination of Physical Objects to be represented on Paper for EngineeringCommunication. |
| | 102014-2 | To develop the manual drawing Skill, drawing interpretation Skill |
| | 102014-3 | To develop the physical realisation of the dimension of the objects |

| SE Semester-I | | |
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| **SE-2015** | **COs** | **Coure Outcome** |
| **207002 Engineering Mathematics** | 207002-1 | Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems. |
| | 207002-2 | Apply Laplace transform and Fourier transform techniques to solve differential equations involved in Vibration theory, Heat transfer and related engineering applications. |
| | 207002-3 | Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data and probability theory in testing and quality control. |
| | 207002-4 | Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems. |
| | 207002-5 | Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations. |
| **202041 Manufacturing Process-I** | 202041-1 | Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects. |
| | 202041-2 | Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes. |
| | 202041-3 | Understand different plastic molding processes, Extrusion of Plastic and Thermoforming |
| | 202041-4 | Understand different Welding and joining processes and its defects |
| | 202041-5 | Understand, Design and Analyze different sheet metal working processes |
| | 202041-6 | Understand the constructional details and Working of Centre Lathe |
| **202042 Computer Aided Machine Drawing** | 202042-1 | Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM. |
| | 202042-2 | Understand the significance of parametric technology and its application in 2D sketching. |
| | 202042-3 | Understand the significance of parametric feature-based modeling and its application in 3D machine components modeling. |
| | 202042-4 | Ability to create 3D assemblies that represent static or dynamic Mechanical Systems. |
| | 202042-5 | Ability to ensure manufacturability and proper assembly of components and assemblies. |
| | 202042-6 | Ability to communicate between Design and Manufacturing using 2D drawings. |
| **202043 Thermodynamics** | 202043-1 | On completion of the course, learner will be able to– |
| | 202043-2 | Apply various laws of thermodynamics to various processes and real systems. |
| | 202043-3 | Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes. |
| | 202043-4 | Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case. |
| | 202043-5 | Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle. |
| | 202043-6 | Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants. |
| | 202043-7 | Use Psychromertic charts and estimate various essential properties related to Psychrometry and processes |
| | 202044-1 | Understand the basic concepts and properties of Material. |
| | 202044-2 | Understand about material fundamental and processing. |

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| 202044<br>Material Science | 202044-3 | Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement |
| | 202044-4 | Detect the defects in crystal and its effect on crystal properties. |
| | 202044-5 | Evaluate the different properties of material by studying different test |
| | 202044-6 | Recognize how metals can be strengthened by cold-working and hot working |
| 202051<br>Strength of<br>Materials | 202051-1 | Apply knowledge of mathematics, science for engineering applications |
| | 202051-2 | Design and conduct experiments, as well as to analyze and interpret data |
| | 202051-3 | Design a component to meet desired needs within realistic constraints of health and safety |
| | 202051-4 | Identify, formulate, and solve engineering problems |
| | 202051-5 | Practice professional and ethical responsibility |
| | 202051-6 | Use the techniques, skills, and modern engineering tools necessary for engineering practice |
| 202054<br>Value Education | 202054 -1 | Understood human values, their significance and role in life. |
| | 202054 -2 | Promote self-reflection and critical inquiry that foster critical thinking of one's value and the values of others. |
| | 202054 -3 | Practice respect for human rights and democratic principles. |
| | 202054 -4 | Familiarized with various living and non-living organisms and their interaction with environment. |
| | 202054 -5 | Understood the basics regarding the leadership and to become a conscious professional. |
| 202054 A<br>Innovations in<br>Engineering Field/<br>Agriculture | 202054 A-1 | Understand what is thinking, its tools and process and its application to innovation |
| | 202054 A-2 | Practice application of innovation in engineering |
| | 202054 A-3 | Understand important terms like national productivity, sustainable development and inclusive growth |
| | 202054 A-4 | Throw a light on developing technologies in agriculture |
| | 202054 A-5 | Learn Interdisciplinary Engineering applications in Agriculture |
| 202054 B<br>Road Safety | 202054 B-1 | Generate awareness about number of people dyeing every year in road accidents, traffic rules and characteristics of accident. |
| | 202054 B-2 | Gain information and knowledge about people responsible for accidents and their duties |
| | 202054 B-3 | Understand the importance of multidisciplinary approach to planning for traffic safety and rehabilitation |
| | 202054 B-4 | Acquire a certificate of coordination/ participation in compulsory events based on the topic under study |

| SE Semester-II | | |
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| **SE-2015** | **COs** | **Coure Outcome** |
| 202045<br>Fluid Mechanics | 202045-1 | Use of various properties in solving the problems in fluids |
| | 202045-2 | Use of Bernoulli's equation for solutions in fluids |
| | 202045-3 | Determination of forces drag and lift on immersed bodies |
| 202047<br>Soft Skills | 202047-1 | Improved communication, interaction and presentation of ideas. |
| | 202047-2 | Right attitudinal and behaviouralchange |
| | 202047-3 | Developed right-attitudinal and behavioral change |
| 202048<br>Theory of<br>Machines – I | 202048-1 | Identify mechanisms in real life applications. |
| | 202048-2 | Perform kinematic analysis of simple mechanisms |
| | 202048-3 | Perform static and dynamic force analysis of slider crank mechanism. |
| | 202048-4 | Determine moment of inertia of rigid bodies experimentally. |
| | 202048-5 | Analyze velocity and acceleration of mechanisms by vector and graphical methods. |
| 202049<br>Engineering<br>Metallurgy | 202049-1 | describe how metals and alloys formed and how the properties change due to microstructure |
| | 202049-2 | apply core concepts in Engineering Metallurgy to solve engineering problems. |
| | 202049-3 | conduct experiments, as well as to analyze and interpret data |
| | 202049-4 | select materials for design and construction. |
| | 202049-5 | possess the skills and techniques necessary for modern materials engineering practice |
| | 202049-6 | recognize how metals can be strengthened by alloying, cold-working, and heat treatment |
| 202050<br>Applied<br>Thermodynamics | 202050-1 | Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses in real cycles. |
| | 202050-2 | Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation. |
| | 202050-3 | Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory of Detonation in CI Engines and Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types. |
| | 202050-4 | Carry out Testing of I. C. Engines and analyze its performance. |
| | 202050-5 | Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control. |
| | 202050-6 | Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors. |
| 203152<br>Electrical and<br>Electronics<br>Engineering | 203152-1 | Develop the capability to identify and select suitable DC motor / induction motor / special purpose motor and its speed control method for given industrial application. |
| | 203152-2 | Program Arduino IDE using conditional statements |
| | 203152-3 | Interfacing sensors with Arduino IDE |

| Course | CO Code | Course Outcome |
|---|---|---|
| 202045<br>Fluid Mechanics | 202045-1 | Use of various properties in solving the problems in fluids |
| | 202045-2 | Use of Bernoulli's equation for solutions in fluids |
| | 202045-3 | Determination of forces drag and lift on immersed bodies |
| 202047<br>Soft Skills | 202047-1 | Improved communication, interaction and presentation of ideas. |
| | 202047-2 | Right attitudinal and behaviouralchange |
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| 202048<br>Theory of<br>Machines – I | 202048-1 | Identify mechanisms in real life applications. |
| | 202048-2 | Perform kinematic analysis of simple mechanisms. |
| | 202048-3 | Perform static and dynamic force analysis of slider crank mechanism. |
| | 202048-4 | Determine moment of inertia of rigid bodies experimentally. |
| | 202048-5 | Analyze velocity and acceleration of mechanisms by vector and graphical methods. |
| 202049<br>Engineering<br>Metallurgy | 202049-1 | describe how metals and alloys formed and how the properties change due to microstructure |
| | 202049-2 | apply core concepts in Engineering Metallurgy to solve engineering problems. |
| | 202049-3 | conduct experiments, as well as to analyze and interpret data |
| | 202049-4 | select materials for design and construction. |
| | 202049-5 | possess the skills and techniques necessary for modern materials engineering practice |
| | 202049-6 | recognize how metals can be strengthened by alloying, cold-working, and heat treatment |
| 202050<br>Applied<br>Thermodynamics | 202050-1 | Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses in real cycles. |
| | 202050-2 | Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation. |
| | 202050-3 | Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory of Detonation in CI Engines and Comparison of SI and CI Combustion and Knocking and Factors affecting, Criteria for good combustion chamber and types. |
| | 202050-4 | Carry out Testing of I. C. Engines and analyze its performance. |
| | 202050-5 | Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Starting) also various harmful gases emitted from exhaust and different devices to control pollution and emission norms for pollution control. |
| | 202050-6 | Describe construction, working of various types of reciprocating and rotary compressors with performance calculations of positive displacement compressors. |
| 203152<br>Electrical and<br>Electronics<br>Engineering | 203152-1 | Develop the capability to identify and select suitable DC motor / induction motor / special purpose motor and its speed control method for given industrial application. |
| | 203152-2 | Program Arduino IDE using conditional statements |
| | 203152-3 | Interfacing sensors with Arduino IDE |

| TE Semester-I | | |
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| **TE-2015** | **COs** | **Coure Outcome** |
| 302041<br>Design of<br>Machine<br>Elements-I | 302041-1 | Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength. |
| | 302041-2 | Ability to design Shafts, Keys and Coupling for industrial applications. |
| | 302041-3 | Ability to design machine elements subjected to fluctuating loads. |
| | 302041-4 | Ability to design Power Screws for various applications. |
| | 302041-5 | Ability to design fasteners and welded joints subjected to different loading conditions. |
| | 302041-6 | Ability to design various Springs for strength and stiffness. |
| 302042<br>Heat Transfer | 302042-1 | Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system. |
| | 302042-2 | Implement the general heat conduction equation to thermal systems with and without internal generation and transient heat conduction. |
| | 302042-3 | Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation. |
| | 302042-4 | Interpret heat transfer by radiation between objects with simple geometries. |
| | 302042-5 | Analyze the heat transfer equipment and investigate the performance. |
| 302043<br>Theory of<br>Machines-II | 302043-1 | Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design. |
| | 302043-2 | Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear. |
| | 302043-3 | The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design. |
| | 302043-4 | Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves. |
| | 302043-5 | The student will synthesize a four bar mechanism with analytical and graphical methods. |
| | 302043-6 | A) The student will analyze the gyroscopic couple or effect for stabilization of Ship Aeroplane and Four wheeler vehicle. B) Student will choose appropriate drive for given application (stepped / step-less). |
| 302044<br>Turbo Machines | 302044-1 | Apply thermodynamics and kinematics principles to turbo machines. |
| | 302044-2 | Analyze the performance of turbo machines. |
| | 302044-3 | Ability to select turbo machine for given application. |
| | 302044-4 | Predict performance of turbo machine using model analysis. |
| 302045<br>Metrology and<br>Quality Control | 302045-1 | Understand the methods of measurement, selection of measuring instruments / standards of measurement, carryout data collection and its analysis. |
| | 302045-2 | Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design |
| | 302045-3 | Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately. |
| | 302045-4 | Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement. |
| 302046<br>Skill Development | 302046-1 | To develop the skill for required in shop floor working. |
| | 302046-2 | To have knowledge of the different tools and tackles used in machine assembly shop. |
| | 302046-3 | Use of theoretical knowledge in practice. |
| | 302046-4 | Practical aspect of the each component in the assembly of the machine. |

| TE Semester-II | | |
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| TE-2015 | COs | Coure Outcome |
| 302047<br>Numerical Methods and Optimization | 302047-1 | Use appropriate Numerical Methods to solve complex mechanical engineering problems. |
| | 302047-2 | Formulate algorithms and programming. |
| | 302047-3 | Use Mathematical Solver. |
| | 302047-4 | Generate Solutions for real life problem using optimization techniques. |
| | 302047-5 | Analyze the research problem |
| 302048<br>Design of Machine Elements-II | 302048-1 | To understand and apply principles of gear design to spur gears and industrial spur gear boxes. |
| | 302048-2 | To become proficient in Design of Helical and Bevel Gear |
| | 302048-3 | To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue. |
| | 302048-4 | To learn a skill to design worm gear box for various industrial applications. |
| | 302048-5 | To inculcate an ability to design belt drives and selection of belt, rope and chain drives. |
| | 302048-6 | To achieve an expertise in design of Sliding contact bearing in industrial applications. |
| 302049<br>Refrigeration and Air Conditioning | 302049-1 | Illustrate the fundamental principles and applications of refrigeration and air conditioning system |
| | 302049-2 | Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems |
| | 302049-3 | Present the properties, applications and environmental issues of different refrigerants |
| | 302049-4 | Calculate cooling load for air conditioning systems used for various |
| | 302049-5 | Operate and analyze the refrigeration and air conditioning systems. |
| 302050<br>Mechatronics | 302050-1 | Identification of key elements of mechatronics system and its representation in terms of block diagram |
| | 302050-2 | Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O |
| | 302050-3 | Interfacing of Sensors, Actuators using appropriate DAQ micro-controller |
| | 302050-4 | Time and Frequency domain analysis of system model (for control application) |
| | 302050-5 | PID control implementation on real time systems |
| | 302050-6 | Development of PLC ladder programming and implementation of real life system. |
| 302051<br>Manufacturing - Process-II | 302051-1 | Student should be able to apply the knowledge of various manufacturing processes. |
| | 302051-2 | Student should be able to identify various process parameters and their effect on processes. |
| | 302051-3 | Student should be able to figure out application of modern machining. |
| | 302051-4 | Students should get the knowledge of Jigs and Fixtures for variety of operations. |
| 302052<br>Machine Shop-II | 302052 | Ability to develop knowledge about the working and programming techniques for various machines and tools |
| 302053<br>Seminar | 302053-1 | Establish motivation for any topic of interest and develop a thought process for technical presentation. |
| | 302053-2 | Organize a detailed literature survey and build a document with respect to technical publications. |
| | 302053-3 | Analysis and comprehension of proof-of-concept and related data. |

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| | 302053-4 | Effective presentation and improve soft skills. |
| | 302053-5 | Make use of new and recent technology (e.g. Latex) for creating technical reports |
| 302054 Audit Course I :- Fire & Safety Technology | 302054-1 | To create and sustain a community of learning in which students acquire knowledge in fire, safety and hazard management and learn to apply it professionally with due consideration for ethical, human life & property safety issues. |
| | 302054-2 | To pursue research and development in fire safety engineering, hazard management and disseminate its findings. |
| | 302054-3 | To meet the challenges of today and tomorrow in the most effective, efficient and contemporary educational manner. |
| | 302054-4 | To help in building national capabilities in fire safety engineering, disaster management, hazard management, industrial safety education through practical training to ensure a fire safe nation. |
| 302054 Audit Course II - Entrepreneurship Development | 302054-1 | Appreciate the concept of Entrepreneurship |
| | 302054-2 | Identify entrepreneurship opportunity. |
| | 302054-3 | Develop winning business plans |
| 302054 Audit Course IV - Lean Management | 302054-1 | Will be able to do practice Lean Management at the workplace |
| | 302054-2 | Will be able to contribute in Continuous Improvement program of the Organization |
| 302054 Audit Course V - Smart Manufacturing | 302054-1 | Comfortable with terminology and practices in Smart Manufacturing |
| | 302054-2 | Able to face the challenges in Industry & also contribute towards advancement. |
| | 302054-3 | Active part of Industry 4.0 (Fourth Industrial Revolution) |

| BE Semester-I | | |
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| **BE-2012** | **COs** | **Coure Outcome** |
| 402041<br>Refrigeration and<br>Air Conditioning | 402041-1 | Illustrate the fundamental principles and applications of refrigeration and air conditioning system |
| | 402041-2 | Obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems |
| | 402041-3 | Present the properties, applications and environmental issues of different refrigerants |
| | 402041-4 | Calculate cooling load for air conditioning systems used for various applications |
| | 402041-5 | Operate and analyze the refrigeration and air conditioning systems. |
| 402042<br>CAD/ CAM<br>Automation | 402042-1 | Analyze and design real world components |
| | 402042-2 | Suggest whether the given solid is safe for the load applied. |
| | 402042-3 | Select suitable manufacturing method for complex components. |
| 402043<br>Dynamics of<br>Machinery | 402043-1 | Solutions to balancing problems of machines. |
| | 402043-2 | Ability to understand the fundamentals of vibration and Noise. |
| | 402043-3 | Ability to develop analytical competency in solving vibration problems. |
| | 402043-4 | Ability to understand measurement and control of vibration and noise. |
| | 402043-5 | Ability to calculate natural frequencies, Eigen values & Eigen vectors. |
| | 402043-6 | Ability to measure vibrations, vibration characteristics and understand various methods for vibration control for real life problem. |
| 402044A<br>Energy Audit and<br>Management<br>(Elective I) | 402044A-1 | Carry out Energy Audit of the residence / society / college where they are studying. |
| | 402044A-2 | Carry out electrical tariff calculation and accurately predict the electricity bill required for the installation. |
| | 402044A-3 | Suggest various methods to reduce energy consumption of the equipment / office / premises. |
| 402044B<br>Tribology<br>(Elective I) | 402044B-1 | For these simplified course contents, student develops confidence in him/her to fulfill course objectives. |
| | 402044B-2 | Term work includes simple case study/assignment/seminar/visit and in-semester theory examination as a part of learning process encourages students. |
| | 402044B-3 | He/she proves himself/herself to be excellent practical engineer in any tribological industry. |
| 402044C<br>Reliability<br>Engineering<br>(Elective I) | 402044C-1 | Understand and analyze different methods of failure. |
| | 402044C-2 | Calculate MTTF, MTBF, failure rate and hazard rate. |
| | 402044C-3 | Different probability methods applied to Reliability. |
| | 402044C-4 | Optimize Cost & reliability. |
| | 402044C-5 | Perform FEMA, FMECA, DOE, Taguchi method. |
| | 402044C-6 | Different methods to test reliability. |

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| 402044D<br>Machine Tool<br>Design (Elective I) | 402044D-1 | Design gear box. |
| | 402044D-2 | Design different machine tools considering static and dynamic loads. |
| | 402044D-3 | Understand effect of vibrations on life of machine tools. |
| | 402044D-4 | Understand design considerations for Special features in Machine tools. |
| 402045A<br>Gas Turbine and<br>Propulsion<br>(Elective II) | 402045A-1 | Demonstrate the gas turbine power plant |
| | 402045A-2 | Illustrate the jet propulsion system |
| | 402045A-3 | Analyze the performance of gas turbine engine |
| | 402045A-4 | Present the technical details of compressors used in gas power systems |
| 402045B<br>Product Design<br>and Development<br>(Elective II) | 402045B-1 | Design a sustainable product. |
| | 402045B-2 | Develop commercial Product |
| | 402045B-3 | Master in new techniques PLM and PDM |
| 402045C<br>Operation<br>Research<br>(ELECTIVE II) | 402045C-1 | Illustrate the need to optimally utilize the resources in various types of industries. |
| | 402045C-2 | Apply and analyze mathematical optimization functions to various applications. |
| | 402045C-3 | Demonstrate cost effective strategies in various applications in industry. |
| 402045D<br>Advanced<br>Manufacturing<br>Processes<br>(Elective II) | 402045D-1 | Selection of appropriate manufacturing process for advance components |
| | 402045D-2 | Characterization of work pieces |

| BE Semester-II | | |
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| **BE-2012** | **COs** | **Coure Outcome** |
| 402047<br>Power Plant<br>Engineering | 402047-1 | Ability to have adequacy with Design, erection and development of energy conversion plants. |
| | 402047-2 | Optimization of Energy Conversion plant with respect to the available resources. |
| | 402047-3 | Scope of alternative erection of optimized, suitable plant at the location depending upon geographical conditions |
| 402048<br>Mechanical<br>System Design | 402048-1 | The student will understand the difference between component level design and system level design. |
| | 402048-2 | Ability to design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated. |
| | 402048-3 | Ability to learn optimum design principles and apply it to mechanical components. |
| | 402048-4 | Ability to to handle system level projects from concept to product. |
| 402049A<br>Refrigeration and<br>Air Conditioning<br>Equipment Design<br>(Elective III) | 402049A-1 | Select the different components of refrigeration system i.e. condensers, evaporators, controls etc. for given applications |
| | 402049A-2 | Demonstrate the concepts of design of evaporators and condensers for unitary systems |
| | 402049A-3 | Analyses the performance of cooling tower and heap pipe. |
| | 402049A-4 | Illustrate the methods for production of ultralow temperature |
| 402049B<br>Robotics (Elective<br>III) | 402049B-1 | Understand the complete design procedure of the robot. |
| | 402049B-2 | Select correct mechanism for operation of the robot. |
| | 402049B-3 | Select necessary actuators, sensors, control for satisfactory performance of the robot. |
| 402049C<br>Industrial<br>Engineering<br>(Elective III) | 402049C-1 | Apply the Industrial Engineering concept in the industrial environment. |
| | 402049C-2 | Manage and implement different concepts involved in methods study and understanding of work content in different situations. |
| | 402049C-3 | Undertake project work based on the course content. |
| | 402049C-4 | Describe different aspects of work system design and facilities design pertinent to manufacturing industries. |
| | 402049C-5 | Identify various cost accounting and financial management practices widely applied in industries. |
| | 402049C-6 | Develop capability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products. |
| 402050<br>A Computational<br>Fluid Dynamics<br>(Elective IV) | 402050A-1 | Ability to analyze and model fluid flow and heat transfer problems. |
| | 402050A-2 | Ability to generate high quality grids and interprete the correctness of numerical results with physics. |
| | 402050A-3 | Ability to use a CFD tool effectively for practical problems and research. |
| | 402050A-4 | Ability to conceptualize the programming skills. |
| 402050B<br>Finite Element<br>Analysis (Elective<br>IV) | 402050B-1 | Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses. |
| | 402050B-2 | Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results. |
| | 402050B-3 | Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis. |
| | 402050B-4 | Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors. |
| 402050C<br>Design of Pumps,<br>Blowers and<br>Compressors<br>(Elective IV) | 402050C-1 | Select suitable Pump, Blower, fan or compressor for a given application. |
| | 402050C-2 | Design Pump, Blower, fan or compressor for a given application |