K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## UG Program

- **Department Name: Sciences and Humanities**
- **UG Program Name:-All**
- **Vision and Mission:-**

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| **Vision** | To augment UG and PG engineering programs in the institute by encouraging First Year Students in their academic pursuit and instilling competence to think critically, logically, and communicate clearly. |
| **Mission** | • To induct the students with the engineering ecosystem that nurtures their holistic development.<br>• To provide a student-centric learning environment to upscale their interest in engineering.<br>• To provide strong foundation of basic sciences and fundamental engineering courses for assimilation of it in developing engineering solutions.<br>• To acquire mathematical ability in evaluating problems and in suggesting solutions.<br>• To improve basic skills of language for effective technical communication in English. |

## Course Outcomes of first year courses (2024-25)

**Class: F. Y. B. Tech** **Sem I**

### Group A:

| Course | COs | Statement |
|---|---|---|
| **SH1313 General Physics and Optics** | CO1 | Compare the behavior of mechanical system under damping and external periodic force. |
| | CO2 | Use the principles of architectural acoustics to assess the acoustical characteristics of a hall. |
| | CO3 | Analyze the interference in thin films, wedge shaped film and Newton's rings to calculate conditions in constructive and destructive interference. |
| | CO4 | Examine the behavior of microscopic particles using the theories in quantum mechanics such as wave particle duality, uncertainty principle, and particle in 1D infinite potential box problem. |
| | CO5 | Compare the semiconductors based on type of charge carrier, band energy diagram, location of Fermi energy, and Hall effect |
| | CO6 | Classify the different types of laser based on fundamentals of operation including solid state, and gas laser. |

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| **SH1515 General Physics and Optics Lab** | CO1 | Develop the skills of performing the experiments relevant to theories in optics, oscillations, semiconductors, ultrasound, and quantum mechanics. |
| | CO2 | Use different measuring tools and techniques to conduct the experiments. |
| | CO3 | Interpret the collected data from experiment to determine the relevant physical quantity. |
| | CO4 | Write a lab report which communicates scientific information in clear manner |
| **SH1056 Matrices and Differential Equations** | CO1 | Use the concepts of matrices that serve as an essential basis for several computational techniques. |
| | CO2 | Solve the problems on ordinary differential equations analytically and numerically. |
| | CO3 | Make use of different methods to solve simultaneous algebraic linear equations |
| | CO4 | Apply the relevant numerical method for interpolating the polynomial. |
| **SH1101 Matrices and Differential Equations Lab** | CO1 | Use MATLAB for interactive computations. |
| | CO2 | Familiar with memory and file management in MATLAB. |
| | CO3 | Generate plots and export this for use in reports and presentations. |
| | CO4 | Familiar with strings, matrices, and their use. |
| **SH1294 Basic Electrical Engineering** | CO1 | Solve D.C. and A.C. electric circuits. |
| | CO2 | Illustrate the notions of magnetic circuits |
| | CO3 | Explore switchgear for electrical installations and illumination |
| | CO4 | Elaborate transformer and rotating electrical machines. |
| **SH1794 Basic Electrical Engineering Lab** | CO1 | Explain the concept of circuit laws and network theorems and apply them to specific network. |
| | CO2 | To demonstrate balanced and unbalanced star and delta connected supply and measure power in three phase circuits. |
| | CO3 | To demonstrate characteristics equations for DC machines and single-phase transformer. |

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| | CO4 | Explain operation, features of electric machines and their applications. |
| | CO5 | Apply the skills using electrical measuring devices. |
| **Electives**<br>**SE1054**<br>**Basics of Civil Engineering** | CO1 | Identify the components of a given type of building structure and recommend their suitability under specified soil and loading conditions. |
| | CO2 | Prepare plan of a single storey residential building for the given requirements using building planning principles, byelaws and property document information. |
| | CO3 | Assess the quality of different construction materials based on their engineering properties and explain the standard procedures followed for using them in the construction of building components. |
| | CO4 | Determine included angles, areas, reduced levels and contours for the specified ground points or surfaces using the methods of horizontal and vertical measurements. |
| | CO5 | . Describe the components of a specified infrastructure system and the functions served by them. |
| **SE1554**<br>**Basics of Civil Engineering Lab** | CO1 | Draw dimensioned sketch/plan of building |
| | CO2 | Plan building using principles and bye laws. |
| | CO3 | Perform horizontal and vertical measurement. |
| | CO4 | Use modern surveying tool/equipment for performing horizontal and vertical measurements. |
| **SE1134**<br>**Green Technology** | CO1 | Explain the basic principles of green chemistry and ecology. |
| | CO2 | Discuss concept of green buildings and green management. |
| | CO3 | Compare conventional and non-conventional energy sources. |
| | `CO4 | Discuss solid waste processing techniques. |
| | CO5 | Describe various green innovations for sustainability. |
| **SE1634** | CO1 | Explain the concept of green technology/green building. |
| | CO2 | Prepare energy and water budget for a building. |

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| **Green Technology Lab** | CO3 | Design rainwater harvesting for a small catchment area. |
| | CO4 | Analyze solid waste for Waste-to-Energy. |
| **SE1453 Creativity, Design Thinking and Entrepreneurial Mindset** | CO1 | Learn structured approach to creativity, problem identification and problem solving in a new venture context |
| | CO2 | Apply design thinking approach to identify innovation opportunities and develop solutions |
| | CO3 | Identify, validate and define specific innovation opportunities through Jobs-to-be-Done methodology |
| | CO4 | Develop mindset of a successful entrepreneur |
| **SE1673 Creativity, Design Thinking and Entrepreneurial Mindset Lab** | CO1 | Learn structured approach to creativity, problem identification and problem solving in a new venture context. |
| | CO2 | Apply design thinking approach to identify innovation opportunities and develop solutions. |
| | CO3 | Develop mindset of a successful entrepreneur |
| **SE1751 Basics of Sensor Technology** | CO1 | Recognize basic analog and digital devices used for different electronic applications. |
| | CO2 | Explain working principle of various sensors |
| | CO3 | Identify suitable sensors and transducers for real time applications |
| | CO4 | Analyze the different sensor based electronic circuits. |
| **SE1791 Basics of Sensor Technology Lab** | CO1 | Identify the electronics components for given values. |
| | CO2 | Design electronic system using sensors |
| | CO3 | Measure electrical parameters of sensors. |
| | CO4 | Write report and communicate effectively**.** |
| **SH1853 Engineering Practice Lab. I** | CO1 | Acquire skills in basic engineering practice. |
| | CO2 | Use hand tools and power tools. |
| | CO3 | Develop sheet metal model for specific application. |
| | CO4 | Illustrate the various operations performed in machine shop. |

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| | CO5 | Perform different joining operations |
| | CO6 | Perform pipe fittings operations. |
| **SE1472 Introduction to Artificial Intelligence** | CO1 | Explain the different terminologies used in Artificial Intelligence. |
| | CO2 | Identify engineering and societal problems that can be efficiently solved by artificial intelligence techniques. |
| | CO3 | Demonstrate the search algorithms to solve problems. |
| | CO4 | Apply Python Programming in AI based applications. |
| | CO5 | Illustrate the concepts of machine learning. |
| | CO6 | Describe the robot tasks, architecture and usage in real world. |
| **SE1692 Introduction to Artificial Intelligence Lab** | CO1 | Identify Real Time Problems with their AI solutions. |
| | CO2 | Demonstrate and explore the functionalities in different programming frameworks & S/W technologies. |
| | CO3 | Solve problems using python programming concepts. |
| | CO4 | Implement supervised learning algorithms using python programming to solve the real time problems. |
| **SE1094 Engineering Materials** | CO1 | Classify materials on the basis of various properties. |
| | CO2 | Estimate different mechanical properties using destructive testing methods. |
| | CO3 | Select suitable non-destructive testing method for flaw detection in component. |
| | CO4 | Explain composites, nonferrous materials and alloys with their applications |
| | CO5 | Identify the recycling issues associated with various engineering materials. |
| **SE1594 Engineering Materials Lab** | CO1 | Illustrate stress strain diagram for different materials. |
| | CO2 | Use Rockwell Hardness testing machine to measure hardness of material. |
| | CO3 | Measure impact strength of the metals |

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| | CO4 | Determine fatigue strength of metals. |
| | CO5 | Determine flaws in the component using non-destructive testing methods. |
| | CO6 | Explain working principle of emission spectrometer. |
| **SE1811 Introduction to Electric Vehicles** | CO1 | Justify the need for EVs and HEVs from environment and policy perspectives. |
| | CO2 | Demonstrate the knowledge of electric vehicle technology. |
| | CO3 | Elaborate the hybrid electric vehicle technology. |
| **SE1831 Introduction to Electric Vehicles Lab** | CO1 | Compare typical conventional powertrain and the electric powertrain. |
| | CO2 | Evaluate the performance and sizing of typical EV electric motor and battery. |
| | CO3 | Model and simulate the EV/HEV using MATLAB/Simulink Powertrain block set. |
| **SH1834 English Proficiency Lab. I** | CO1 | Analyse aspects of nature and process of communication in professional contexts. |
| | CO2 | Demonstrate reception skills od language. |
| | CO3 | Apply speaking skills in various situations. |
| | CO4 | Make use of English language with grammatical accuracy. |
| **SH1893 Engineering Exploration and Design Project** | CO1 | Explain the role of an engineer as a problem solver |
| | CO2 | Design engineering solutions to complex problems utilizing multi-disciplinary systems approach. |
| | CO3 | Examine a given problem using process of engineering problem analysis. |
| | CO4 | Build simple systems/prototypes using engineering design and development process. |
| | CO5 | Analyze engineering solutions from ethical and sustainability perspectives. |
| | CO6 | Apply basics of engineering project management skills in project development. |

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| **SH136**<br><br>**Biology for Engineers** | CO1 | Apply biological engineering principles, procedures needed to solve real-world problems. |
| | CO2 | Describe the functions of biological systems. |
| | CO3 | Analyze biological phenomena and compute work done at microscale. |
| | CO4 | Explain working of different biomedical instruments. |
| | CO5 | Select the sensors for given biological applications. |
| | CO6 | Explain relevant aspect of movement control process. |

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# Course Outcomes of first year courses (2024-25)

**Class: F. Y. B. Tech** **Sem II**

## Group A:

| | | |
|---|---|---|
| **SH 1036 Modern Engineering Chemistry** | CO1 | Examine water quality for industrial and domestic sector and suggest remedial measures |
| | CO2 | Distinguish the basic concepts of spectroscopic methods for characterization of advanced materials. |
| | CO3 | Interpret components of the various systems using Phase rule concept and outline the various applications of alloys |
| | CO4 | Identify causes of corrosion and its remedial measures. |
| | CO5 | Explain the synthesis and applications of nanomaterials in engineering sector. |
| | CO6 | Compare types and quality of fuels, lubricants and illustrate the applications of batteries |
| **SH1535 Engineering Chemistry Lab** | CO1 | Examine the materials by using analytical instruments. |
| | CO2 | Identify the quality of water for industrial and domestic purposes. |
| | CO3 | Apply the knowledge of corrosion science for measurement of rate of corrosion. |
| | CO4 | Apply science of polymers and nanomaterials in the synthesis of materials. |
| | CO5 | Inspect the quality of fuel. |
| **SH1026 Calculus** | CO1 | Solve problems on improper and multiple integrals |
| | CO2 | Sketch the curve and use it to solve the problems on rectification and multiple integral. |
| | CO3 | Prove the results of partial differentiation. |
| | CO4 | Apply partial differentiation for problems on jacobian, errors and approximations, maxima and minima. |
| | CO1 | Develop codes for different type's integrals. |

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| **SH1161 Calculus Lab** | CO2 | Sketch the curves. |
| | CO3 | Solve various problems on partial differentiation by MATLAB. |
| **SH1135 Engineering Graphics** | CO1 | Draw the projections of line, plane and regular solids with respect to reference planes as per given conditions using AUTOCAD software. |
| | CO2 | Generate the sectional view, true shape of the section and development of the solid with the help of AUTOCAD software. |
| | CO3 | Prepare orthographic views of engineering components by using AUTOCAD software. |
| **SH1333 Programming for Problem Solving** | CO1 | Explain the basic terminologies and concepts of C programming language. |
| | CO2 | Construct the algorithm and flow chart to solve the given problem |
| | CO3 | Write a C program for given problem statement |
| | CO4 | Examine the given C program to remove the logical & syntax errors and predict the correct output |
| **SH146 Vedic Mathematics** | CO1 | Apply Vedic sutras to usual multiplication |
| | CO2 | Solve problems on division and divisibility by Vedic sutras |
| | CO3 | Factorise the polynomials of degree two and three using Vedic sutras |
| | CO4 | Employ Vedic Sutras to solve system of linear equations and matrices faster and with |
| **SH1913 Programming for Problem Solving Lab** | CO1 | Describe various terminologies and concepts of C programming language |
| | CO2 | Construct the algorithm and flow chart to solve the given problem. |
| | CO3 | Implement a 'C' program for given problem statement |
| | CO4 | Test the implemented 'C' programs by removing syntax & logical errors for getting expected output on various input. |
| **SH1623** | CO1 | Identify the need of positive attitude in interpersonal communication. |

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| **English Proficiency Lab. II** | CO2 | Demonstrate conversational and comprehension skills of English language. |
| | CO3 | Demonstrate writing skills through reports, letters, circulars, notices, and memos. |
| | CO4 | Organize content of technical documents in specific forms. |
| **SH1643 Engineering Practice Lab II** | CO1 | Make wooden job. |
| | CO2 | Make Sheet metal job. |
| | CO3 | Make job by various machining processes. |
| | CO4 | Make job by joining processes. |
| **SH136 Biology for Engineers** | CO1 | Apply biological engineering principles, procedures needed to solve real-world problems. |
| | CO2 | Describe the functions of biological systems. |
| | CO3 | Analyze biological phenomena and compute work done at microscale. |
| | CO4 | Explain working of different biomedical instruments. |
| | CO5 | Select the sensors for given biological applications. |
| | CO6 | Explain relevant aspect of movement control process. |

## Course Outcomes of first year courses (2024-25)

**Class: F. Y. B. Tech** **Sem I**

## Group B:

| Course | COs | Statement |
|---|---|---|
| **SH1201 Linear Algebra, and** | CO1 | Use the concepts of matrices that serve as an essential basis for several computational techniques. |
| | CO2 | Make use of different methods to solve simultaneous algebraic linear equations. |

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| **Ordinary Differential Equation** | CO3 | Solve the problems on ordinary differential equations analytically and numerically. |
| | CO4 | Apply the relevant numerical method for interpolating the polynomial. |
| **SH1221 Linear Algebra, and Ordinary Differential Equation Lab** | CO1 | Use MATLAB for interactive computations. |
| | CO2 | Familiar with memory and file management in MATLAB. |
| | CO3 | Generate plots and export this for use in reports and presentations. |
| | CO4 | Familiar with strings, matrices, and their use. |
| **SH1834 English Proficiency Lab. I** | CO1 | Analyse aspects of nature and process of communication in professional contexts. |
| | CO2 | Demonstrate reception skills od language. |
| | CO3 | Apply speaking skills in various situations. |
| | CO4 | Make use of English language with grammatical accuracy. |
| **SH 1181 Advanced Engineering Chemistry** | CO1 | Examine water quality for industrial and domestic sector and suggest remedial measures |
| | CO2 | Distinguish the basic concepts of spectroscopic methods for characterization of advanced materials. |
| | CO3 | Illustrate fundamentals of various polymers and distinguish their applications in engineering field. |
| | CO4 | Identify causes of corrosion and its remedial measures. |
| | CO5 | Explain the synthesis and applications of nanomaterials in engineering sector. |
| | CO6 | Explain the fundamentals of electroplating with its applications. |
| **SH1535 Engineering Chemistry Lab** | CO1 | Examine the materials by using analytical instruments. |
| | CO2 | Identify the quality of water for industrial and domestic purposes. |
| | CO3 | Apply the knowledge of corrosion science for measurement of rate of corrosion. |
| | CO4 | Apply science of polymers and nanomaterials in the synthesis of materials. |
| | CO5 | Inspect the quality of fuel. |

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| **SH1135 Engineering Graphics** | CO1 | Draw the projections of line, plane and regular solids with respect to reference planes as per given conditions using AUTOCAD software. |
| | CO2 | Generate the sectional view, true shape of the section and development of the solid with the help of AUTOCAD software. |
| | CO3 | Prepare orthographic views of engineering components by using AUTOCAD software. |
| **SH1333 Programming for Problem Solving** | CO1 | Explain the basic terminologies and concepts of C programming language. |
| | CO2 | Construct the algorithm and flow chart to solve the given problem |
| | CO3 | Write a C program for given problem statement |
| | CO4 | Examine the given C program to remove the logical & syntax errors and predict the correct output |
| **SH1913 Programming for Problem Solving Lab** | CO1 | Describe various terminologies and concepts of C programming language |
| | CO2 | Construct the algorithm and flow chart to solve the given problem. |
| | CO3 | Implement a 'C' program for given problem statement |
| | CO4 | Test the implemented 'C' programs by removing syntax & logical errors for getting expected output on various input. |
| **SH146 Vedic Mathematics** | CO1 | Apply Vedic sutras to usual multiplication |
| | CO2 | Solve problems on division and divisibility by Vedic sutras |
| | CO3 | Factorise the polynomials of degree two and three using Vedic sutras |
| | CO4 | Employ Vedic Sutras to solve system of linear equations and matrices faster and with |

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## Course Outcomes of first year courses (2024-25)

**Class: F. Y. B. Tech** **Sem II**

## Group B:

| Course | COs | Statement |
|---|---|---|
| **SH1241**<br>: **Quantum Physics and Materials** | CO1 | Solve the Schrodinger equation to obtain wave functions for some basic, physically important types of potential in one dimension, and estimate the shape of the wave function based on the shape of the potential. |
| | CO2 | Explain the types of semiconductor, concept of Fermi energy, and Hall Effect in semiconductors. |
| | CO3 | Illustrate the basics of laser production and its application in holography, propagation of light through optical fibers and its application in sensors and communication. |
| | CO4 | Classify and analyze magnetic materials and superconductors. |
| **SH1281 Quantum Physics and Materials Lab** | CO1 | Develop the skills of performing the experiments relevant to theories in optics, semiconductors, hysteresis, and quantum mechanics. |
| | CO2 | Use different measuring tools and techniques to conduct the experiments. |
| | CO3 | Interpret the collected data from experiment to determine the relevant physical quantity. |
| | CO4 | Write a lab report which communicates scientific information in a clear manner. |
| **SH1294**<br>**Basic Electrical Engineering** | CO1 | Solve D.C. and A.C. electric circuits. |
| | CO2 | Solve magnetic circuits and related issues. |
| | CO3 | Illustrate transformers and its application. |
| | CO4 | Choose appropriate rotating machines based on their applications. |
| | CO5 | Explore suitable capacity of wires, cables switchgear and illumination system for electrical installations. |
| **SH1794** | CO1 | Explain the concept of circuit laws and network theorems and apply them to specific network. |

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| **Basic Electrical Engineering Lab** | CO2 | Demonstrate balanced and unbalanced star and delta connected supply and measure power in three phase circuits. |
| | CO3 | Demonstrate characteristics equations for DC machines and single-phase transformer. |
| | CO4 | Explain operation, features of electric machines and their applications. |
| | CO5 | Apply the skills using electrical measuring devices. |
| **Electives**<br>**SE1054**<br>**Basics of Civil Engineering** | CO1 | Identify the components of a given type of building structure and recommend their suitability under specified soil and loading conditions. |
| | CO2 | Prepare plan of a single storey residential building for the given requirements using building planning principles, byelaws and property document information. |
| | CO3 | Assess the quality of different construction materials based on their engineering properties and explain the standard procedures followed for using them in the construction of building components. |
| | CO4 | Determine included angles, areas, reduced levels and contours for the specified ground points or surfaces using the methods of horizontal and vertical measurements. |
| | CO5 | . Describe the components of a specified infrastructure system and the functions served by them. |
| **SE1554**<br>**Basics of Civil Engineering Lab** | CO1 | Draw dimensioned sketch/plan of building |
| | CO2 | Plan building using principles and bye laws. |
| | CO3 | Perform horizontal and vertical measurement. |
| | CO4 | Use modern surveying tool/equipment for performing horizontal and vertical measurements. |
| **SE1134**<br>**Green Technology** | CO1 | Explain the basic principles of green chemistry and ecology. |
| | CO2 | Discuss concept of green buildings and green management. |
| | CO3 | Compare conventional and non-conventional energy sources. |
| | `CO4 | Discuss solid waste processing techniques. |
| | CO5 | Describe various green innovations for sustainability. |

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| **SE1634**<br>**Green Technology Lab** | CO1 | Explain the concept of green technology/green building. |
| | CO2 | Prepare energy and water budget for a building. |
| | CO3 | Design rainwater harvesting for a small catchment area. |
| | CO4 | Analyze solid waste for Waste-to-Energy. |
| **SE1453**<br>**Creativity, Design Thinking and Entrepreneurial Mindset** | CO1 | Learn structured approach to creativity, problem identification and problem solving in a new venture context |
| | CO2 | Apply design thinking approach to identify innovation opportunities and develop solutions |
| | CO3 | Identify, validate and define specific innovation opportunities through Jobs-to-be-Done methodology |
| | CO4 | Develop mindset of a successful entrepreneur |
| **SE1673**<br>**Creativity, Design Thinking and Entrepreneurial Mindset Lab** | CO1 | Learn structured approach to creativity, problem identification and problem solving in a new venture context. |
| | CO2 | Apply design thinking approach to identify innovation opportunities and develop solutions. |
| | CO3 | Develop mindset of a successful entrepreneur |
| **SE1751**<br>**Basics of Sensor Technology** | CO1 | Recognize basic analog and digital devices used for different electronic applications. |
| | CO2 | Explain working principle of various sensors |
| | CO3 | Identify suitable sensors and transducers for real time applications |
| | CO4 | Analyze the different sensor based electronic circuits. |
| **SE1791**<br>**Basics of Sensor Technology Lab** | CO1 | Identify the electronics components for given values. |
| | CO2 | Design electronic system using sensors |
| | CO3 | Measure electrical parameters of sensors. |
| | CO4 | Write report and communicate effectively**.** |
| **SH1852** | CO1 | Acquire skills in basic engineering practice. |
| | CO2 | Use hand tools and power tools. |

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| **Engineering Practice Lab. I** | CO3 | Develop sheet metal model for specific application. |
| | CO4 | Illustrate the various operations performed in machine shop. |
| | CO5 | Perform different joining operations |
| | CO6 | Perform pipe fittings operations. |
| **SE1472 Introduction to Artificial Intelligence** | CO1 | Explain the different terminologies used in Artificial Intelligence. |
| | CO2 | Identify engineering and societal problems that can be efficiently solved by artificial intelligence techniques. |
| | CO3 | Demonstrate the search algorithms to solve problems. |
| | CO4 | Apply Python Programming in AI based applications. |
| | CO5 | Illustrate the concepts of machine learning. |
| | CO6 | Describe the robot tasks, architecture and usage in real world. |
| **SE1692 Introduction to Artificial Intelligence Lab** | CO1 | Identify Real Time Problems with their AI solutions. |
| | CO2 | Demonstrate and explore the functionalities in different programming frameworks & S/W technologies. |
| | CO3 | Solve problems using python programming concepts. |
| | CO4 | Implement supervised learning algorithms using python programming to solve the real time problems. |
| **SE1094 Engineering Materials** | CO1 | Classify materials on the basis of various properties. |
| | CO2 | Estimate different mechanical properties using destructive testing methods. |
| | CO3 | Select suitable non-destructive testing method for flaw detection in component. |
| | CO4 | Explain composites, non ferrous materials and alloys with their applications |
| | CO5 | Identify the recycling issues associated with various engineering materials. |
| | CO1 | Illustrate stress strain diagram for different materials. |

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| **SE1594 Engineering Materials Lab** | CO2 | Use Rockwell Hardness testing machine to measure hardness of material. |
| | CO3 | Measure impact strength of the metals |
| | CO4 | Determine fatigue strength of metals. |
| | CO5 | Determine flaws in the component using non-destructive testing methods. |
| | CO6 | Explain working principle of emission spectrometer. |
| **SE1811 Introduction to Electric Vehicles** | CO1 | Justify the need for EVs and HEVs from environment and policy perspectives. |
| | CO2 | Demonstrate the knowledge of electric vehicle technology. |
| | CO3 | Elaborate the hybrid electric vehicle technology. |
| **SE1831 Introduction to Electric Vehicles Lab** | CO1 | Compare typical conventional powertrain and the electric powertrain. |
| | CO2 | Evaluate the performance and sizing of typical EV electric motor and battery. |
| | CO3 | Model and simulate the EV/HEV using MATLAB/Simulink Powertrain block set. |
| **SE1433 Basics of Mechanical Engineering** | CO1 | Explain different power generation systems. |
| | CO2 | Select appropriate energy conversion device for the given application. |
| | CO3 | Classify vehicles on the basis of different parameters. |
| | CO4 | Compare two stroke and four stroke 1C engines. |
| | CO5 | Describe different transmission devices in a given system. |
| | CO6 | Choose suitable materials and manufacturing processes for a given application. |
| **SE1633 Basics of Mechanical Engineering Lab** | CO1 | Explain the different components of power generation systems. |
| | CO2 | Identify the systems and components of vehicle. |
| | CO3 | Distinguish between two stroke and four stroke engines. |
| | CO4 | Explain the working of major components of vehicle. |

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| **SH1893**<br><br>**Engineering Exploration and Design Project** | CO1 | Explain the role of an engineer as a problem solver |
| | CO2 | Design engineering solutions to complex problems utilizing multi-disciplinary systems approach. |
| | CO3 | Examine a given problem using process of engineering problem analysis. |
| | CO4 | Build simple systems/prototypes using engineering design and development process. |
| | CO5 | Analyze engineering solutions from ethical and sustainability perspectives. |
| | CO6 | Apply basics of engineering project management skills in project development. |
| **SH1261**<br><br>**Calculus and complex variables** | CO1 | Solve problems on improper and multiple integrals |
| | CO2 | Sketch the curve and use it to solve the problems on rectification and multiple integral. |
| | CO3 | Prove the results of partial differentiation and apply partial differentiation for problems on Jacobian, maxima and minima |
| | CO4 | Solve various problems of complex variable. |
| **SH1301 Calculus and complex variables Lab** | CO1 | Develop codes for different types integrals. |
| | CO2 | Sketch the curves. |
| | CO3 | Solve various problems on partial differentiation by MATLAB. |
| **SH1623**<br><br>**English Proficiency Lab. II** | CO1 | Identify the need of positive attitude in interpersonal communication. |
| | CO2 | Organize content of technical documents in specific forms. |
| | CO3 | Demonstrate writing skills through reports, letters, circulars, notices, and memos. |
| | CO4 | Apply techniques of online communication in its various forms. |
| | CO1 | Make wooden job. |
| | CO2 | Make Sheet metal job. |

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| **SH1643 Engineering Practice Lab II** | CO3 | Make job by various machining processes. |
| | CO4 | Make job by joining processes. |

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# Robotics and Automation

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## UG Program

- **Department Name :- Robotics and Automation**
- **UG Program Name :- B.Tech. Robotics and Automation**

- **Vision and Mission :-**

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|---|---|
| **Vision** | To excel in the robotics & automation field through continuous research, innovation and industry-oriented curriculum leading to responsible engineering professionals. |
| **Mission** | • To inculcate teaching and learning process promoting state-of-the-art industry practices in robotics and automation engineering and technology to address global challenges.<br>• To integrate academics, research and entrepreneurship skills to address present and future challenges of ever-growing industries.<br>• To develop professionalism with strong foundations adapting to changing technology. |

| Sr. No. | Program Outcomes |
|---|---|
| 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 analyze 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 modeling 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. |
| 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. |

| Sr. No. | Program Specific Outcomes |
|---|---|
| **1.** | Apply engineering skills to model, simulate and implement robotics and automation systems for improvement of the industrial productivity. |
| **2.** | Design indigenous systems using advanced hardware and software tools to solve problems faced in factory automation. |
| **3.** | Develop the application of robotics and automation Engineering to solve societal problems. |

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1. | III | RA201 | Fundamentals of Robotics & Automation | 1. Explain the fundamental concepts related to robotics and its applications.<br>2. Explain the fundamental concepts of mechanisms and their application to robotics.<br>3. Compare various end effectors used in robotic applications.<br>4. Use robot programming to solve problems in diverse applications.<br>5. Distinguish between various types of automation systems.<br>6. Apply the knowledge of Programmable Logic Controllers (PLCs) for industrial automation problems |
| 2. | III | RA203 | Engineering Mechanics | 1. Calculate resultant force of coplanar force system.<br>2. Analyze engineering problems applying conditions of equilibrium<br>3. Determine centroid & moment of inertia of the geometrical plane lamina. |
| 3. | III | RA205 | Sensors and Instrumentation | 1. Explain the basic principles of measurement systems, classify different types of measurement errors, and perform error analysis.<br>2. Compare different types of motion, proximity and ranging sensors.<br>3. Illustrate the working principles of force measurement devices.<br>4. Comprehend and implement optical and pressure sensing technologies.<br>5. Describe the general structure, components and key characteristics of smart sensors.<br>6. Analyse and apply Data Acquisition Systems in various applications. |
| 4. | III | RA207 | Analog and Digital Electronics | 1. Explain the working principles of electronic devices.<br>2. Select components for building analog circuits.<br>3. Design analog and digital circuits.<br>4. Convert digital signals to analog and vice versa.<br>5. Explain the working principles of electronic devices. |
| 5. | III | RA209 | Materials and Manufacturing Technology | 1. Explain the characteristics of materials.<br>2. Select suitable material for robotics and automation application.<br>3. Select manufacturing method for robotic and automation components.<br>4. Describe advanced manufacturing methods. |
| 6. | | | | 1. Verify law of polygon of forces, law of triangle of forces and principle of moment. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | III | RA211 | Engineering Mechanics Lab. | 2. Verify Lami's theorem |
| | | | | 3. Compare coefficient of friction of various surfaces in contact. |
| | | | | 4. Correlate theoretical and practical results of support reactions and Centroid of plane lamina. |
| | | | | 5. Analyze a simple truss. |
| 7. | III | RA213 | Analog and Digital Electronics Lab. | 1. Verify characteristics of electronics devices. |
| | | | | 2. Analyze electronic circuits as per requirement. |
| | | | | 3. Design analog and digital circuits. |
| | | | | 4. Use logic gates to design circuits. |
| 8. | III | RA215 | Object Oriented Programming Lab. | 1. Identify elements and features of object-oriented programming. |
| | | | | 2. Implement various object-oriented concepts with the help of programs. |
| | | | | 3. Apply the object-oriented concepts in real time problem-solving. |
| | | | | 4. Use constructors and destructors in the programs. |
| | | | | 5. Implement inheritance concept in programming. |
| 9. | III | RA217 | Technical Aptitude - I | 1. Comprehend the knowledge gained in the course work |
| | | | | 2. Demonstrate problem-solving ability |
| 10. | III | SH2634 | Professional Leadership Skills | 1. Explain the traits of a leadership through real life examples. |
| | | | | 2. Exhibit the ability to work effectively in team. |
| | | | | 3. Prepare a presentation as per the audience and context requirements. |
| 11. | IV | SH2614 | Interpersonal Skills | 1. Exhibit interpersonal communication skills. |
| | | | | 2. Demonstrate decision-making skills. |
| | | | | 3. Apply conflict resolution styles appropriate in different situations. |
| | | | | 4. Demonstrate skills to manage balance in work and life. |
| 12. | IV | SH2694 | Innovation Tools and Methods for Entrepreneurs | 1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them |
| | | | | 2. Apply User Journey Map to the selected problem to show user interaction at various stages |
| | | | | 3. Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| 13. | IV | SH2594 | Personal Effectiveness and Body Language | 1. Develop skills to build self-esteem and positive attitude. |
| | | | | 2. Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | 3. Demonstrate responsiveness towards time, stress, and health issues. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 4. Interpret the non-verbal behaviour of a person. |
| 14. | IV | SH2734 | German Language – III | 1. Develop skills to build self-esteem and positive attitude. |
| | | | | 2. Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | 3. Demonstrate responsiveness towards time, stress, and health issues. |
| 15. | IV | SH2714 | Japanese Language – III | 1. Make use of basic conversations in various situations. |
| | | | | 2. Identify the sentence patterns. |
| | | | | 3. Explain insights about the communication required for living in Japan. |
| | | | | 4. Interpret Japanese work ethics required in their professional career. |
| 16. | IV | RA202 | Mathematics for Robotics & Automation | 1. Solve higher order linear differential equations and its applications. |
| | | | | 2. Solve Partial Differential Equation to various engineering problems. |
| | | | | 3. Apply Laplace and Invers Laplace transforms to standard functions and use it to solve Ordinary Differential Equation. |
| | | | | 4. Evaluate Fourier transform and apply them to solve heat conduction problem in Engineering. |
| | | | | 5. Apply Z-Transform, Inverse Z-Transform and Solve Difference Equations. |
| 17. | IV | RA204 | Strength of Materials | 1. Apply elementary knowledge of stresses and strains |
| | | | | 2. Select appropriate beam section for robotic arms |
| | | | | 3. Apply stiffness criteria for beam analysis |
| | | | | 4. Analyze the twisting of robot links. |
| | | | | 5. Compare behavior of columns based on end conditions. |
| 18. | IV | RA206 | Control Systems | 1. Discuss various control systems. |
| | | | | 2. Model the control system mathematically. |
| | | | | 3. Analyse control systems using various mathematical tools. |
| | | | | 4. Represent the system using state space model. |
| | | | | 5. Discuss role of control systems in industrial automation and process control applications. |
| 19. | IV | RA208 | Robot Kinematics | 1. Select the type of mechanism for the robotic applications |
| | | | | 2. Apply spatial transformation to obtain forward and inverse kinematics |
| | | | | 3. Perform workspace analysis for different types of robots |
| | | | | 4. Plan trajectories for the tool to follow on order to perform meaningful tasks. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5. Perform Jacobian analysis of serial manipulators |
| | | | | 6. Apply the procedure to design robot end effectors |
| 20. | IV | RA210 | Machine Drawing Lab. | 1. Develop base features for modeling of machine elements. |
| | | | | 2. Develop 3D model for machine components. |
| | | | | 3. Assemble components using functional constraints. |
| | | | | 4. Prepare production drawings in drafting workbench. |
| | | | | 5. Simulate the working of systems. |
| 21. | IV | SH2174 | Environmental Science | 1. Apply interdisciplinary knowledge in environmental science by integrating concepts and principles from various fields of science and engineering to address environmental issues. |
| | | | | 2. Evaluate environmental impacts of human activities on ecosystems and on the environment. |
| | | | | 3. Use scientific approach to identify and solve environment related problems. |
| | | | | 4. Design sustainable solutions to address environmental challenges by considering renewable energy sources, waste management strategies conservation measures, and environmental policies. |
| | | | | 5. Participate in group work to become acquainted with the importance of teamwork, collaboration |
| | | | | 6. Develop presentation and report writing skills. |
| 22. | IV | RA212 | Technical Aptitude - II | 1. Comprehend the knowledge gained in the course work |
| | | | | 2. Demonstrate problem-solving ability |
| 23. | IV | SH202 | मराठी भाषिक कौशल्यविकास | 1. **भाषा आणि व्यक्तिमत्व विकास यांमधील सहसंबंध स्पष्ट करू शकेल** |
| | | | | 2. **भाषिक कौशल्यविकास करू शकेल** |
| | | | | 3. **कथा या मराठी साहित्य प्रकाराचे विश्लेषण करू शकेल** |
| | | | | 4. **एकांकिका या मराठी साहित्य प्रकाराच्या विश्लेषणाची क्षमता प्राप्त करेल** |
| 24. | IV | SH204 | हिंदी कथा साहित्य एवं प्रयोजमूलक हिंदी | 1. विद्यार्थियों में मानवीय संवेदनाओं के विकास के साथ नवीन सामाजिक सांस्कृतिक बोधऔर जीवन मूल्यों का विकास होगा। |
| | | | | 2. विद्यार्थियों में साहित्य के माध्यम से कलात्मक गुणों की अभिवृद्धि होगी कला की साहित्यिक विधाओं के प्रति अभिरुचि जागृत होगी तथा रचनात्मक कौशल्य को बढ़ावा मिलेगा। |
| | | | | 3. विद्यार्थियों में नए वैश्विक मूल्यों के प्रति सजगता को बढ़ावा मिलेगा एवं मूल्यवादी दृष्टि के प्रति दायित्व बोध उत्पन्न होगा।छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| | | | | 4. छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |

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**Rajarambapu Institute of Technology, Rajaramnagar**
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# Civil Engineering

## UG Program

- **Department Name :-Civil Engineering**
- **UG Program Name :-Civil Engineering**

| | |
|---|---|
| **Vision** | To be an outstanding department devoted to provide high end research and technical education in Civil engineering which will produce socially aware professionals to provide solutions to global community |
| **Mission** | To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.<br>To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.<br>To mentor students in pursuit of higher education, entrepreneurship and global professionalism. |

| Sr. No. | Program Outcomes |
|---|---|
| 13. | Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| 14. | Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| 15. | 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. |
| 16. | 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. |
| 17. | Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| 18. | 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. |
| 19. | 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. |
| 20. | Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |

| | |
|---|---|
| 21. | Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| 22. | 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. |
| 23. | 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. |
| 24. | 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. |

| Sr. No. | Program Specific Outcomes |
|---|---|
| 1 | Enhance employability and/or entrepreneur skills through in-house and onsite training. |
| 2 | Provide solutions/procedures to societal and rural development problems through research and innovative practices. |

**S. Y. B. Tech Civil**

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1. | III | CE231 | Mathematics for Civil Engineer | Solve problems on linear differential equations (LDE) and linear partial differential equations (PDE). |
| | | | | Apply linear differential equations (LDE) to deflection of beams and columns |
| | | | | Determine Fourier series of given functions. |
| | | | | Compute Karl Pearson's coefficient of correlation and to fit regression lines. |
| | | | | Solve problems on probability distributions. |
| 2. | III | CE2214 | Building Planning and Design | Suggest appropriate materials for building construction applications. |
| | | | | Prepare a functional design of components of the building. |
| | | | | Explain building finish materials and procedures. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Design and draw residential building plan using AutoCAD software. |
| | | | | Prepare plumbing and electrification plan for the building. |
| 3. | III | CE2074 | Surveying | Calculate reduced levels and identify the characteristics of contours. |
| | | | | Determine the angular and linear measurements by using theodolite. |
| | | | | Calculate the data for design of curve and area-volumes. |
| | | | | Describe the principles of surveying with advanced techniques. |
| 4. | III | CE2034 | Engineering Mechanics | Calculate resultant force of coplanar force system. |
| | | | | Analyze engineering problems applying conditions of equilibrium |
| | | | | Determine centroid & moment of inertia of the geometrical plane lamina. |
| 5. | III | SH2174 | Environmental Science | Apply interdisciplinary knowledge from various fields of science and engineering to address environmental issues. |
| | | | | Evaluate environmental impacts of human activities on the environment. |
| | | | | Use scientific approach to identify and solve environment related problems. |
| | | | | Design sustainable solutions to address environmental challenges. |
| | | | | Participate in group work to become acquainted with the importance of teamwork, collaboration |
| | | | | Develop presentation and report writing skills. |
| 6. | III | CEMD201 | Building Construction and Planning | Suggest appropriate materials for building construction applications. |
| | | | | Prepare a functional design of components of the building. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Design and draw residential building using principles of planning and bye-laws. |
| | | | | Prepare plumbing and electrification plan for the building. |
| | | | | Explain properties of building finishing materials and application procedure. |
| 7. | III | CSMD201 | Introduction to Data Structures | Compare between linear and nonlinear data structures |
| | | | | Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | Determine a suitable data structure and algorithm to solve a real world problem |
| 8. | III | EEMD201 | Electrical Power Generation | List the main components of different power plants |
| | | | | Describe the operation of various power plants used for electrical power generation. |
| | | | | Explain working principles of various power plants |
| | | | | Compare different power plants based on advantages, limitations and future prospects |
| | | | | Draw layout of electrical power plants. |
| | | | | Explore alternate electrical energy resources for future needs and challenges. |
| 9. | III | ECMD201 | Electronics Devices and Applications | Describe the fundamental concepts of electronics and working principles of different devices. |
| | | | | Analyze different analog and digital electronics circuits. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Design digital electronics circuits with truth table and logic diagram. |
| 10. | III | CIMD201 | Data Structures | Describe the basic terminologies of data structures. |
| | | | | Examine the linear data structure array with its types. |
| | | | | Demonstrate the working of stack, queue performed on data structures. |
| | | | | Illustrate the working of linked list. |
| | | | | Discuss Tree terminologies and their Applications. |
| | | | | Elaborate Graph terminologies with their types. |
| 11. | III | MEMD203 | Design Thinking | Identify the new product opportunities and sources of new product ideas. |
| | | | | Elaborate the product life cycle and product design process. |
| | | | | Integrate the customer and end-consumer needs into design process. |
| | | | | Assimilate the various product characteristics to design a novel product |
| | | | | Participate effectively in group work sessions and teams to become acquainted with the importance of teamwork and collaboration that is critical to new product success. |
| 12. | III | MCMD201 | Fundamentals of Mechatronics | Identify various elements of mechatronics systems. |
| | | | | Select appropriate sensor/Actuator/controller/control algorithm for different applications. |
| | | | | Develop PLC/ microcontroller-based applications. |
| 13. | III | AIMD201 | Object Oriented Programming | Understand the basic object oriented programming concepts and apply them in problem solving. |
| | | | | Illustrate inheritance concepts for reusing the program. |
| | | | | Implement program using loops, decision statements and functions in Python. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Plot data using appropriate Python visualization libraries. |
| 14. | III | RAMD201 | Fundamentals of Robotics and Automation | Differentiate various robotic configurations and performance metrics. |
| | | | | Compare various end effectors, sensors, and drive systems in robotic applications. |
| | | | | Illustrate kinematic and dynamic principles applied to robotic systems. |
| | | | | Outline robot programming solutions for diverse applications. |
| | | | | Distinguish various types and aspects of automation. |
| | | | | Relate the knowledge of Programmable Logic Controllers (PLCs) to industrial automation tasks. |
| 15. | III | CE2234 | Building Planning and Drawing Laboratory | Design and draw the different types of staircases for a building using AutoCAD. |
| | | | | Prepare submission and working drawings of a residential building using AutoCAD. |
| 16. | III | CE2114 | Surveying Laboratory | Determine the reduced levels by using dumpy level. |
| | | | | Measure the angular and linear measurements by using theodolite and tachometry. |
| | | | | Perform the setting out of the simple curves. |
| | | | | Prepare topographical map by using total station and software. |
| 17. | III | CE2134 | Engineering Mechanics and Materials Testing Laboratory | Verify law of polygon of forces, principle of moment, Lami's theorem. |
| | | | | Compare coefficient of friction of various surfaces in contact. |
| | | | | Correlate theoretical and practical results of support reactions and Centroid of plane lamina. |
| | | | | Analyze a simple truss. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Identify various types of stresses in various structural elements. |
| | | | | Determine various strengths of different construction materials |
| 18. | III | CE233 | Building Interior Design & Drawing | Design and draw the furniture, plumbing and electrification details of a building using AutoCAD. |
| | | | | Design and draw the flooring and ceiling details of a building using AutoCAD. |
| 19. | III | SH2634 | Professional Leadership Skills | Explain the traits of a leadership through real life examples. |
| | | | | Exhibit the ability to work effectively in team. |
| | | | | Prepare a presentation as per the audience and context requirements. |
| 20. | III | SH2614 | Interpersonal Skills | Exhibit interpersonal communication skills. |
| | | | | Demonstrate decision-making skills. |
| | | | | Apply conflict resolution styles appropriate in different situations. |
| | | | | Demonstrate skills to manage balance in work and life. |
| 21. | III | SH2694 | Innovation Tools and Methods for Entrepreneurs | Explain structured approach to define the problem with every possible detail, identify conflicts and solve them |
| | | | | Apply User Journey Map to the selected problem to show user interaction at various stages |
| | | | | Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| 22. | III | SH2594 | Personal Effectiveness and Body Language | Develop skills to build self-esteem and positive attitude. |
| | | | | Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | Demonstrate responsiveness towards time, stress, and health issues. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Interpret the non-verbal behaviour of a person. |
| 23. | III | SH2734 | German Language - Level III | Interpret the language if the next person is speaking slowly and clearly. |
| | | | | Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | Demonstrate the language by self-introduction in German with simple sentences. |
| 24. | III | SH2644 | German Language - Level IV | Interpret the language if the next person is speaking slowly and clearly. |
| | | | | Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | Demonstrate the language by self-introduction in German with simple sentences. |
| 25. | III | SH2714 | Japanese Language - Level III | Make use of basic conversations in various situations. |
| | | | | Identify the sentence patterns. |
| | | | | Explain insights about the communication required for living in Japan. |
| | | | | Interpret Japanese work ethics required in their professional career. |
| 26. | III | SH2624 | Japanese Language - Level IV | To be able to make basic conversations in various situations. |
| | | | | To recognize the sentence patterns. |
| | | | | To improve Japanese Language proficiency. |
| | | | | To give students insights about the communication required for living in Japan. |
| | | | | To expose students to the Japanese work ethics required in their professional careers. |
| 27. | III | CE232 | Strength of Material | Analyze the section for various types of stresses and strains. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Construct shear force and bending moment diagrams for determinate beams. |
| | | | | Determine stresses (bending, shear and torsional) developed in the beam cross section. |
| | | | | Evaluate strain energy stored in a body due to various loading conditions. |
| 28. | IV | CE2044 | Concrete Technology | Explain properties of various materials used in the manufacture of different kinds of concretes and role played by them in developing strong, durable concretes. |
| | | | | Select materials for the manufacturing concretes for a given requirement. |
| | | | | Explain procedures for conducting various quality control tests on fresh and hardened concrete as per standard codes. |
| | | | | Design concrete mixes of given grade using mix design procedures recommended by IS and ACI codes of practices. |
| 29. | IV | CE2064 | Fluid Mechanics | Analyze different physical properties of fluid. |
| | | | | Calculate various forces acting on submerged and floating bodies. |
| | | | | Discriminate fluid kinematics and fluid dynamics. |
| | | | | Illustrate flow through pipe and flow through open channels. |
| | | | | Analyzes dimensional homogeneity using Buckingham's $\pi$ theorem |
| 30. | IV | CE234 | Water resources and Irrigation Engineering | Analyze the intricate processes involved in the water cycle and its impact on the distribution of water resources. |
| | | | | Utilize advanced techniques to evaluate and interpret rainfall data for |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | making well-informed decisions in water management. |
| | | | | Develop and assess various irrigation methods tailored to the specific water requirements and efficiency of different crops. |
| | | | | Evaluate the structural stability criteria for gravity dams and identify potential vulnerabilities in earthen dam constructions. |
| | | | | Apply statistical flood estimation methods to determine flood discharge and devise effective flood control measures. |
| 31. | IV | CE236 | Highway Engineering | Design the geometric components of highway. |
| | | | | Determine traffic volume for design of road. |
| | | | | Perform different tests on highway materials. |
| | | | | Design the highway pavement. |
| | | | | Explain about construction and maintenance of highways. |
| 32. | IV | CEMD202 | Building Estimation and Valuation | Explain the types and basic requirements of the estimate. |
| | | | | Explain measurement sheet, abstract sheet, and detailed specifications of different construction items. |
| | | | | Prepare detailed estimate of load bearing structure and framed structure. |
| | | | | Prepare rate analysis and bar bending schedule of different construction items. |
| | | | | Explain the tenders and contracts. |
| | | | | Describe basic terms of valuation. |
| 33. | IV | CSMD202 | Problem Solving using JAVA | Understand the basic object oriented programming concepts and apply them in problem solving. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Apply concept of inheritance for code reusability. |
| | | | | Develop Programs using multithreading. |
| | | | | Develop data-centric applications using JDBC. |
| | | | | Design the basics of java console and GUI based programming |
| 34. | IV | EEMD202 | Power System | Write the basic working principles of different generating sources. |
| | | | | Analyze different types of loads |
| | | | | Explain importance of power factor and tariffs in power system. |
| | | | | Identify various components in power transmission and distribution system. |
| | | | | Select substation equipments as per requirement. |
| 35. | IV | ECMD202 | Electronics Communication Systems | Describe different communication systems. |
| | | | | Explain applications of analog and digital modulation techniques. |
| | | | | Analyze different modulation and demodulation techniques. |
| | | | | Explain the use of satellite communication. |
| 36. | IV | CIMD202 | Computer Algorithms | Analysing asymptotically the performance of algorithms. |
| | | | | Compare and analyse searching and sorting algorithms. |
| | | | | Apply different algorithm design techniques to solve problems like job sequencing, knapsack, TSP, finding shortest path etc. |
| | | | | Apply backtracking method to solve problems like N-queens, graph coloring, sum of subsets etc. |
| | | | | Describe computational complexity theory to classify computational problems according to their inherent difficulty. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 37. | IV | MEMD204 | Behavioral Engineering and Design | Explain key concepts and theories related to influencing user behavior in product design. |
| | | | | Utilize psychological principles to develop product designs that effectively address user needs and preferences. |
| | | | | Create products that demonstrate high levels of user engagement, measured through metrics such as adoption rates and user interaction patterns. |
| | | | | Develop products that prioritize user satisfaction and usability, as measured through user testing and feedback. |
| | | | | Incorporate aesthetic appeal and ergonomic considerations into product designs, assessed through objective criteria such as user comfort and visual appeal ratings. |
| | | | | Analyze user feedback and iteratively improve designs to enhance user experience, measured by improvements in user satisfaction scores or usability metrics. |
| 39. | IV | MCMD202 | Industrial Fluid Power | Describe the structure and function of common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors etc. |
| | | | | Model and analyze common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors. |
| | | | | Create & simulate basic hydraulic and pneumatic circuit diagrams for different applications. |
| | | | | Design, develop & analyze simple hydraulic and pneumatic systems for given task. |
| 40. | IV | AIMD202 | Data structure & Algorithms | Compare between linear and nonlinear data structures |
| | | | | Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | Analyze various searching and sorting algorithms and apply it to solve particular problem. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Determine a suitable data structure and algorithm to solve a real world problem |
| 41. | IV | RAMD202 | Sensors and Actuators | Explain the functioning of various sensors and transducers |
| | | | | Calibrate the transducers such as accelerometers, microphones and strain gauges. |
| | | | | Explain the characteristics of various sensors and transducers |
| | | | | Describe the process and need for calibration. |
| | | | | Choose the sensor for measurement of few parameters. |
| | | | | Use the appropriate sensor and calibrate |
| 42. | IV | CE2184 | Concrete Technology Laboratory | Explain standard procedures for testing properties of various ingredients of concrete and concrete mixes/specimens |
| | | | | Perform tests on ingredients of concrete and on fresh and hardened concrete to determine their properties using standard procedures |
| | | | | Design the concrete mix for a given grade of concrete using guidelines of IS code |
| | | | | Evaluate the quality of concrete specimens / elements using NDT equipment |
| 43. | IV | CE2164 | Fluid Mechanics Laboratory | Determine fluid properties. |
| | | | | Design most economical open channel section. |
| | | | | Measure velocity of flow using wind tunnel. |
| 44. | IV | CE238 | Highway Materials Testing Laboratory | Perform quality control tests on aggregate and bitumen. |
| | | | | Suggest suitable material for road construction. |
| | | | | Perform quality control tests on bituminous pavement. |
| 45. | IV | CE240 | | Read the working drawings and |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | Practical Aspects of Construction Supervision | perform the inspection of different work items of building construction as per the given detailing and specifications. |
| | | | | Judge the quality of on-site construction materials and the different work items of building construction. |
| | | | | Perform independently the supervision work of any building as per the provided drawings and detailed specifications |

**T. Y. B. Tech Civil**

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1. | V | CE 3014 | Design of Steel Structures | Analyse and design of connections. |
| | | | | Analyse the steel tension and compression members. |
| | | | | Design the steel tension and compression members. |
| 2. | V | CE351 | Estimations and Costing | Apply standard requirements to prepare detailed estimate |
| | | | | Estimate the quantities for building, road, canal and culvert |
| | | | | Analyze the rates for construction items |
| | | | | Prepare tenders and contracts documents |
| | | | | Prepare valuation report of property (Land & Building) |
| 3. | V | CE3053 | Irrigation and Hydraulic Structures | Explain hydrological cycle and ground water flow. |
| | | | | Calculate various surface and ground water hydrology parameters |
| | | | | Estimate water requirement of crops. |
| | | | | Design canal and canal regulator structures. |
| 4. | | CE353 | Mechanics of Structures | Analyze and design axially loaded columns. |
| | | | | Analyze and design structural members subjected to direct and bending stresses. |
| | | | | Compute slopes and deflections at various locations for determinate beams. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Construct ILD for determinate beams and 2D trusses. |
| | | | | Analyze three hinged arches and suspended cables. |
| 5. | V | CE359 | Legal Practices in Construction | Explain the fundamental principles of construction laws and their application in the construction industry. |
| | | | | Discuss types of contracts and provisions of Indian contract act. |
| | | | | Explain compliance with legal requirements related to building acts, arbitration and labor laws throughout the construction process. |
| | | | | Acquire the ability to draft, negotiate, and manage various types of construction contracts, ensuring adherence to legal requirements and effective project execution. |
| | | | | Discuss the ethical and professional responsibilities of construction professionals, including compliance with codes of conduct and regulatory standards. |
| 6. | V | CE361 | Optimization Techniques | Discuss the fundamentals of optimization in engineering. |
| | | | | Identify the necessity and scope of optimization techniques. |
| | | | | Analyze the managerial problem through mathematical models and arrive at an optimal solution or decision. |
| 7. | V | CE363 | Construction Quality Control | Evaluate the quality in civil construction works. |
| | | | | Develop quality checks for construction. |
| | | | | Apply provisions of standard codes in civil construction. |
| | | | | Prepare quality control documents for construction projects. |
| 8. | V | CE365 | Advanced Fluid Mechanics | Apply basic laws of fluid mechanics to solve fluid flow numerically. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Explain the advection-dispersion phenomenon in groundwater hydrology |
| | | | | Explain the application of the Navier-Stokes Equation in pipe flow |
| | | | | Determine boundary layer thickness, Prandtl's mixing length and velocity distribution |
| | | | | Calculate Pump head and specify the Pump suitability |
| 9. | V | CE367 | Solid Waste Management | Determine solid waste properties and quantity for municipal and hazardous waste. |
| | | | | Illustrate health effects by municipal solid waste. |
| | | | | Design optimum route for collection of solid waste. |
| | | | | Select suitable processing technique for solid waste management |
| | | | | Design sanitary land fill site for solid waste management |
| | | | | Explain applications Artificial Intelligence in solid waste management |
| 10. | V | CE369 | Public Building Planning and Design | Design the various types of public buildings for given requirements following the principles of building planning and development control regulations |
| | | | | Prepare the different drawings (i.e. line plans, building plans, sectional elevations etc.) of the public buildings using AutoCAD software |
| 11. | V | CE371 | Engineering Geology | Identify earth constituents their genesis and physical & mechanical properties. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Recognize geological structures in rock mass, their origin and their impact on civil engineering structures. |
| | | | | Analyze and interpret geological reports and information and the latest geological exploration methods for suitable site selection. |
| | | | | Describe and compare different geological formation and geological structures required for construction of dam, reservoirs and tunnel. |
| 12. | V | CE373 | Matrix Methods of Structural Analysis | Perform the structural analysis of determinate and indeterminate structures using matrix methods. |
| | | | | Analyze the structures by using the stiffness & flexibility method. |
| | | | | Solve multiple degree of freedom two-dimensional problems involving trusses & beams. |
| 13. | V | CE375 | Earthquake Engineering | Explain various concepts related to engineering seismology. |
| | | | | Evaluate responses for a single degree of freedom system for free and forced vibration. |
| | | | | Apply principles of earthquake resistant structural system for building planning. |
| | | | | Calculate lateral loads developed due to earthquake forces by equivalent static method. |
| | | | | Explain methods to improve earthquake resisting capacity of the structure |
| 14. | V | OE3064 | Environmental Impact Assessment | Apply EIA methods to prepare a report. |
| | | | | Analyse the all projects by using Environmental Impact assessment tool. |
| | | | | Provide solution for decision making in Industrial Development Problem. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Prepare EIA report for submission to concerned authority. |
| 15. | V | OE350 | Operations Research | Identify the necessity and scope of operation research in decision making. |
| | | | | Formulate and solve linear programming problems using mathematical models and various optimization techniques. |
| | | | | Apply quantitative analysis methods to real-world decision-making scenarios in various industries. |
| | | | | Evaluate and improve decision-making processes under uncertainty. |
| 16. | V | ATMD301 | Automotive Safety & Ergonomics | Discuss the basics of vehicle collision and its effects. |
| | | | | Summarize the various safety concepts used in passenger cars. |
| | | | | Explain use of ergonomics in automotive design. |
| | | | | Explain the human response to impact. |
| | | | | Explain the use of various systems used in automobiles for safety & ergonomic considerations. |
| 17. | V | CEMD301 | Infrastructure Engineering | Apply the knowledge of geometric design in road construction. |
| | | | | Identify the quality parameters of pavement materials and various methods of road construction. |
| | | | | Discuss the various aspects of airport engineering. |
| | | | | Explain design parameters of railway engineering and it's component parts. |
| | | | | Summaries the different off shore structures for dock and harbors. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 18. | VI | CSMD301 | Fundamentals of Database Systems | Describe the purpose and nature of the database system for storing and fast access to thedata |
| | | | | Identify various protocols, issues, and techniques related to transaction managementfor a consistent & and stable database |
| | | | | Draw E-R models to represent simple database application scenarios |
| | | | | Design the queries to manipulate and access data using procedural and non-procedural languages |
| | | | | Apply relational database design concepts to remove data redundancy and to retrieve data easily |
| | | | | Perform operation on Unstructured data. |
| 19. | VI | EEMD301 | Electrical Machines | Describe behavior of dc machine. |
| | | | | Explain the working principle of 1-Phase and 3-Phase transformers. |
| | | | | Explain working of different induction motors. |
| | | | | Select the relevant electrical machines for different applications |
| | | | | Interpret the relevant fractional horse power motor for different applications |
| 20. | VI | ECMD301 | Advanced Communication Systems | Explain the principles of antenna and wave propagation. |
| | | | | Understand basic antenna parameters and their types. |
| | | | | Discuss the evolution, requirements, and challenges of 5G communication systems. |
| | | | | Understand and compare various communication techniques. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Communicate effectively on complex engineering topics related to modern communication techniques. |
| 21. | VI | CIMD301 | Introduction to DBMS | Describe the fundamental elements of relational database management systems. |
| | | | | Design ER-models to represent simple database application scenarios. |
| | | | | Write SQL query to perform various operations on the database. |
| | | | | Analyze principles of integrity constraints, Hashing and Indexing on databases. |
| | | | | Illustrate the transaction management, concurrency control and crash recovery. |
| 22. | VI | MEMD301 | Manufacturing and Assembly Processes | Select appropriate manufacturing process suitable for the component design and production volume |
| | | | | Select appropriate joining process for given application. |
| | | | | Select appropriate machine tools for machining operations. |
| | | | | Select appropriate finishing process for given product. |
| | | | | Explain concept of automation in manufacturing. |
| | | | | Explain and select appropriate Non Traditional machining process and machine with constructional details for engineering component. |
| 23. | VI | MCMD301 | Sensor and Instrumentation | Understand the fundamental principles of various sensors and transducers. |
| | | | | Analyze the characteristics, advantages, and limitations of different sensor types. |
| | | | | Apply appropriate signal conditioning techniques to improve sensor output accuracy and integrate sensors into mechatronic systems for real-time data acquisition and control. |
| | | | | Select appropriate sensors for specific mechatronic systems used in real life applications. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 24. | VI | AIMD301 | Machine Learning | Utilize machine learning techniques and understand the basic theory underlying machinelearning. |
| | | | | Articulate supervised, unsupervised and reinforcement learning |
| | | | | Identify the basic concepts of learning and decision trees. |
| | | | | Utilize Bayesian techniques for problems appear in machine learning |
| | | | | Perform statistical analysis of machine learning techniques. |
| 25. | VI | ATMD303 | Automobile Engineering Lab. | Differentiate between S.I. and C.I. engines. |
| | | | | Zest engines and plot performance characteristics curves. |
| | | | | Describe the working of various automotive systems. |
| 26. | VI | CEMD303 | Smart Cities & Sustainable Development | Discuss the concept of smart cities and ideologies of sustainable Development. |
| | | | | Analyze the different approaches toward smart cities on global level. |
| | | | | Evaluate the present state and approach of Smart city Mission in India. |
| | | | | Comprehend the concept of resilience and sustainable development and its measurement. |
| | | | | Study the present status of sustainable development in India. |
| 27. | VI | CSMD303 | Object-oriented Programming in Python | Demonstrate a comprehensive understanding of Python syntax, data types, and basic operations. |
| | | | | Make use of common Python libraries for data manipulation. |
| | | | | Implement lists, tuples, sets, and dictionaries for effective data handling. |
| | | | | Apply principles of OOP, including classes, objects, inheritance, and polymorphism. |
| 28. | VI | EEMD303 | Electrical Technology | Demonstrate speed control methods of electrical machines. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Analyze performance of DC motor and induction motor for speed control applications. |
| | | | | Implement power electronic circuits for given application. |
| | | | | Measure electrical quantities using electrical and electronic instruments. |
| 29. | VI | ECMD303 | Electronic Product Design | Elaborate product design processes. |
| | | | | Explain various aspects of PCB design. |
| | | | | Differentiate product-testing methods. |
| | | | | Create various documents for the product. |
| 30. | VI | CIMD303 | OOP using Java | Explain the concepts and terminologies in object-oriented concepts and java programming language. |
| | | | | Apply object-oriented programming features and concepts for solving given problem. |
| | | | | Develop the java application using the collection framework to solve real word problem. |
| | | | | Apply the concepts exception handling to develop error free codes. |
| | | | | Utilize the concepts of package to develop efficient codes. |
| 31. | VI | MEMD303 | Refrigeration and Air Conditioning | Explain the basic laws of thermodynamics, working of various RAC systems, psychrometric process of air, applications of RAC systems. |
| | | | | Summarise the properties of refrigerants. |
| | | | | Calculate performance of refrigeration and air conditioning system. |
| 32. | VI | MCMD303 | Industrial Automation | Explore the architecture of PLC and its functions. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Execute the various instructions and logic in PLC. |
| | | | | Develop the PLC program for various applications. |
| | | | | Design and develop the SCADA, DCS system for various applications. |
| 33. | VI | AIMD303 | Business Intelligence | Articulate data pre-processing techniques |
| | | | | Analyze the data modeling required for business intelligence related tasks |
| | | | | Determine the role of statistical techniques in data analysis tasks |
| | | | | Identify big data analysis techniques |
| | | | | Utilize different reporting/visualization tool |
| 34. | VI | SH3034 | Scholastic Aptitude I | Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | Develop a bridge in analogies, series and visualizing directions. |
| | | | | Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams |
| 35. | VI | CE355 | Estimations Costing and Valuation Laboratory | Explain mode of measurement and current market rates of civil engineering materials and labours. |
| | | | | Prepare detailed estimate of different structures like building, road, canal, culvert and factory shed etc. |
| | | | | Prepare bar bending schedule of different RCC items. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 36 | V | CE357 | Summer Internship | Apply academic concepts in civil engineering into practical situations encountered during the internship. |
| | | | | Develop effective communication skills, both written and verbal, through interactions with colleagues, clients, and project stakeholders within the civil engineering industry. |
| | | | | Exhibit proficiency in planning, organizing, and executing tasks related to civil engineering projects, showcasing effective time management and resource utilization during the internship. |
| | | | | Cultivate teamwork, ethical conduct, and professional behavior within the civil engineering workplace, emphasizing the importance of integrity and collaboration in the industry setting. |
| 37 | VI | CE352 | Geotechnical Engineering | Classify types of soil using different index properties of soil. |
| | | | | Calculate permeability of various types of soil using different methods. |
| | | | | Analyse compressibility phenomenon of soil using Laboratory and field considerations. |
| | | | | Determine settlement, shear strength and bearing capacity of soil. |
| 39 | VI | CE354 | Construction Practices | Discuss applications of various construction practices. |
| | | | | Select appropriate equipment for construction task. |
| | | | | Develop method statement for construction task. |
| | | | | Analyze equipment selection based on productivity. |
| 40 | VI | CE356 | Research Methodology | Formulate a research problem by using literature review process. |
| | | | | Analyse the data related research information. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Prepare and present research proposal/paper by following research ethics. |
| | | | | Make effective use of computing tools to analyse the data and prepare report. |
| | | | | Describe nature and processes involved in development of intellectual property rights. |
| 41 | VI | CE364 | Construction Equipment Management | Discuss the suitability of equipment for a specified construction task. |
| | | | | Select equipment/plant for a particular task. |
| | | | | Perform productivity and economic analysis for equipment. |
| 42 | VI | CE382 | Town Planning | Describe different concepts of town planning. |
| | | | | Illustrate surveying and zoning methods pertaining to town planning. |
| | | | | Critique on the policies, norms, bylaws, and housing schemes in the Indian context. |
| | | | | Summarize the concept, necessity, and components of a master plan, including layout planning for city development and re-planning of existing towns. |
| | | | | Outline various legislative acts pertinent to town planning. |
| 43 | VI | CE366 | Advanced Hydraulic Engineering | Explain the water balance and continuity equation for watershed |
| | | | | Determine the depth and velocity of flow in an open channel |
| | | | | Design of equivalent pipe flow and Flood forecasting |
| | | | | Analyses flood protection systems and reservoir operation system |
| | | | | Prepare DPR for urban water requirement |
| 44 | VI | CE368 | Air Quality Assessment | Describe structure of the atmosphere and Scales of air pollution. |
| | | | | Interpret on sources of air pollution natural and artificial, air pollution Episodes. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Explain effect of different air pollutants on man, animals and plants. |
| | | | | Analyse the dispersion of air pollution in the atmosphere. |
| | | | | Design of air pollution control mechanism |
| 45 | VI | CE370 | Traffic Engineering | Illustrate the traffic and its components, factors affecting road traffic for traffic planning. |
| | | | | Design traffic intersections and signals considering traffic regulations. |
| | | | | Summarize the basic principles behind the design and placement of traffic control devices for traffic management. |
| | | | | Select the suitable techniques necessary for maintaining road environment. |
| | | | | Suggest preventive measures to avoid road accidents by analyzing traffic conditions. |
| 46 | VI | CE372 | Industrial Waste Management | Apply various techniques of wastewater volume and strength reduction |
| | | | | Analyze characteristics of Industrial wastewater. |
| | | | | Suggest different wastewater treatment option for industrial wastewater. |
| | | | | Design Effluent Treatment Plant for Industrial wastewater treatment. |
| | | | | Prepare Report for Industrial Wastewater Management using AI tools. |
| 47 | VI | CE3184 | Repair and Rehabilitation of Structures | Identify the causes of distress and deterioration of concrete structure |
| | | | | Explain the stages of condition assessment of buildings. |
| | | | | Interpret and evaluate of ND test result data. |
| | | | | Describe the procedures of various repair and strengthening techniques. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Design for strengthening of structural member/elements |
| 48 | VI | CE374 | Advanced Structural Analysis | Analyse indeterminate structures using force methods- Consistent deformation method and three moment equation. |
| | | | | Analyse indeterminate structures using displacement methods- Slope-deflection equation and moment distribution method. |
| | | | | Analyse indeterminate beam and portal frame using matrix methods of analysis- Stiffness and flexibility matrix method. |
| 49 | VI | CE376 | Composite Materials and Structures | Describe the properties and uses of composite materials in civil engineering fields. |
| | | | | Analyse and design of composite column and beam. |
| | | | | Analyse and design of composite slab. |
| 50 | VI | CE378 | Finite Element Method | Apply variational approach for solving 1D,2D problems |
| | | | | Analyze linear springs, bars, beam and truss by FEM |
| | | | | Explain convergence and compatibility requirement |
| | | | | Develop element stiffness matrix [K] for isoparametric element |
| | | | | Formulate element stiffness matrix for 3D and axisymmetric element |
| 51 | VI | CE380 | Fiber Reinforced Concrete | Compare types of fibres used in Fiber-Reinforced Concrete with respect to their properties and applications. |
| | | | | Evaluate the effect of fibers on the properties of Fiber-Reinforced Concrete. |
| | | | | Illustrate the characteristics of Fiber-Reinforced Concrete in the fresh and hardened state. |
| | | | | Design Fiber-Reinforced Concrete mixes.Illustrate applications and |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | advancements in Fiber-Reinforced Concrete. |
| 52 | VI | OE3381 | Disaster Management | Outline disaster and disaster management cycle. |
| | | | | Summarize disaster preparedness and response activities for various types of disaster. |
| | | | | Apply various advanced techniques for disaster management. |
| | | | | Examine role of various agencies in disaster management. |
| | | | | Analyze the disaster management scenario in India. |
| 53 | VI | OE3084 | Materials Management | Apply management principles to material management, |
| | | | | Develop and apply codification and standardization process, |
| | | | | Derive material procurement plan and evaluate vendors, |
| | | | | Develop stores layout for optimum stores management, |
| | | | | Apply inventory control techniques for material management. |
| | | | | Apply M.R.P. logic and systems to material management. |
| 54 | VI | OE358 | Plumbing (Water and Sanitation) | Explain the scope and purpose of building industry codes and standards |
| | | | | Explain different plumbing fixtures and its working. |
| | | | | Prepare layout of sanitary drain and storm drain. |
| | | | | Calculate water requirement and suggest layout for water supply. |
| | | | | Discuss functions of WTP and STP in plumbing system. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 55 | VI | ATMD302 | Electric Vehicles | Articulate the need of EVs and HEVs in today's transportation context. |
| | | | | Design an electric vehicle for given requirements. |
| | | | | Design a hybrid electric vehicle for given requirements. |
| | | | | Elaborate fuel cell technology for vehicular application. |
| 56 | VI | CEMD302 | Environmental Engineering | Explain importance of water and wastewater analysis for various parameters. |
| | | | | Discuss impact of pollution on man, animal and plants. |
| | | | | Prepare layout of water and wastewater treatment process. |
| | | | | Design Water and Wastewater Treatment Plant. |
| | | | | Apply AI tools for impact of humans on environment. |
| 57 | VI | CSMD302 | Artificial Intelligence | Understand the basic concepts and techniques of Artificial Intelligence. |
| | | | | Apply AI algorithms for solving typical practical problems. |
| | | | | Describe appropriate knowledge representation schemes in AI. |
| | | | | Apply reasoning schemes in AI. |
| | | | | Analyze the planning schemes for goal stack. |
| | | | | Evaluate performance of solution for constraint satisfaction problem. |
| 58 | VI | EEMD302 | Smart Grid | Summarize the concept and future of smart grid |
| | | | | Develop smart grid architecture |
| | | | | Compile various smart grid technologies |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Identify communication and information technologies for smart grid |
| | | | | Elaborate distributed generation and storage technologies |
| | | | | Recommend smart metering and distribution automation |
| 59 | VI | ECMD302 | Industrial Electronics | Identify basics Power Electronics devices and components. |
| | | | | Illustrate use of Power Electronics. |
| | | | | Develop PLC logic using ladder programming. |
| | | | | Analyze industrial electronics applications. |
| 60 | VI | CIMD302 | Software Engineering | Describe fundamental concepts in software engineering and project management |
| | | | | Practice software process models for the undertaken software problems |
| | | | | Design function-oriented and object oriented models using modern tools. |
| | | | | Identify classes and build the domain model using advanced concepts in object, dynamic and functional modeling. |
| | | | | Analyze existing software systems using function and object-oriented analysis. |
| | | | | Design models using UML diagrams for software systems: use case, class, sequence, collaboration, activity, state chart diagrams, component and deployment. |
| 61 | VI | MEMD302 | Power Plant Engineering | Explain economics of power generation and energy scenario |
| | | | | Explain improvisations in Rankine cycle and its effect on performance |
| | | | | Analyze thermodynamics gas power cycles and effect of various parameter on efficiency. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Analyze different techniques for improvement of efficiency of gas turbine plant |
| | | | | Explain construction and working of nuclear power plants and its subsystems |
| | | | | Explain construction and working of different renewable energy power plants |
| 62 | VI | MCMD302 | Industrial Robotics | Explain the basic concepts of Robots. |
| | | | | Select an end effector and sensor for application. |
| | | | | Explain drives and controls for robotic system. |
| | | | | Develop program for robot to perform tasks in industrial applications. |
| 63 | VI | AIMD302 | Principles of Artificial Intelligence | Articulate basic concepts and techniques of Artificial Intelligence. |
| | | | | Apply AI algorithms for solving typical practical problems. |
| | | | | Designate appropriate knowledge representation schemes in AI. |
| | | | | Analyze reasoning schemes in AI. |
| 64 | VI | SH3064 | Scholastic Aptitude II | Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | Develop a bridge in analogies, series and visualizing directions. |
| | | | | Apply various short cuts & techniques to manage speed and accuracy to get equipped |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | for various competitive and campus recruitment exams |
| 65 | VI | CE358 | Geotechnical Engineering Laboratory | Determine index and engineering properties of soil. |
| | | | | Classify soil based on its index properties. |
| | | | | Analyze field conditions through Laboratory tests. |
| 66 | VI | CE360 | Design of Steel Structures Laboratory | Analyse and design steel industrial shed by manual process and software/ tool. |
| | | | | Interpret the results obtained from the software. |
| | | | | Prepare structural drawing of steel industrial shed. |
| 67 | VI | CE362 | Software Laboratory | Develop technical competency in software in the Civil Engineering field. |
| | | | | Solve civil engineering problems by using software. |
| | | | | Develop presentation skills for project/case study. |
| | | | | Design and interpret data by soft skill Civil Engineering projects. |
| 68 | VI | CE3144 | Capstone Project Phase I | Perform a comprehensive literature review to identify gaps and gain insights into existing solutions within the chosen engineering field. |
| | | | | Define clear problem statements and establish project objectives of the engineering project proposal. |
| | | | | Develop detailed project plans encompassing tasks, timelines, and resource allocation, applying effective project management principles. |
| | | | | Effectively communicate the proposals in both written and verbal formats, ensuring adherence to industry standards for documentation. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 1. | **VII** | **CE4013** | **Design of Reinforced Concrete Structures** | Design singly, doubly reinforced and flanged beams using Limit State Method of design. |
| | | | | Design R.C.C. slab and R.C.C. staircase using Limit State Method of design |
| | | | | Design R.C.C. columns, isolated pad footing using Limit State Method of design. |
| 2. | **VII** | **CE4033** | **Construction Equipment and Methods** | Plan equipment/plants utilization for construction activities, |
| | | | | Perform productivity and economic analysis of equipment, |
| | | | | Develop method statement for construction task, |
| | | | | Discuss equipment requirement for construction task. |
| 3. | **VII** | **CE4473** | **Earthquake Engineering** | Explain various concept related to engineering seismology |
| | | | | Evaluate responses for a single degree of freedom system for free and force vibration |
| | | | | Apply principles of earthquake resistant structural systems for building planning. |
| | | | | Estimate lateral loads developed due to earthquake force by equivalent static method. |
| | | | | Design and detail ductile RCC Structural elements. |
| | | | | Explain different methods to improve earthquake resisting capacity of the structure. |
| 4. | VII | CE4353 | PE-III Design of Bridges | Explain various components of bridge hydrology and types of loading on bridge. |

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| | | | | Analyze the sub structure and super structure of R.C.C. bridges. |
| | | | | Design the sub structure and super structure of R.C.C. bridges. |
| 5. | VII | CE4373 | PE-III Design of formwok | Design the form work for Beams, Slabs, columns, Walls and Foundations. |
| | | | | Design the form work for Special Structures. |
| | | | | Explain the working of flying formwork. |
| | | | | Explain the formwork failures through case studies. |
| 6. | VII | CE4393 | PE-III Advanced Construction Equipment | Select appropriate equipment for construction task. |
| | | | | Discuss processes of operation of equipment. |
| | | | | Develop method statement for construction tasks. |
| 7. | VII | CE4413 | PE-III Environmental Management System | Describe an environmental policy for an organization. |
| | | | | Develop environmental treatment and monitor system. |
| | | | | Analyze a life cycle assessment for a selected product or service. |
| | | | | Apply standard environmental, health and safety auditing principles and practices to environmental management systems. |
| 8. | VII | CE4433 | **PE- III Geographical Information System (GIS)** | Explain principles and components of GIS |
| | | | | Describe types of data used in GIS |
| | | | | Describe the data editing operations |
| | | | | Explain various steps used for Disaster Management |

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| 9. | VII | CE4453 | **PE-III Metro Rail Technology** | Relate the importance of metro rail infrastructure to the development of India. |
| | | | | Choose suitable methods for preliminary survey of metro rail. |
| | | | | Identify rail and signal components in Metro. |
| | | | | Illustrate the codal provisions and the Metro Act. |
| 10. | VII | CE4093 | PE-IV Advanced Structural Design | Design reinforced concrete flat slab, combined footing, raft footing and pile foundation. |
| | | | | Design cantilever and counterfort retaining wall. |
| | | | | Design overhead circular water tank with flat base. |
| 11. | VII | CE4113 | **PE-IV Pre-stressed Concrete Structures** | Explain the concept and importance of pre-stressing. |
| | | | | Analyze the pre-stressed concrete sections |
| | | | | Design the pre-stressed concrete sections for flexure and shear |
| | | | | Design an end block for pre-stressed members. |
| 12. | VII | CE4133 | **PE-IV Project Management** | Apply principles of project management for the success of the project |
| | | | | Analyze impact of time, cost and scope on construction projects. |
| | | | | Develop pre-feasibility report for construction project. |
| | | | | Plan the project using various techniques. |
| | | | | Develop project close out checklist for given project. |

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| | | | | Apply techniques for human resource management |
| 13. | | **CE4153** | **PE-IV Rock Mechanics** | Classify the various types of rocks based on geological strata and engineering parameters of the rock. |
| | | | | Analyze the theory of in-situ induced stresses in a rock mass and structurally controlled failure. |
| | | | | Analyze the rock slope stability and rockfall hazards |
| | | | | Determine settlement and bearing capacity of rock foundation. |
| | | | | Apply the concepts of rock mechanics for various subsurface conditions. |
| 14. | VII | CE4173 | **PE-IV Industrial Waste Management** | Explain various techniques of wastewater volume and strength reduction. |
| | | | | Discuss characteristics of Industrial wastewater. |
| | | | | Suggest different wastewater treatment options for industrial wastewater. |
| | | | | Prepare layout of ETP for Industrial Wastewater Management. |
| | | | | Design Effluent Treatment Plant for Industrial wastewater treatment. |
| 15. | VII | CE4193 | **PE-IV Pavement Analysis and Design** | Select the material based on its specifications and design criteria of pavements. |
| | | | | Analyze the stresses in flexible and rigid pavements. |
| | | | | Design of flexible and rigid pavements. |
| | | | | Compose different steps for construction and strengthening of pavements. |
| 16. | VII | CE4513 | **PE-IV** | Evaluate concrete quality based on the microstructural analysis/ properties. |

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| | | | **Advanced Concrete Technology** | Recommend appropriate admixture for given concreting applications. |
| | | | | Examine the mechanisms affecting the properties of fresh and hardened concrete. |
| | | | | Justify the use of special purpose concretes for a given concreting job. |
| 17. | VII | CE4533 | **PE-V Advanced Structural Analysis** | Construct ILD for indeterminate structures |
| | | | | Apply energy principles/theorems for analysis of indeterminate structures. |
| | | | | Construct SFD, BMD and TMD for beam curves in plan. |
| | | | | Analyze beams on elastic foundations under various loads. |
| | | | | Evaluate forces in space truss members. |
| | | | | Analyze building frames using approximate methods of analysis. |
| 18. | VII | CE4553 | **PE-V Finite Element Analysis** | Apply variational approach for solving 1D,2D problems |
| | | | | Analyze linear springs, bars, beam and truss by FEM |
| | | | | Describe convergence and compatibility requirement |
| | | | | Develop element stiffness matrix [K] for isoparametric element |
| | | | | Formulate element stiffness matrix for 3D and axisymmetric element |
| 19. | VII | CE4573 | **PE-V Matrix Method of Structural Analysis** | Develop stiffness and flexibility matrix of structural members. |
| | | | | Analyze structure using flexibility and stiffness matrix method |
| | | | | Apply direct stiffness approach for structural analysis. |

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| | | | | Analyze the structure using the matrix method by application of MATLAB. |
| 20. | VII | CE4593 | **PE-V Construction Resource Planning and Management** | Draft layout for store and material management |
| | | | | Select vendor for material purchase, |
| | | | | Build proper inventory management skill, |
| | | | | Describe employee development and welfare facilities, |
| | | | | Design performance appraisal matrix |
| 21. | VII | CE4613 | **PE-V Total Quality Management** | Illustrate Quality Management philosophies and the contribution of Quality Gurus in TQM Journey. |
| | | | | Identify the basic concept and framework of Total Quality management |
| | | | | Apply the tools and techniques of quality management in manufacturing and services sector. |
| | | | | Summarize the codal provisions for quality improvement |
| 22. | VII | CE4633 | **PE-V Air Pollution and Control** | Examine structure of the atmosphere air pollution, scales of air pollution |
| | | | | Interpret on sources of air pollution natural and artificial, air pollution Episodes |
| | | | | Analyze effect of different air pollutants on man, animals and plants. |
| | | | | Design Stack height and explain meteorology, transport and control mechanism |
| | | | | Evaluate effects of noise pollution. |
| 23. | VII | CE4653 | **PE-V** | Demonstrate appreciation and knowledge of histories of planning |

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| | | | **Fundamentals of Urban and Regional Planning** | Express basic understanding of sociological processes generally as they relate to urban and regional planning |
| | | | | Analyze planning and policy issues for urban and regional infrastructure |
| | | | | Develop knowledge of constitutional amendments as they impact urban and regional planning. |
| | | | | Analyze the nature, form and planning of metropolitan cities and regions in India |
| 24. | VII | CE4673 | **PE-V Solid and Hazardous Waste Management** | Apply basic concepts for management of municipal, biomedical, hazardous, e-waste, industrial wastes. |
| | | | | Explain different techniques for solid wastes management. |
| | | | | Assess environmental and health impacts solid waste mis-management |
| | | | | Design landfill site for different solid waste management |
| 25. | VII | CE4693 | **PE-V Photogrammetry Surveying** | Apply advanced surveying methodologies to conduct topographical survey measurements. |
| | | | | Calculate the errors in topographical surveying measurements. |
| | | | | Illustrate the principles of advanced surveying techniques. |
| 26. | VII | CE4713 | **PE-V Geo-informatics for Engineering** | Explain the principles of Geo-informatics |
| | | | | Describe the Remote Sensing process |
| | | | | Demonstrate the image interpretation and ground investigation |
| | | | | Analyze and apply Remote sensing techniques for ground investigation |

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| 27. | VII | CE4733 | **PE-V Docks, Harbour and Airport Engineering** | List out various types of docks and harbour based on its selection criteria. |
| | | | | Identify various component parts of docks and harbour and its constructional aspects. |
| | | | | Analyze the requirements of airport layout with respect to international regulations |
| | | | | Summarize concepts for planning of runway, taxiway, apron and terminal building facility. |
| 28. | VII | CE4213 | **PE-IV Advanced Structural Design Laboratory** | Design reinforced concrete flat slab, combined footing, raft footing, pile foundation using appropriate software. |
| | | | | Design retaining wall and elevated circular water tank using appropriate software. |
| | | | | Prepare structural drawings of flat slab, combined footing, raft footing, pile foundation, retaining wall and elevated circular water tank. |
| 29. | VII | CE4233 | **PE-IV Pre-stressed Concrete Structures Laboratory** | Design the pre-stressed concrete sections for flexure and shear |
| | | | | Design an end block for prestressed members. |
| | | | | Design the pre-stressed concrete beams |
| 30. | VII | CE4253 | **PE-IV Project Management Laboratory** | Develop a project charter for a construction project. |
| | | | | Analyze feasibility of project. |
| | | | | Determine optimum time and optimum cost of project through network compression. |
| | | | | Plan resources required for execution of the project. |
| 31. | VII | CE4273 | | Determine the physical and mechanical properties of rock samples |

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| | | | **PE-IV Rock Mechanics Laboratory** | Classify various types of rock based on observations and laboratory testing |
| | | | | Prepare the site investigation report. |
| 32. | | CE4293 | **PE-IV Industrial Waste Management Laboratory** | Analyze characteristics of Industrial wastewater |
| | | | | Prepare a water budget for industry. |
| | | | | Suggest different wastewater treatment options for industrial wastewater treatment. |
| | | | | Prepare layout of ETP for Industrial Wastewater Management. |
| | | | | Design Effluent Treatment Plant (ETP) for Industrial wastewater treatment. |
| 33. | VII | CE4313 | **PE-IV Pavement Analysis and Design Laboratory** | Select materials based on its suitability in different layers of pavement |
| | | | | Evaluate different methods of quality control during pavement construction. |
| | | | | Design of bituminous mix for flexible pavement. |
| | | | | Design of concrete mix for rigid pavement. |
| 34. | VII | CE4333 | **PE-IV Advanced Concrete Technology Laboratory** | Evaluate the quality of concrete/ concrete elements based on the data collected during condition assessment of RCC building |
| | | | | Design the mixes of special concretes using the available guidelines. |
| | | | | Perform the workability tests on flowable concretes |
| 35. | VII | CE4053 | **Design of Concrete Structures Laboratory** | Determine primary and combination design loads on building referring appropriate standards and handbooks |
| | | | | Design a two storied building manually and using standard software. |
| | | | | Prepare structural drawings of slab, beam, column and footing. |

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| 36. | VII | CE4493 | **Capstone Project Phase-II** | Analyze the primary/secondary data to solve the problem. |
| | | | | Interpret results of experimentation/questionnaire survey/ data analysis. |
| | | | | Perform project work in team. |
| | | | | Apply the tools/techniques/ knowledge to arrive at a conclusion. |
| | | | | Develop oral and written presentation skills. |
| 37. | VII | CE4073 | **Employment Enhancement Skills** | Develop technical competency in software in the Civil Engineering field, |
| | | | | Solve civil engineering problems by using software. |
| | | | | Develop presentation skills for project/case study. |
| | | | | Design and interpret data by soft skill Civil Engineering projects. |
| 38. | VIII | OE4381 | **Finance for Engineers (Online Course)** | Discuss the fundamental aspects of accounting and finance |
| | | | | Apply theoretical knowledge and information for preparing various financial statements. |
| | | | | Analyze the financial information for solving managerial problems. |
| | | | | Evaluate financial performance of the organization for effective decision making |
| 39. | VIII | OE4361 | **Engineering Management & Economics (Online Course)** | Develop administrative, organizational and planning skills to execute engineering project. |
| | | | | Develop bar chart/mile stone chart for the project. |
| | | | | Analyze profit/cost data and carry out economic analysis to take optimal decision. |

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| | | | | Calculate depreciation as per various methods. |
| 40. | VIII | IP4023 | **Internship & Project** | Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services) |
| | | | | Develop an attitude to adjust with the company culture, work norms, code of conduct. |
| | | | | Recognize and follow the safety norms, Code of conduct. |
| | | | | Demonstrate the ability to observe, analyse and document the details as per the industry practices. |
| | | | | Interpret the processes, systems and procedures and to relate to the theoretical concepts- studies |
| | | | | Develop the leadership abilities, communication. |
| | | | | Demonstrate project management and finance sense |
| | | | | Identify the project/problem in the domain of a program relevant for the company. |
| | | | | Compile the information to the pertaining to the problem identified. |
| | | | | Analyse the information using the statistical tools/ techniques |
| | | | | Develop the feasible solution for given problem. |
| | | | | Analyse the impact of the project on the performance of company/department. |
| 41. | VIII | OE4381 | **Finance for Engineers (Online Course)** | Discuss the fundamental aspects of accounting and finance. |
| | | | | Apply theoretical knowledge and information for preparing various financial statements. |

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| | | | | Analyze the financial information for solving managerial problems. |
| | | | | Evaluate financial performance of the organization for effective decision making. |
| 42. | VIII | OE4361 | **Engineering Management & Economics (Online Course)** | Develop administrative, organizational and planning skills to execute engineering project. |
| | | | | Develop bar chart/mile stone chart for the project |
| | | | | Analyze profit/cost data and carry out economic analysis to take optimal decision |
| | | | | Calculate depreciation as per various methods. |
| 43. | VIII | RE4043 | **Research Project** | Investigate the technical literature |
| | | | | Recognize and evaluate theories, practices, and/or research on a chosen topic by conducting a thorough literature review and submitting a written integrative, critical summary of the current literature. |
| | | | | Design a research problem and develop a methodology |
| | | | | Develop and implement an advanced original research or creative project. |
| | | | | Develop the ability to explain the conceptual viability of the project and describe the major components involved. |
| | | | | Develop the ability to explain how the project will impact the relevant body of work. |
| | | | | Develop advanced discipline-relevant skills and competencies. |
| | | | | Construct an accurate record of research performed. |

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| | | | | Write a research report and paper. |
| 44. | VIII | ED4103 | Project Management | Prepare business Plan for selected business. |
| | | | | Make risk analysis & market analysis of selected project. |
| | | | | Make risk analysis & market analysis of selected project |
| | | | | Make financial appraisal of selected project. |
| 45. | VIII | ED4043 | Commercial Aspects of the Project | Interpret basic Financial Terminologies. |
| | | | | Prepare & analyze financial statements. |
| | | | | Prepare financial Plan for venture. |
| | | | | Apply basic principles of marketing for various products. |
| | | | | Prepare market survey. |
| | | | | Apply knowledge of marketing management for selected business. |
| 46. | VIII | ED4063 | Entrepreneurship Development Program (EDP) | Apply knowledge of engineering, economics, marketing and finance for formulation of business plan, starting & managing new business. |
| 47. | VIII | ED4083 | Entrepreneurship Development Project | Apply knowledge of engineering, economics, marketing and finance for preparation of project report. |
| | | | | Make commercial, technical and financial appraisal of project. |

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## PG Program

- **Department Name :- Civil Engineering**
- **PG Program Name :- Structural Engineering**

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| **Vision** | To be an outstanding department devoted to provide high end research and technical education in Civil engineering which will produce socially aware professionals to provide solutions to global community |
| **Mission** | To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.<br>To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.<br>To mentor students in pursuit of higher education, entrepreneurship and global professionalism. |

| Sr. No. | Program Outcomes |
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| 1. | An ability to independently carry out research /investigation and development work to solve practical problems. |
| 2. | An ability to write and present a substantial technical report/document. |
| 3. | Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program. |
| 4. | An ability to design civil engineering structures and execute the projects. |
| 5. | An ability to use modern tools and techniques, skills, instrumentation and software packages necessary to predict and solve complex engineering problems. |
| 6. | An ability to perform efficiently with others as part of collaborative and/or multidisciplinary team with ethics. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 1 | I | **CES1015** | **Advanced Solid Mechanics** | Analyze bodies for stresses and strains |
| | | | | Analyze prismatic bars and tubes subjected to torsion. |

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| | | | | Analyze beams and thick cylinders for elasto-plastic loading |
| 2 | | **CES1035** | **Advanced Structural Analysis** | Develop ILD for reactions, S.F. and B.M. for indeterminate structures |
| 3 | | | | Construct SFD, BMD and TMD for beams curved in plan for various loading and supportcondition. |
| | | | | Analyse the beam-column structures |
| | | | | Analyse the structures by using the stiffness & flexibility matrix method. |
| | | | | Solve boundary value problems from civil engineering. |
| 4 | | **CES1055** | **Structural Dynamics and Earthquake Engineering** | Analyse the response of single and multi-degree freedom systems by fundamental theory. |
| | | | | Explain principles of seismology and conceptual design. |
| | | | | Evaluate lateral loads developed on multi-storeyed structures |
| 5 | | **SHP5511** | **Technical Communication** | Use grammatically correct sentences in different types of technical writings. |
| | | | | Apply technical writing skills to improve readability of documents. |
| | | | | Demonstrate professional skills required in job interviews and at workplace |
| 6 | | **CES1075** | **Computer Aided Design of Steel Structures Lab** | Analyze and design of the steel structures such as truss, towers, steel building frame and hoarding board etc. using standard software packages. |
| | | | | Interpret the results of analysis and design obtained from the software. |
| | | | | Prepare drawings of detailing of structural elements |
| 7 | | **CES1095** | **Structural Dynamics Lab** | Examine damping effect on beam model. |
| | | | | Perform testing of various models of structures for dynamic loading |
| 8 | | **CES1115** | **Mini Project I** | Identify research problem. |
| | | | | Prepare and present statement of Purpose. |
| | | | | Perform analysis work. |
| | | | | Communicate with outside agencies. |
| | | | | Prepare report and present the work carried out. |
| | | | | Develop self-learning ability |

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| 9 | | **CES1135** | **Theory of Thin Plates and Shells** | Analyse various problems using different theories based on plates and shells. |
| | | | | Derive equilibrium equations related with different theories of plates and shells |
| 10 | | **CES1155** | **Advanced Concrete Technology** | Select binders and admixtures to design strong, durable and sustainable concretes. |
| | | | | Describe various special processes and techniques involved in various concreting jobs. |
| | | | | Identify reasons affecting durability of concrete / concrete structures /elements. |
| | | | | Design concrete mix for special concretes. |
| | | | | Analyse qualities of concrete elements using appropriate destructive or non-destructivetesting methods for evaluating quality |
| 11 | | **CES1175** | **Analysis and Design of Tall Structures** | Evaluate forces on tall structures due to wind load. |
| | | | | Construct SFD and BMD in building frame by approximate analysis method. |
| | | | | Design RC shear wall, chimney, bunkers and silos |
| 12 | | **CES1195** | **Design of Bridges** | Evaluate various loadings on bridges. |
| | | | | Analyse and design of super-structure of various bridges. |
| | | | | Analyse and design of sub-structure of various bridges |
| 13 | | **CES1213** | **Structural Health Monitoring** | Discuss the concept and various components of SHM |
| | | | | Identify suitable Sensors and Instruments required in SHM for in-service performance structures. |
| | | | | Assess the health of structures using different techniques of SHM |
| | | | | Select the appropriate strengthening and retrofitting techniques for regaining the structurstrength. |
| | | | | Design the sensor layouts of SHM for the civil engineering structures |
| 14 | | **SHP5171** | **Numerical Methods for Engineers** | Apply numerical methods for error analysis. |
| | | | | Compute the roots of the given equations and polynomials |
| | | | | Apply the relevant numerical method for interpolating the polynomial. |
| | | | | Develop the equation to be fitted to the given data. |

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| | | | | Solve problems involving linear algebraic equations |
| 15 | II | **CES1025** | **Finite Element Analysis** | Describe the finite element method and convergence requirement |
| | | | | Apply the basic finite element formulation techniques to solve civil engineering problems by 1D, 2D and axisymmetric elements |
| | | | | Explain shape function and isoparametric element |
| | | | | Derive element stiffness matrix for thin plate and shell element |
| | | | | Use commercial software to solve problems related to civil engineerin |
| 16 | | **CES1045** | **Design of Concrete Structures** | Analyse R.C. slabs using yield line theory. |
| | | | | Design R.C.C. deep beam and flat slab. |
| | | | | Design R.C.C. elevated service reservoir, retaining wall |
| | | | | Design R.C. members for fire resistance |
| 17 | | **CES1065** | **Research Methodology & Intellectual Property Rights (IPR)** | Prepare abstract through literature review. |
| | | | | Formulate a research problem. |
| | | | | Prepare and present research proposal/paper by following research ethics. |
| | | | | Prepare and present report on intellectual property rights |
| 18 | | **CES1085** | **Computer Aided Design of Concrete Structures Lab.** | Analyse and design of the RCC structures such as building, retaining wall, flat slab and foundations using standard software packages. |
| | | | | Interpret the results of analysis and design obtained from the software. |
| | | | | Prepare drawings of detailing of structural elements |
| 19 | | **CES1105** | **Advanced Concrete Technology Lab** | Design special concretes using IS 10262-2019. |
| | | | | Evaluate durability properties of concrete. |
| | | | | Judge the quality of concrete using NDT. |
| | | | | Write a technical report on special concreting techniques based on site visit |
| 20 | | **CES1125** | **Mini Project II** | Identify research problem. |
| | | | | Prepare and present statement of Purpose. |
| | | | | Perform analysis work. |
| | | | | Communicate with outside agencies. |
| | | | | Prepare report and present the work carried out. |

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| | | | | Develop self-learning ability. |
| 21 | | **SHP552** | **Frameworkof Indian Constitution** | Realize the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution. |
| | | | | Identify the importance of fundamental rights as well as fundamental duties |
| | | | | Understand the functioning of Union, State and Local Governments in Indian federal system |
| | | | | Learn procedure and effects of emergency, composition and activities of electioncommission and amendment procedure. |
| 22 | | **CES1145** | **Advanced Earthquake Engineering** | Design RCC structural elements for ductility requirements as per IS 13920 2016. |
| | | | | Apply clauses given in IS codes to design of water tanks for earthquake force. |
| | | | | Apply new techniques for controlling the vibrations of the structures. |
| | | | | Evaluate natural frequency of continuous elements/systems. |
| | | | | Apply IS code clauses masonry structures for improving resistance to earthquake forces |
| 23 | | **CES1161** | **Composite Structures** | Design composite structural elements like beams, columns, floors, trusses. |
| | | | | Design of Multi-storeyed commercial and residential composite building. |
| | | | | Design composite girder bridges. |
| 24 | | **CES1181** | **Maintenance and Rehabilitation of Structures** | Diagnose the causes of distress and deterioration of concrete structure |
| | | | | Describe the procedures of various repair techniques or methods. |
| | | | | Suggest appropriate materials and techniques for repair and strengthening of structures/elements |
| | | | | Prepare a report on condition assessment of buildings based on observations |
| 25 | | **CES1205** | **Design of Pre-stress Concrete Structures** | Explain the concept, material requirement and behaviour of the pre-stressedconcrete. |
| | | | | Calculate the losses of pre-stress in pre-tensioning and post-tensioning concrete. |
| | | | | Analyse & design the statically determinate, |

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| | | | | indeterminate pre-stressed concretebeams and end block. |
| | | | | Analyse & design the pre-stressed concrete pipes and tanks |
| 26 | | **CES1225** | **Design of Steel Structures** | Design steel structures and frames by varying methods. |
| | | | | Design various connectivity of structure as per code provisions |
| 27 | | **CES1240** | **Design of Foundations** | Explain various types of foundations and their design procedures |
| | | | | Design different types of foundations. |
| | | | | Perform the analysis and design of various types of foundation using available software's |
| 28 | III | **CES2015** | **Industry Internship** | Identify training area. |
| | | | | Prepare on site work report of training. |
| | | | | Perform analysis work. |
| | | | | Communicate with agencies. |
| | | | | Prepare report and present the work carried out. |
| 29 | | **MOE2011** | **Artificial Intelligence - Machine Learning** | Describe central machine learning methods and techniques and how they relate to artificial intelligence |
| | | | | Differentiate between supervised and unsupervised learning techniques |
| | | | | Apply the ML algorithms to a real-world problem, |
| | | | | Optimize the models learned and report on the expected accuracy that can be achieved by applying the models. |
| | | | | Evaluate a given problem and apply appropriate machine learning technique |
| 30 | | **MOE2021** | **Creative Thinking: Techniques &Tools** | Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios |
| | | | | Apply different brainstorming techniques in group activities |
| | | | | Be proficient in the application of the 6 thinking hats tool in different life scenarios |
| | | | | Develop a systematic approach to idea generation through the use of morphological analysis |
| | | | | Innovate on an existing product, service or situation applying the SCAMPER method |

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| | | | | Get confident with the theory of inventive problem solving, called TRIZ |
| 31 | | **MOE2031** | **MOOC Course** | Identify the real applications and practices of courses studied, at industry level. |
| | | | | Recognize various modelling, analysis and validation techniques adopted at industries. |
| | | | | Demonstrate the issues at design, manufacturing and assembly levels. |
| | | | | Summarize and present technical data in report format. |
| 32 | | **MOE2041** | **Condition Monitoring and Signal Processing** | Identify the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors. |
| | | | | Analyze for machinery condition monitoring and explain how this compliments monitoring the condition. |
| | | | | Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure. |
| | | | | Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system. |
| | | | | Identify vibration measurement, lubrication oil analysis |
| 33 | | **MOE2051** | **Aircraft Conceptual Design** | Analyze the design process of aircraft and decide the aircraft configuration. |
| | | | | Choose type of power plant as per flight regime. |
| | | | | Design the fuselage layout as per type of aircraft. |
| | | | | Design the wing for type of aircraft and its wing loading |
| | | | | Evaluate lift, drag and mass for design synthesis. |
| | | | | Examine the influence of various design requirements on the configuration of an aircraft to derive an optimized design |
| 34 | | **MOE2060** | **Augmented Reality and Virtual Reality** | Define the basic concepts of Virtual and Augmented Reality |
| | | | | Identify the differences in AR/VR concepts and technologies |
| | | | | Describe the fundamental concepts relating to Virtual Reality such as presence, immersion, and engagement |

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| | | | | Evaluate usability of AR/VR applications and critique their use of AR/VR capabilities |
| | | | | Design and prototype effective AR/VR applications using UNITY platform for various application |
| 35 | | **MOE2070** | **Industrial Instrumentation** | Elaborate working principal of different transducers. |
| | | | | Select suitable transducer/sensor for specific application. |
| | | | | Justify the use of specific measurement technique for specific task. |
| | | | | Evaluate the Calibration and Interfacing of the transducers. |
| 36 | | **MOE2080** | **Advanced Mechatronics Systems** | Explain Mechatronics System |
| | | | | Analyze the Mechatronics Based System |
| | | | | Model, simulate, and verify the mechatronics systems. |
| | | | | Identify Electrical, Hydraulic and Pneumatic Components. |
| 37 | | **CES2035** | **Dissertation Phase-I** | Identify research problem from literature survey. |
| | | | | Prepare research design for identified problem. |
| | | | | Prepare synopsis report. |
| | | | | Present the work plan to be carried out |
| 38 | | **CES2055** | **Dissertation Phase-II** | Prepare the set up for experimentation/ develop/ learn software. |
| | | | | Perform experimental/software analysis for validation of research work. |
| | | | | Generate report of work carried out. |
| | | | | Present the work carried out |
| 39 | IV | **CES2025** | **Dissertation Phase-III** | Perform experimental/software analysis for developing research work. |
| | | | | Generate report work carried out. |
| | | | | Present the work carried out. |
| 40 | | **CES2045** | **Dissertation Phase-IV** | Perform experimental/software analysis for developing research work. |
| | | | | Generate report work carried out. |
| | | | | Publish a research paper in journals/conference. |
| | | | | Prepare report using total work done as dissertation report. |
| | | | | Present the work carried out |

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# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

- **Department Name :- Civil Engineering**
- **PG Program Name :- Construction Management**

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|---|---|
| **Vision** | To be an outstanding department devoted to provide high end research and technical education in Civil engineering which will produce socially aware professionals to provide solutions to global community |
| **Mission** | To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.<br>To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.<br>To mentor students in pursuit of higher education, entrepreneurship and global professionalism. |

| Sr. No. | Program Outcomes |
|---|---|
| 7. | An ability to independently carry out research /investigation and development work to solve practical problems. |
| 8. | An ability to write and present a substantial technical report/document. |
| 9. | Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program. |
| 10. | An ability to Analyze, evaluate, and select computer applications for the purpose of efficient and effective construction project management. |
| 11. | An ability to Analyze construction projects relative to fundamental aspects of construction management (i.e., cost, schedule, quality, safety, ethics) and develop appropriate solutions |
| 12. | Apply ethical business principles and Demonstrate responsibility for safety planning and productivity in construction management settings. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1. | I | **CCM1010** | **Construction Planning & Scheduling** | Develop project work breakdown structure. |

| | | | | |
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| | | | | Estimate activity time durations and define scope of project. |
| | | | | Prepare and update schedule of a construction project. |
| | | | | Analyze resource requirement for a construction project. |
| 2. | | **CCM1030** | **Construction Equipment** | Select equipment/plant for particular task. |
| | | | | Perform productivity analysis for equipment. |
| | | | | Design equipment fleet for construction task. |
| | | | | Perform economic analysis of equipment use. |
| 3. | | **CCM1050** | **Construction Practices** | Develop method statement for various construction activities. |
| | | | | Differentiate among various practices used to complete construction activities. |
| | | | | Choose appropriate technique for particular construction activity. |
| 4. | | **CCM1070** | **Quality Assurance and Quality Control in Construction** | Differentiate between QA and QC in consideration with different construction activities. |
| | | | | Apply stastical quality control and monitoring methods. |
| | | | | Develop quality checks for construction activities. |
| | | | | Develop guideline in accordance with quality standard codes and quality management system |
| 5. | | **CCM1095** | **Management Information System** | Demonstrate Information Systems used in organizations for meeting strategic and operational goals. |
| | | | | Develop skills using current end-user software for communication, data transformation, collaboration, and problem solving |
| 6. | | **CCM1115** | **Disaster Management** | Summarize effects of natural and man-made disasters. |
| | | | | Develop disaster management program. |
| | | | | Analyze vulnerable conditions and risk assessment. |
| | | | | Prepare plan for post disaster management |
| | | | | Describe stakeholder's role in disaster response. |

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| 7. | | **CCM1135** | **Pavement Construction & Management** | Conduct highway condition assessment surveys. |
| | | | | Develop method for pavement management using PMS system. |
| | | | | Select material as per MORTH and IRC specifications. |
| | | | | Plan and design pavement structures |
| 8. | | **CCM1150** | **Repair and Rehabilitation of Structures** | Perform Assessment of buildings. |
| | | | | Recognize damages in the structure. |
| | | | | Select proper repair materials. |
| | | | | Suggest repair or rehabilitation method for particular damage |
| 9. | | **CCM1175** | **Bridge Construction** | Select location for bridge based on topographical and geotechnical investigation. |
| | | | | Perform hydrological calculations of design parameters. |
| | | | | Apply standard loadings and safety consideration for bridge design. |
| | | | | Select appropriate bridge superstructure elements for bridges |
| 10. | | **CCM1195** | **Prefabricated Structures** | Choose prefabricated elements for construction. |
| | | | | Develop detail drawings of prefabricated elements. |
| | | | | Design prefabricated elements for construction. |
| | | | | Prepare project report for establishing production unit |
| 11. | | **CCM1210** | **Advanced Concrete Technology** | Select binders, SCMs and admixtures to design strong, durable and sustainable concretes. |
| | | | | Analyze the factors affecting properties of fresh concrete. |
| | | | | Develop quality control plan for a concrete construction. |
| | | | | Design special purpose concrete mixes using mix design procedures recommended by pertinent codes of practices and handbooks |
| 12. | | **CCM1235** | **Construction Waste Management** | Develop strategies for construction and demolition waste management and resource efficiency. |
| | | | | Examine the environmental impact of building materials. |
| | | | | Design site waste management plans. |

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| | | | | Justify the application of waste minimization techniques on construction site. |
| 13. | | **CCM1255** | **Microsoft Project (MSP) Laboratory** | Develop Work Breakdown Structure for project. |
| | | | | Prepare project schedule using Microsoft project. |
| | | | | Modify construction schedule based on site progress. |
| | | | | Extract and present various types of reports |
| 14. | | **CCM1275** | **Geographic Information System Laboratory** | Perform data collection using tools. |
| | | | | Analyze data using GIS software. |
| | | | | Prepare and present maps in GIS |
| 15. | | **SHP5511** | **Technical Communication** | Acquire skills required for good oral and written communication. |
| | | | | Demonstrate improved writing skills and level of readability. |
| | | | | Ensure the good quality of technical reports at very first-time submission. |
| 16. | II | **CCM1020** | **Project Economics & Financial Management** | Analyze projects using different techniques. |
| | | | | Suggest different sources of finance. |
| | | | | Analyze different financial statement with the help of ratio analysis. |
| 17. | | **CCM1040** | **Legal Aspects in Construction** | Select appropriate type of contract for construction projects. |
| | | | | Develop tender document for construction project. |
| | | | | Perform comparative analysis of types of contract. |
| | | | | Analyse arbitration documents for construction project. |
| 18. | | **CCM1060** | **Project Formulation and Appraisal** | Perform technical and financial analysis of construction projects. |
| | | | | Perform BC ratio analysis. |
| | | | | Select project based on appraisal. |
| | | | | Develop administration process for project execution. |
| 19. | | **CCM1080** | **Advanced Construction Techniques** | Use modern construction techniques in the high rise structures. |
| | | | | Identify the suitable formwork technique used to construct a structure. |
| | | | | Justify the concepts used in the construction of special structures |
| 20. | | **CCM1105** | **Health and Safety Management** | Classify hazards to employees on construction site. |

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| | | | | Determine safe practices necessary for a project site. |
| | | | | Identify the causes of accidents and suggest preventive measures to avoid accident. |
| | | | | Prepare safety management plan. |
| 21. | | **CCM1125** | **Human Resource Management** | Plan manpower for a project. |
| | | | | Develop organization for a project. |
| | | | | Apply aspects of human behavior to HRM. |
| | | | | Select right person to build the team. |
| | | | | Discuss solutions for human resource problems |
| 22. | | **CCM1145** | **Shoring, Scaffolding and Formwork** | Develop proper plan for form-work. |
| | | | | Select appropriate material and type of form-work. |
| | | | | Design form-work for components. |
| | | | | Design scaffold for construction task. |
| 23. | | **SHP5261** | **Probability and Statistics for Engineers** | Apply relevant probability distribution for given problems. |
| | | | | Use different methods of sampling and testing in statistical inference. |
| | | | | Solve problems on correlation and regression. |
| 24. | | **CCM1165** | **Material Management** | Apply supplier selection methods. |
| | | | | Produce optimal stores layout. |
| | | | | Perform codification and classification. |
| | | | | Perform material requirement planning. |
| | | | | Apply inventory control techniques for materials management. |
| 25. | | **CCM1180** | **Advanced Construction Materials** | Justify the need of new material development. |
| | | | | Choose material for construction process based on material properties. |
| 26. | | **CCM1200** | **International Contracting** | Prepare tender documents as per international contracting procedures. |
| | | | | Apply of various conditions of international contract under the FIDIC document. |
| | | | | Understand the labour laws. |
| | | | | Act as arbitrator for dispute resolving. |
| 27. | | **CCM1225** | **Research Methodology & IPR** | Prepare abstract through literature review. |
| | | | | Formulate a research problem. |

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| | | | | Prepare and present research proposal/paper by following research ethics. |
| | | | | Prepare and present a report on Intellectual Property Rights. |
| 28. | | **CCM1245** | **Fundamentals of BIM Laboratory** | Develop drawings as per software requirement. |
| | | | | Compute quantities of building items. |
| | | | | Develop project schedule using "Revit" application. |
| 29. | | **CCM1265** | **Primavera Laboratory** | Prepare schedule plan for construction project. |
| | | | | Analyze construction project using primavera. |
| | | | | Prepare and present various types of reports. |
| 30. | | **CCM1285** | **Mini project** | Select mini project problem. |
| | | | | Prepare and present statement of purpose. |
| | | | | Develop solution to the selected problem. |
| | | | | Prepare and present report related to project undertaken. |
| 31. | | **SHP552** | **Framework of Indian Constitution** | Realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution. |
| | | | | Identify the importance of fundamental rights as well as fundamental duties |
| | | | | Understand the functioning of Union, State and Local Governments in Indian federal system |
| | | | | Learn procedure and effects of emergency, composition and activities of election commission and amendment procedure |
| 32. | III | **MOE2011** | **Artificial Intelligence - Machine Learning** | Describe central machine learning methods and techniques and how they relate to artificial intelligence |
| | | | | Differentiate between supervised and unsupervised learning techniques |
| | | | | Apply the ML algorithms to a real-world problem, |
| | | | | Optimize the models learned and report on the expected accuracy that can be achieved by applying the models. |

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| | | | | Evaluate a given problem and apply appropriate machine learning technique |
| 33. | | **MOE2021** | **Creative Thinking: Techniques &Tools** | Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios |
| | | | | Apply different brainstorming techniques in group activities |
| | | | | Be proficient in the application of the 6 thinking hats tool in different life scenarios |
| | | | | Develop a systematic approach to idea generation through the use of morphological analysis |
| | | | | Innovate on an existing product, service or situation applying the SCAMPER method |
| | | | | Get confident with the theory of inventive problem solving, called TRIZ |
| 34. | | **MOE2031** | **MOOC Course** | Identify the real applications and practices of courses studied, at industry level. |
| | | | | Recognize various modelling, analysis and validation techniques adopted at industries. |
| | | | | Demonstrate the issues at design, manufacturing and assembly levels. |
| | | | | Summarize and present technical data in report format. |
| 35. | | **MOE2041** | **Condition Monitoring and Signal Processing** | Identify the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors. |
| | | | | Analyze for machinery condition monitoring and explain how this compliments monitoring the condition. |
| | | | | Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure. |
| | | | | Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system. |
| | | | | Identify vibration measurement, lubrication oil analysis |
| 36. | | **MOE2051** | **Aircraft Conceptual Design** | Analyze the design process of aircraft and decide the aircraft configuration. |

| | | | | |
|---|---|---|---|---|
| | | | | Choose type of power plant as per flight regime. |
| | | | | Design the fuselage layout as per type of aircraft. |
| | | | | Design the wing for type of aircraft and its wing loading |
| | | | | Evaluate lift, drag and mass for design synthesis. |
| | | | | Examine the influence of various design requirements on the configuration of an aircraft to derive an optimized design |
| 37. | | **MOE2060** | **Augmented Reality and Virtual Reality** | Define the basic concepts of Virtual and Augmented Reality |
| | | | | Identify the differences in AR/VR concepts and technologies |
| | | | | Describe the fundamental concepts relating to Virtual Reality such as presence, immersion, and engagement |
| | | | | Evaluate usability of AR/VR applications and critique their use of AR/VR capabilities |
| | | | | Design and prototype effective AR/VR applications using UNITY platform for various application |
| 38. | | **MOE2070** | **Industrial Instrumentation** | Elaborate working principal of different transducers. |
| | | | | Select suitable transducer/sensor for specific application. |
| | | | | Justify the use of specific measurement technique for specific task. |
| | | | | Evaluate the Calibration and Interfacing of the transducers. |
| 39. | | **MOE2080** | **Advanced Mechatronics Systems** | Explain Mechatronics System |
| | | | | Analyze the Mechatronics Based System |
| | | | | Model, simulate, and verify the mechatronics systems. |
| | | | | Identify Electrical, Hydraulic and Pneumatic Components. |
| 40. | | **CCM2015** | **Industry Internship** | Relate theory to practice. |
| | | | | Compile technical data of the project. |
| | | | | Prepare daily work reports of ongoing activities. |
| | | | | Prepare and present internship report. |
| 41. | | **CCM2035** | **Dissertation Phase-I** | Select research problem through literature survey. |

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| | | | | Develop research design for research problem. |
| | | | | Prepare and present synopsis report. |
| 42. | | **CCM2055** | **Dissertation Phase-II** | Perform data/experimental data collection for the project. |
| | | | | Analyze collected data using appropriate tools/techniques/ software. |
| | | | | Perform experimental/software analysis for validation of research work. |
| | | | | Prepare and present report. |
| 43. | IV | **CCM2025** | **Dissertation Phase-III** | Analyze collected data using appropriate tools/techniques/ software's. |
| | | | | Prepare and present/publish technical paper. |
| | | | | Prepare and present report |
| 44. | | **CCM2045** | **Dissertation Phase-IV** | Compile the work done in appropriate sequence. |
| | | | | Derive conclusion of the work done of the project. |
| | | | | Analyze proposed system. |
| | | | | Perform plagiarism analysis of compiled report. |
| | | | | Prepare and present the final dissertation report in desired format. |

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# Computer Science and Engineering

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# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## UG Program

- **Department Name :-Computer Science and Engineering**
- **UG Program Name :- Computer Engineering**
- **Vision and Mission :-**

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| **Vision** | To excel in the computer science engineering discipline through continuous research, innovation and industry-oriented curriculum leading to responsible IT professionals. |
| **Mission** | 1. To inculcate teaching and learning process promoting state-of-the-art IT industry practices in computer science engineering and technology to address global challenges.<br>2. To integrate academics, research and entrepreneurship skills to address present and future challenges of the society and industry.<br>3. To develop professionalism with strong foundations adapting to changing technology. |

| Sr. No. | Program Outcomes |
|---|---|
| 25. | PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems. 3. 4. 5. 6. |
| 26. | PO2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| 27. | PO3: 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 public health and safety, and cultural, societal, and environmental considerations. |
| 28. | PO4: 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. |
| 29. | PO5: 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. |

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| 30. | PO6: 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. |
| 31. | PO7: Ethics: Apply ethical principles and commit to professional ethics and responsibilities<br>and norms of the engineering practice. |
| 32. | PO8: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| 33. | PO9: Communication: Communicate effectively on complex engineering activities with the engineering community and with the 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. |
| 34. | PO10: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| 35. | PO11: 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. |

| Sr. No. | Program Specific Outcomes |
|---|---|
| PSO1 | Apply knowledge of database management systems, data mining and analytics techniques to solve real world problems |
| PSO2 | Apply knowledge of machine learning and intelligence to identify, formulate and solve complex engineering problems |
| PSO3 | Design, develop and deploy software using emerging IT technologies like open source tools, mobile application development platforms, web technologies and cloud computing |

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- **S.Y. B. Tech.**

| Sr. No. | Semester | Course Code | Course Name | Course Learning Outcomes |
|---|---|---|---|---|
| **1.** | III | CS2014 | Computer Organization and Architecture | 1) Perform various arithmetic operations on different number systems. |
| | | | | 2) Apply Boolean algebra to solve logic functions. |
| | | | | 3) Design, implement, and analyze various logic circuits. |
| | | | | 4) Apply the programming techniques in developing assembly language program. |
| | | | | 5) Analyze flow chart and apply assembly language programming techniques. |
| **2.** | III | CS2034 | Data structure & Algorithms | 1) Compare between linear and nonlinear data structures. |
| | | | | 2) Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | 3) Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | 4) Determine a suitable data structure and algorithm to solve a real world problem. |
| **3.** | III | CS2074 | Discrete Mathematics | 1) Describe mathematical logic, truth table and their applications to programming and hardware design. |
| | | | | 2) Apply the concepts of set theory. |
| | | | | 3) Characterize the properties of relations, functions and algebraic systems for formal languages. |
| | | | | 4) Develop essential concepts to solve problems on graphs and networks. |
| | | | | 5) Express counting principle to determine various combinatorial configurations. |
| **4.** | III | CEMD201 | Building Construction and Planning | 1) Suggest appropriate materials for building construction applications. |
| | | | | 2) Prepare a functional design of components of the building. |
| | | | | 3) Design and draw residential building using principles of planning and bye-laws. |
| | | | | 4) Prepare plumbing and electrification plan for the building. |
| | | | | 5) Explain properties of building finishing materials and application procedure. |
| **5.** | III | CSMD201 | Introduction to Data Structures | 1) Compare between linear and nonlinear data structures. |

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| | | | | 2) Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | 3) Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | 4) Determine a suitable data structure and algorithm to solve a real world problem. |
| **6.** | III | EEMD201 | Electrical Power Generation | 1) List the main components of different power plants. |
| | | | | 2) Describe the operation of various power plants used for electrical power generation. |
| | | | | 3) Explain working principles of various power plants. |
| | | | | 4) Compare different power plants based on advantages, limitations and future prospects. |
| | | | | 5) Draw layout of electrical power plants. |
| | | | | 6) Explore alternate electrical energy resources for future needs and challenges. |
| **7.** | III | ECMD201 | Electronics Devices and Applications | 1) Describe the fundamental concepts of electronics and working principles of different devices. |
| | | | | 2) Analyze different analog and digital electronics circuits. |
| | | | | 3) Design digital electronics circuits with truth table and logic diagram. |
| **8.** | III | CIMD201 | Data Structures | 1) Describe the basic terminologies of data structures. |
| | | | | 2) Examine the linear data structure array with its types. |
| | | | | 3) Demonstrate the working of stack, queue performed on data structures. |
| | | | | 4) Illustrate the working of linked list. |
| | | | | 5) Discuss Tree terminologies and their Applications. |
| | | | | 6) Elaborate Graph terminologies with their types. |
| **9.** | III | MEMD203 | Design Thinking | 1) Identify the new product opportunities and sources of new product ideas. |
| | | | | 2) Elaborate the product life cycle and product design process. |
| | | | | 3) Integrate the customer and end-consumer needs into design process. |
| | | | | 4) Assimilate the various product characteristics to design a novel product. |

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| | | | | 5) Participate effectively in group work sessions and teams. |
| **10.** | III | MCMD201 | Fundamentals of Mechatronics | 1. Identify various elements of mechatronics systems. |
| | | | | 2. Select appropriate sensor/Actuator/controller/control algorithm for different applications. |
| | | | | 3. Develop PLC/ microcontroller-based applications. |
| **11.** | III | AIMD201 | Object Oriented Programming | 1) Understand the basic object-oriented programming concepts and apply them in problem solving. |
| | | | | 2) Illustrate inheritance concepts for reusing the program. |
| | | | | 3) Implement program using loops, decision statements and functions in Python. |
| | | | | 4) Plot data using appropriate Python visualization libraries. |
| **12.** | III | RAMD201 | Fundamentals of Robotics & Automation | 1) Differentiate various robotic configurations and performance metrics. |
| | | | | 2) Compare various end effectors, sensors, and drive systems in robotic applications. |
| | | | | 3) Illustrate kinematic and dynamic principles applied to robotic systems. |
| | | | | 4) Outline robot programming solutions for diverse applications. |
| | | | | 5) Distinguish various types and aspects of automation. |
| | | | | 6) Relate knowledge of PLCs to industrial automation. |
| **13.** | III | SH2174 | Environmental Science | 1) Describe methods for conservation of natural resources, ecosystem and to achieve sustainable development. |
| | | | | 2) Evaluate impacts of environmental pollution on the environment and human health. |
| | | | | 3) Design sustainable solutions to address environmental challenges. |
| | | | | 4) Demonstrate the importance of teamwork, collaborative approach in group work. |
| | | | | 5) Develop presentation and report writing skills. |
| **14.** | III | CS221 | Object Oriented Programming | 1) Explain the fundamental concepts of Object-Oriented Programming. |
| | | | | 2) Illustrate the concepts of polymorphism and inheritance. |
| | | | | 3) Use exception handling in C++ programs. |

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| | | | | 4) Demonstrate the concept of file handling using C++. |
| | III | | | 5) Implement templates in C++. |
| **15.** | III | CS2134 | Data structure & Algorithms Lab | 1) Implement various data structures and algorithms using programming languages such as C or C++. |
| | | | | 2) Conduct experiments to validate the theoretical analysis of algorithms. |
| | | | | 3) Analyze data, interpret results, and draw conclusions. |
| | | | | 4) Evaluate the efficiency and scalability of different data structures and algorithms enabling them to make informed choices when selecting the most appropriate solution for a given problem |
| **16.** | III | CS223 | Digital Marketing | 1) Describe the principles of search engine optimization (SEO), social media marketing, email marketing, and analytics. |
| | | | | 2) Apply data analysis techniques to measure and optimize digital marketing campaigns. |
| | | | | 3) Design effective digital marketing plans and strategies. |
| | | | | 4) Develop practical skills in implementing digital marketing strategies. |
| **17.** | III | CS2174 | Technical Aptitude-I | 1) Choose proper techniques to find solution for engineering problems. |
| | | | | 2) Solve various types of problems. |
| | | | | 3) Develop ability to face competitive examinations. |
| | | | | 4) Inspect the problem & conclude with proper solution. |
| **18.** | III | SH2634 | Professional Leadership Skills | 1) Explain the traits of a leadership through real life examples. |
| | | | | 2) Exhibit the ability to work effectively in team. |
| | | | | 3) Prepare a presentation as per the audience and context requirements. |
| **19.** | III | SH2614 | Interpersonal Skills | 1) Exhibit interpersonal communication skills. |
| | | | | 2) Demonstrate decision-making skills. |
| | | | | 3) Apply conflict resolution styles appropriate in different situations. |
| | | | | 4) Demonstrate skills to manage balance in work and life. |

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| **20.** | III | SH2694 | Innovation Tools and Methods for Entrepreneurs | 1) Explain structured approach to define the problem with every possible detail, identify conflicts and solve them. |
| | | | | 2) Apply User Journey Map to the selected problem to show user interaction at various stages. |
| | | | | 3) Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| **21.** | III | SH2594 | Personal Effectiveness and Body Language | 1) Develop skills to build self-esteem and positive attitude. |
| | | | | 2) Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | 3) Discover ways to overcome procrastination. |
| | | | | 4) Demonstrate responsiveness towards stress and health issues. |
| | | | | 5) Interpret the non-verbal behaviour of a person. |
| **22.** | III | SH2734 | German Language- III | 1) Interpret the language if the next person is speaking slowly and clearly. |
| | | | | 2) Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | 3) Demonstrate the language by self-introduction in German with simple sentences. |
| **23.** | III | SH2714 | Japanese Language - III | 1) Make use of basic conversations in various situations. |
| | | | | 2) Identify the sentence patterns. |
| | | | | 3) Explain insights about the communication required for living in Japan. |
| | | | | 4) Interpret Japanese work ethics required in their professional career. |
| **24.** | IV | CS220 | Statistics and Fuzzy Logic | 1) Apply the statistical techniques, probability distributions and density estimates to various kinds of data. |
| | | | | 2) Develop the fundamental concepts of fuzzy sets and operations. |
| | | | | 3) Apply fuzzy arithmetic for various problems involving fuzzy numbers. |
| | | | | 4) Develop the concept of fuzzy relations and operations. |
| **25.** | IV | CS230 | Software Engineering | 1) Explain various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance. |
| | | | | 2) Identify risks, manage the change to assure quality in software projects. |

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| | | | | 3) Apply the knowledge, techniques, and skills in the development of a software product. |
| | | | | 4) Evaluate various software testing techniques and metrics. |
| **26.** | IV | CS224 | Finite Automata and Formal Languages | 1) Solve automata problems using mathematical theorems and techniques. |
| | | | | 2) Design computational models for different language classes. |
| | | | | 3) Construct grammar or regular expressions for different language classes. |
| | | | | 4) Prove and disprove key properties of formal languages and automata. |
| | | | | 5) Create a compiler using various tools like LEX and YACC. |
| **27.** | IV | CS2004 | Computer Network | 1) Remember and explain the modulation techniques, components used in a communication system. |
| | | | | 2) Analyze different network models and protocols of different layers. |
| | | | | 3) Understand and discuss the concept of multiplexing & switching. |
| | | | | 4) Apply and discuss various functions of the different protocols in network layer. |
| | | | | 5) Create the different services of application layer. |
| **28.** | IV | SH202 | **मराठी भाषिक कौशल्यविकास** | **१. भाषा आणि व्यक्तिमत्व विकास यांमधील सहसंबंध स्पष्ट करू शकेल** |
| | | | | **२. भाषिक कौशल्यविकास करू शकेल** |
| | | | | **३. कथा या मराठी साहित्य प्रकाराचे विश्लेषण करू शकेल** |
| | | | | **४. एकांकिका या मराठी साहित्य प्रकाराच्या विश्लेषणाची क्षमता प्राप्त करेल** |
| **29.** | IV | SH204 | **हिंदी कथा साहित्य एवं प्रयोजमूलक हिंदी** | **1.** विद्यार्थियों में मानवीय संवेदनाओं के विकास के साथ नवीन सामाजिक सांस्कृतिक बोधऔर जीवन मूल्यों का विकास होगा। |
| | | | | **2.** विद्यार्थियों में साहित्य के माध्यम से कलात्मक गुणों की अभिवृद्धि होगी कला की साहित्यिक विधाओं के प्रति अभिरुचि जागृत होगी तथा रचनात्मक कौशल्य को बढ़ावा मिलेगा। |
| | | | | **3.** विद्यार्थियों में नए वैश्विक मूल्यों के प्रति सजगता को बढ़ावा मिलेगा एवं मूल्यवादी दृष्टि के प्रति दायित्व बोध उत्पन्न होगा।छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| | | | | **4.** छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| **30.** | IV | CS226 | Java Programming | 1) State the OOP concepts and basic Java programming fundamentals. |

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| | | | | 2) Explain interfaces, packages, and exception handling in Java. |
| | | | | 3) Apply file handling and multithreading in Java programs. |
| | | | | 4) Develop Java programs for database connectivity. |
| | | | | 5) Design graphical user interfaces using Java. |
| **31.** | IV | CEMD202 | Building Estimation and Valuation | 1) Explain the types and basic requirements of the estimate. |
| | | | | 2) Explain measurement sheet, abstract sheet, and detailed specifications of different construction items. |
| | | | | 3) Prepare detailed estimate of load bearing structure and framed structure. |
| | | | | 4) Prepare rate analysis and bar bending schedule of different construction items. |
| | | | | 5) Explain the tenders and contracts. |
| | | | | 6) Describe basic terms of valuation. |
| **32.** | IV | CSMD202 | Problem Solving using JAVA | 1) Explain the basic object-oriented programming concepts. |
| | | | | 2) Illustrate the concept of inheritance for code reusability. |
| | | | | 3) Use the concepts of interfaces and packages in Java programming. |
| | | | | 4) Demonstrate the concepts of exception handling and multithreading. |
| | | | | 5) Implement JDBC and GUI programming using Java. |
| **33.** | IV | EEMD202 | Power System | 1) Write the basic working principles of different generating sources. |
| | | | | 2) Analyze different types of loads. |
| | | | | 3) Explain importance of power factor and tariffs in power system. |
| | | | | 4) Identify various components in power transmission and distribution system. |
| | | | | 5) Select substation equipments as per requirement. |
| **34.** | IV | ECMD202 | Electronics Communication Systems | 1) Describe different communication systems. |
| | | | | 2) Explain applications of analog and digital modulation techniques. |

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| | | | | 3) Analyze different modulation and demodulation techniques. |
| | | | | 4) Explain the use of satellite communication. |
| **35.** | IV | CIMD202 | Computer Algorithms | 1) Analysing asymptotically the performance of algorithms. |
| | | | | 2) Compare and analyse searching and sorting algorithms. |
| | | | | 3) Apply different algorithm design techniques to solve problems like job sequencing, knapsack, TSP, finding shortest path etc. |
| | | | | 4) Apply backtracking method to solve problems like N-queens, graph coloring, sum of subsets etc. |
| | | | | 5) Describe computational complexity theory to classify computational problems according to their inherent difficulty.. |
| **36.** | IV | MEMD204 | Behavioral Engineering and Design | 1. Explain key concepts and theories related to influencing user behavior in product design. |
| | | | | 2. Utilize psychological principles to develop product designs that effectively address user needs and preferences. |
| | | | | 3. Create products that demonstrate high levels of user engagement, measured through metrics such as adoption rates and user interaction patterns. |
| | | | | 4. Develop products that prioritize user satisfaction and usability, as measured through user testing and feedback. |
| | | | | 5. Incorporate aesthetic appeal and ergonomic considerations into product designs, assessed through objective criteria such as user comfort and visual appeal ratings. |
| | | | | 6. Analyze user feedback and iteratively improve designs to enhance user experience, measured by improvements in user satisfaction scores or usability metrics. |
| **37.** | IV | MC2051 | Industrial Fluid Power | 1. Describe the structure and function of common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors etc. |

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| | | | | 2. Model and analyze common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors. |
| | | | | 3. Create & simulate basic hydraulic and pneumatic circuit diagrams for different applications. |
| | | | | 4. Design, develop & analyze simple hydraulic and pneumatic systems for given task. |
| **38.** | IV | AIMD202 | Data Structures & Algorithms | 1) Compare between linear and nonlinear data structures. |
| | | | | 2) Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | 3) Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | 4) Determine a suitable data structure and algorithm to solve a real world problem. |
| **39.** | IV | RAMD202 | Sensors & Actuators | 1) Explain the functioning of various sensors and transducers. |
| | | | | 2) Calibrate the transducers such as accelerometers, microphones and strain gauges. |
| | | | | 3) Explain the characteristics of various sensors and transducers. |
| | | | | 4) Describe the process and need for calibration. |
| | | | | 5) Choose the sensor for measurement of few parameters. |
| | | | | 6) Use the appropriate sensor and calibrate. |
| **40.** | IV | CS2044 | Computer Networks Lab | 1. Define and apply architectural principles and mechanisms for data exchange among computer |
| | | | | 2. Design, implement and analyse simple computer networks. |
| | | | | 3. Identify& analyse the performance of different network layer protocols to formulate and solve network-engineering problems. |
| | | | | 4. Analyze to compare performance of different routing protocols. |

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| | | | | 5. Ability to use techniques, skills, and modem networking tools necessary for engineering practice. |
| | | | | 6. Demonstrate an understanding of computer communications standards. |
| **41.** | IV | CS232 | Fundamentals of Web Technology | 1. Explain the fundamental concepts of web technology, including the structure of the Internet, client-server architecture, and basic HTTP protocols. |
| | | | | 2. Apply syntax and semantics of HTML for creation of well-structured and semantic web documents. |
| | | | | 3. Apply CSS to style web documents and enhance user interfaces for web applications. |
| | | | | 4. Analyze JavaScript code for utilizing the DOM and handling events in web apps. |
| | | | | 5. Develop responsive web application using Bootstrap. |
| | | | | 6. Deploy interactive website on World Wide Web. |
| **42.** | IV | CS2084 | Technical Aptitude-II | 1) Choose proper techniques to find solution for engineering problems. |
| | | | | 2) Solve various types of problems. |
| | | | | 3) Develop ability to face competitive examinations. |
| | | | | 4) Inspect the problem & conclude with proper solution. |
| **43.** | IV | SH2634 | Professional Leadership Skills | 1. Explain the traits of a leadership through real life examples. |
| | | | | 2. Exhibit the ability to work effectively in team. |
| | | | | 3. Prepare a presentation as per the audience and context requirements. |
| **44.** | IV | SH2614 | Interpersonal Skills | 1. Exhibit interpersonal communication skills. |
| | | | | 2. Demonstrate decision-making skills. |
| | | | | 3. Apply conflict resolution styles appropriate in different situations. |

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| | | | | 4. Demonstrate skills to manage balance in work and life. |
| **45.** | IV | SH2694 | Innovation Tools and Methods for Entrepreneurs | 1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them |
| | | | | 2. Apply User Journey Map to the selected problem to show user interaction at various stages |
| | | | | 3. Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| **46.** | IV | SH2594 | Personal Effectiveness and Body Language | 1. Develop skills to build self-esteem and positive attitude. |
| | | | | 2. Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | 3. Discover ways to overcome procrastination. |
| | | | | 4. Demonstrate responsiveness towards stress and health issues. |
| | | | | 5. Interpret the non-verbal behaviour of a person. |
| **47.** | IV | SH 2644 | German Language - IV | 1. Interpret the language if the next person is speaking slowly and clearly. |
| | | | | 2. Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | 3. Demonstrate the language by self-introduction in German with simple sentences. |
| **48.** | IV | SH2624 | Japanese Language - IV | 1. To be able to make basic conversations in various situations. |
| | | | | 2. To recognize the sentence patterns. |
| | | | | 3. To improve Japanese Language proficiency. |
| | | | | 4. To give students insights about the communication required for living in Japan. |
| | | | | 5. To expose students to the Japanese work ethics required in their professional careers. |

- **T. Y. B. Tech.**

| Sr.No. | Semester | Course Code | Course Name | Course Learning Outcomes |
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| 1. | V | CS3014 | Database Management Systems | 1) Formulate E-R models to represent simple database application scenarios . |
| | | | | 2) Apply the principles of the database system for efficient access of the data . |
| | | | | 3) Analyze various protocols, issues, and techniques related to transaction management for enabling consistency of database . |
| | | | | 4) Design the queries to manipulate data using procedural and non-procedural languages |
| 2. | V | CS335 | Operating System | 1) Distinguish between different operating systems . |
| | | | | 2) Express concepts of process management . |
| | | | | 3) Summarize synchronization techniques . |
| | | | | 4) Demonstrate the concept of deadlock . |
| | | | | 5) Discuss memory management and virtual memory management |
| | | | | 6) Review on storage management, Protection and security |
| 3. | V | CS323 | Cryptography and Network Security | 1) Analyze different methods of Data Encryption and Decryption; their advantages & limitations . |
| | | | | 2) Use different key distribution methods for distribution of Public/Private & Secret keys . |
| | | | | 3) Apply message authentications techniques for implementing security during message communication . |
| | | | | 4) Create and use digital signatures . |
| | | | | 5) Discuss different security attacks & security solutions for e-mail & web applications |
| 4. | V | CS325 | Program Elective - I-Parallel Algorithm Design | 1) Compare different parallel architectures . |
| | | | | 2) Design parallel algorithms for different applications |
| | | | | 3) Analyze the role of parallel architecture in parallel algorithmâ€™s design . |
| | | | | 4) Perform complexity analysis of parallel systems . |
| | | | | 5) Compare different Parallel algorithms from various application domains |
| 5. | V | CS327 | Program Elective - I-Soft Computing | 1) Describe soft computing techniques and their role in problem solving . |
| | | | | 2) Apply various Soft Computing techniques such as fuzzy logic and genetic algorithms to solve problems . |

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| | | | | 3) Analyze the strengths and weaknesses of different Soft Computing techniques in specific problem domains . |
| | | | | 4) Design and implement advanced Soft Computing models for complex real-world problems |
| 6. | V | CS329 | Program Elective - I Operations Research | 1) Develop mathematical models for the given application . |
| | | | | 2) Apply mathematical methods to solve complex operational problems . |
| | | | | 3) Evaluate operations research techniques in solving business problems . |
| | | | | 4) Select appropriate operations research technique to solve engineering, scientific or business problems |
| 7. | V | CS331 | Data Warehousing & Data Mining | 1) Analyze the aspect of mining data over the statistical techniques for selected applications . |
| | | | | 2) Justify the usage of various classification/clustering algorithms . |
| | | | | 3) Apply knowledge to build association based rules technique for real world case studies . |
| | | | | 4) Explore data warehousing and OLAP concepts . |
| | | | | 5) Experiment the advancement in mining techniques for wide variety of areas |
| 8. | V | OE3104 | Network Administration | 1) Recall and describe the different basic components of computer networks . |
| | | | | 2) Explain the functions and interactions of each layer of the OSI model . |
| | | | | 3) Distinguish various networking devices with their functions . |
| | | | | 4) Analyze different web services and applications . |
| | | | | 5) Synthesize the knowledge about cyber security related services and networking maintenance |
| 9. | V | CEMD301 | Infrastructure Engineering | 1) Apply the knowledge of geometric design in road construction . |
| | | | | 2) Identify the quality parameters of pavement materials and various methods of road construction . |
| | | | | 3) Discuss the various aspects of airport engineering . |
| | | | | 4) Explain design parameters of railway engineering and its component parts . |
| | | | | 5) Summaries the different off shore structures for dock and harbors |
| 10. | V | OE3104 | Network Administration | 1. Recall and describe the different basic components of computer networks. |
| | | | | 2. Explain the functions and interactions of each layer of the OSI model. |
| | | | | 3. Distinguish various networking devices with their functions. |

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| | | | | 4. Analyze different web services and applications. |
| | | | | 5. Synthesize the knowledge about cyber security related services and networking |
| 11. | V | CEMD301 | Infrastructure Engineering | 1. Apply the knowledge of geometric design in road construction. . |
| | | | | 2. Identify the quality parameters of pavement materials and various methods of road construction |
| | | | | 3. Discuss the various aspects of airport engineering. |
| | | | | 4. Explain design parameters of railway engineering and it's component parts. |
| | | | | 5. Summaries the different off shore structures for dock and harbors. |
| 12. | V | CSMD301 | Fundamentals of Database Systems | 1) Describe the purpose and nature of the database system for storing and fast access to the data . |
| | | | | 2) Identify various protocols, issues, and techniques related to transaction management for a consistent and stable database . |
| | | | | 3) Draw E-R model store present simple database application scenarios . |
| | | | | 4) Design the queries to manipulate and access data using procedural and non-procedural languages |
| | | | | 5)Apply relational database design concepts to remove data redundancy and to retrieve data easily |
| | | | | 6)Perform operation on Unstructured data. |
| 13. | V | EEMD301 | Electrical Machines | 1) Describe behavior of dc machine . |
| | | | | 2) Explain the working principle of 1-Phase and 3-Phase transformers . |
| | | | | 3) Explain working of different induction motors . |
| | | | | 4) Select the relevant electrical machines for different applications . |
| | | | | 5) Interpret the relevant fractional horse power motor for different applications |
| 14. | V | ECMD301 | Advanced Communication Systems | 1) Explain the principles of antenna and wave propagation . |
| | | | | 2) Understand basic antenna parameters and their types . |
| | | | | 3) Discuss the evolution, requirements, and challenges of 5G communication systems . |
| | | | | 4) Understand and compare various communication techniques . |
| | | | | 5) Communicate effectively on complex engineering topics related to modern communication techniques |

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| 15. | V | CIMD301 | Introduction of DBMS | 1) Describe the fundamental elements of relational database management systems .<br>2) Design ER-model store present simple database application scenarios .<br>3) Write SQL query to perform various operations on the database .<br>4) Analyze principle of integrity constraints, Hashing and Indexing on databases .<br>5) Illustrate the transaction management, concurrency control and crash recovery |
| 16. | V | MEMD305 | Product Design Tools and Techniques | 1) Explain the basic principles of engineering design .<br>2) Design products for ease of manufacturing and assembly .<br>3) Apply value engineering and concurrent engineering principles in product design .<br>4) Apply reverse engineering on a product .<br>5) Apply various prototyping techniques, including rapid prototyping technologies |
| 17. | V | MCMD301 | Sensor and Instrumentation | 1) Understand the fundamental principles of various sensors and transducers .<br>2) Analyze the characteristics, advantages, and limitations of different sensor types .<br>3) Apply appropriate signal conditioning techniques to improve sensor output accuracy and integrate sensors into mechatronic systems for real-time data acquisition and control .<br>4) Select appropriate sensors for specific mechatronic systems used in real life applications |
| 18. | V | AIMD301 | Machine Learning | 1) Utilize machine learning techniques and understand the basic theory underlying machine learning .<br>2) Articulate supervised, unsupervised and reinforcement learning .<br>3) Identify the basic concepts of learning and decision trees .<br>4) Utilize Bayesian techniques for problems appear in machine learning .<br>5) Perform statistical analysis of machine learning techniques |
| 19. | V | RAMD301 | Kinematic & Dynamics for Robots | 1) Select the type of mechanism for the robotic applications .<br>2) Perform kinematic analysis and synthesis of mechanisms .<br>3) Perform forward and inverse kinematics of robots .<br>4) Perform workspace analysis for different types of robots . |

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| | | | | 5) Design robot manipulators based on dynamic analysis 6) Perform forward and inverse dynamics of robots |
| | | | | 6) Perform forward and inverse dynamics of robots |
| 20. | V | SH3034 | Scholastic Aptitude - I | 1) Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems . |
| | | | | 2) Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests . |
| | | | | 3) Develop a bridge in analogies, series and visualizing directions . |
| | | | | 4) Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams |
| 21. | V | CEMD303 | Smart Cities & Sustainable Development | 1) Develop a critical understanding of the different concept and ideologies of smart cities . |
| | | | | 2) Analyse the different approaches toward planning and development of smart cities on global level . |
| | | | | 3) Assess the existing state and approach of Smart city Mission in India . |
| | | | | 4) Comprehend the concept of resilience and sustainable development and its measurement . |
| | | | | 5) Evaluate the present status of sustainability and rating systems initiatives within the Indian context |
| 22. | V | CSMD303 | Object-oriented Programming in Python | 1) Demonstrate a comprehensive understanding of Python syntax, data types, and basic operations . |
| | | | | 2) Make use of common Python libraries for data manipulation . |
| | | | | 3) Implement lists, tuples, sets, and dictionaries for effective data handling . |
| | | | | 4) Apply principles of OOP, including classes, objects, inheritance, and polymorphism |
| 23. | V | EEMD303 | Electrical Technology | 1) Demonstrate speed control methods of electrical machines . |
| | | | | 2) Analyze performance of DC motor and induction motor for speed control applications . |
| | | | | 3) Implement power electronic circuits for given application . |
| | | | | 4) Measure electrical quantities using electrical and electronic instruments |
| 24. | V | ECMD303 | Electronic Product Design | 1) Elaborate product design processes . |
| | | | | 2) Explain various aspects of PCB design . |
| | | | | 3) Differentiate product-testing methods . |
| | | | | 4) Create various documents for the product |

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| 25. | V | CIMD303 | OOP using Java | 1) Explain the concepts and terminologies in object-oriented concepts and java programming language .<br>2) Apply object-oriented programming features and concepts for solving given problem .<br>3) Develop the java application using the collection framework to solve real word problem .<br>4) Apply the concepts exception handling to develop error free codes .<br>5) Utilize the concepts of package to develop efficient codes |
| 26. | V | MEMD307 | Design and Prototyping | 1) Use CAD software to create detailed CAD models and designs .<br>2) Explain the workflow and settings for effective additive manufacturing .<br>3) Simulate the 3D printing process to identify and correct potential issues before actual printing .<br>4) Print a 3D component based on CAD models |
| 27. | V | MCMD303 | Industrial Automation | 1) Explore the architecture of PLC and its functions .<br>2) Execute the various instructions and logic in PLC .<br>3) Develop the PLC program for various applications .<br>4) Design and develop the SCADA, DCS system for various applications |
| 28. | V | AIMD303 | Business Intelligence | 1. Articulate data pre-processing techniques<br>2. Analyze the data modeling required for business intelligence related tasks<br>3. Determine the role of statistical techniques in data analysis tasks<br>4. Identify big data analysis techniques<br>5. Utilize different reporting/visualization tool |
| 29. | V | RAMD303 | Robot Programming Lab. | 1. Explain Robot programming ecosystem.<br>2. Create reusable code for robot powered applications.<br>3. Design a custom robot using programming.<br>4. Simulate and control the robot using ROS. |
| 30. | V | CS333 | Web Technology | 1. Explain the fundamental concepts of web technology, including the structure of the Internet, client-server architecture, and basic HTTP protocols.<br>2. Apply syntax and semantics of HTML for creation of well-structured and semantic web documents.<br>3. Apply CSS to style web documents and enhance user interfaces for web applications.<br>4. Analyze JavaScript code for utilizing the DOM and handling events in web apps.<br>5. Develop responsive web application using Bootstrap. |

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| | | | | 6. Deploy interactive website on World Wide Web. |
| 31. | V | CS3174 | Database Management System Lab | 1. To Recognize the fundamentals of database design and ER modelling.<br>2. To Apply PL/SQL programming techniques including exception handling.<br>3. To Analyze and design complex SQL queries to manage database objects and manipulate data.<br>4. To Develop Java applications to connect and interact with databases using JDBC ODBC.<br>5. To Sort out the CRUD operations on Mongo DB and integrate NoSQL databases with applications. |
| 32. | V | C3214 | Summer Internship/ Professional Certification | 1. Apply the theoretical and practical knowledge of Computer Science & Engineering for product/service development.<br>2. Undergo real time IT Industry practices regarding product/service development.<br>3. Identify and analyze engineering problems to provide IT based solutions.<br>4. Adopt recent industry practices for project development<br>5. Improve the ability to work in teams<br>6. Enhance technical skills for solving complex engineering problems. |
| 33. | VI | CS320 | Machine Learning | 1. Differentiate among various machine learning techniques.<br>2. Apply data pre-processing techniques to real-world problems in various domains<br>3. Build and apply machine learning models to solve practical problems in various<br>4. Fields (e.g., finance, healthcare, marketing etc).<br>5. Analyse the concept of neural networks for learning linear and non-linear activation functions.<br>6. Develop new Recommender Systems for a number of domains especially, Education,Health-care etc. |
| 34. | VI | CS322 | Design and Analysis of Algorithms | 1. Identify appropriate algorithm design techniques for solving problems<br>2. Design an algorithm to solve problem in systematic way.<br>3. Analyze the performance or complexity of algorithms<br>4. Explain non-deterministic and randomized algorithms. |
| 35. | | | | 1. Formulate a research problem |

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| | VI | CS324 | Research Methodology | 2. Search, review and analyze relevant literature<br>3. Make effective use of computing tools to search, analyze, and present information<br>4. Prepare, present, and get published |
| 36. | VI | CS326 | Program Elective-II- Cyber Security | 1. Explain essentials of Cyber Security concepts<br>2. Apply the scientific method for security assessment<br>3. Develop computer forensics awareness<br>4. Formulate and execute Cyber Security strategies leveraging the latest technological developments<br>5. Analyze the actual and intricate problems of cybercrime. |
| 37. | VI | CS328 | Program Elective – II Parallel Computing and HPC | 1. Compare different parallel architectures and models<br>2. Develop parallel programs using various parallel programming models<br>3. Apply parallel computing concepts to solve real-world problems<br>4. Analyze and optimize the performance of parallel applications<br>5. Evaluate the high-performance computing systems. |
| 38. | VI | CS330 | Program Elective-II- Artificial Neural Network | 1. Explain the basic structure and functioning of artificial neural networks<br>2. Implement simple neural network architectures, such as single-layer perceptrons and basic multi-layer feedforward networks<br>3. Analyze the behavior of neural networks during training and testing phases, including the impact of different activation functions and learning algorithms<br>4. Evaluate the performance of neural networks in solving various real-world problems |
| 39. | VI | CS332 | Program Elective - II Introduction to Logistics | 1. To Recognize fundamentals of logistics and supply chain management principles.<br>2. Apply logistics and supply chain strategies to optimize business operations.<br>3. To Analyze the flow of goods and information effectively within supply chain networks. |

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| | | | and Supply Chain Management | 4. To Develop Effective Distribution Networks |
| | | | | 5. To sort out the distribution and transportation network. |
| 40. | VI | CS334 | Program Elective-II-Big Data Analytics | 1. Understand Big Data and its analytics in the real world |
| | | | | 2. Analyze the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics 2 |
| | | | | 3. Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm 3 |
| | | | | 4. Design and Implementation of Big Data Analytics using pig and spark to solve data intensive problems and to generate analytics |
| | | | | 5. Implement Big Data Activities using Hive |
| 41. | VI | OE348 | Information Technology Foundation Program | 1. Solve the real-world problem using Programming Concept |
| | | | | 2. Apply Data structure Algorithm to solve Computational Problem |
| | | | | 3. Make use of an ER model for a given problem domain. |
| | | | | 4. Relate the relationship between project integration, scope, cost and time Management System to improve quality of projects. |
| 42. | VI | CEMD302 | Environmental Engineering | 1. Explain importance of water and wastewater analysis for various parameters. |
| | | | | 2. Discuss impact of pollution on man, animal and plants. |
| | | | | 3. Prepare layout of water and wastewater treatment process. |
| | | | | 4. Design Water and Wastewater Treatment Plant. |
| | | | | 5. Apply AI tools for impact of humans on environment. |
| 43. | VI | CSMD302 | Artificial Intelligence | 1. Understand the basic concepts and techniques of Artificial Intelligence. |
| | | | | 2. Apply AI algorithms for solving typical practical problems. |
| | | | | 3. Describe appropriate knowledge representation schemes in AI. |
| | | | | 4. Apply reasoning schemes in AI. |
| | | | | 5. Analyze the planning schemes for goal stack. |
| | | | | 6. Evaluate performance of solution for constraint satisfaction problem. |

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| 44. | VI | EEMD302 | Smart Grid | 1. Summarize the concept and future of smart grid<br>2. Develop smart grid architecture<br>3. Compile various smart grid technologies<br>4. Identify communication and information technologies for smart grid<br>5. Elaborate distributed generation and storage technologies<br>6. Recommend smart metering and distribution automation |
| 45. | VI | ECMD302 | I<br>Industrial Electronics | 1. Identify basics Power Electronics devices and components.<br>2. Illustrate use of Power Electronics.<br>3. Develop PLC logic using ladder programming.<br>4. Analyze industrial electronics applications. |
| 46. | VI | CIMD302 | Software Engineering | 1. Describe fundamental concepts in software engineering and project management<br>2. Practice software process models for the undertaken software problems<br>3. Design function-oriented and object oriented models using modern tools.<br>4. Identify classes and build the domain model using advanced concepts in object,<br>5. dynamic and functional modeling<br>6. Analyze existing software systems using function and object-oriented analysis.<br>7. Design models using UML diagrams for software systems: use case, class, sequence, collaboration, activity, state chart diagrams, component and deployment. |
| 47. | VI | MEMD304 | | 1. Explain product positioning and branding strategies for new products<br>2. Analyse market trends and consumer behaviour to identify opportunities for new product development<br>3. Develop pricing strategies and cost estimation techniques for new products<br>4. Explain the basics of intellectual property rights and patents in the context of new product development<br>5. Design distribution channels and sales strategies |

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| | | | Marketing and Business Fundamentals for New Products | |
| 48. | VI | MCMD302 | Industrial Robotics | 1. Explain the basic concepts of Robots |
| | | | | 2. Select an end effector and sensor for application |
| | | | | 3. Explain drives and controls for robotic system |
| | | | | 4. Develop program for robot to perform tasks in industrial applications. |
| 49. | VI | AIMD302 | Principles of AI | 1. Articulate basic concepts and techniques of Artificial Intelligence |
| | | | | 2. Apply AI algorithms for solving typical practical problems |
| | | | | 3. Designate appropriate knowledge representation schemes in AI |
| | | | | 4. Analyze reasoning schemes in AI. |
| 50. | VI | RAMD302 | Industrial Automation & Control | 1. Explain need, basic elements, and systems of industrial automation |
| | | | | 2. Develop PLC programming for various applications |
| | | | | 3. Discuss various material handling and identification technologies |
| | | | | 4. Explain basics of DCS and its interfacing |
| 51. | VI | SH3064 | Scholastic Aptitude II | 1. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems |
| | | | | 2. Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | 3. Develop a bridge in analogies, series and visualizing directions |
| | | | | 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams. |

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| 52. | VI | CS336 | Machine Learning Lab | 1. Explore dataset and its associated characteristics using python libraries |
| | | | | 2. Implement various supervised learning algorithms for given dataset |
| | | | | 3. Implement various Unsupervised learning algorithms for given dataset |
| | | | | 4. Design solution for real world problem by implementing ML algorithms. |
| | | | | 5. Develop, report and present implementation of typical Mini Project in ML. |
| 53. | VI | CS338 | Mobile Application Development-I | 1. Demonstrate setting up a React development environment and understand the project structure |
| | | | | 2. Differentiate between functional and class components in React |
| | | | | 3. Set up a Node.js environment and demonstrate basic asynchronous programming concepts |
| | | | | 4. Configure MongoDB server and establish a connection to a database |
| | | | | 5. Evaluate the role of Express.js in building RESTful APIs |
| | | | | 6. Create React components that handle API responses and update the UI accordingly. |
| 54. | VI | CS3144 | Technical Aptitude-IV | 1. Choose proper techniques to find solution for engineering problems |
| | | | | 2. Solve various types of problems |
| | | | | 3. Develop ability to face competitive examinations |
| | | | | 4. Inspect the problem & conclude with proper solution. |
| 55. | VI | CS3104 | Capstone Project Phase I | 1. Apply knowledge of computer science for real world problem |
| | | | | 2. Possess Professional, Practical and reflective practitioner skills |
| | | | | 3. Upgrade and apply the knowledge through continuous learning |
| | | | | 4. Effectively apply Design Thinking Processes and Template to structure learning lifecycle in the development of a prototype |
| | | | | 5. To develop project management and time management skills. 6. To formulate a process whereby to keep the end-user or customer in mind throughout the project life cycle. |

- **Final Year. B. Tech.**

| Sr.No. | Semester | Course Code | Course Name | Course Learning Outcomes (CLOs) |
|---|---|---|---|---|
| 1. | VII | CS4013 | Machine Learning | 1. Differentiate among various machine learning techniques. |
| | | | | 2. Formulate a machine learning problem. |
| | | | | 3. Apply machine learning techniques such as classification and feature selection to practical applications and detect patterns in the data. |
| | | | | 4. Choose appropriate ML and Neural network algorithm for predication of class label or value of target attribute. |
| | | | | 5. Develop new Recommender Systems for a number of domains especially, Education, Health-care etc. |
| 2. | VII | CS4033 | Program Elective – III Big Data Analytics | 1. Identify big data for business intelligence |
| | | | | 2. Explore the fundamental concepts of big data and its analytics |
| | | | | 3. Analyze the big data using Hadoop and intelligent techniques |
| | | | | 4. Apply NoSQL big data management underlying analytics framework |
| | | | | 5. Recognize the suitable secure models for building competitive business decisions |
| 3. | VII | CS4053 | Program Elective-III: Natural Language Processing | 1. Acquire knowledge of the fundamental mathematical models and algorithms in the field of NLP. |
| | | | | 2. Apply these mathematical models and algorithms in applications in software design and implementation for NLP. |
| | | | | 3. Apply deep learning models to solve machine translation and conversation problems. |
| | | | | 4. Analyze deep structured semantic models on information retrieval and natural language applications. |
| | | | | 5. Acquire knowledge of the design and implementation issues in various NLP applications such as information extraction and Machine translation. |
| 4. | | CS4073 | Program Elective-III: Blockchain Technology | 1. Differentiate Blockchain models. |
| | | | | 2. Analyze Components & Consensus models of Blockchain. |
| | | | | 3. Illustrate the Forking methods & Cryptographic concepts of Blockchain. |
| | | | | 4. Draw the architecture of Hyperledger fabric. |

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| | | | | 5. Describe applications of Blockchain in the sector of Trade, Government & Finance |
| | | | | 6. Explain research aspects of Blockchain |
| 5. | VII | CS4093 | Program Elective-III:IOS Development Lab-I | 1. Define key programming terms relevant to Swift and iOS programming. |
| | | | | 2. Describe the process of creating an iOS application. |
| | | | | 3. Demonstrate programming best practices in Swift. |
| | | | | 4. Select the appropriate UI primitives, persistent storage, user interactions, to develop the working iOS application from the concept. |
| | | | | 5. Develop, report and present implementation of typical Mini Project. |
| 6. | VII | CS4113 | Program Elective-IV:Parallel Programming | 1. Identify compute intensive part from sequential algorithm |
| | | | | 2. Design a parallel algorithm for any compute-intensive application |
| | | | | 3. Develop parallel programs to use multi-core processors using OpenMP |
| | | | | 4. Write parallel programs to demonstrate various features of CUDA C/C++ |
| | | | | 5. Explore different features of the CUDA framework |
| 7. | VII | CS4133 | Program Elective-IV:Artificial Intelligence | 1. Apply Artificial Intelligence techniques for problem solving |
| | | | | 2. Comprehend the abstractions and reasoning for Intelligent Agents |
| | | | | 3. Analyze and design a real-world problem for implementation |
| | | | | 4. Develop knowledge of decision making and learning methods |
| | | | | 5. Select appropriately from a range of techniques when implementing intelligent systems |
| 8. | VII | CS4153 | Program Elective-IV Internet of Things | 1. Identify the various components of IoT. |
| | | | | 2. Design a middleware for IoT. |
| | | | | 3. Identify the issues to address the security, intelligence in IoT. |
| | | | | 4. Describe various protocols used in IoT. |
| | | | | 5. Establish the communication between IoT devices and cloud server using wireless technology. |
| | | | | 6. Develop IoT application to solve real world problems. |
| 9. | VII | CS4173 | | 1. Introduce different databases systems like distributed and parallel databases |

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| | | | Program Elective-V Advanced Database System | 2. Illustrate data mining & warehousing with OLAP implementations |
| | | | | 3. Explore and design the object-oriented database. |
| | | | | 4. Acquaint with distributed query processing and its phases including query optimization |
| | | | | 5. Demonstrate Bigdata with Hadoop& its components |
| 10. | VII | CS4233 | IOS Development Lab-II | 1. Define key programming terms relevant to Swift and iOS programming. |
| | | | | 2. Describe the process of creating an iOS application. |
| | | | | 3. Design the user interface (UI) and user's interaction for iOS application. |
| | | | | 4. Select the appropriate UI primitives, persistent storage, user interactions, to develop the working iOS application from the concept. |
| | | | | 5. Develop, report and present implementation of typical Mini Project. |
| 11. | VII | CS4193 | Program Elective V- Computer Vision | 1. Implement fundamental image processing techniques required for computer vision |
| | | | | 2. Perform shape analysis |
| | | | | 3. Implement boundary tracking techniques |
| | | | | 4. Apply chain codes and other region descriptors |
| | | | | 5. Apply Hough Transform for line, circle, and ellipse detections. |
| | | | | 6. Apply and analyse 3D vision techniques. |
| 12. | VII | CS4213 | Program Elective – V : Wireless Networks | 1. Comment on difference between wireless and wired networks and possible challenges in the design of wireless networks. |
| | | | | 2. Identify design issues in various wireless technologies and discuss possible solutions for them. |
| | | | | 3. Review architectures of various access technologies such as 3G, 4G, WiFi etc. |
| | | | | 4. List challenges and possible solutions in various layers for Ad hoc networks |
| | | | | 5. Demonstrate working of different types of wireless network applications. |
| 13. | VII | CS4253 | Cloud Computing | 1. Describe fundamental concepts of cloud computing and its Architecture |
| | | | | 2. Explain the core concepts of Virtualization |
| | | | | 3. Differentiate and analyze the components of various cloud platforms |
| | | | | 4. Explain the key components of Amazon web Services |
| | | | | 5. Analyze the applications of Cloud Computing in different domains |
| 14. | VII | CS4273 | | 1. Explore dataset and it associated characteristics using python libraries. |

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| | | | Machine Learning Lab | 2. Implement various supervised learning algorithms for given dataset. |
| | | | | 3. Implement various Unsupervised learning algorithms for given dataset. |
| | | | | 4. Implement reinforcement learning algorithm to solve suitable real word problem. |
| | | | | 5. Design solution for real world problem by implementing ML algorithms. |
| | | | | 6. Develop, report and present implementation of typical Mini Project. |
| 15. | VII | CS4293 | Parallel Programming Lab | 1. Design different parallel algorithms to solve compute-intensive problems |
| | | | | 2. Develop programs using different parallel programming languages on multi-core and many-core architecture systems |
| | | | | 3. Evaluate the performance of applications/programs using different performance metrics |
| 16. | VII | CS4313 | Program Elective IV Lab: Artificial Intelligence Lab | 1. Apply Artificial Intelligence techniques for problem solving |
| | | | | 2. Comprehend the abstractions and reasoning for Intelligent Agents |
| | | | | 3. Analyze and design a real-world problem for implementation |
| | | | | 4. Develop knowledge of decision making and learning methods |
| | | | | 5. Select appropriately from a range of techniques when implementing intelligent systems |
| | | | | 6. Design, develop and present a mini project for typical application of Artificial Intelligence. |
| 17. | VII | CS4333 | Program Elective IV Lab : Internet of Things Lab | 1. Identify the components of IoT |
| | | | | 2. Design a middleware for IoT |
| | | | | 3. Develop IoT application to solve social problems |
| | | | | 4. Analyze various protocols for IoT |
| | | | | 5. Establish the communication to the cloud through Wi-Fi / Bluetooth |
| | | | | 6. Design, develop and present a mini project for typical application of IoT. |
| 18. | VII | CS4353 | Capstone Project Phase –II | 1) Apply knowledge of computer science for real world problem. |
| | | | | 2) Possess Professional, Practical and reflective practitioner skills. |
| | | | | 3) Upgrade and apply the knowledge through continuous learning. |
| | | | | 4) Effectively apply Design Thinking Processes and Template to structure learning life cycle in the development of a prototype. |
| | | | | 5) To develop project management and time management skills |

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| | | | | 6) To formulate a process whereby to keep the end-user or customer in mind throughout the project lifecycle. |
| 19. | VII | CS4373 | Web Technology Lab | 1. Design static and dynamic web pages using scripting languages like HTML and CSS |
| | | | | 2. Develop a dynamic web application using JavaScript and jQuery to demonstrate data validation |
| | | | | 3. Demonstrate knowledge of Angular by designing dynamic web applications. |
| | | | | 4. Design and Debug React App. |
| | | | | 5. Develop web Application in React using JavaScript |

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## PG Program

- **Department Name :- Computer Science & Engineering**
- **PG Program Name :- Computer Science & Engineering**
- **Vision and Mission :-**

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| **Vision** | To excel in the computer science engineering discipline through continuous research, innovation and industry-oriented curriculum leading to responsible IT professionals. |
| **Mission** | 1. To inculcate teaching and learning process promoting state-of-the-art IT industry practices in computer science engineering and technology to address global challenges.<br>2. To integrate academics, research and entrepreneurship skills to address present and future challenges of the society and industry.<br>3. To develop professionalism with strong foundations adapting to changing technology. |

| Sr. No. | Program Outcomes |
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| 1. | **PO1:** An ability to independently carry out research /investigation and development work to solve practical problems. |
| 2. | **PO2:** An ability to write and present a substantial technical report/document. |
| 3. | **PO3:** Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program. |
| 4. | **PO4:** Apply knowledge of database management systems, data mining and analytics techniques to solve real world problems. |
| 5. | **PO5:** Apply knowledge of machine learning and intelligence to identify, formulate and solve complex engineering problems. |
| 6. | **PO6:** Design, develop and deploy software using emerging IT technologies like open source tools, mobile application development platforms, web technologies and cloud computing. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 1. | I | CSE129 | Foundation of Data Science | Apply statistical and computational techniques to analyze datasets. |
| | | | | Analyze different data visualizations techniques. |
| | | | | Evaluate data characteristics using hypothesis testing. |
| | | | | Explore ethical implications of data science. |
| 2. | I | CSE1016 | Machine Learning | Explain the working principles of advanced machine learning paradigms including semi |

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| | | | | supervised, self-supervised, and reinforcement learning. |
| | | | | Apply appropriate advanced algorithms such as meta-learning, few-shot learning, and federated learning to solve domain-specific problems. |
| | | | | Analyze the performance and limitations of various advanced machine learning models on complex datasets |
| | | | | Design end-to-end machine learning solutions using cutting-edge techniques with privacy, scalability, and data efficiency in mind. |
| 3. | I | CSE1026 | Advanced Algorithms | Select appropriate algorithm design techniques such as greedy method, dynamic programming, backtracking and heuristic algorithms. |
| | | | | Explore different NP problems and approximation algorithmic solutions. |
| | | | | Apply backtracking algorithm to solve real world problems. |
| | | | | Apply and design parallel algorithms to solve fundamental problems. |
| | | | | Apply and compare performance of local search techniques algorithms for solving fundamental combinatorial problems. |
| | | | | Compare and design global search techniques for solving engineering/real-world combinatorial problems. |
| 4. | I | CSE130 | Program Elective-I-Big Data Paradigm | Analyze big data for business intelligence |
| | | | | Explore business case studies for big data analytics |
| | | | | Implement map-reduce analytics using hadoop related advance frameworks |
| | | | | Apply NoSQL big data management |
| | | | | Manage big data with aspects of Security, Privacy and ethics |
| 5. | I | CSE1046 | Program Elective-I (Cloud Computing) | Compare cloud computing with other computing technologies. |
| | | | | Illustrate the virtualization technologies and its role in enabling the cloud computing system model. |
| | | | | Identify and compare different cloud service and deployment models for scientific, business and consumer applications. |
| | | | | Describe Aneka platform as a service to design different applications. |

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| | | | | Compare different cloud services with pros and cons from multiple cloud providers. |
| | | | | Describe recent advances in cloud framework/services for solving scientific and business applications. |
| 6. | I | CSE131 | Program Elective-I- Decision Support Systems | Explain the role of data, models, and user interfaces in supporting decision-making processes. |
| | | | | Apply decision models, what-if analysis, and optimization techniques in solving structured and semi-structured problems. |
| | | | | Analyze the integration of data-driven, knowledge-driven, and web-based DSS within enterprise environments. |
| | | | | Evaluate advanced DSS technologies and ethical considerations in the design and deployment of intelligent decision systems. |
| 7. | I | CSE132 | Program Elective-II - Block Chain Technology | Identify basic cryptographic primitives utilised in Blockchain- Secure, collision-resistant hash functions, digital signatures, public key cryptosystems, and zero-knowledge proof systems |
| | | | | Explain basic Distributed System concepts – distributed consensus and atomic broadcast, Byzantine fault-tolerant consensus methods |
| | | | | Compare Basic Blockchain (Blockchain 1.0), Blockchain 2.0 and Blockchain 3.0 |
| | | | | Design various Blockchain applications |
| 8. | I | CSE1073 | Program Elective-II- Computer Vision | Describe Image formation processs (BL2). |
| | | | | Apply fundamental image processing techniques required for computer vision (BL3). |
| | | | | Analyze 3-D vision. (BL4) |
| | | | | Generate and evaluate appropriate 3D model from images. (BL5) |
| 9. | I | CSE133 | Program Elective-II- Software Engineering and Project Management | Describe fundamental concepts of software engineering and project management, including project phases, stakeholder roles, and basic terminology. |
| | | | | Explain various software requirement analysis and specification techniques, and describe the processes involved in software estimation and project planning. |
| | | | | Apply appropriate tools and techniques to analyze, plan, and schedule software projects, including estimation and resource allocation. |

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| | | | | Evaluate and recommend effective risk management, reliability strategies, and human resource practices to enhance software project success and address real-world project challenges. |
| 10. | I | CSE134 | Research Methodology and IPR | Formulate a research problem. |
| | | | | Analyze research related information. |
| | | | | Prepare and present research proposal / paper by following research ethics. |
| | | | | Make effective use of computers and computing tools to search information, analyze information and prepare report. |
| | | | | Describe nature and processes involved in development of intellectual property rights. |
| 11. | I | CSE1106 | Machine Learning Lab | Demonstrate data preparation, transformation, and visualization techniques. |
| | | | | Implement advanced ML algorithms using Python and open-source libraries. |
| | | | | Evaluate and compare models based on relevant performance metrics. |
| | | | | Design end-to-end ML pipelines and research-oriented solutions using real-world or benchmark datasets. |
| 12. | I | CSE1116 | Advanced Algorithms Laboratory | Select appropriate algorithm design techniques such as greedy method, dynamic programming, backtracking and heuristic algorithms. |
| | | | | Apply backtracking algorithm to solve real world problems. |
| | | | | Explore different NP problems and approximation algorithmic solutions. |
| | | | | Apply and design parallel algorithms to solve fundamental problems. |
| | | | | Apply and compare performance of local search techniques algorithms for solving fundamental combinatorial problems. |
| | | | | Compare and design global search techniques for solving engineering/real-world combinatorial problems. |
| 13. | I | CSE135 | Seminar | Conduct a focused and systematic literature review |
| | | | | Identify state-of-the-art trends and open research problems |
| | | | | Critically evaluate methodologies and research gaps |
| | | | | Present technical content with academic rigor and clarity |

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| | | | | Formulate a feasible problem statement for the upcoming Mini-Project and Disseration |
| 14. | I | SHE5513 | Technical Communication | Construct grammatically correct sentences in different types of technical writing, such as reports and proposals. |
| | | | | Apply technical writing skills to improve the readability of documents. |
| | | | | Demonstrate professional skills required in job interviews and at workplaces. |
| 15. | II | CSE1152 | Deep Learning | Apply various approaches for training of the neural network and Deep Learning networks. |
| | | | | Analyse working of the neural networks and Deep Learning networks with reference to certain case study examples. |
| 16. | | | | Analyse performance of Generative Adversarial Network. |
| | | | | Develop typical applications of deep learning networks for solving real world problems |
| 17. | II | CSE136 | Information and Network Security | After successful completion of the course, students will be able to, |
| | | | | Define basic concepts of computer security, attacks, and classical encryption. (L1) |
| | | | | Explain DES, AES, RSA and their cryptographic operations. (L2) |
| | | | | Apply hash and MAC algorithms for data integrity and authentication.(L3) |
| | | | | Analyze secure communication protocols like SSL, HTTPS, and S/MIME. (L4) |
| | | | | Evaluate threats from malware and configure firewalls for system protection. (L5) |
| 18. | II | CSE137 | Adhoc Networks | Discuss the design and research issues in wireless networks |
| | | | | Demonstrate the working of 802.11 a/g/n wireless standards |
| | | | | Apply the different types of routing protocols in ad-hoc networks. |
| | | | | Analyze different protocols in MAC, Routing and Transport Control for Sensor Networks |
| 19. | II | CSE138 | Program Elective-III-Advanced Database Management System | After successful completion of the course, students will be able to, |
| | | | | Describe query processing steps, join strategies, indexing techniques, and cost-based optimization used in relational databases. |
| | | | | Apply transaction and concurrency control mechanisms such as 2PL and timestamp ordering to maintain data consistency. |

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| | | | | Analyze distributed and parallel database systems to determine suitable fragmentation, replication, and query strategies. |
| | | | | Compare and evaluate object-oriented, temporal, and NoSQL databases based on structure, use cases, and consistency models. |
| | | | | Design a data warehousing solution and big data processing framework using OLAP, ETL, Hadoop, and Spark for large-scale analytical workloads. |
| 20. | II | CSE1186 | Program Elective-III-Parallel Computing | Explain how massive parallelisms are implemented in accelerator architectures. |
| | | | | Design and implement parallel algorithms for GPGPU. |
| | | | | Demonstrate parallel patterns for performance improvement. |
| | | | | Analyze the parallel programming and computational thinking strategies. |
| | | | | Compare different Parallel algorithms from various application domains for performance analysis. |
| 21. | II | CSE139 | Program Elective III-Introduction to Industry 4.0 and Industrial Internet of Things | Describe the fundamental of theory and practice related to Industrial IoT Systems. |
| | | | | Identify, formulate and solve engineering problems by using Industrial IoT. |
| | | | | Explain Data Monitoring &Control in IIoT. |
| | | | | Discuss the Advanced Technologies and platform in IIoT. |
| | | | | Investigate the use of IoT capability in Industrial applications. |
| 22. | II | CSE1206 | Soft Computing | Identify and describe soft computing techniques and their roles in building intelligent machines. |
| | | | | Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems. |
| | | | | Design artificial neural network for solving real world problems. |
| | | | | Evaluate solutions by various evolutionary approaches for a given problem. |
| | | | | Design hybrid algorithms for solving complex problems. |
| 23. | II | CSE140 | Program Elective-IV - Natural Language Processing | Acquire knowledge of the fundamental mathematical models and algorithms in the field of NLP. (BL2) |
| | | | | Apply NLP models and algorithms in applications. (BL3) |

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| | | | | Analyze deep learning models for NLP applications. (BL4) |
| | | | | Evaluate NLP applications such as information extraction and Machine translation (BL5). |
| 24. | II | CSE1226 | Program Elective-IV - Software Architecture | Recognize major software architectural styles, design patterns, and frameworks. |
| | | | | Describe a software architecture using various documentation approaches and architectural description languages. |
| | | | | Design and develop software architecture for large scale software systems. |
| | | | | Formulate architectural alternatives for a problem and select among them. |
| | | | | Apply well-understood paradigms for designing new systems. |
| 25. | II | CSE1232 | Deep Learning Laboratory | Apply various approaches for pre-processing and visualization of input data for Deep Learning networks. |
| | | | | Apply various approaches for training of neural networks and Deep Learning networks with reference to certain case study examples. |
| | | | | Analyse performance of Deep Learning Networks. |
| | | | | Develop and present typical applications of deep learning networks for solving real world problems. |
| 26. | II | CSE139 | Information and Network Security Lab | Define basic cryptographic concepts and classical encryption techniques like Caesar, Vigenère, and Playfair. |
| | | | | Explain and simulate symmetric (DES, AES) and asymmetric (RSA) encryption algorithms |
| | | | | Apply hashing (SHA, MD5) and HMAC to ensure data integrity and authentication. |
| | | | | Analyze the use of digital signatures and secure key generation techniques in cryptographic applications. (L4) |
| | | | | Evaluate weaknesses in classical encryption using frequency analysis and demonstrate secure password practices. (L5) |
| 27. | II | CSE142 | Program Elective-III-Lab Advanced Database Management System Lab | Implement advanced SQL queries including views, indexing, and performance tuning. |
| | | | | Simulate transaction management and concurrency control mechanisms using real time cases. |
| | | | | Analyze distributed database models using fragmentation, replication, and optimization strategies. |
| | | | | Evaluate NoSQL and graph database technologies for unstructured data handling. |

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| | | | | Design a data warehousing and big data solution using OLAP and Hadoop/Spark frameworks. |
| 28. | II | CSE1266 | Program Elective-III - Parallel Computing Lab | Design different parallel algorithms suitable for multi-core and many-core systems. |
| | | | | Implement different parallel algorithms on multi-core and many-core systems. |
| | | | | Solve compute intensive applications using accelerators. |
| | | | | Perform the analysis with different performance metrics. |
| 29. | II | CSE1276 | Program Elective-III- Internet of Things Lab | Explore the relationship between IoT, cloud computing. |
| | | | | Adapt the emerging cloud and IoT technologies informed by an appropriate evaluation process to support business applications. |
| | | | | Design secure cloud and IoT applications to support scalable online services using best practice. |
| | | | | Demonstrate knowledge of cloud computing and IoT concepts, components, architecture, frameworks and issues. |
| | | | | Analyze applications of IoT in real time scenario. |
| 30. | II | CSE143 | Mini Project | Conduct a focused and systematic literature review |
| | | | | Identify state-of-the-art trends and open research problems |
| | | | | Critically evaluate methodologies and research gaps |
| | | | | Present technical content with academic rigor and clarity |
| | | | | Define a feasible problem statement for the upcoming Mini-Project |
| 31. | III | CSE2016 | Industry Internship | Identify the real applications and practices of courses studied, at industry level |
| | | | | Recognize various modeling, analysis and validation techniques adopted at industries |
| | | | | Demonstrate the issues at design, manufacturing and assembly levels |
| | | | | Summarize and present technical data in report format. |
| 32. | III | MOE2012 | Artificial Intelligence - Machine Learning | Describe central machine learning methods and techniques and how they relate to artificial intelligence. |
| | | | | Differentiate between supervised and unsupervised learning techniques. |
| | | | | Apply the ML algorithms to a real-world problem. |
| | | | | Optimize the models learned and report on the expected accuracy that can be achieved by applying the models. |
| | | | | Evaluate a given problem and apply appropriate machine learning technique. |

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| 33. | III | MOE2022 | Creative Thinking: Techniques & Tools | Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios. |
| | | | | Apply different brainstorming techniques in group activities. |
| | | | | Be proficient in the application of the 6 thinking hats tool in different life scenarios. |
| | | | | Develop a systematic approach to idea generation through the use of morphological analysis. |
| | | | | Innovate on an existing product, service or situation applying the SCAMPER method. |
| | | | | Get confident with the theory of inventive problem solving, called TRIZ. |
| 34. | | MOE2032 | MOOC Course | Identify the real applications and practices of courses studied, at industry level |
| | | | | Recognize various modelling, analysis and validation techniques adopted at industries. |
| | | | | Demonstrate the issues at design, manufacturing and assembly levels. |
| | | | | Summarize and present technical data in report format. |
| 35. | III | MOE2041 | Energy Audit and Management | Identify the important of Energy Scenario. |
| | | | | Use energy audit knowledge to carry out energy audit of a given firm. |
| | | | | Examine different rolls in energy action planning |
| | | | | Apply project finance and management skills to carry out energy audit |
| | | | | Plan for energy monitoring and targeting. |
| 36. | III | MOE2062 | Augmented Reality and Virtual Reality | Define the basic concepts of Virtual and Augmented Reality |
| | | | | Identify the differences in AR/VR concepts and technologies |
| | | | | Describe the fundamental concepts relating to Virtual Reality such as presence, immersion, and engagement |
| | | | | Evaluate usability of AR/VR applications and critique their use of AR/VR capabilities |
| | | | | Design and prototype effective AR/VR applications using UNITY platform for various application. |
| 37. | III | MOE2072 | Industrial Instrumentation | Elaborate working principal of different transducers. |
| | | | | Select suitable transducer/sensor for specific application. |
| | | | | Justify the use of specific measurement technique for specific task. |
| | | | | Evaluate the Calibration and Interfacing of the transducers. |
| 38. | III | MOE2082 | | Explain Mechatronics System |
| | | | | Analyze the Mechatronics Based System. |

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| | | | Advanced Mechatronics Systems | Model, simulate, and verify the mechatronics systems. |
| | | | | Identify Electrical, Hydraulic and Pneumatic Components. |
| 39. | III | MOE2091 | Disaster Management | Outline disaster and disaster management cycle. |
| | | | | Summarize disaster preparedness and response activities for various types of disaster. |
| | | | | Apply various advanced techniques for disaster management. |
| | | | | Examine role of various agencies in disaster management. |
| | | | | Dissect the disaster management scenario in India. |
| 40. | III | CSE2026 | Dissertation Phase – I | Explain the contributions of various researchers in the field of design engg. after carrying out literature survey from reputed journals. |
| | | | | Recognize the gap in the research and define a problem statement. |
| | | | | Explain significance and applicability of problem statement. |
| | | | | Summarize and present technical data in report format. |
| 41. | III | CSE2036 | Dissertation Phase – II | Outline the work plan for problem statement. |
| | | | | Identify the proper modelling and analysis tool. |
| | | | | Reproduce the preliminary results of problem statement. |
| | | | | Summarize and present technical data in report format. |
| 42. | IV | CSE2046 | Dissertation Stage III | Explain the issues related to method adopted in solving the problem |
| | | | | Select proper technique in solving the problem |
| | | | | Compare the results with available literature |
| 43. | IV | CSE 2056 | Dissertation Stage IV | Design new methodology to address the problem. |
| | | | | Justify the results obtained from new methodology. |
| | | | | Write technical report and de end work. |

K. E. Society's
**Rajarambapu Institute of Technology, Rajaramnagar**
(An Empowered Autonomous Institute, affiliated to SUK)

# Computer Science and Engineering

# (Artificial Intelligence & Machine Learning)

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## UG Program

- **Department Name:- Computer Science and Engineering (Artificial Intelligence & Machine Learning)**
- **UG Program Name: - Computer Science and Engineering (Artificial Intelligence & Machine Learning)**

- **Vision and Mission: -**

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| **Vision** | To be renowned department for education in Computer Science and Engineering (Artificial Intelligence & Machine Learning) for molding students into professional with research aptitude and innovation |
| **Mission** | ➢ To offer high quality education through state of art curriculum and innovate teaching & learning practices<br>➢ To establish state of art laboratories and center of excellence in the emerging fields of AI and ML<br>➢ To mold students to be technically competent through innovation and leadership.<br>➢ To inculcate problem solving aptitude in graduates with lifelong learning skills to become valuable resource for industry and society.<br>➢ To adopt professional practice, standards and ethical values |

| Sr. No. | Program Outcomes |
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| 36. | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and AI-ML specialization to the solution of complex engineering problems. |
| 37. | **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences. |
| 38. | **Design/Development of solutions:** Design and develop IT solutions using AI-ML domain knowledge for engineering problems that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. |
| 39. | **Conduct investigations of problems:** Use fundamental knowledge of AI-ML domain and engineering skills including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |

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| 40. | **Modern tool usage:** Create, select, and apply appropriate techniques, resources, modern engineering and AI-ML tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| 41. | **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. |
| 42. | **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. |
| 43. | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| 44. | **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| 45. | **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. |
| 46. | **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one own work, as a member and leader in a team, to manage projects and in multidisciplinary environments |
| 47. | **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. |
| **Sr. No.** | **Program Specific Outcomes** |
| **PSO1** | Design and develop applications of AI & ML for Data analytics, Augmented / Virtual Reality (AR/VR), health care systems and allied domains |
| **PSO2** | Utilize dynamic up-scaling of AI and ML techniques for industrial applications in the areas including Robotics, Autonomous Systems, Natural Language Processing, IOT, Cloud Computing, Security, Networks, Computing, Open source technologies and emerging areas |
| **PSO3** | Demonstrate use of AI and ML techniques for solutions of real life problems |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1 | III | AI201 | Discrete Mathematics | Define mathematical logic, truth table and their applications to programming and design. |
| | | | | Apply the concepts of set theory. |
| | | | | Characterize the properties of relations, functions and algebraic systems for formal languages. |
| | | | | Develop essential concepts to solve problems on graphs and networks |
| | | | | Express counting principle to determine various combinatorial configurations |
| 2 | III | AI203 | Data structure & Algorithms | Compare between linear and nonlinear data structures |
| | | | | Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | Determine a suitable data structure and algorithm to solve a real world problem |
| 3 | III | AI205 | Computer Organization and Architecture | Perform various arithmetic operations on different number systems. |
| | | | | Apply Boolean algebra to solve logic functions. |
| | | | | Design, implement, and analyze various logic circuits. |
| | | | | Apply the programming techniques in developing the assembly language program for the microprocessor system. |

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| | | | | Analyze flow chart and apply assembly language programming techniques |
| **4** | **III** | **AI207** | **Principles of Artificial Intelligence** | Recognize the basic concepts and techniques of Artificial Intelligence. |
| | | | | Apply AI algorithms for solving typical practical problems. |
| | | | | Describe appropriate knowledge representation schemes in AI. |
| | | | | Analyze reasoning schemes in AI. |
| **5** | **III** | **AIMD201** | **Object Oriented Programming** | Identify and integrate basic object-oriented programming concepts and apply them in problem-solving |
| | | | | Construct and test inheritance concepts for reusing the program. |
| | | | | Develop and test a program using loops, decision statements, and functions in Python. |
| | | | | Evaluate the given Plot data using appropriate Python visualization libraries. |
| **6** | **III** | **SH2174** | **Environmental Science** | Apply interdisciplinary knowledge in environmental science by integrating concepts and principles from various fields of science and engineering to address environmental issues. |
| | | | | Evaluate environmental impacts of human activities on ecosystems and on the environment. |
| | | | | Use scientific approach to identify and solve environment related problems. |

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| | | | | Design sustainable solutions to address environmental challenges by considering renewable energy sources, waste management strategies conservation measures, and environmental policies. . |
| | | | | Participate in group work to become acquainted with the importance of teamwork, collaboration |
| | | | | Develop presentation and report writing skills |
| **7** | **III** | **AI209** | **Object Oriented Programming using JAVA** | Recognize the basic object oriented programming concepts and apply them in problem solving. |
| | | | | Illustrate inheritance concepts for reusing the program. |
| | | | | Demonstrate on the multi-tasking by using multiple threads. |
| | | | | Develop data-centric applications using JDBC. |
| | | | | Exhibit the basics of java console and GUI based programming |
| **8** | **III** | **AI211** | **Data structure & Algorithms Lab** | Implement various data structures and algorithms using programming languages such as C or C++. |
| | | | | Conduct experiments to validate the theoretical analysis of algorithms. |
| | | | | Analyze data, interpret results, and draw conclusions, aiding them in making informed decisions for algorithmic optimizations. |

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| | | | | Evaluate the efficiency and scalability of different data structures and algorithms, enabling them to make informed choices when selecting the most appropriate solution for a given problem |
| **9** | **III** | **AI213** | **Desktop Publishing for Web Development** | Create well-structured web pages using HTML and apply the principles of semantic markup. |
| | | | | Style web pages effectively using CSS, including layout design and responsive techniques. |
| | | | | Implement client-side interactivity and dynamic content using JavaScript and jQuery. |
| | | | | Utilize Bootstrap to develop responsive and mobile-first web applications. |
| | | | | Set up and customize WordPress websites, managing content and plugins effectively. |
| | | | | Build and deploy functional websites that integrate HTML, CSS, JS, Bootstrap, and WordPress. |
| **10** | **III** | **AI215** | **Technical Aptitude-I** | Choose proper techniques to find solution for engineering problems |
| | | | | Solve various types of problems |
| | | | | Develop ability to face competitive examinations |
| | | | | Inspect the problem & conclude with proper solution |
| **11** | **III** | **SH2634** | **Professional Leadership Skills** | Explain the traits of a leadership through real life examples. |

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| | | | | Exhibit the ability to work effectively in team. |
| | | | | Prepare a presentation as per the audience and context requirements. |
| **12** | **III** | **SH2614** | **Interpersonal Skills** | Exhibit interpersonal communication skills. |
| | | | | Demonstrate decision-making skills. |
| | | | | Apply conflict resolution styles appropriate in different situations. |
| | | | | Demonstrate skills to manage balance in work and life. |
| **13** | **III** | **SH2694** | **Innovation Tools and Methods for Entrepreneurs** | Explain structured approach to define the problem with every possible detail, identify conflicts and solve them |
| | | | | Apply User Journey Map to the selected problem to show user interaction at various stages |
| | | | | Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| **14** | **III** | **SH2594** | **Personal Effectiveness and Body Language** | Develop skills to build self-esteem and positive attitude. |
| | | | | Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | Discover ways to overcome procrastination. |
| | | | | Demonstrate responsiveness towards stress and health issues. |
| | | | | Interpret the non-verbal behaviour of a person. |

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| **15** | **III** | **SH 2734** | **German Language- III** | Interpret the language if the next person is speaking slowly and clearly. |
| | | | | Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | Demonstrate the language by self-introduction in German with simple sentences |
| **16** | **III** | **SH2714** | **Japanese Language – III** | Make use of basic conversations in various situations. |
| | | | | Identify the sentence patterns. |
| | | | | Explain insights about the communication required for living in Japan. |
| | | | | Interpret Japanese work ethics required in their professional career. |
| **17** | **IV** | **AI202** | **Statistics and Fuzzy systems** | Apply the probability distributions, random number generation and density estimations to perform analysis of various kinds of data |
| | | | | Develop the fundamental concepts such as fuzzy sets, operations and fuzzy relations. |
| | | | | Acquire and apply the schemes of fuzzification of scalar variables and the defuzzification of membership functions. |
| | | | | Develop fuzzy decision making techniques. |
| **18** | **IV** | **AI204** | **Machine Learning** | Realize machine learning and learn the basic theory underlying machine learning. |
| | | | | Differentiate supervised, unsupervised and reinforcement learning |

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| | | | | Recognize the basic concepts of learning and decision trees. |
| | | | | Realize Bayesian techniques for problems appear in machine learning |
| | | | | Perform statistical analysis of machine learning techniques |
| **19** | **IV** | **AI206** | **Computer Networks** | Analyze the various Components of Data Communication & Various Networking Concepts. |
| | | | | Apply the concepts, Services and Protocols. |
| | | | | Assess the algorithms used in Computer Networks |
| | | | | Evaluate the problems related to framing, routing error correction & detection and others. |
| **20** | **IV** | **AI208** | **Database Management Systems** | Enlighten terms related to database design and management |
| | | | | Apply the Relational Algebra with Structured Query Language (SQL) for database definition and manipulation |
| | | | | Use the concept of functional dependency and decompose schemas by applying certain normal forms |
| | | | | Analyze the principles of concurrency control, recovery and deadlock handling for database consistency |
| | | | | Design and create database to solve real world problems |
| **21** | **IV** | **AIMD202** | **Data Structures & Algorithms** | Compare between linear and nonlinear data structures |

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| | | | | Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | Determine a suitable data structure and algorithm to solve a real world problem |
| **22** | **IV** | **SH202** | **मराठी भाषिक कौशल्यविकास** | **भाषा आणि व्यक्तिमत्व विकास यांमधील सहसंबंध स्पष्ट करू शकेल** |
| | | | | **भाषिक कौशल्यविकास करू शकेल** |
| | | | | **कथा या मराठी साहित्य प्रकाराचे विश्लेषण करू शकेल** |
| | | | | **एकांकिका या मराठी साहित्य प्रकाराच्या विश्लेषणाची क्षमता प्राप्त करेल** |
| **23** | **IV** | **SH204** | **हिंदी कथा साहित्य एवं प्रयोजमूलक हिंदी** | विद्यार्थियों में मानवीय संवेदनाओं के विकास के साथ नवीन सामाजिक सांस्कृतिक बोधऔर जीवन मूल्यों का विकास होगा। |
| | | | | विद्यार्थियों में साहित्य के माध्यम से कलात्मक गुणों की अभिवृद्धि होगी कला की साहित्यिक विधाओं के प्रति अभिरुचि जागृत होगी तथा रचनात्मक कौशल्य को बढ़ावा मिलेगा। |
| | | | | विद्यार्थियों में नए वैश्विक मूल्यों के प्रति सजगता को बढ़ावा मिलेगा एवं मूल्यवादी दृष्टि के प्रति दायित्व बोध उत्पन्न होगा।छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| | | | | छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| **24** | **IV** | **AI210** | **Machine Learning Lab** | Explore dataset and its associated characteristics using python libraries. |
| | | | | Implement various supervised learning algorithms for given dataset. |
| | | | | Implement various Unsupervised learning algorithms for given dataset. |
| | | | | Design solution for real world problem by implementing ML algorithms. |

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| | | | | Develop, report and present implementation of typical Mini Project in ML. |
| **25** | **IV** | **AI212** | **Database Management Systems Lab** | Sketch E-R diagram for given Case Study/ Problem Statement. |
| | | | | Implement SQL query for various operations like retrieval, insertion, manipulation of data, PL/SQL cursor, procedure and triggers. |
| | | | | Design relational database using Normalization and Functional Dependency. |
| | | | | Apply hashing mechanism to build hash index file on given records |
| | | | | Develop a program to connect database to an application program. |
| **26** | **IV** | **AI214** | **Hardware Networking with python programming** | Explain the concepts in Python. |
| | | | | Implement programs using loops, decision statements, python collections, functions, and modules in Python. |
| | | | | Use object-oriented programming with classes using Python. |
| | | | | Apply data pre-processing for the given dataset using Python. |
| | | | | Plot data using appropriate Python visualization libraries. |
| | | | | Perform the exploratory data analysis using Python for the given dataset. |
| **27** | **IV** | **AI216** | **Technical Aptitude-II** | Choose proper techniques to find solution for engineering problems |
| | | | | Solve various types of problems |

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| | | | | Develop ability to face competitive examinations |
| | | | | Inspect the problem & conclude with proper solution |
| **28** | **IV** | **SH2634** | **Professional Leadership Skills** | Explain the traits of a leadership through real life examples. |
| | | | | Exhibit the ability to work effectively in team. |
| | | | | Prepare a presentation as per the audience and context requirements. |
| **29** | **IV** | **SH2614** | **Interpersonal Skills** | Exhibit interpersonal communication skills. |
| | | | | Demonstrate decision-making skills. |
| | | | | Apply conflict resolution styles appropriate in different situations. |
| | | | | Demonstrate skills to manage balance in work and life. |
| **30** | **IV** | **SH2694** | **Innovation Tools and Methods for Entrepreneurs** | Explain structured approach to define the problem with every possible detail, identify conflicts and solve them |
| | | | | Apply User Journey Map to the selected problem to show user interaction at various stages |
| | | | | Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| **31** | **IV** | **SH2594** | **Personal Effectiveness and Body Language** | Develop skills to build self-esteem and positive attitude. |
| | | | | Develop interpersonal skills characterized by effective communication and conflict resolution. |

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| | | | | Discover ways to overcome procrastination. |
| | | | | Demonstrate responsiveness towards stress and health issues. |
| | | | | Interpret the non-verbal behavior of a person. |
| **32** | **IV** | **SH 2644** | **German Language - IV** | Interpret the language if the next person is speaking slowly and clearly. |
| | | | | Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | Demonstrate the language by self-introduction in German with simple sentences. |
| **33** | **IV** | **SH2624** | **Japanese Language - IV** | To be able to make basic conversations in various situations. |
| | | | | To recognize the sentence patterns. |
| | | | | To improve Japanese Language proficiency. |
| | | | | To give students insights about the communication required for living in Japan. |
| | | | | To expose students to the Japanese work ethics required in their professional careers. |

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| 1 | V | **AI301** | **Deep Learning** | Designate the basic concepts related to Deep learning in feed forward networks, activation function, and loss function. |

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| | | | | Apply appropriate deep learning tools and optimization strategies for exploratory data analysis. |
| | | | | Analyze the results of state-of-the-art algorithms and convert the appropriate information required to solve real-world problems. |
| | | | | Demonstrate various case studies in deep learning. |
| 2 | V | **AI303** | **Software Engineering** | Analyze fundamental concepts in software engineering and project management. |
| | | | | Practice software process models for the undertaken software problems. |
| | | | | Design function-oriented and object-oriented models using modern tools. |
| | | | | Compare different software testing techniques and strategies. |
| | | | | Apply the project management concepts for the undertaken software problems. |
| | | | | Illustrate concepts of project monitoring and control in software development |
| 3 | V | **AI305** | **Sensor Actuated Technology** | Illustrate Key Concepts and Terminologies related to IOT. |
| | | | | Outline Raspberry Pi Programs and Arduino Programs. |
| | | | | Analyze IOT Servers and Cloud Services. |
| | | | | Evaluate IOT Solutions for real life Problems. |
| 4 | V | **AI307** | **Computer Graphics and Vision** | Demonstrate Proficiency in Color Image Processing Techniques, including Color Models and Segmentation. |

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| | | | | Apply 2D and 3D Graphics Algorithms for Line Drawing, Polygon Filling, and Transformations. |
| | | | | Utilize Texture Analysis Methods, including Statistical Approaches and Wavelets,for Image Understanding. |
| | | | | Integrate Object Recognition and Tracking Techniques to Identify and MonitorObjects in Image. |
| | | | | Develop a Solid Understanding of Fundamental Concepts in Color Image Processing and Computer Graphics |
| 5 | V | **AI309** | **Ad-hoc Networks** | Clarify the working principles of ad-hoc wireless networks. |
| | | | | List the challenges in design of wireless ad-hoc network. |
| | | | | Analyze protocols at MAC, Routing and Transport layers of ad-hoc networks. |
| | | | | Identify security issues in designing MANET and VANET. |
| | | | | Develop ad-hoc network using physical devices like laptops, mobiles |
| 6 | V | **AI311** | **Text and Speech Analysis** | Evaluate existing and emerging deep learning architectures for text and speechprocessing |
| | | | | Analyze deep learning techniques for NLP tasks, language modeling, and machine translation |
| | | | | Utilize coreference and coherence for text processing Build question-answeringsystems, chatbots, and dialogue systems |
| | | | | Apply deep learning models for building speech recognition and text-to-speechsystems |

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| 7 | V | **OE343** | **Data Science** | Articulate basic terms what Statistical Inference means |
| | | | | Analyze the data using various statistical measures |
| | | | | Identify data organization techniques used as foundations for modelling data |
| | | | | Utilize R elements for data handling |
| | | | | Perform data reduction and apply visualization techniques |
| 8 | V | **AIMD301** | **Machine Learning** | Utilize machine learning techniques and understand the basic theory underlying machine learning. |
| | | | | Articulate supervised, unsupervised and reinforcement learning. |
| | | | | Identify the basic concepts of learning and decision trees. |
| | | | | Utilize Bayesian techniques for problems appear in machine learning. |
| | | | | Perform statistical analysis of machine learning techniques. |
| 9 | V | **AIMD303** | **Business Intelligence** | Articulate data pre-processing techniques |
| | | | | Analyze the data modeling required for business intelligence related tasks |
| | | | | Determine the role of statistical techniques in data analysis tasks |
| | | | | Identify big data analysis techniques |
| | | | | Utilize different reporting/visualization tool |
| 10 | V | **SH3034** | **Scholastic Aptitude I** | Develop a thorough conceptual understanding and develop a logicalapproach towards solving Aptitude and Reasoning problems. |

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| | | | | Articulate usage of basic aptitude terms of percentages, averages, ratios andapplications of business aptitude terms of profits and interests |
| | | | | Develop a bridge in analogies, series and visualizing directions. |
| | | | | Apply various short cuts & techniques to manage speed and accuracy to get |
| 11 | V | **AI313** | **Deep Learning Lab** | List the useful libraries in Python and for the house price prediction dataset, build multi-layer perceptron |
| | | | | Model and evaluate their performance. |
| | | | | Summarize and implement state-of-the-art deep learning models. |
| | | | | Interpret the model results and analyze the performance of the model for given datasets |
| 12 | V | **AI315** | **Big Data Analytics Lab** | Identify and investigate the distributed underlying experimental bed of hadoop |
| | | | | Compare the usage of map-reduce paradigm for parallel execution |
| | | | | Recognize the nosql prototype to build the big data management |
| | | | | Apply the skills to construct nosql designs and its manipulation |
| | | | | Visualizing business benefits from unstructured data analysis |
| 13 | V | **AI317** | **Technical Aptitude-III** | Choose proper techniques to find solution for engineering problems |
| | | | | Solve various types of problems |
| | | | | Develop ability to face competitive examinations |

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| | | | | Inspect the problem & conclude with proper solution |
| 14 | V | **AI319** | **Summer Internship/ Professional Certification** | Apply the theoretical and practical knowledge of CS/IT Engineering for product/service development. |
| | | | | Undergo real time IT Industry practices regarding product/service development. |
| | | | | Identify and analyze engineering problems to provide IT based solutions. |
| | | | | Adopt recent industry practices for project development |
| | | | | Improve the ability to work in teams |
| | | | | Enhance technical skills for solving complex engineering problems. |
| 15 | VI | **AI302** | **Optimization Techniques for AI** | Understand the principles of optimization and its role in AI. |
| | | | | Explore various optimization algorithms and their applications. |
| | | | | Apply optimization techniques to real-world AI problems. |
| | | | | Analyze and compare the efficiency and effectiveness of different optimization methods |
| 16 | VI | **AI304** | **Automata Theory** | Solve automata problems using mathematical theorems and techniques. |
| | | | | Design computational models for different language classes. |
| | | | | Construct grammar or regular expressions for different language classes. |
| | | | | Prove and disprove key properties of formal languages and automata. |

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| | | | | Create a compiler using various tools like LEX and YACC. |
| 17 | VI | **AI306** | **Research Methodology** | Utilize the basic concepts of Research Methodology. |
| | | | | Apply the methodology, irrespective of their discipline, in developing the most appropriate methodology for their research studies. |
| | | | | Analyze the art of using different research methods and techniques. |
| | | | | Develop the spirit of scientific inquiry in the students |
| 18 | VI | **AI308** | **Smart Cities** | Acquire the terminology, technology and its applications of IoT |
| | | | | Optimize resources for different IoT applications like Smart Cities |
| | | | | Utilize Real world IoT Design constraint. |
| | | | | Demonstrate and Deploy responsive Web Application using APIs and generate reports using templates. |
| 19 | VI | **AI310** | **Augmented and Virtual Reality** | Identify, examine, and develop software that reflects fundamental techniques for the design and deployment of VR and AR experiences. |
| | | | | Designate how VR and AR systems work. |
| | | | | Choose, develop, explain, and defend the use of particular designs for AR and VR experiences. |
| | | | | Evaluate the benefits and drawbacks of specific AR and VR techniques. |
| | | | | Recognize and examine state-of-the-art AR and VR design problems and solutions. |

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| 20 | VI | **AI312** | **Wireless & Mobile Nets** | Articulate fundamental concepts of Wireless, Mobile, Ad Hoc, Sensor, Optical and ATM networks operation. |
| | | | | Choose appropriate protocol for desired communication service. |
| | | | | Compare various types of routing protocols. |
| | | | | Evaluate advanced network technologies and network protocols. |
| 21 | VI | **AI314** | **Sentiment Analysis** | Utilize proficiency in applying supervised and unsupervised sentiment classification techniques. |
| | | | | Develop expertise in generating sentiment lexicons through dictionary and corpus-based approaches. |
| | | | | Apply Master advanced skills in analyzing debates, recognizing stances, and mining intents in textual discussions. |
| | | | | Acquire the ability to identify and analyze comparative opinions, including specialtypes of comparisons. |
| | | | | Apply knowledge in detecting fake opinions, performing automated abnormal pattern discovery, and assessing the quality of reviews using regression models. |
| 22 | VI | **OE342** | **Data Mining** | Compare various conceptions of data mining as evidenced in both research andapplication |
| | | | | Apply Classification and Clustering techniques for real time problems |
| | | | | Characterize the various kinds of patterns that can be discovered by association rulemining |
| | | | | Analyze web mining techniques for structured/un-structured data patterns |

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| | | | | Evaluate mathematical methods underlying the effective application of data mining |
| 23 | VI | **AIMD302** | **Principles of AI** | Articulate basic concepts and techniques of Artificial Intelligence. |
| | | | | Apply AI algorithms for solving typical practical problems. |
| | | | | Designate appropriate knowledge representation schemes in AI. |
| | | | | Analyze reasoning schemes in AI. |
| 24 | | **SH3064** | **Scholastic Aptitude II** | Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | Articulate usage of basic aptitude terms of percentages, averages, ratios andapplications of business aptitude terms of profits and interests |
| | | | | Develop a bridge in analogies, series and visualizing directions. |
| | | | | Apply various short cuts & techniques to manage speed and accuracy to getequipped for various competitive and campus recruitment exams |
| 25 | VI | **AI316** | **Web Technology Lab** | Analyze the difference between static and dynamic web page. |
| | | | | Develop application using HTML5, CSS 3.0, Java Script and jquery. |
| | | | | Implement application using Java Servlet, Manage session of users in web application. |
| | | | | Implement a Java servlet application to connect with RDBMS |
| | | | | Build application using Java Server Pages (JSP), Manage session of users in web application. |

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| | | | | Develop a Java Server Pages application to connect with RDBMS |
| 26 | VI | **AI318** | **Mobile Application Development Lab** | Setup the Android development environment |
| | | | | Utilize the appropriate User Interface controls in Android app |
| | | | | Implement SQLite and Shared Preferences concepts to store data in Android app |
| | | | | Implement Location and Notification based functionalities in Android app |
| | | | | Design and develop a WebView based Android app |
| | | | | Build and deploy Android app on Google Play Store |
| 27 | VI | **AI320** | **Technical Aptitude-IV** | Choose proper techniques to find solution for engineering problems |
| | | | | Solve various types of problems |
| | | | | Develop ability to face competitive examinations |
| | | | | Inspect the problem & conclude with proper solution |
| 28 | VI | **AI322** | **Capstone Project Phase I** | Apply knowledge of computer science for real world problem. |
| | | | | Possess Professional, Practical and reflective practitioner skills. |
| | | | | Upgrade and apply the knowledge through continuous learning. |
| | | | | Effectively apply Design Thinking Processes and Template to structure learning lifecycle in thedevelopment of a prototype. |
| | | | | To develop project management and time management skills |

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| | | | | To formulate a process whereby to keep the end-user or customer in mind throughout the project lifecycle. |

K. E. Society's
**Rajarambapu Institute of Technology, Rajaramnagar**
(An Empowered Autonomous Institute, affiliated to SUK)

# Electrical Engineering

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## UG Program

- **Department Name :- Electrical Engineering**
- **UG Program Name :- B. Tech. Electrical Engineering**
- **Vision and Mission :-**

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| **Vision** | Develop globally competent electrical engineers to serve future needs and challenges of the society. |
| **Mission** | • **To inculcate teaching and learning processes to promote state-of-the-art service in electrical industries to address local and global challenges.**<br>• **To integrate academics, research, and entrepreneurship skills in the domain of electrical engineering to address the present and future challenges of society.**<br>• **To develop professionalism with strong foundations in adopting change in environmental technology.** |

| Sr. No. | Program Outcomes |
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| 1. | Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems. |
| 2. | Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4) |
| 3. | Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5) |
| 4. | Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8). |
| 5. | Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6) |
| 6. | The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its |

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| | impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7). |
| 7. | Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9) |
| 8. | Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams. |
| 9. | Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences |
| 10. | Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments. |
| 11. | Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8) |

| Sr. No. | Program Specific Outcomes |
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| 1 | Apply knowledge of power systems, power electronics, electrical machines and control systems for the industrial applications. |
| 2 | Operate and control renewable energy sources and electric vehicle systems. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 1 | III | EE2014 | DC Machines and Transformer | Explain working principle and operation of single-phase and three-phase transformers. |

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| | | | | Analyze performance with different applications of three-phase transformers. |
| | | | | Evaluate performance of the DC Machine. |
| | | | | Interpret characteristics of DC machines. |
| | | | | Identify suitable DC Machine and transformer for industrial applications. |
| 2 | III | EE2034 | Electrical Circuit Analysis | Apply fundamental laws to analyze DC and AC circuits. |
| | | | | Make use of different theorems to evaluate steady state parameters of AC and DC circuits. |
| | | | | Analyze the electrical two port networks. |
| | | | | Evaluate the circuit under transient conditions. |
| | | | | Design basic passive filters. |
| 3 | III | EE211 | Mathematics for Electrical Engineers | Solve Linear Differential equations related to engineering application in electrical Engineering. |
| | | | | Find and represent periodic functions using Fourier series. |
| | | | | Apply rules of vector differential calculus to evaluate gradient, divergence and conservative vector field. |

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| | | | | Identify an appropriate probability distribution and use its properties to calculate probabilities |
| | | | | Apply Laplace transform and Z-transform by using properties to various functions to solve electrical engineering problems. |
| 4 | III | EE213 | Power Transmission and Distribution System | Compare different tariffs for economic generation |
| | | | | Calculate different transmission line parameters |
| | | | | Select different components of overhead transmission lines and cables |
| | | | | Explain various phenomena occurring in power system |
| | | | | Identify importance of power factor and choose distribution system with minimum power loss. |
| 5 | III | EEMD201 | Electrical Power Generation | 1. Explain the fundamental concepts of energy sources like conventional and non-conventional energy. |
| | | | | 2. Describe various advantages and disadvantages of energy sources. |
| | | | | 3. Illustrate different technology associate with thermal, hydro and nuclear power energy sources. |

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| | | | | 4. Illustrate different technology associate with solar, wind, biomass and other renewable energy sources. |
| | | | | Describe the working of micro/mini hydropower system. |
| 6 | III | SH2174 | Environmental Science | Apply interdisciplinary knowledge in environmental science by integrating concepts and principles from various fields of science and engineering to address environmental issues. |
| | | | | Evaluate environmental impacts of human activities on ecosystems and on the environment. |
| | | | | Use scientific approach to identify and solve environment related problems. |
| | | | | Design sustainable solutions to address environmental challenges by considering renewable energy sources, waste management strategies conservation measures, and environmental policies. |
| | | | | Participate in group work to become acquainted with the importance of teamwork, collaboration |
| | | | | Develop presentation and report writing skills. |
| 7 | III | EE2514 | DC Machines and Transformer Lab | Perform polarity and O.C. S.C. test on transformer. |

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| | | | | Interpret load characteristics of transformer. |
| | | | | Demonstrate speed control characteristics of DC Machines. |
| | | | | Identify characteristics of various machines along with their efficiencies. |
| | | | | Analyze various parameters of the DC machines. |
| 8 | III | EE2574 | Computer Programming Lab | Analyze the problem to find the objects and build Object Oriented Program. |
| | | | | Elaborate the concepts of "Inline function", "Friend Function", "Function Overloading" and "Operator Overloading". |
| | | | | Modify/Extend the program by using Inheritance. |
| | | | | Use of memory management technique "Constructors" &"Destructors" to increase speed of program execution. |
| | | | | Perform different operation of file like "Create", "Open", "Close" files and perform "Read", "Write" and "Append". |
| 9 | III | EE261 | Electrical Maintenance and Troubleshooting | Demonstrate safe practice to prevent electrical accidents while handling electrical tools/equipment. |

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| | | | | Use tools/instruments for installation and to generate technical reports. |
| | | | | Conduct various tests as per IS on electrical equipment/machines. |
| | | | | Prepare maintenance schedule of different equipment/machines. |
| | | | | Develop trouble shooting chart for various electrical equipment, machines & domestic appliances. |
| 10 | III | EE2594 | Technical Aptitude -I | Apply the knowledge acquired during the course work. |
| | | | | Develop the ability of problem solving. |
| 11 | III/IV | SH2634 | Professional Leadership Skills | Explain the traits of a leadership through real life examples. |
| | | | | Exhibit the ability to work effectively in team. |
| | | | | Prepare a presentation as per the audience and context requirements. |
| 12 | III/IV | SH2614 | Interpersonal Skills | Exhibit interpersonal communication skills. |
| | | | | Demonstrate decision-making skills. |
| | | | | Apply conflict resolution styles appropriate in different situations. |
| | | | | Demonstrate skills to manage balance in work and life. |

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| 13 | III/IV | SH2694 | Innovation Tools and Methods for Entrepreneurs | Explain structured approach to define the problem with every possible detail, identify conflicts and solve them |
| | | | | Apply User Journey Map to the selected problem to show user interaction at various stages |
| | | | | Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| 14 | III/IV | SH2594 | Personal Effectiveness and Body Language | Develop skills to build self-esteem and positive attitude. |
| | | | | Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | Demonstrate responsiveness towards time, stress, and health issues. |
| | | | | Interpret the non-verbal behaviour of a person. |
| 15 | III/IV | SH2734 | German Language - Level III | Interpret the language if the next person is speaking slowly and clearly. |
| | | | | Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | Demonstrate the language by self-introduction in German with simple sentences. |

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| 16 | III | SH2714 | Japanese Language - Level III | Make use of basic conversations in various situations. |
| | | | | Identify the sentence patterns. |
| | | | | Explain insights about the communication required for living in Japan. |
| | | | | Interpret Japanese work ethics required in their professional career. |
| 17 | IV | EE2064 | Analog and Digital Electronics | Interpret characteristics of diodes, transistors, and MOSFET. |
| | | | | Analyze various analog circuits. |
| | | | | Design operational amplifier-based circuits. |
| | | | | Describe the fundamental concepts and techniques used in digital electronics. |
| | | | | Design combinational and sequential logic circuits. |
| 18 | IV | EE2024 | AC Machines | Describe behavior of three phase and single phase induction motors. |
| | | | | Interpret various characteristics of three phase induction motor. |
| | | | | Identify various industrial applications for single phase and three phase Induction Motor. |

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| | | | | Evaluate winding parameters of Synchronous Generator. |
| | | | | Analyze performance characteristics and testing of Synchronous Machine. |
| 19 | IV | EE214 | Electrical Measurement and Instrumentation | Analyze different electrical measuring instrument. |
| | | | | Identify the various parameters in electrical measuring instruments. |
| | | | | Design measuring schemes for various electronic instrument applications. |
| | | | | Select appropriate transducer for various measuring applications. |
| | | | | Describe different non-electrical measuring instruments. |
| 20 | IV | EE2084 | Signals and Systems | Represent the various signals mathematically |
| | | | | Classify the systems and infer their properties |
| | | | | Compute the Fourier series and Fourier Transforms for given signals |
| | | | | Apply Laplace and Z-transforms to solve the systems. |
| | | | | Appreciate the significance of Sampling |
| 21 | IV | EEMD202 | Power System | Write the basic working principles of different generating sources. |

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| | | | | Analyze different types of loads |
| | | | | Explain importance of power factor and tariffs in power system. |
| | | | | Identify various components in power transmission and distribution system. |
| | | | | Select substation equipments as per requirement. |
| 22 | IV | SH202 | मराठी भाषिक कौशल्यविकास | भाषा आणि व्यक्तिमत्व विकास यांमधील सहसंबंध स्पष्ट करू शकेल |
| | | | | भाषिक कौशल्यविकास करू शकेल |
| | | | | कथा या मराठी साहित्य प्रकाराचे विश्लेषण करू शकेल |
| | | | | एकांकिका या मराठी साहित्य प्रकाराच्या विश्लेषणाची क्षमता प्राप्त करेल |
| 23 | IV | SH204 | हिंदी कथा साहित्य एवं प्रयोजमूलक हिंदी | विद्यार्थियों में मानवीय संवेदनाओं के विकास के साथ नवीन सामाजिक सांस्कृतिक बोधऔर जीवन मूल्यों का विकास होगा। |
| | | | | विद्यार्थियों में साहित्य के माध्यम से कलात्मक गुणों की अभिवृद्धि होगी कला की साहित्यिक विधाओं के प्रति अभिरुचि जागृत होगी तथा रचनात्मक कौशल्य को बढ़ावा मिलेगा। |
| | | | | विद्यार्थियों में नए वैश्विक मूल्यों के प्रति सजगता को बढ़ावा मिलेगा एवं मूल्यवादी दृष्टि के प्रति दायित्व बोध उत्पन्न होगा।छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| | | | | छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| 24 | IV | EE2524 | AC Machines Lab | Evaluate parameters of AC machines (Asynchronous and Synchronous) |

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| | | | | Plot the characteristics of various AC machines and solving engineering problems. |
| | | | | Demonstrate speed control characteristics of AC Machines. |
| | | | | Analyze the parameters and predict the efficiency of the AC machines. |
| | | | | Analyze the voltage regulation of Synchronous Generator. |
| 25 | IV | EE2544 | Analog and Digital Electronics lab | Illustrate input-output response of analog electronic. |
| | | | | Build diode circuits like rectifier, clipper & clamper. |
| | | | | Design various applications of Op-Amp. |
| | | | | Design sequential and combinational circuits. |
| | | | | Simulate and validate Analog and Digital circuits using simulation tools. |
| 26 | IV | EE262 | Electrical Measurement and Instrumentation Lab | Determine the measurement of electrical parameters using various measurement techniques. |
| | | | | Examine AC bridges for the measurement of inductance, capacitance and frequency. |

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| | | | | Identify different measuring instruments for the measurement of various electrical and non-electrical parameters. |
| | | | | Demonstrate various digital measuring instruments. |
| | | | | Draw the characteristics of solar panel, earth resistance and temperature transducers. |
| 27 | IV | EE264 | Electrical Installation | Elaborate electrical Safety, Installation Codes, and Standards |
| | | | | Determine a suitable size of wires and switchgears |
| | | | | Design various electrical installation diagrams |
| | | | | Estimate component requirements of electrical installation |
| | | | | Prepare quotation, tender and other related documents |
| 28 | IV | EE2564 | Technical Aptitude -II | Apply the knowledge acquired during the course work. |
| | | | | Develop the ability of problem solving. |
| 29 | IV | SH2624 | Japanese Language - Level IV | To be able to make basic conversations in various situations. |
| | | | | To recognize the sentence patterns. |

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| | | | | To improve Japanese Language proficiency. |
| | | | | To give students insights about the communication required for living in Japan. |
| | | | | To expose students to the Japanese work ethics required in their professional careers. |
| 30 | V | EE3034 | Power System Analysis | Apply per unit system for power system components. |
| | | | | Analyze symmetrical faults in power systems. |
| | | | | Apply symmetrical component method for unsymmetrical faults in power system |
| | | | | Examine power system transient stability. |
| | | | | Outline FACTs and HVDC devices for electrical power systems. |
| 31 | V | EE3054 | Control System | Represent the physical system into a mathematical model. |
| | | | | Calculate the time-domain specifications for a given second order system. |
| | | | | Analyse the different systems using Time domain and Frequency domain tools and techniques. |
| | | | | Compare different controllers and compensators used in control systems. |

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| | | | | Apply the knowledge of State Space techniques for analysing and understanding the MIMO systems. |
| 32 | V | EE3094 | Energy Storage Technologies | Explain the energy storage as a structural unit of a power system. |
| | | | | Compare various energy storage technologies for power systems. |
| | | | | Apply hydrogen energy storage for power system applications. |
| | | | | Analyze the economics and reliability of energy storage systems. |
| 33 | V | EE3114 | Restructured Power System | Identify new dimensions associated with the power system and its economics. |
| | | | | Compare the various operating mechanisms of conventional and restructured power system. |
| | | | | Interpret various aspects of power markets and market architecture. |
| | | | | Propose ancillary services and bidding strategies in power sectors |
| 34 | V | EE3134 | Digital Signal Processing | Formulate signals mathematically in continuous, discrete-time, and frequency domains. |
| | | | | Analyze discrete-time systems using Z-transform. |

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| | | | | Construct signals using Discrete-Fourier Transform (DFT) and FFT algorithms. |
| | | | | Design digital filters for various applications |
| | | | | Apply digital signal processing for the analysis of real-life signals. |
| 35 | V | EE3154 | Electrical Utilization and Traction | Analyze electric heating for industrial application. |
| | | | | Demonstrate electric welding for industrial application. |
| | | | | Inspect electric circuits for refrigeration and air conditioning. |
| | | | | Evaluate the use of various process control techniques. |
| | | | | Summarize electrical traction systems and drives. |
| 36 | V | OE341 | Energy Auditing and Management | Identify the important of Energy Scenario. |
| | | | | Use energy audit knowledge to carry out energy audit of a given firm. |
| | | | | Examine different rolls in energy action planning |
| | | | | Apply project finance and management skills to carry out energy audit |
| | | | | Plan for energy monitoring and targeting. |

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| 37 | V | EEMD301 | Electrical Machines | Describe behavior of dc machine. |
| | | | | Explain the working principle of 1-Phase and 3-Phase transformers. |
| | | | | Explain working of different induction motors. |
| | | | | Select the relevant electrical machines for different applications |
| | | | | Interpret the relevant fractional horse power motor for different applications |
| 38 | V | SH3034 | Scholastic Aptitude-I | Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | Develop a bridge in analogies, series and visualizing directions. |
| | | | | Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams |
| 39 | V | EEMD303 | Electrical Technology | Demonstrate speed control methods of electrical machines. |

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| | | | | Analyze performance of DC motor and induction motor for speed control applications. |
| | | | | Implement power electronic circuits for given application. |
| | | | | Measure electrical quantities using electrical and electronic instruments. |
| 40 | V | EE3514 | Control Systems Lab | Test for responses of the mathematical model of different electromechanical systems for various standard inputs. |
| | | | | Evaluate time domain and frequency domain specifications of LTI systems |
| | | | | Examine the stability of LTI system using time-domain and frequency-domain techniques. |
| | | | | Design simple controller for LTI systems |
| | | | | Analyze state space models of LTI systems |
| 41 | V | EE3534 | Microcontroller Lab | Illustrate internal and external structure of microcontroller |
| | | | | Make a use of instruction set to write assembly language programming |
| | | | | Develop embedded C language program of modern microcontrollers |
| | | | | Design microcontroller interfacing circuit for various I/O device |

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| 42 | V | EE359 | Advanced Software Lab | Analyze AC/DC converters circuits using software. |
| | | | | Make use of advance software programming and Simulink platform to solve different problems. |
| | | | | Analyze the power system analysis problem using advance simulation toolbox. |
| | | | | Develop power system network in advance software to solve power flow analysis problems. |
| | | | | Design power system network in advance optimization software to solve power systems problem. |
| 43 | V | EE3554 | Technical Aptitude -III | Apply the knowledge acquired during the course work. |
| | | | | Develop the ability of problem solving. |
| 44 | V | EE3574 | Summer Internship | Apply the Technical knowledge in real industrial situations. |
| | | | | Identify the industry problem on which they can do their final year project. |
| | | | | Formulate Technical reports/projects. |
| | | | | Demonstrate professional values and ethical standards. |
| | | | | Understand the social, economic and administrative considerations that |

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| | | | | influence the working environment of industrial organizations. |
| 45 | VI | EE314 | Power System Protection | Compare the different protective devices |
| | | | | Describe Relays for power system protection. |
| | | | | Identify the proper earthing system and selection of Lightening arrester |
| | | | | Explain digital relaying scheme |
| 46 | VI | EE3044 | Power Electronics | Explain power semiconductor devices based on working principle, structure and operating characteristics. |
| | | | | Estimate the performance parameters of uncontrolled rectifiers and phase-controlled converters for R, RL and RLE Load. |
| | | | | Analyze the performance of DC-DC converters with respect to configurations and control strategies |
| | | | | Draw waveforms and circuits of single phase and three phase inverter. |
| | | | | Describe working principle and applications of AC-AC converters. |
| 47 | VI | EE316 | Research Methodology | Describe the research process and the principle activities, skills and ethics associated with the research process. |
| | | | | Formulate a research problem |

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| | | | | Assess and critique a published journal article. |
| | | | | Identify the components of a literature review process |
| | | | | Construct an effective research article or proposal by following research ethics |
| 48 | VI | EE3064 | Electrical Energy Conservation and Auditing | Explain the basic principles of Energy Management and Audit |
| | | | | Apply mathematical tools to solve energy economics |
| | | | | Select energy-efficient electrical technologies for electrical motors |
| | | | | Select energy-efficient Industrial technologies for energy saving |
| | | | | Apply energy-efficient technologies for energy saving |
| 49 | VI | EE318 | Battery Management Systems | Discuss BMS for various applications. |
| | | | | Compare various batteries for specific applications |
| | | | | Illustrate battery parameters and battery testing |
| | | | | Explain battery management methods for a given system |
| | | | | Illustrate thermal management and aging of batteries for electric vehicles |

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| 50 | VI | EE3104 | Advanced Control Systems | Design compensators for LTI systems. |
| | | | | Design state feedback controller and observer for the system models. |
| | | | | Examine stability of the state space models. |
| | | | | Analyze discrete time systems |
| | | | | Examine stability of discrete time systems |
| 51 | VI | EE3124 | Application of Microcontrollers in Electrical Engineering | Illustrate internal and external structure of PIC microcontroller |
| | | | | Make a use of instruction set to write assembly language programming |
| | | | | Develop embedded C language program of modern PIC microcontrollers |
| | | | | Design PIC microcontroller interfacing circuit for various I/O device |
| 52 | VI | OE3182 | Industrial Drives | Analyze stability, moment of inertia, speed and torque in industrial drive system |
| | | | | Elaborate energy conservation in industrial drive system |
| | | | | Identify various sensors required for industrial drives |
| | | | | Compare various control strategies for AC and DC drives |

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| | | | | Select special motors for industrial applications |
| 53 | VI | EEMD302 | Smart Grid | Summarize the concept and future of smart grid |
| | | | | Develop smart grid architecture |
| | | | | Compile various smart grid technologies |
| | | | | Identify communication and information technologies for smart grid |
| | | | | Elaborate distributed generation and storage technologies |
| | | | | Recommend smart metering and distribution automation |
| 54 | VI | SH3064 | Scholastic Aptitude-II | Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | Develop a bridge in analogies, series and visualizing directions. |
| | | | | Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams |

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| 55 | VI | EE3544 | Power Electronics Lab | Implement triggering circuits and operating characteristics of power semiconductor devices. |
| | | | | Demonstrate performance of power electronic converters connected to resistive load |
| | | | | Analyze performance of power electronic converters based on output parameters and operating characteristics. |
| | | | | Design power electronics converters for specific applications |
| | | | | Perform simulation of power electronic converters |
| 56 | VI | EE360 | Automation and Control Lab | Design relay logic-based control system for the given applications. |
| | | | | Implement IEC based programming languages for various PLCs. |
| | | | | Develop Relay Logic Ladder for the real-time PLC based control applications. |
| | | | | Design SCADA based GUI system for the real time applications. |
| | | | | Develop GUI based monitoring system of the real time applications using HMI. |
| 57 | VI | EE362 | Power System Protection Lab | Explain different types of power system schemes. |

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| | | | | Compare the Electromagnetic, static and microprocessor based relays |
| | | | | Describe Current-time and voltage-time characteristics of relays. |
| | | | | Demonstrate faults on power system fault simulation panels |
| | | | | Illustrate the proper earthing system and safety precautions in Electrical systems |
| 58 | VI | EE3564 | Technical Aptitude –IV | Apply the knowledge acquired during the course work. |
| | | | | Develop the ability of problem solving. |
| 59 | VI | EE3584 | Capstone Project Phase -I | Carry out literature survey and identify as well as select a problem. |
| | | | | Communicate problem, methodology and outcomes systematically and effectively in the form of a technical report. |
| | | | | Work as a member and a team leader in engineering teams / multidisciplinary teams. |
| | | | | Demonstrate an ability to use different tools and techniques to solve the given problem. |
| | | | | Comprehend and analyze an engineering problem and report findings to provide an appropriate solution. |

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| 60 | VII | EE4013 | Power System Protection | Explain different types of power system faults. |
| | | | | Compare the different protective devices |
| | | | | Describe Relays for power system protection. |
| | | | | Classify different circuit breakers as per their application |
| | | | | Ensure the proper earthing system and selection of Lightening arrester |
| 61 | VII | EE4033 | Electrical Drives | List the parts of electrical drives, advantages and factors affecting the choice of electrical drives. |
| | | | | Interpret the equivalent parameters, stability and components of load torque for a given motor-load system. |
| | | | | Apply power electronics converter and their control techniques to control dc drives. |
| | | | | Estimate the performance parameters of dc drives controlled by rectifiers and choppers. |
| | | | | Describe stator side and rotor side control of induction motor drive. |
| | | | | Explain the special motor drives for industrial applications. |

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| 62 | VII | EE4053 | Power System Dynamics and Control | Compare various methods to enhance power system stability. |
| | | | | Develop dynamic modeling of a synchronous machine, excitation system, speed governing system, and transmission line. |
| | | | | Examine impact of stability on power system planning, and operation. |
| | | | | Outline stability issues in interconnected power system. |
| | | | | Analyze Power system stabilizer. |
| 63 | VII | EE4073 | HVDC Transmission Systems | Elaborate HVDC system and describe various types of DC links |
| | | | | Analysis of Line Commutated Converters and Voltage Source Converters in HVDC Transmission System with their control methods |
| | | | | Explain various faults and protection methods for HVDC transmission systems |
| | | | | Discuss about Reactive power, Harmonics and filters in HVDC system |
| | | | | Illustrate HVDC components modeling and AC/DC power flow |
| 64 | VII | EE4093 | Nonlinear Control Systems | List different types of non-linearities present in the system |

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| | | | | Analyze non-linear systems using analytical and graphical methods |
| | | | | Comment on stability of nonlinear systems using various approaches. |
| | | | | Apply Lyapunov stability criteria for nonlinear system |
| | | | | Develop mathematical model of real-time nonlinear systems |
| 65 | VII | EE4113 | FACTS Controllers | Examine the importance of controllable parameters and benefits of FACTS Controllers. |
| | | | | Compare the operation of SVC and STATCOM |
| | | | | Analyze the functional operation and control of series compensation |
| | | | | Describe the principles, operation and control of voltage & Phase angle regulator |
| | | | | Explain combined & special purpose FACTS controllers |
| 66 | VII | EE4133 | High Voltage Engineering | Identify and analyze the breakdown theories of solid, liquid and gaseous materials |
| | | | | Describe as well as use different methods of generation of high AC, DC, impulse voltage and current. |

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| | | | | Demonstrate and use different methods of measurement of high AC, DC, impulse voltage and current |
| | | | | Identify the occurrence of overvoltage and to provide remedial solutions |
| | | | | Demonstrate an ability to carry out different tests on high voltage equipment and devices as well as ability to design the high voltage laboratory with all safety measures |
| 67 | VII | EE4153 | Power Quality and Harmonics | Discuss various power quality problems and their analysis. |
| | | | | Describe Power Quality Standards and Monitoring |
| | | | | Asses sources of harmonic in power system |
| | | | | Analyze effects of Harmonics on Power system |
| | | | | Explain harmonic filters |
| 68 | VII | EE4173 | Smart Grids | Summarize the concept and future of smart grid |
| | | | | Develop smart grid architecture |
| | | | | Compile various smart grid technologies |
| | | | | Identify communication and information technologies for smart grid |

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| | | | | Elaborate distribution generation technologies |
| | | | | Recommend smart metering and distribution automation equipment's |
| 69 | VII | EE4193 | FPGA DSP Processors | Explain the basic functions of FPGA DSP processors. |
| | | | | Interpret the modules of DSP processors |
| | | | | Compare FPGA based DSP technologies |
| | | | | Elaborate FPGA implantation tools and its synthesis |
| | | | | Develop architecture of FPGA based DP systems |
| 70 | VII | EE4213 | Computer Modeling of Electrical Power System | Develop mathematical models of various equipment used in power system to analyse both AC and AC-DC power system network. |
| | | | | Model single and three phase power system network by using linear transformation and compound admittance technique. |
| | | | | Formulate AC and AC-DC power system analysis problem. |
| | | | | Apply various methods of load flow studies to analyse AC power system network. |

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| | | | | Analyse AC-DC power system network by using power flow analysis method. |
| 71 | VII | EE4233 | Power System Optimization | Describe the need of power system optimization. |
| | | | | Formulate power system optimization problem. |
| | | | | Apply numerical and heuristic technique to solve power system optimization problem. |
| | | | | Solve power system optimization problem. |
| | | | | Assess the impact of parameters on defined optimization problem. |
| 72 | VII | EE4253 | Battery Management System | Discuss BMS for various applications. |
| | | | | Compare various batteries for specific applications |
| | | | | Illustrate battery parameters and battery testing |
| | | | | Explain battery management methods for a given system |
| | | | | Illustrate thermal management and aging of batteries for electric vehicles |
| 73 | VII | EE4273 | Advanced Power Electronics | Design mathematical model of various converters. |

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| | | | | Analyze AC voltage controllers and resonant converters. |
| | | | | Describe Switched mode power converters. |
| | | | | Apply knowledge of inverters for various electrical applications |
| | | | | Select power electronic conditioners and filters for Power Quality Improvement. |
| 74 | VII | EE4513 | Power System Protection Lab | Explain different types of power system schemes. |
| | | | | Compare the Electromagnetic, static and microprocessor based relays |
| | | | | Describe characteristics of relays. |
| | | | | Demonstrate faults on panels |
| | | | | Ensure the proper earthing system and safety precautions in Electrical systems |
| 75 | VII | EE4533 | Electrical Drives Lab | Demonstrate AC and DC drives, fed from various power electronics converters |
| | | | | Examine closed loop control of electrical drive system |
| | | | | Analyze performance of electrical drives by plotting speed-torque characteristics |
| | | | | Compare performance of electrical drives using speed-torque characteristics |

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| | | | | Simulate AC and DC drives, fed from various power electronics converters |
| 76 | VII | EE4553 | Wind and Solar Lab | Prepare report on wind resource assessment |
| | | | | Operate and maintain squirrel cage and DFIG based systems. |
| | | | | Compute reactive power requirement for standalone wind turbine system |
| | | | | Demonstrate the effects of shadowing on PV modules |
| | | | | Identify the installation materials for off grid PV systems |
| 77 | VII | EE4573 | Control and Automation Lab | Design relay logic-based control system for the given applications. |
| | | | | Implement IEC based programming languages for various PLCs |
| | | | | Develop Relay Logic Ladder for the real-time PLC based control applications. |
| | | | | Study SCADA based GUI system for the real time applications. |
| | | | | Use HMI to develop GUI based monitoring system of the real time applications. |
| 78 | VII | EE4593 | Capstone Project Phase-II | Devise sound technical knowledge, for identified problem of project. |

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| | | | | Propose engineering solution to complex problems. |
| | | | | Demonstrate the skills and attitude in professional way in a team. |
| | | | | Illustrate the component and cost optimization solutions wherever applicable. |
| | | | | Develop skills towards the use of modern tools and presentations. |
| | | | | Justify outcomes through simulation/ experimentation in environmental and sustainable way. |
| | | | | Summarize project report in an ethical way. |
| 79 | VIII | OE4381 | Finance for Engineers | Discuss the fundamental aspects of accounting and finance. |
| | | | | Apply theoretical knowledge and information for preparing various financial statements. |
| | | | | Analyze the financial information for solving managerial problems. |
| | | | | Evaluate financial performance of the organization for effective decision making. |
| 80 | VIII | OE4361 | Engineering Management & Economics | Develop administrative, organizational and planning skills to execute engineering project. |

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| | | | | Develop bar chart/mile stone chart for the project. |
| | | | | Analyze profit/cost data and carry out economic analysis to take optimal decision. |
| | | | | Calculate depreciation as per various methods. |
| 81 | VIII | IP4023 | Internship & Project | Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services) |
| | | | | Develop an attitude to adjust with the company culture, work norms, code of conduct. |
| | | | | Recognize and follow the safety norms, Code of conduct. |
| | | | | Demonstrate the ability to observe, analyse and document the details as per the industry practices. |
| | | | | Interpret the processes, systems and procedures and to relate to the theoretical concepts- studies. |
| | | | | Develop the leadership abilities, communication. |
| | | | | Demonstrate project management and finance sense |

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| | | | | Identify the project/problem in the domain of a program relevant for the company. |
| | | | | Compile the information to the pertaining to the problem identified. |
| | | | | Analyse the information using the statistical tools/ techniques. |
| | | | | develop the feasible solution for given problem. |
| | | | | Analyse the impact of the project on the performance of company/department. |
| 82 | VIII | RE4043 | Research Project | Investigate the technical literature. |
| | | | | Recognize and evaluate theories, practices, and/or research on a chosen topic by conducting a thorough literature review and submitting a written integrative, critical summary of the current literature. |
| | | | | Design a research problem and develop a methodology. |
| | | | | Develop and implement an advanced original research or creative project. |
| | | | | Develop the ability to explain the conceptual viability of the project and describe the major components involved. |

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| | | | | Develop the ability to explain how the project will impact the relevant body of work. |
| | | | | Develop advanced discipline-relevant skills and competencies. |
| | | | | Construct an accurate record of research performed. |
| | | | | Write a research report and paper. |
| 83 | VIII | ED4103 | Project Management | Prepare business Plan for selected business. |
| | | | | Make risk analysis& market analysis of selected project. |
| | | | | Make risk analysis& market analysis of selected project |
| | | | | Make financial appraisal of selected project. |
| 84 | VIII | ED4043 | Commercial Aspects of the Project | Interpret basic Financial Terminologies. |
| | | | | Prepare & analyze financial statements. |
| | | | | Prepare financial Plan for venture. |
| | | | | Apply basic principles of marketing for various products. |
| | | | | Prepare market survey. |

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| | | | | Apply knowledge of marketing management for selected business. |
| 85 | VIII | ED4062 | Entrepreneurship Development Program (EDP) | Apply knowledge of engineering, economics, marketing and finance for formulation of business plan, starting & managing new business |
| 86 | VIII | ED4083 | Entrepreneurship Development Project | Apply knowledge of engineering, economics, marketing and finance for preparation of project report. |
| | | | | Make commercial, technical and financial appraisal of project. |

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## PG Program

- **Department Name :- Electrical Engineering**
- **PG Program Name :- M. Tech. Power System and Power Electronics**
- **Vision and Mission :-**

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| **Vision** | Develop globally competent electrical engineers to serve future needs and challenges of the society. |
| **Mission** | • To inculcate teaching and learning processes to promote state-of-the-art service in electrical industries to address local and global challenges.<br>• To integrate academics, research, and entrepreneurship skills in the domain of electrical engineering to address the present and future challenges of society.<br>• To develop professionalism with strong foundations in adopting change in environmental technology. |

| Sr. No. | Program Outcomes |
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| 1. | To independently carry out research /investigation and development work to solve practical problems. |
| 2. | To write and present a substantial technical report/document. |
| 3. | To demonstrate a degree of mastery over the area of power systems and power electronics. |
| 4. | To collaborate, work harmoniously in teams and address multidisciplinary issues with consideration of professional, legal, and ethical concerns. |
| 5. | To use advanced techniques, skills, and modern engineering tools with financial aspects. |
| 6. | To learn continuously, independently and update knowledge & skills |

## M.Tech Power Systems and Power Electronics (AY 2024-25)

## Course Outcomes

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| | | | | 1. Estimate the error. |

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| **1** | **I** | **SHP5152** | **Numerical Computational Technique** | 2. Apply the relevant numerical method for interpolating the polynomial |
| | | | | 3. Develop the equation to be fitted and fit the curve for given data |
| | | | | 4. Estimate numerically the solution of given algebraic equation. |
| | | | | 5. Use the relevant method for solving the simultaneous linear equations and compute the Eigen values. |
| | | | | 6. Construct the fuzzy set for given linguistic variable and apply fuzzy logic. |
| **2** | **I** | **EPP1012** | **Computer Aided Power System Analysis** | 1. Model different components of power system |
| | | | | 2. Carry out contingency analysis of power system |
| | | | | 3. Analyze power network by conducting power flow studies |
| | | | | 4. Model and simulate generator excitation system |
| | | | | 5. Estimate state of power system using state estimation theory |
| **3** | **I** | **EPP1022** | **Electric and Hybrid Electric Vehicles** | 1. Discuss the trends and philosophy of electric vehicles |
| | | | | 2. Analyze Conventional Vehicles and Powertrains |
| | | | | 3. Discuss the electric drive mechanism. |
| | | | | 4. Classify hybrid electric vehicles |
| | | | | 5. Differentiate Electric and range-extended electric vehicles |

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| | | | | 6. Describe plug-in hybrid electric vehicles and electrical infrastructure |
| **4** | **I** | **EPP1033** | **Wind and Solar energy Technology** | 1. Describe the principle of energy generation from wind and solar PV systems |
| | | | | 2. Formulate wind and solar energy systems by mathematical equations |
| | | | | 3. Assess energy produced from wind and solar energy systems. |
| | | | | 4. Compare the different methods of energy generation from wind and energy systems |
| | | | | 5. Develop economic analysis of a wind turbine and solar PV systems |
| **5** | **I** | **EPP1052** | **Distribution Automation** | 1. Prepare layout of the substations and feeders considering load and desired voltage |
| | | | | 2. Design distribution system and associated equipment and devices. |
| | | | | 3. Identify an appropriate method of communication for any particular distribution system with a view of automation and SCADA |
| | | | | 4. Analysis distribution feeder components. |
| | | | | 5. Model the different distribution feeder components. |
| | | | | 1. Discuss the smart grid in Indian perspective |

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| **6** | **I** | **EPP1082** | **Smart Grid Technologies** | 2. Explain various smart grid technologies. |
| | | | | 3. Describe smart meters and advance metering infrastructure. |
| | | | | 4. Compare Smart grid and microgrid |
| | | | | 5. Apply power quality management in smart grid |
| | | | | 6. Identify communication technologies for smart grid |
| **7** | **I** | **EPP1102** | **Renewable Energy Lab** | 1. Prepare report on wind resource assessment |
| | | | | 2. Operate and maintain squirrel cage and DFIG based systems. |
| | | | | 3. Compute reactive power requirement for standalone wind turbine system |
| | | | | 4. Demonstrate the effects of shadowing on PV modules |
| | | | | 5. List the installation materials for off grid PV systems |
| **8** | **I** | **EPP111** | **Electric Vehicle Lab** | 1. Interpret wiring harness and circuit diagram of EV workbench |
| | | | | 2. Examine the mechanical and electrical specifications and calculate the indices |
| | | | | 3. Demonstrate the voltage and current readings for correct and faulty throttle conditions |
| | | | | 4. Perform motor power and torque calculations to select a motor to build their own EV. |

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| | | | | 5. Operate Smart BMS application under different conditions. |
| **9** | **I** | **SHP5512** | **Technical Communication** | **1.** Acquire skills required for good oral and written communication |
| | | | | **2.** Demonstrate improved writing and reading skills |
| | | | | **3.** Ensure the good quality of oral and written communication |
| **10** | **II** | **EPP2022** | **Advanced Control of Electrical Drives** | 1. Justify the need of closed loop drive system for industrial applications. |
| | | | | 2. Explain the working principle of different types of drive system. |
| | | | | 3. Compare different types of electric drives. |
| | | | | 4. Develop mathematical models of electric drive system for specific application. |
| | | | | 5. Design controllers for closed-loop operation of different types of electrical motors. |
| **11** | **II** | **EPP2052** | **Power System Optimization** | 1. Explain the need of power system optimization |
| | | | | 2. Formulate power system optimization problem |
| | | | | 3. Apply numerical and heuristic technique to solve power system optimization problem. |
| | | | | 4. Solve power system optimization problem |
| | | | | 5. Assess the impact of parameters on defined optimization problem. |

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| **12** | **II** | **EPP2032** | **Grid Integration of Renewable Energy Sources** | 1. Summarize the grid codes for integration of renewable energy sources |
| | | | | 2. Explain the working principle of different power electronic topologies and controllers. |
| | | | | 3. Model mathematically renewable energy sources and associated control system |
| | | | | 4. Design systems to reduce impact of renewable energy fluctuations on grid |
| | | | | 5. Develop simulation systems using MATLAB |
| **13** | **II** | **EPP2072** | **Power Quality and Harmonics** | 1. Discuss various power quality problems and their analysis. |
| | | | | 2. Classify various voltage quality issues and solutions. |
| | | | | 3. Describe Power Quality Standards and Monitoring. |
| | | | | 4. Asses sources of harmonic in power system |
| | | | | 5. Analyze effects of Harmonics on Power system |
| | | | | 6. Design of harmonic filters. |
| **14** | **II** | **EPP2092** | **Research Methodology & IPR** | 1. Formulate a research problem. |
| | | | | 2. Analyze research related information |
| | | | | 3. Prepare and present research proposal/paper by following research ethics |

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| | | | | 4. Make effective use of computers and computing tools to search information, analyze information and prepare report. |
| | | | | 5. Describe nature and processes involved in development of intellectual property rights |
| **15** | **II** | **EPP2102** | **Advanced Power System Protection Lab** | 1. Analyze characteristics of digital relays |
| | | | | 2. Demonstrate fault simulation on different protection panels |
| | | | | 3. Develop an algorithm for different protection schemes |
| | | | | 4. Simulate protection models |
| | | | | 5. Interpret the simulation results |
| **16** | **II** | **EPP2112** | **Advanced Electric Drives Lab** | 1. Demonstrate control of Induction motor drive. |
| | | | | 2. Experiment with chopper fed DC drive system. |
| | | | | 3. Experiment with three phase half and full converter fed DC motor drive. |
| | | | | 4. Demonstrate control of BLDC, servo and stepper motor drive system. |
| | | | | 5. Demonstrate control of AC and DC drives using MATLAB/SIMULINK |
| **17** | **II** | **EPP2122** | **Mini Project** | 1. Formulate a real world problem. |
| | | | | 2. Design solution for a set of requirements. |
| | | | | 3. Use software packages available to analyze the proposed theory. |

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| | | | | 4. Explain technical ideas, strategies and methodologies in written form and oral presentations |
| **18** | **II** | **SHP552** | **Framework of Indian Constitution** | 1. Realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution. |
| | | | | 2. Identify the importance of fundamental rights as well as fundamental duties |
| | | | | 3. Understand the functioning of Union, State and Local Governments in Indian federal system |
| | | | | 4. Learn procedure and effects of emergency, composition and activities of election commission and amendment procedure. |
| **19** | **III** | **EPP3012** | **Industry Internship** | 1. Apply engineering knowledge learned during the program. |
| | | | | 2. Apply his/her technical skills to solve industrial problem. |
| | | | | 3. Work in multi-disciplinary environment. |
| **20** | **III** | **MOE2011** | **Artificial Intelligence - Machine Learning** | 1. Describe central machine learning methods and techniques and how they relate to artificial intelligence |
| | | | | 2. Differentiate between supervised and unsupervised learning techniques |
| | | | | 3. Apply the ML algorithms to a real-world problem, |

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| | | | | 4. Optimize the models learned and report on the expected accuracy that can be achieved by applying the models. |
| | | | | 5. Evaluate a given problem and apply appropriate machine learning technique |
| **21** | **III** | **EPP3022** | **Dissertation Phase - I** | 1. Identify research opportunities in his/her domain or multidisciplinary domains |
| | | | | 2. Formulate the problem statement and its objectives correctly |
| | | | | 3. Apply the principles of project management during development of the project |
| | | | | 4. Present synopsis in logical order |
| | | | | 5. Write synopsis of the proposed system |
| **22** | **III** | **EPP3032** | **Dissertation Phase - II** | 1. Identify research opportunities in his/her domain or multidisciplinary domains. |
| | | | | 2. Formulate the problem statement and its objectives correctly |
| | | | | 3. Develop, simulate and implement the system by complying with desired technical specifications |
| | | | | 4. Analyze and synthesize obtained results in theoretical and practical context |
| | | | | 5. Present report in logical order |
| | | | | 6. Write report of the system implementation |

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| **23** | **IV** | **EPP4012** | **Dissertation Phase - III** | 1. Formulate the problem statement and its objectives correctly |
| | | | | 2. Develop, simulate and implement the system by complying with desired technical specifications |
| | | | | 3. Analyze and synthesize obtained results in theoretical and practical context |
| | | | | 4. Present report in logical order |
| | | | | 5. Write report of the system implementation |
| | | | | 6. Apply the principles of project management during development of the project |
| **24** | **IV** | **EPP4022** | **Dissertation Phase - IV** | 1. Formulate the problem statement and its objectives correctly |
| | | | | 2. Develop, simulate and implement the system by complying with desired technical specifications |
| | | | | 3. Analyze and synthesize obtained results in theoretical and practical context |
| | | | | 4. Present report in logical order |
| | | | | 5. Write report of the system implementation |
| | | | | 6. Apply the principles of project management during development of the project |

K. E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to SUK)

# Electronics and Telecommunication Engineering

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

- **Department Name :-Electronics and Telecommunication Engineering**
- **UG Program Name :-B. Tech. Electronics and Telecommunication Engineering**
- **Vision and Mission :-**

| | |
|---|---|
| **Vision** | Promote excellence in the field of Electronics & Telecommunication Engineering and allied areas through quality education and research to provide valuable assets for industry and society with global perspective |
| **Mission** | • To provide quality education through industry ready curriculum, effective teaching learning process and stateof-art infrastructure to develop global competency.<br>• To inculcate research aptitude leading to patents and publications in refereed journals.<br>• To imbibe professional ethics, leadership skills, social, cultural & environmental awareness with a passion for lifelong learning.<br>• To strengthen relationships with industry, society, government bodies and alumni |

| Sr. No. | Program Outcomes |
|---|---|
| 48. | PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems. |
| 49. | PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4) |
| 50. | PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5) |
| 51. | PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8). |
| 52. | PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6) |
| 53. | PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its |

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| | impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7). |
| 54. | PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9) |
| 55. | PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams. |
| 56. | PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences |
| 57. | PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to ones own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments. |
| 58. | PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8) |

| Sr. No. | Program Specific Outcomes |
|---|---|
| 1. | Knowledge of Communication Engineering: Demonstrate the knowledge of communication engineering and its tools for the purpose of research, development and testing of main or subsystems in electronics domain. |
| 2. | Knowledge of Embedded Systems: Integrate the hardware and programming for the development of embedded systems. |
| 3. | Knowledge of Signal Processing: Analyze set of data in the form of various kinds of signals for the purpose of research, design and development of electronic systems. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1 | I | EC2053 | Analog Communication | CO:1 Describe different communication systems |

| | | | | |
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| | | | | CO:2 Solve problems based on various communication systems |
| | | | | CO:3 Analyze different modulation-demodulation techniques |
| | | | | CO:4 Evaluate performance parameters of communication systems |
| | | | | CO:5 |
| 2 | I | EC2133 | Analog Communication lab | CO:1 Demonstrate different modulation and demodulation waveforms in time and frequency domain. |
| | | | | CO:2 Analyse different modulation-demodulation techniques |
| | | | | CO:3 Interpret result and prepare report |
| | | | | CO:4 |
| | | | | CO:5 |
| | III | EC2012 | Electronics Devices | Describe fundamentals of semiconductor devices |
| | | | | Explain working principle of various solid state devices |
| | | | | Illustrate various applications of electronics devices |
| | | | | Analyze different biasing circuits and frequency models |
| | | | | |
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| | | EC2032 | Digital System Design | State fundamental knowledge of digital design |
| | | | | Apply knowledge for real-time application |
| | | | | Illustrate combinational and sequential circuits |
| | | | | Design combinational and sequential circuits |
| | | | | |
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| | | EC2052 | Analog Communication | 1. Describe the basic concepts of communication systems. |
| | | | | 2. Solve problems based on different communication signals. |
| | | | | 3. Develop simple systems for generating and demodulating am and fm signals. |

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| | | | 4. Explain different types of pulse modulation systems. |
| | | | 5. Compare the performance of various modulation systems |
| | | | |
| | EC2072 | Network Theory | Analyze ac & dc circuits |
| | | | Illustrate resonance in series & parallel circuit |
| | | | Calculate different parameters of electrical circuits |
| | | | Design analog passive filters & attenuators |
| | | | |
| | | | |
| | SH2112 | Engineering Mathematics III | Build and test circuit as per the requirement |
| | | | Observe and plot the frequency response of amplifier |
| | | | Interpret results of experiment and compaired with measured values |
| | | | Communicate results and observations and write report |
| | | | |
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| | EC2092 | Comprehensive Exam I | Demonstarte overall understanding of core subjects together. |
| | | | Mange time to solve critical problems in core subjects. |
| | | | Apply apropriate mathematical tools and techniques for quick analysis of the problem. |
| | | | Understand self intelectual level to prepare for future competitive exam. |
| | | | |
| | | | |
| | EC2112 | Electronics Devices Lab | Build and test circuit as per the requirement |
| | | | Observe and plot the frequency response of amplifier |
| | | | Interpret results of experiment and compaired with measured values |
| | | | Communicate results and observations and write report |
| | | | |
| | | | |
| | EC2132 | Digital System Design Lab | Apply boolean laws/k-map-method to reduce a given boolean function |
| | | | Demonstrate the operation of combinational and sequential circuits for various practical applications |
| | | | Interpret results and compare with experimental values |

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| | | | | Communicate effectively through lab journals |
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| | | EC2152 | Analog Communication Lab | Analyze & design simple analog communication systems |
| | | | | Illustrate amplitude and frequency modulation and demodulation methods |
| | | | | Draw different modulation and demodulation waveforms and frequency spectrums. |
| | | | | Demonstrate different types of pulse modulation systems |
| | | | | Conduct the experiments in group and write reports. |
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| 1 | II | EC2083 | Signals & Systems | CO:1 Describe mathematical description and representation of continuous time and discrete time signals & systems. |
| | | | | CO:2 Determine the response of LTI systems using Convolution. |
| | | | | CO:3 Apply knowledge of transform theory techniques for signal and system analysis. |
| | | | | CO:4 Analyze signals and systems in frequency domain using Fourier transform. |
| | | | | CO:5 Demonstrate use of MATLAB to manipulate signals and systems. |
| 2 | II | EC212 | Linear Integrated Circuit & Applications | CO:1 Describe fundamentals of Linear Integrated Circuits. |
| | | | | CO:2 Analyse different AC and DC parameters of Operational Amplifier. |
| | | | | CO:3 Design various applications of Operational Amplifier. |
| | | | | CO:4 Elaborate fundamentals and applications of special Integrated Circuits. |
| 3 | II | EC220 | Linear Integrated Circuits & Applications Lab | CO:1 Analyze different parameters of various configurations of Op-Amp. |
| | | | | CO:2 Design various applications of Op-Amp. |
| | | | | CO:3 Interpret theoretical and practical results. |
| | | | | CO:4 Communicate effectively through lab journals. |
| 4 | II | EC2042 | Microcontroller | CO:1 Describe basic fundamentals of pic microcontroller |

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| | | | | CO:2 Write programs for pic microcontroller |
| | | | | CO:3 Interface peripherals with pic microcontroller |
| | | | | CO:4 Develop an embedded application using pic microcontroller |
| | | | | CO:5 |
| 5 | II | EC2142 | Microcontroller Lab | CO:1 Install configure and utilize the mplab tool for pic microcontroller programming. |
| | | | | CO:2 Write programs for pic microcontroller |
| | | | | CO:3 Compile debug and test programs for pic microcontroller |
| | | | | CO:4 Develop application using pic microcontroller |
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| 1 | I | EC315 | VLSI Testing & Verification | CO:1 Apply techniques to improve testability of VLSI circuits. |
| | | | | CO:2 Use logic simulation methods, ATPG, BIST and boundary scan techniques in testing of VLSI circuits. |
| | | | | CO:3 Analyze design of VLSI circuits by application of functional, timing and formal verification methods. |
| 2 | I | EC311 | Information Theory and Coding | CO:1 Explain different concepts in information theory and coding. |
| | | | | CO:2 Solve numerical on information theory, source coding and channel coding and error control coding. |
| | | | | CO:3 Apply various theorems of encoding, error control etc. on signals. |
| | | | | CO:4 Analyse various channel coding and error control techniques. |
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| | | | Identify various forces and their effects, to analyze real life problems |
| | | | Analyze engineering problems applying conditions of equilibrium |
| | | | Determine centroid & moment of inertia of the geometrical plane lamina |
| | | | Apply fundamental concepts of kinematics and kinetics to analyze practical problems |
| IV | CE2262 | Engineering Mechanics | |

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| | EC2022 | Analog Circuits | Interprete different parameters of various configurations of Operational Amplifier |
| | | | Analyze various applications of Operational Amplifier |
| | | | Explain various oscillators and active filters |
| | | | Illustrate waveform generators using special IC s |
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| | EC2042 | Microcontrollers | 1. Describe basic fundamentals of pic microcontroller |
| | | | 2. Write programs for pic microcontroller |
| | | | 3. Interface peripherals with pic microcontroller |
| | | | 4. Develop an embedded application using pic microcontroller |
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| | EC2062 | Digital Communication | Explain different concepts of digital communication systems |
| | | | Solve numerical on statistical theory, source coding & channel coding |
| | | | Apply various theorems of encoding, error control etc on signals |
| | | | Analyze various digital modulation and channel coding techniques |
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| | EC2082 | Signals and Systems | Classify continuous and discrete-time signals and systems |
| | | | Illustrate use of convolution and impulse response in lti systems |
| | | | Apply mathematical techniques to represent signals and systems |
| | | | Make use of transform theory techniques for system analysis |
| | | | Distinguish fourier techniques for frequency-domain analysis |
| | | | |
| | EC2102 | Comprehensive Exam II | Demonstarte overall understanding of core subjects together. |
| | | | Mange time to solve critical problems in core subjects. |
| | | | Apply apropriate mathematical tools and techniques for quick analysis of the problem. |
| | | | Understand self intelectual level to prepare for future competitive exam. |
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| | CE2282 | Engineering Mechanics Lab | Identify various forces and their effects, to analyze real life problems |
| | | | Analyze engineering problems applying conditions of equilibrium |
| | | | Determine centroid & moment of inertia of the geometrical plane lamina |
| | | | Apply fundamental concepts of kinematics and kinetics to analyze practical problems |
| | | | |
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| | EC2122 | Analog Circuits Lab | Analyze different parameters of various configurations of Operational Amplifier |
| | | | Design various applications of Operational Amplifier |
| | | | Interprete theoretical & practical results |
| | | | Communicate effectively through lab journals |
| | | | |
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| | EC2142 | Microcontrollers Lab | 1. install configure and utilize the mplab tool for pic microcontroller programming. |
| | | | 2. write programs for pic microcontroller |
| | | | 3. compile debug and test programs for pic microcontroller |
| | | | 4. develop application using pic microcontroller |
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| | EC2162 | Digital Communication Lab | Calculate PDF, CDF, mean and variance of continuous and discrete random variables using simulation tool |
| | | | Demonstrate different modulation and shift keying techniques |
| | | | Write necessary reports and conduct the experiments in group |
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| | SH2172 | Environmental Science | Interpret impacts of human activities on natural resources and its control measure |
| | | | Apply ecological knowledge to solve environmental problems |
| | | | Select the appropriate technology to control environmental pollution |
| | | | Plan waste management and disaster management practices. |
| | | | Justify methods to assess impacts of developmental activities on environment. |

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| | | | Analyze environmental change and its social impacts |

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| V | EC3012 | Digital Signal Processing | Relate effect of computation accuracy on performance of digital signal processing system |
| | | | Represent signals mathematically in continuous and discrete-time, and in the frequency domain. |
| | | | Analyze discrete-time systems using z-transform |
| | | | Describe the Discrete-Fourier Transform (DFT) and the FFT algorithms. |
| | | | Design digital filters for various applications. |
| | | | |
| | EC3032 | Power Electronics | Discuss characteristics, ratings and drive circuits of the power devices |
| | | | Analyze the operation of power electronics converters, inverters and drives |
| | | | Determine performance parameters of the converters and inverters |
| | | | Design switching control circuit to meet desired specifications. |
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| | EC3052 | Product Design | Describe the stages of product design and development |
| | | | Apply various concepts for product design. |
| | | | Devise product testing methods. |
| | | | Explain the processes and importance of documentation. |
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| | EC3072 | Electromagnetic Waves & Antenna Theory | Apply the knowledge of vector algebra and co-ordinate system to formulate and solve electromagnetic field problems. |
| | | | Use and apply basics of electric and magnetic fields to solve the electrostatics and magnetostatics problems. |
| | | | Solve transmission line and Wave propagation problems. |
| | | | Explain basics of antennas. |
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| | EC3092 | Program Elective - I ECS_ ITC | Able to use Mathematics,investigate existing techniques-To have electronics systems |
| | | | Analyze coding techniques with mathematics using different software-To Demonstrate in systems |

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| | | | Apply research based knowledgeof coding.-To Analyze the system |
| | | | Analyze coding and error correction techniques considering ethical aspectsand communicate effectively by demonstrating engineering principleswith life long learning.-Demonstrate effectively |
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| | EC3172 | Program Elective - I CS | Identify different mathematical models of the control systems |
| | | | Design and analyze the system parameters to meet performance specifications in time and frequency domain. |
| | | | Comment on stability of control system using different methods |
| | | | Compare different control system and compensators |
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| | EC3192 | Comprehensive Exam III | Demonstarte overall understanding of core subjects together. |
| | | | Mange time to solve critical problems in core subjects. |
| | | | Apply apropriate mathematical tools and techniques for quick analysis of the problem. |
| | | | Understand self intelectual level to prepare for future competitive exam. |
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| | EC3212 | Digital Signal Processing Lab | Design and simulate the working of given digital signal processing techniques |
| | | | Describe techniques available for implementation of digital signal processing system |
| | | | Write relevant conclusion on the performance of designed digital signal processing system |
| | | | Present and write laboratory reports in desired format in grammatically correct language |
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| | EC3232 | Power Electronics Lab | Interpret v-i characteristics of power electronics devices |
| | | | Experiment power electronics converter for various conditions |
| | | | Design and test power electronic converter. |

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| | | | Write report on the conduction of experimentation. |
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| | EC3235 | Object Oriented Programming using C++ Lab | Write, debug, and test basic cpp codes using the object oriented approaches introduced in the course. |
| | | | Discuss and analyze c++ problems in an object-oriented programming tool. |
| | | | Evaluate the performance of developed c++ program. |
| | | | Present and write laboratory reports in desired format in grammatically correct language. |
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| | EC3272 | Antenna Lab | Measure and analyze the parameters of the different antennas |
| | | | Design and Simulate different types of Antennas using Electromagnetic Field solver |
| | | | Analyze the performance of the different types of antennas |
| | | | Demonstrate ability to work effectively in a team |
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| | SH3032 | Aptitude Training I | Develop thorough conceptual understanding and logical approach towards solving Aptitude and Reasoning problem. |
| | | | Write use of basic aptitude terms of percentage, average, ratios and application of business aptitude terms of profits and interests. |
| | | | Develop a bridge in analogies, series and visualizing directions. |
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| | EC3292 | Summer Internship | Demonstrate skills to use modern engineering tools, software, and equipment to solve real world problems. |
| | | | Apply knowledge of professional and ethical responsibilities. |
| | | | Communicate in verbal and written form. |
| | | | Write a detailed report on Summer Internship |
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| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1 | I | EC4013 | Computer Network | CO:1 Describe the networking concepts |
| | | | | CO:2 Formulate Algorithms of error correction and congestion |
| | | | | CO:3 Analyze the performance of the network by implementing various algorithms |
| | | | | CO:4 Illustrate network security aspects. |
| | | | | CO:5 Design network for specific application |
| 2 | I | EC4192 | Computer Architecture | CO:1 Describe computer architecture concepts and mechanisms related to the design of modern processors, memories, and networks and explain how these concepts and mechanisms interact. |
| | | | | CO:2 Evaluate various design alternatives and make a compelling quantitative and/or qualitative argument for why one design is superior to the other approaches. |
| | | | | CO:3 Demonstrate the ability to implement and verify designs of varying complexity at the register-transfer-level. |
| | | | | CO:4 Communicate with i/o devices and standard i/o interfaces. |
| | | | | CO:5 Create new designs at the register-transfer-level and the associated effective testing strategies. |
| 3 | I | EC4132 | Biomedical Electronics | CO:1 Analyze the biological processes like other electronic processes |
| | | | | CO:2 Recognize the application of the electronic systems in biological and medical applications. |
| | | | | CO:3 Signify the importance of safety aspects in the medical field |

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# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

- **Department Name :-Electronics and Telecommunication Engineering**
- **UG Program Name :-M. Tech. Electronics**
- **Vision and Mission :-**

| | |
|---|---|
| **Vision** | Promote excellence in the field of Electronics & Telecommunication Engineering and allied areas through quality education and research to provide valuable assets for industry and society with global perspective |
| **Mission** | • To provide quality education through industry ready curriculum, effective teaching learning process and stateof-art infrastructure to develop global competency.<br>• To inculcate research aptitude leading to patents and publications in refereed journals.<br>• To imbibe professional ethics, leadership skills, social, cultural & environmental awareness with a passion for lifelong learning.<br>• To strengthen relationships with industry, society, government bodies and alumni |

| Sr. No. | Program Outcomes |
|---|---|
| 13. | PO1**:**An ability to independently carry out research /investigation and development work to solve practical problems.<br><br>PO2:An ability to write and present a substantial technical report/document.<br><br>PO3:Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.<br><br>PO4:Adapt professional, ethical and moral responsibilities.<br><br>PO5:Use knowledge of Project Management and Finance to tackle administrative responsibilities.<br><br>PO6:Explore ideas and engage in lifelong learning. |

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| **Course Code** | **Course Name** | **CO** | **CO Statement** |

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| EEE119 | Industrial Automation Lab | CO1 | Develop a ladder program for the given application. |
| | | CO2 | Use PLC to control the output devices. |
| | | CO3 | Measure the performance parameters of the system. |
| | | CO4 | Interpret the results of the experimentation. |
| | | CO5 | Write a report on the conduction of the experiments. |
| EEE121 | Embedded Systems and IoT Lab | CO1 | Use real IoT protocols for communication and transfer IoT data to the cloud. |
| | | CO2 | Design an IoT device to work with a Cloud Computing platform. |
| | | CO3 | Implement IoT systems using sensors, hardware, and open-source IoT platforms. |
| | | CO4 | Study the security and privacy issues in IoT. |
| EEE123 | Soft Computing Lab | CO1 | Analyze the applications of fuzzy logic. |
| | | CO2 | Evaluate the applications of soft computing. |
| | | CO3 | Interpret the applications of hybrid systems. |
| EEE1255 | Advanced Digital Signal Processing Lab | CO1 | Design digital signal processing systems based on given specifications. |

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| | | CO2 | Develop MATLAB programs to simulate the working of DSP systems. |
| | | CO3 | Analyze the performance of digital signal processing systems. |
| | | CO4 | Demonstrate effectively through oral/lab reports. |
| EEE127 | Machine Learning Lab | CO1 | Demonstrate supervised and unsupervised algorithms. |
| | | CO2 | Design various applications using machine learning. |
| | | CO3 | Verify practical and theoretical results. |
| | | CO4 | Improve the ability to communicate effectively through written lab journals. |
| EEE102 | Optimization Techniques | CO1 | Formulate engineering problems into an optimization framework. |
| | | CO2 | Acquire efficient computational procedures to solve optimization problems. |
| | | CO3 | Analyze various evolutionary optimization techniques. |
| EEE104 | FPGA Based Digital Design | CO1 | Describe VLSI front-end design of combinational and sequential systems. |
| | | CO2 | Model VLSI circuits and systems using Verilog HDL. |
| | | CO3 | Analyze digital designs in terms of various parameters. |

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| | | CO4 | Design and synthesize various digital modules. |
| EEE106 | Advanced Communication Engineering | CO1 | Describe different types of path loss models. |
| | | CO2 | Design RF links, microwave networks, and circuits. |
| | | CO3 | Compute parameters of microwave networks and circuits. |
| | | CO4 | Analyze different types of antennas and microwave circuits. |
| EEE108 | Automotive Electronics and Electrical Systems | CO1 | Describe the use of electrical and electronic systems in vehicles. |
| | | CO2 | Summarize various types of sensors and actuators for modern automobiles. |
| | | CO3 | Illustrate vehicle communication protocols. |
| | | CO4 | Classify vehicle batteries and charging systems. |
| | | CO5 | Hypothesize the concept of hybrid vehicles. |
| EEE110 | Digital Image Processing | CO1 | Explain different concepts and processes in digital image processing. |
| | | CO2 | Apply different image processing operations on an image. |
| | | CO3 | Analyze various operations on images using different tools. |

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| | | CO4 | Compare filtering, enhancement, segmentation, and classification techniques used in image processing. |
| | | CO5 | Design various applications in Image Processing. |
| **Course Code** | **Course Name** | **CO** | **CO Statement** |
| EEE1125 | Biomedical Signal Processing | CO1 | Analyze genesis of biomedical signals such as the action potential, EMG, ECG, EEG, and heart sound signals. |
| | | CO2 | Describe signal processing techniques for filtering, noise removal, and cancellation of interference and characterization of signals. |
| | | CO3 | Design and implement techniques for the detection of events such as the QRS complex, heart sounds, and murmurs. |
| EEE114 | Artificial Intelligence | CO1 | Apply Artificial Intelligence techniques for problem solving. |
| | | CO2 | Comprehend the abstractions and reasoning for Intelligent Agents. |
| | | CO3 | Analyze and design a real-world problem for implementation. |
| | | CO4 | Develop knowledge of decision-making and learning methods. |

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| EEE116 | Cloud Computing | CO1 | Apply the analytics in cloud to extract information. |
| | | CO2 | Analyze the cloud information. |
| | | CO3 | Deploy their data in the cloud for simple applications. |
| EEE118 | Green Wireless Communications | CO1 | Recognize the challenges in energy efficiency and spectral efficiency for digital data transmission. |
| | | CO2 | Select methods to manage the dynamic loads of mobile communications for energy saving. |
| | | CO3 | Indicate the design practices for power minimization at cellular base station. |
| | | CO4 | Practice cell deployment strategies for efficient network management. |
| | | CO5 | Conceptualize Smart City essentials. |
| SHP552 | Framework of Indian Constitution | CO1 | Realize the significance of the Constitution of India to students from all walks of life. |
| | | CO2 | Identify the importance of fundamental rights as well as fundamental duties. |
| | | CO3 | Understand the functioning of Union, State, and Local Governments in Indian federal systems. |
| | | CO4 | Learn procedures and effects of emergency, composition, |

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| | | | and activities of election commissions. |
| EEE122 | Digital Design Lab | CO1 | Design circuits of digital VLSI systems. |
| | | CO2 | Model VLSI circuits and systems using Verilog HDL. |
| | | CO3 | Use tools and techniques to perform experiments and verify the results. |
| | | CO4 | Demonstrate effectively through oral/lab report. |
| EEE124 | Advanced Communication Lab | CO1 | Design and simulate different types of antennas and microwave structures in electromagnetic field solvers. |
| | | CO2 | Analyze different parameters of antennas and microwave structures. |
| | | CO3 | Compare the performance of different types of antennas and microwave structures. |
| EEE126 | Automotive Electronics Lab | CO1 | Describe automotive system modules. |
| | | CO2 | Demonstrate multifunction testers. |
| | | CO3 | Interpret the findings of automotive systems. |
| | | CO4 | Write reports in an appropriate format. |
| EEE128 | Digital Image Processing Lab | CO1 | Demonstrate image enhancement and image filtering algorithms. |

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| | | CO2 | Design various applications using image processing. |
| | | CO3 | Verify practical and theoretical results. |
| | | CO4 | Improve the ability to communicate effectively through written lab journals. |
| EEE1130 | Biomedical Signal Processing Lab | CO1 | Realize bio-signals such as ECG, EEG, and EMG. |
| | | CO2 | Analyze bio-signals and biomedical devices. |
| | | CO3 | Apply signal processing to the bio-signal. |
| | | CO4 | Interpret normal and abnormal bio-signals. |
| **Course Code** | **Course Name** | **CO** | **CO Statement** |
| EEE1325 | Mini Project | CO1 | Select the title of the mini-project and formulate its objectives correctly. |
| | | CO2 | Develop, simulate, and implement the system by complying with desired technical specifications. |
| | | CO3 | Analyze and synthesize obtained results in theoretical and practical contexts. |
| | | CO4 | Present findings in logical order. |
| | | CO5 | Write a report to document his/her findings. |

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| EEE2015 | Industry Internship | CO1 | Apply engineering knowledge learned during the program. |
| | | CO2 | Propose creative and innovative solutions to the given problem. |
| | | CO3 | Work in a multi-disciplinary setting. |
| | | CO4 | Show concern for society, environment, and other social concerns. |
| | | CO5 | Demonstrate given tasks according to industrial needs with full integrity and responsibility. |
| MOE2011 | Artificial Intelligence - Machine Learning | CO1 | Describe central machine learning methods and their relation to artificial intelligence. |
| | | CO2 | Differentiate between supervised and unsupervised learning techniques. |
| | | CO3 | Apply the ML algorithms to real-world problems. |
| | | CO4 | Optimize the models learned and report on the expected accuracy. |
| | | CO5 | Evaluate a given problem and apply appropriate machine learning techniques. |
| MOE2021 | Creative Thinking: Tools and Techniques | CO1 | Comprehend the importance of tackling global challenges as well as everyday problem-solving scenarios. |

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| | | CO2 | Apply brainstorming techniques in group activities. |
| | | CO3 | Be proficient in applying the 6 thinking hats tool in different life scenarios. |
| | | CO4 | Develop a systematic approach to idea generation through morphological analysis. |
| | | CO5 | Innovate on existing products or services using the SCAMPER method. |
| | | CO6 | Get confident with the theory of inventive problem solving (TRIZ). |
| MOE2041 | Condition Monitoring and Signal Processing | CO1 | Identify maintenance schemes and their scope and limitations. |
| | | CO2 | Analyze machinery condition monitoring. |
| | | CO3 | Appreciate the need for modern technological approaches in maintenance. |
| | | CO4 | Emphasize modern testing equipment in failure detection. |
| | | CO5 | Identify vibration measurement and lubrication oil analysis techniques. |
| MOE2051 | Aircraft Conceptual Design | CO1 | Analyze the design process of an aircraft and decide its configuration. |

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| | | CO2 | Choose the type of power plant as per flight regime. |
| | | CO3 | Design the fuselage layout and wing configuration. |
| | | CO4 | Evaluate lift, drag, and mass for the design synthesis process. |
| | | CO5 | Examine the influence of design requirements to derive optimized designs. |
| MOE2060 | Augmented Reality and Virtual Reality | CO1 | Define the basic concepts of Virtual and Augmented Reality. |
| | | CO2 | Identify differences in AR/VR concepts and technologies. |
| | | CO3 | Describe fundamental concepts related to VR such as immersion and engagement. |
| | | CO4 | Evaluate usability and critique user experiences of AR/VR. |
| | | CO5 | Design and prototype effective AR/VR applications using Unity for various applications. |
| MOE2070 | Industrial Instrumentation | CO1 | Elaborate on the working principle of different transducers. |
| | | CO2 | Select suitable transducers for specific applications. |

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| | | CO3 | Justify the use of specific measurement techniques for specific tasks. |
| | | CO4 | Evaluate the calibration and interfacing of transducers. |
| MOE2080 | Advanced Mechatronics Systems | CO1 | Explain mechatronics systems. |
| | | CO2 | Analyze mechatronics-based systems. |
| | | CO3 | Model, simulate, and verify mechatronics systems. |
| | | CO4 | Identify electrical, hydraulic, and pneumatic components. |
| EEE2035 | Dissertation Phase I | CO1 | Identify research opportunities in multidisciplinary domains. |
| | | CO2 | Formulate the problem statement and its objectives correctly. |
| | | CO3 | Apply principles of project management during development. |
| | | CO4 | Present a synopsis in logical order. |
| | | CO5 | Write a synopsis of the proposed system. |
| **Course Code** | **Course Name** | **CO** | **CO Statement** |
| EEE2035 | Dissertation Phase I | CO1 | Identify research opportunities in his/her domain or multidisciplinary domains. |

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| | | CO2 | Formulate the problem statement and its objectives correctly. |
| | | CO3 | Apply principles of project management during the development of the project. |
| | | CO4 | Present a synopsis in logical order. |
| | | CO5 | Write a synopsis of the proposed system. |
| EEE2055 | Dissertation Phase II | CO1 | Identify research opportunities in his/her domain or multidisciplinary domains. |
| | | CO2 | Formulate the problem statement and its objectives correctly. |
| | | CO3 | Develop, simulate, and implement the system by complying with desired technical specifications. |
| | | CO4 | Analyze and synthesize obtained results in theoretical and practical contexts. |
| | | CO5 | Present findings in logical order. |
| | | CO6 | Write a report on the system implementation. |
| | | CO7 | Apply principles of project management during the development of the project. |
| EEE2025 | Dissertation Phase III | CO1 | Identify research opportunities in his/her |

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| | | | domain or multidisciplinary domains. |
| | | CO2 | Formulate the problem statement and its objectives correctly. |
| | | CO3 | Develop, simulate, and implement the system by complying with desired technical specifications. |
| | | CO4 | Analyze and synthesize obtained results in theoretical and practical contexts. |
| | | CO5 | Present findings in logical order. |
| | | CO6 | Write a report on the system implementation. |
| | | CO7 | Apply principles of project management during the development of the project. |
| EEE2045 | Dissertation Viva Voce (Dissertation Phase-IV) | CO1 | Identify research opportunities in his/her domain or multidisciplinary domains. |
| | | CO2 | Formulate the problem statement and its objectives correctly. |
| | | CO3 | Develop, simulate, and implement the system by complying with desired technical specifications. |
| | | CO4 | Analyze and synthesize obtained results in theoretical and practical contexts. |

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| | | CO5 | Present findings in logical order. |
| | | CO6 | Write a report on the system implementation. |
| | | CO7 | Apply principles of project management during the development of the project. |

| Course Code | Course Name | CO | CO Statement |
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| EEE1015 | Industrial Automation | CO1 | Explain the functions of components of industrial automation system. |
| | | CO2 | Write PLC ladder programs for the given applications. |
| | | CO3 | Interface the given I/O devices with the PLC module. |
| | | CO4 | Design an automation system for industrial applications. |
| EEE103 | Embedded Systems and IoT | CO1 | Discuss on IoT enabled hardware, various protocols and software. |
| | | CO2 | Identify IoT Technologies and their types that are in use. |
| | | CO3 | Analyze and evaluate the data received through sensors in IoT. |
| | | CO4 | Demonstrate IoT systems using sensors, hardware, and open-source IoT platforms. |
| EEE1055 | Soft Computing | CO1 | Describe soft computing techniques and their roles in building intelligent machines. |
| | | CO2 | Comprehend the abstractions and reasoning for Intelligent Agents. |

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| | | CO3 | Design a real-world problem for implementation. |
| | | CO4 | Develop knowledge of decision-making and learning methods. |
| EEE1075 | Advanced Digital Signal Processing | CO1 | Explain techniques available for implementation of digital signal processing systems. |
| | | CO2 | Design and simulate the working of given digital signal processing systems. |
| | | CO3 | Evaluate the performance of digital signal processing systems. |
| | | CO4 | Interpret the performance of digital signal processing systems. |
| EEE109 | Machine Learning | CO1 | Describe various algorithms in machine learning. |
| | | CO2 | Analyze different architectures and basic techniques used in ML. |
| | | CO3 | Apply mathematical models and algorithms to solve real-world problems. |
| | | CO4 | Design various machine learning applications. |
| EEE111 | Optical Communication | CO1 | Describe components of optical fiber communication. |
| | | CO2 | Design link for optical fiber communication systems. |
| | | CO3 | Analyze the performance of analog and digital optical fiber systems. |
| EEE1135 | Network Security | CO1 | Describe the network security issues and service attacks. |
| | | CO2 | Apply network layer security protocols, Transport layer security protocols, and Web security protocols. |

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| | | CO3 | Analyze security protocols for various parameters. |
| EEE115 | Micro Electro Mechanical Systems (MEMS) | CO1 | Describe MEMS material and fabrication techniques. |
| | | CO2 | Discuss various sensors and actuators used in MEMS. |
| | | CO3 | Analyze various applications of MEMS in interdisciplinary areas. |
| EEE1175 | Research Methodology and IPR | CO1 | Formulate a research problem. |
| | | CO2 | Analyze research-related information. |
| | | CO3 | Prepare and present research proposals/papers by following research ethics. |
| | | CO4 | Describe the nature and processes involved in the development of intellectual property rights. |
| SHP5511 | Technical Communication | CO1 | Use grammatically correct sentences in different types of technical writings. |
| | | CO2 | Apply technical writing skills to improve the readability of documents. |
| | | CO3 | Demonstrate professional skills required in job interviews and at the workplace. |

K. E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to SUK)

# • Information Technology

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

- **Department Name :- Information Technology**
- **UG Program Name :- B. Tech. in Computer Science and Information Technology**
- **Vision and Mission :-**

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| **Vision** | To become a prominent department of Information Technology producing competent IT professionals with research and multidisciplinary skills, inculcating moral values and societal concerns. |
| **Mission** | ▪ To offer high quality education through state of art curriculum and innovative teaching & learning practices.<br>▪ To establish state of art laboratories and center of excellence in the field of technology.<br>▪ To adopt professional practice, standards and values.<br>▪ To inculcate problem solving aptitude in graduates with lifelong learning skills to become valuable resource for IT industry and society.<br>▪ To create, share, and apply knowledge in Computer Science and Information Technology, including multidisciplinary areas that extend the scope of Computer Science and Information Technology to benefit society. |

| Sr. No. | Program Outcomes |
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| 59. | **PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| 60. | **PO2: Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences. |
| 61. | **PO3: Design/Development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet |

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| | the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations. |
| 62. | **PO4: Conduct investigations of problems:** Use fundamental knowledge and engineering skills including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. |
| 63. | **PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. |
| 64. | **PO6: 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. |
| 65. | **PO7: 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. |
| 66. | **PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| 67. | **PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| 68. | **PO10: 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. |
| 69. | **PO11: 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. |
| 70. | **PO12: 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. |

| Sr. No. | Program Specific Outcomes |
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| 4. | **PSO1:** Apply the relevant computational algorithms and techniques to design solutions in multidisciplinary domains. |
| 5. | **PSO2:** Demonstrate skills in emerging IT technologies like Artificial Intelligence, Data Science Cloud Computing, IIoT and Cyber Security. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 1. | III | CI2012 | Discrete Mathematics | 1. Evaluate logic statements using the properties of logic.<br>2. Apply the concepts in discrete data structures such as sets, relations and functions to solve the problems.<br>3. Use elementary combinatorics to solve counting problems.<br>4. Solve examples of lattices, algebraic structures.<br>5. Prove the theorems and properties of lattices, algebraic structures, graphs.<br>6. Apply graph theory concepts to solve problems of connectivity. |
| 2. | | CI2032 | Data Structures | 1. Describe the basic terminologies of data structures.<br>2. Write algorithms for operations performed on data structures<br>3. Demonstrate the working of various data structures like stack, queue, linked list, tree, graph, etc.<br>4. Compare static and dynamic representations of data structures<br>5. Choose appropriate data structures while developing solution to the problem |

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| 3. | | CI219 | Digital Logic and Computer Organization | 1. Comprehend computer structure, types, operational concepts, performance, parallelism, history, and digital logic gates.<br>2. Apply Boolean algebra concepts, perform binary arithmetic operations, understand number base conversions, analyse and manipulate different number representations, utilize various codes, and simplify logic functions using K-Maps up to 4 variables.<br>3. Design combinational circuits and sequential circuits.<br>4. Demonstrate proficiency in instruction set architecture, RISC and CISC instruction sets, instruction execution and branching.<br>5. Explain the I/O organization principle and the memory system concepts.<br>6. Describe the pipelining concepts. |
| 4. | | CIMD201 | Data Structures (MDM-I) | 1. Describe the basic terminologies of data structures.<br>2. Write algorithms for operations performed on data structures<br>3. Demonstrate the working of various data structures like stack, queue, linked list, tree, graph, etc.<br>4. Compare static and dynamic representations of data structures<br>5. Choose appropriate data structures while developing solution to the problem. |
| 5. | | SH2174 | Environmental Science | 1. Apply interdisciplinary knowledge in environmental science by integrating concepts and principles from various fields of science and engineering to address environmental issues.<br>2. Evaluate environmental impacts of human activities on ecosystems and on the environment.<br>3. Use scientific approach to identify and solve environment related problems.<br>4. Design sustainable solutions to address environmental challenges by considering renewable energy sources, waste |

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| | | | | management strategies conservation measures, and environmental policies.<br>5. Participate in group work to become acquainted with the importance of teamwork, collaboration.<br>6. Develop presentation and report writing skills. |
| 6. | | CI2052 | Object Oriented Programming with Java Lab | 1. Explain the concepts and terminologies in object-oriented concepts and java programming language.<br>2. Apply object-oriented programming features and concepts for solving given problem.<br>3. Develop the java application using the collection framework to solve real word problem.<br>4. Apply the concepts of package, multithreading and exception handling to develop efficient and error free codes.<br>5. Use the lambda expression to iterate, filter and extract data from collection and streams to manipulate and transform the data. |
| 7. | | CI2072 | Data Structures Lab | 1. Describe the basic terminologies of data structures and algorithms<br>2. Write algorithms for operations to be performed on data structures<br>3. Implement stack, queue, linked list, tree and graph data structures in C language<br>4. Compare static and dynamic representations of linear and non-linear data structures<br>5. Choose appropriate data structures while developing solution to the problem |
| 8. | | CI221 | UI/UX Design Lab | 1. Apply the foundational concepts and principles of UI/UX design.<br>2. Apply the design thinking process to identify user needs and problems.<br>3. Create wireframes and prototypes using industry-standard design tools. |

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| | | | | 4. Evaluate and improve the usability of digital interfaces.<br>5. Demonstrate knowledge of responsive design techniques for different devices.<br>6. Collaborate effectively within a design team and communicate design solutions clearly. |
| 9. | | CI2092 | Technical Aptitude-I | 1. Comprehend the knowledge gained in the course work.<br>2. Demonstrate the ability in Problem Solving. |
| 10. | | SH2634 | Professional Leadership Skills<br>(Professional Skills Development and Foreign Languages) | 1. Explain the traits of a leadership through real life examples.<br>2. Exhibit the ability to work effectively in a team.<br>3. Prepare a presentation as per the audience and context requirements |
| 11. | | SH2614 | Interpersonal Skills<br>(Professional Skills Development and Foreign Languages) | 1. Exhibit interpersonal communication skills.<br>2. Demonstrate decision-making skills.<br>3. Apply conflict resolution styles appropriate in different situations.<br>4. Demonstrate skills to manage balance in work and life.<br>5. Apply Jeevanvidya wisdom in day to day life. |
| 12. | | SH2694 | Innovation Tools and Methods for Entrepreneurs (Professional Skills Development and Foreign Languages) | 1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them<br>2. Apply User Journey Map to the selected problem to show user interaction at various stages<br>3. Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| 13. | | SH2594 | Personal Effectiveness and Body Language | 1. Develop skills to build self-esteem and positive attitude.<br>2. Develop interpersonal skills characterized by effective communication and conflict resolution. |

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| | | | (Professional Skills Development and Foreign Languages) | 3. Discover ways to overcome procrastination.<br>4. Demonstrate responsiveness towards stress and health issues.<br>5. Interpret the non-verbal behaviour of a person. |
| 14. | | SH2734 | German Language Level III<br>(Professional Skills Development and Foreign Languages) | 1. Interpret the language if the next person is speaking slowly and clearly.<br>2. Make use of the language in routine life with the routing topics like family, shopping, work etc.<br>3. Demonstrate the language by self-introduction in German with simple sentences. |
| 15. | | SH2714 | Japanese Language Level-III<br>(Professional Skills Development and Foreign Languages) | 1. Make use of basic conversations in various situations.<br>2. Identify the sentence patterns.<br>3. Explain insights about the communication required for living in Japan.<br>4. Interpret Japanese work ethics required in their professional career. |
| 1. | IV | CI216 | Mathematics for IT | 1. Compute Karl Pearson's Product moment correlation Coefficient and fit the lines of regression.<br>2. Compute Discrete probability distribution, Continuous probability distributions and Joint probability distributions.<br>3. Apply specific probability distributions to real-life examples.<br>4. Compute the Mathematical formulas for the given fuzzy set.<br>5. Prove additional properties of alpha-cuts and use extension principle to fuzzy sets.<br>6. Apply extension principle to fuzzy arithmetic and solve fuzzy equations. |

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| 2. | | CI2022 | Design and Analysis of Algorithms | 1. Analyzing asymptotically the performance of algorithms.<br>2. Compare and analyze various searching and sorting algorithms.<br>3. Apply different algorithm design techniques to solve problems like job sequencing, knapsack, TSP, finding shortest path etc.<br>4. Apply backtracking method to solve problems like N-queens, graph coloring, sum of subsets etc.<br>5. Describe computational complexity theory to classify computational problems according to their inherent difficulty. |
| 3. | | CI2042 | Software Engineering and Project Management | 1. Describe fundamental concepts in software engineering and project management<br>2. Practice software process models for the undertaken software problems<br>3. Design function-oriented and object oriented models using modern tools.<br>4. Compare different software testing techniques and strategies.<br>5. Apply the project management concepts for the undertaken software problems<br>6. Illustrate concepts of project monitoring and control in software development |
| 4. | | CI2062 | Database Management Systems | 1. Describe the fundamental elements of relational database management systems.<br>2. Design ER-models to represent simple database application scenarios.<br>3. Write SQL/PL-SQL query to perform various operations on the database.<br>4. Apply concepts of integrity constraints, Hashing and Indexing on databases. |

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| | | | | 5. Illustrate the transaction management, concurrency control and crash recovery.<br>6. Explain fundamentals of NoSQL (MongoDB) Database System. |
| 5. | | CIMD202 | Computer Algorithms<br>(MDM-II) | 1. Analyze asymptotically the performance of algorithms.<br>2. Compare and analyze searching and sorting algorithms.<br>3. Apply different algorithm design techniques to solve problems like job sequencing, knapsack, TSP, finding shortest path etc.<br>4. Apply backtracking method to solve problems like N-queens, graph coloring, sum of subsets etc.<br>5. Describe computational complexity theory to classify computational problems according to their inherent difficulty. |
| 6. | | SH202 | मराठी भाषिक कौशल्यविकास<br>(Modern Indian Language) | १. भाषा आणि व्यक्तिमत्व विकास यांमधील सहसंबंध स्पष्ट करू शकेल<br>२. भाषिक कौशल्यविकास करू शकेल<br>३. कथा या मराठी साहित्य प्रकाराचे विश्लेषण करू शकेल<br>४. एकांकिका या मराठी साहित्य प्रकाराच्या विश्लेषणाची क्षमता प्राप्त करेल |
| 6. | | SH204 | हिंदी कथा साहित्य एवं प्रयोजमूलक हिंदी<br>(Modern Indian Language) | 1. विद्यार्थियों में मानवीय संवेदनाओं के विकास के साथ नवीन सामाजिक सांस्कृतिक बोधऔर जीवन मूल्यों का विकास होगा।<br>2. विद्यार्थियों में साहित्य के माध्यम से कलात्मक गुणों की अभिवृद्धि होगी कला की साहित्यिक विधाओं के प्रति अभिरुचि जागृत होगी तथा रचनात्मक कौशल्य को बढ़ावा मिलेगा।<br>3. विद्यार्थियों में नए वैश्विक मूल्यों के प्रति सजगता को बढ़ावा मिलेगा एवं मूल्यवादी दृष्टि के प्रति दायित्व बोध उत्पन्न होगा।छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे।<br>4. छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| 8. | | CI218 | Design and Analysis of | 1. Compare different algorithm design techniques. |

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| | | | Algorithms Lab | 2. Apply various sorting techniques to sort the given numbers and analyze its time complexity.<br>3. Implement divide and conquer technique to solve the problem and analyze its time complexity.<br>4. Demonstrate algorithm design techniques like greedy, dynamic programming and backtracking to solve real world problems. |
| 9. | | CI2082 | Database Management Systems Lab | 1. Sketch E-R diagram for given Case Study/ Problem Statement.<br>2. Write SQL query for various operations like retrieval, insertion and manipulation of data etc.<br>3. Apply PL/SQL for implementing Cursor, Procedure/Function and Trigger.<br>4. Design databases for given applications.<br>5. Demonstrate basic commands of MongoDB with installation. |
| 10. | | CI2102 | Python lab | 1. Explain the concepts in python.<br>2. Implement programs using loops, decision statements, python collections, functions and modules in python.<br>3. Use object-oriented programming with classes using python.<br>4. Apply data pre-processing for the given dataset using python.<br>5. Plot data using appropriate Python visualization libraries.<br>6. Perform the exploratory data analysis using python for the given dataset. |
| 11. | | CI220 | Web Development Lab | 1. Create well-structured web pages using HTML and apply the principles of semantic markup.<br>2. Style web pages effectively using CSS, including layout design and responsive techniques.<br>3. Implement client-side interactivity and dynamic content using JavaScript and jQuery. |

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| | | | | 4. Utilize Bootstrap to develop responsive and mobile-first web applications.<br>5. Set up and customize WordPress websites, managing content and plugins effectively.<br>6. Build and deploy functional websites that integrate HTML, CSS, JS, Bootstrap, and WordPress. |
| 12. | | CI2122 | Technical Aptitude-II | 1. Comprehend the knowledge gained in the course work.<br>2. Demonstrate the ability in Problem Solving |
| 13. | | SH2634 | Professional Leadership Skills<br>(Professional Skills Development and Foreign Languages) | 1. Explain the traits of a leadership through real life examples.<br>2. Exhibit the ability to work effectively in team.<br>3. Prepare a presentation as per the audience and context requirements |
| 14. | | SH2614 | Interpersonal Skills<br>(Professional Skills Development and Foreign Languages) | 1. Exhibit interpersonal communication skills.<br>2. Demonstrate decision-making skills.<br>3. Apply conflict resolution styles appropriate in different situations.<br>4. Demonstrate skills to manage balance in work and life.<br>5. Apply Jeevanvidya wisdom in day to day life. |
| 15. | | SH2694 | Innovation Tools and Methods for Entrepreneurs (Professional Skills Development and Foreign Languages) | 1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them<br>2. Apply User Journey Map to the selected problem to show user interaction at various stages<br>3. Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| 16. | | SH2594 | Personal Effectiveness and Body Language<br>(Professional Skills Development | 1. Develop skills to build self-esteem and positive attitude.<br>2. Develop interpersonal skills characterized by effective communication and conflict resolution.<br>3. Discover ways to overcome procrastination. |

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| | | | and Foreign Languages) | 4. Demonstrate responsiveness towards stress and health issues.<br>5. Interpret the non-verbal behaviour of a person. |
| 17. | | SH2644 | German Language-Level – IV<br><br>(Professional Skills Development and Foreign Languages) | 1. Interpret the language if the next person is speaking slowly and clearly.<br>2. Make use of the language in routine life with the routing topics like family, shopping, work etc.<br>3. Demonstrate the language by self-introduction in German with simple sentences. |
| 18. | | SH2624 | Japanese Language Level-IV<br><br>(Professional Skills Development and Foreign Languages) | 1. To be able to make basic conversations in various situations.<br>2. To recognize the sentence patterns.<br>3. To improve Japanese Language proficiency.<br>4. To give students insights about the communication required for living in Japan.<br>5. To expose students to the Japanese work ethics required in their professional careers. |
| 1. | V | CI3012 | Automata Theory | 1. Predict the regular expression for given language<br>2. Design computational models for given language<br>3. Construct the Context Free Grammar (CFG) for given language<br>4. Parse the given string using top down & bottom-up parsing<br>5. Prove the properties of regular language and context free language |
| 2. | | CI3032 | Operating Systems | 1. Explain fundamental concepts in operating systems<br>2. Apply the concepts of operating systems for the given requirement<br>3. Select the appropriate algorithm such as scheduling, deadlock, page replacement or disk scheduling for devising solution to the given problem |

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| | | | | 4. Compare various operating system techniques<br>5. Justify findings of the given problem using operating system concepts |
| 3. | | CI325 | NOSQL (PE-I) | 1. Explore the evolution, types, and emergence of NoSQL databases.<br>2. Discuss distribution models and consistency considerations in NoSQL databases.<br>3. Outline the architecture, features, and use cases of document databases.<br>4. Analyze graph databases and their applicability to connected data and recommendation engines.<br>5. Examine key-value stores, their features, and appropriate use cases.<br>6. Explain column-family stores, their features, and scenarios where they are best utilized. |
| 4. | | CI3072 | Image Processing (PE-I) | 1. Illustrate a theoretical foundation of digital image processing concepts.<br>2. Discuss advanced concepts of image processing.<br>3. Implement image processing features on Scikit.<br>4. Implement Image Restoration and Compression operations using OpenCV.<br>5. Apply AI to classify images.<br>6. Elaborate real time uses case in image processing |
| 5. | | CI327 | Industrial Internet of Things (PE-I) | 1. Describe the fundamental of theory and practice related to Industrial IoT Systems.<br>2. Identify, formulate and solve engineering problems by using Industrial IoT.<br>3. Explain Data Monitoring & Control in IIoT.<br>4. Discuss the Advanced Technologies and platform in IIoT.<br>5. Investigate the case studies of IoT capability in Industrial applications. |

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| 6. | | CI3092 | IPR and Cyber Law<br>(PE-I) | 1. Describe fundamentals of Intellectual Property Right.<br>2. Justify Information Technology Related Intellectual Property Rights.<br>3. Interpret Ownership and Enforcement of Intellectual Property<br>4. Distinguish different laws in cyber world.<br>5. Compare various cyber-attacks & offenses.<br>6. Analyse Indian IT Act 2000 & amendments in IT Act |
| 7. | | OE345 | Soft Computing<br>(OE-I) | 1. Explain the necessity of Soft Computing techniques in addressing complex, uncertain and imprecise problems encountered in various domains.<br>2. Analyze and apply Fuzzy Logic concepts such as fuzzy sets, membership functions, fuzzy inference systems.<br>3. Evaluate different search methods for problem-solving, including state space search, heuristic search and evolutionary algorithms for finding optimal solutions.<br>4. Design and implement Genetic Algorithms for solving single-objective optimization problems, utilizing various genetic operators such as encoding, crossover, selection, and mutation.<br>5. Design different ANN models for solving real-life problems. |
| 8. | | OE361 | Object Oriented Modeling and Design<br>(OE-I) | 1. Identify object classes and build the domain model using advanced concepts in object, dynamic and functional modeling.<br>2. Apply different object-oriented design techniques.<br>3. Design models using UML diagrams for software systems: use case, class, sequence, collaboration, activity, state chart diagrams, component and deployment.<br>4. Design software systems using open source and advanced modeling tools.<br>5. Evaluate designs of software systems in mini-projects, projects using Software Modeling & Design concepts. |

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| 9. | | CIMD301 | Introduction to DBMS (MDM-III) | 1. Describe the fundamental elements of relational database management systems.<br>2. Design ER-models to represent simple database application scenarios.<br>3. Write SQL query to perform various operations on the database.<br>4. Analyze principles of integrity constraints, Hashing and Indexing on databases.<br>5. Illustrate the transaction management, concurrency control and crash recovery. |
| 10. | | CIMD303 | OOP using Java (MDM-IV) | 1. Explain the concepts and terminologies in object-oriented concepts and java programming language.<br>2. Apply object-oriented programming features and concepts for solving given problem.<br>3. Develop the java application using the collection framework to solve real word problem.<br>4. Apply the concepts exception handling to develop error free codes.<br>5. Utilize the concepts of package to develop efficient codes. |
| 11. | | SH3034 | Scholastic Aptitude -I | 1. Develop a logical approach towards solving Aptitude and Reasoning problems.<br>2. Analyze usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests<br>3. Develop a bridge in analogies, series and visualizing directions.<br>4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams. |

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| 12. | | CI3052 | Mobile Application Development Lab | 1. Explain the basic concepts and terminologies of Android technology.<br>2. Design user interfaces using views, layout managers, menus and dialogs through material design.<br>3. Develop mobile application using activity, services, content providers and broadcast receivers of Android Technology<br>4. Develop mobile applications using different types of databases.<br>5. Apply testing frameworks, packaging and deploy android application to emulators and physical devices. |
| 13. | | CI3112 | Technical Aptitutude - III | 1. Comprehend the knowledge gained in the course work.<br>2. Demonstrate the ability in Problem Solving |
| 14. | | CI3132 | Summer Internship | 1. Apply the theoretical and practical knowledge of CS/IT Engineering for product/service development.<br>2. Undergo real time IT Industry practices regarding product/service development.<br>3. Identify and analyze engineering problems to provide IT based solutions.<br>4. Adopt recent industry practices for project development<br>5. Improve the ability to work in teams<br>6. Enhance technical skills for solving complex engineering problems. |
| 1. | VI | CI3022 | Computer Networks | 1. Describe the various network components and topologies.<br>2. Illustrate the concepts, services, protocols and algorithms used in ComputerNetworks.<br>3. Write the terminology and client-server programs using Berkeley socketprogramming.<br>4. Solve problems related to routing, framing, error correction, detection and IPv4addressing. |

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| | | | | 5. Compare the different services, protocols and algorithms used in ComputerNetworks. |
| 2. | | CI3042 | Machine Learning | 1. Analyze ML fundamentals, types, and challenges in practical applications.<br>2. Evaluate binary and multiclass classification using performance measures and error analysis.<br>3. Analyze linear regression, polynomial models, and logistic regression with regularization.<br>4. Evaluate the implementation of linear and nonlinear SVMs, SVM regression.<br>5. Implement decision tree training, visualization, hyperparameter tuning.<br>6. Apply ensemble methods, including voting classifiers, bagging, random forests, boosting, and stacking. |
| 3. | | CI326 | Research Methodology | 1. Apply research knowledge, understand types, and integrate perspectives in practice.<br>2. Learn eight-step research process, from problem formulation to report writing.<br>3. Analyze literature effectively, enhancing methodologies, contextualizing findings, and constructing frameworks.<br>4. Evaluate problem importance, identify sources, and formulate objectives proficiently.<br>5. Create comprehensive proposals, addressing elements and developing detailed work schedules.<br>6. Develop proficiency in data processing, covering editing, coding, and advanced report writing. |
| 4. | | CI330 | Data Mining (PE-II) | 1. Understand the basic concepts of data mining and its relevance in extracting valuable insights from large datasets. |

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| | | | | 2. Learn different approaches to classifying data, including statistical methods, distance-based techniques, and decision tree algorithms.<br>3. Explore advanced classification methods such as neural networks, rule-based systems, and ensemble techniques for improving classification accuracy.<br>4. Know how clustering algorithms group similar data points together and their applications in exploratory data analysis and pattern recognition<br>5. Study how association rule mining uncovers interesting relationships between variables in large datasets and its applications in market basket analysis and recommendation systems.<br>6. Explore practical applications of data mining across various domains, understand the latest trends, and discuss the ethical and societal implications of data mining technologies. |
| 5. | | CI332 | Natural Language Processing<br>(PE-II) | 1. Explain the basic concepts and techniques of Natural language Processing for analyzing words based on Morphology<br>2. Extract information from text automatically using concepts and methods from natural language processing (NLP) including stemming, n-grams, POS tagging, and parsing.<br>3. Analyze the syntax, semantics, and pragmatics of a statement written in a natural language<br>4. Apply knowledge of NLP algorithms like text representation, text pre-processing, feature extraction, statistical text analysis to various text and speech applications.<br>5. Recognize the significance of research in natural language processing for common NLP tasks such as spam filtering, spell checking, machine learning, etc. to engage in lifelong learning. |
| 6.. | | CI334 | Robotic Process Automation (PE-II) | 1. Explain Basic concept of RPA.<br>2. Elaborate RPA, where it can be applied and how it's implemented. |

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| | | | | 3. Demonstrate the Sequences, flowchart and Control Flow.<br>4. Identify different Advanced Automation Concepts & Techniques.<br>5. Knowledge to handle the Exceptions and Reporting.<br>6. Provide the Deployment of the Robot and to maintain the connection. |
| 7. | | CI3062 | Blockchain Technology (PE-II) | 1. Differentiate Blockchain models.<br>2. Analyze Components & Consensus models of Blockchain.<br>3. Illustrate the Forking methods & Cryptographic concepts of Blockchain.<br>4. Draw the architecture of Hyperledger fabric.<br>5. Describe applications of Blockchain in the sector of Trade, Government & Finance<br>6. Explain research aspects of Blockchain |
| 8. | | OE3401 | Cyber Security (OE-II) | 1. Describe fundamental terms in cybercrime legislation.<br>2. Compare various cyber-attacks & offences.<br>3. Analyze the Indian IT Act 2000 & amendments in the IT Act.<br>4. Asses social networks and security issues related to social media platforms.<br>5. Apply a strategy for creating awareness about cyber security for e-banking and legal issues among the social community.<br>6. Device the best practices and policies in various layers of cyberspace. |

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| 9. | | OE360 | Distributed Systems (OE-II) | 1. Describe the basic principles and characteristics of distributed systems.<br>2. Explain different models of distributed systems and understand their applications.<br>3. Apply fundamental networking principles and Analyze internet protocols.<br>4. Comprehend the role of operating systems in supporting distributed systems, including processes, threads, communication, and virtualization.<br>5. Develop and secure web services for distributed applications.<br>6. Analyze distributed file system architecture. |
| 10.. | | CIMD302 | Software Engineering (MDM-V) | 1. Describe fundamental concepts in software engineering and project management<br>2. Practice software process models for the undertaken software problems<br>3. Design function-oriented and object oriented models using modern tools.<br>4. Identify classes and build the domain model using advanced concepts in object, dynamic and functional modeling.<br>5. Analyze existing software systems using function and object-oriented analysis.<br>6. Design models using UML diagrams for software systems: use case, class, sequence, collaboration, activity, state chart diagrams, component and deployment. |
| 11. | | SH3064 | Scholastic Aptitude -II | 1. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems.<br>2. Understand usage of basic aptitude terms of |

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| | | | | percentages, averages, ratios and applications of business aptitude terms of profits and interests<br>3. Develop a bridge in analogies, series and visualizing directions.<br>4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams |
| 12 | | CI3022 | Computer Networks Lab | 1. Implement client server applications using Berkeley Socket programming.<br>2. Implement programs to demonstrate error detecting, correcting, and routing algorithms.<br>3. Solve problems based on IPv4 network addressing.<br>4. Examine packet capturing, analyzing and simulation tools.<br>5. Demonstrate the different protocols used at application layer. |
| 13 | | CI328 | Machine Learning Lab | 1. Implement data cleaning, scaling, and transformation methods to enhance model robustness.<br>2. Assess binary classifier effectiveness on different data sets, analyzing performance metrics and conducting error analysis.<br>3. Evaluate learning curves, demonstrating comprehension of linear regression and gradient descent optimization.<br>4. Apply voting classifiers, bagging, and boosting, showcasing proficiency in diverse ensemble techniques. |
| 14. | | CI3122 | Full Stack – Front End Web Technology Lab | 1. Develop a foundational understanding of React and create basic web applications.<br>2. Acquire a deeper understanding of React, incorporating hooks and state management.<br>3. Demonstrate familiarity with advanced React techniques and implement best practices.<br>4. Utilize existing component libraries proficiently to enhance React projects.<br>5. Comprehend the fundamentals of React Native and its role in mobile app development.<br>6. Possess the skills to independently create basic React Native applications and navigate between |

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| 15. | | CI3142 | Technical Aptitude -IV | 1. Comprehend the knowledge gained in the course work.<br>2. Demonstrate the ability in Problem Solving |
| 16. | | CI3162 | Capstone Project Phase-I | 1. Apply the theoretical and practical knowledge of CS/IT Engineering for product/service development<br>2. Identify and analyze engineering problems to provide IT based solutions<br>3. Design efficient algorithms for better products/services<br>4. Adopt recent industry practices for project development<br>5. Improve the ability to work in teams<br>6. Develop effective presentation and communication skills through projects.<br>7. Manage the project in terms of scope, cost, time and quality of project as defined by stakeholders |
| 1. | VII | CI4011 | Cloud Computing | 1. Understand the technological changes in computing technologies.<br>2. Compare the architectures and service & deployment models of cloud computing.<br>3. Explore the need and importance of virtualization technologies.<br>4. Practice various cloud applications to obtain the cloud platform services.<br>5. Examine cloud computing service and application adoption issues in different sectors.<br>6. Elaborate advanced applications in different sectors of cloud computing market. |
| 2. | | CI4031 | Soft Computing (PE-III) | 1. Gain understanding of various soft computing techniques.<br>2. Identify and design fuzzy based systems.<br>3. Analyze performance of different evolutionary algorithms for mathematical and real-world optimization problems. |

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| | | | | 4. Explore different selection, crossover and mutation operators in different types genetic algorithms.<br>5. Identify and formulate complex problems from different engineering domains. |
| 3. | | CI4051 | Human Computer Interaction (PE-III) | 1. Explain the concepts of human computer interaction.<br>2. Analyze the steps involved in the design process of human computer interaction.<br>3. Design graphical user interface for given specification.<br>4. Describe special considerations in designing user interfaces for wellness.<br>5. Discuss and analyze research in the field of HCI. |
| 4. | | CI4071 | Software Testing (PE-III) | 1. Describe software testing fundamentals.<br>2. Explain different software testing types.<br>3. Design/build test cases based on different test case design techniques.<br>4. Illustrate the different stages of Defect Management process.<br>5. Make use of modern automation tools for testing a given software system.<br>6. Produce test case reports using manual and automation testing for given case studies. |
| 5. | | CI431 | Software Project Management (PE-III) | 1. Identify the key phases of Software project management.<br>2. Create the systematic project plans for any software projects.<br>3. Estimate the effort and cost needed to implement the software projects.<br>4. Prepare an activity plan for a project and estimate the overall duration.<br>5. Develop strategies to calculate risk factors involved in Software projects. |

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| | | | | 6. Assess the Quality management through different types of metrics used in software development. |
| 6. | | CI4091 | Internet of Things (PE-IV) | 1. Describe the applications, basic terminologies and fundamentals of IoT.<br>2. Illustrate the different IoT platforms, communication standards and protocols.<br>3. Identify the security issues and challenges in IoT.<br>4. Design and develop the IoT solutions for real word problems.<br>5. Prepare an IoT case study for smart applications. |
| 7. | | CI4111 | Computer Vision (PE-IV) | 1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision.<br>2. Choose the appropriate image processing methods for image segmentation.<br>3. Apply computer vision techniques for solving practical problems on Area Extractions.<br>4. Analyze the accuracy of the methods used in Region Analysis.<br>5. Illustrate basic methods of computer vision related to Facet Model Recognition<br>6. Explain the different forms of Knowledge Representation methods used in computer vision. |
| 8. | | CI4131 | Data Analytics (PE-IV) | 1. Differentiate the characteristics of datasets and compare the trivial data and big data for various applications.<br>2. Select and implement techniques and computing environment that are suitable for the data analytical applications. |

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| | | | | 3. Solve problems associated with the data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.<br>4. Understand and apply scaling up machine learning techniques and associated computing techniques and technologies for data analytical.<br>5. Provide problem solutions for multi-core or distributed, concurrent/Parallel environments. |
| 9. | | CI433 | Bioinformatics (PE-IV) | 1. Extract information from different types of bioinformatics data (gene, protein, disease, etc.), including their biological characteristics and relationships<br>2. Employ different data representation models and formats used for bioinformatics data representation, including markup languages such as SBML and CellML, and ontologies such as GO ontology<br>3. Apply the different approaches used for data integration and data management, including data warehouse and wrapper approaches<br>4. Analyze processed data with the support of analytical and visualization tool<br>5. Interact with non-bioinformatics professionals, such as biologists and biomedical researchers, to better understand their bioinformatics needs for improved support and service delivery<br>6. Design and develop bioinformatics solutions by adapting existing tools, designing new ones, or a combination of both. |
| 10. | | CI4151 | Blockchain Technology (PE-V) | 1. Differentiate Blockchain models.<br>2. Analyze Components & Consensus models of Blockchain.<br>3. Discuss Forking & Cryptographic concepts of Blockchain.<br>4. Describe applications of Blockchain in the sector of Trade, Government & Finance |

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| | | | | 5. Explain research aspects of Blockchain |
| 11. | | CI4171 | Virtual Reality and Augmented Reality (PE-V) | 1. Describe the basic concept and framework of virtual reality and development tools.<br>2. Illustrate the principles and multidisciplinary features of virtual reality<br>3. Describe the technology for multimodal user interaction and perception in VR (visual, audial and haptic interface and behavior).<br>4. Discuss the technologies for managing large-scale VR environment in real time.<br>5. Analyze the virtual reality issues. |
| 12. | | CI4211 | Parallel Computing (PE-V) | 1. Summarize parallel programming technique and compare it with Sequential Programming.<br>2. Develop programs to use multi-core processors using OpenMP.<br>3. Write a parallel program using MPI<br>4. Explore different features of the CUDA framework.<br>5. Identify the different CUDA capable GPU platforms.<br>6. Design a parallel algorithm for any compute-intensive application. |
| 13. | | CI4231 | Big Data (PE-V) | 1. Understand the need of Big data Technologies.<br>2. Write program using Map Reduce framework.<br>3. Describe Hadoop and its components<br>4. Write the queries using HIVEQL<br>5. Use Hadoop ecosystem like Pig and Hive to build application |
| 14. | | CI4191 | Web Technology Lab | 1. Install and Configure Web servers and application servers.<br>2. Implement JSTL Tags.<br>3. Design Spring Boot Applications. |

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| | | | | 4. Demonstrate framework to map object-oriented domain models to relational databases for web applications<br>5. Manage relational data in Java applications using JPA<br>6. To develop web services using Spring boot Framework |
| 15. | | CI4251 | R Programming Lab<br>(PE Lab) | 1. Implementation of core concepts of R programming using R studio and console<br>2. Implement basic statistical operations using R Programming.<br>3. Apply suitable type of data distributions to different engineering problems<br>4. Create charts, plots and vectors for graphical analysis.<br>5. Solve Machine Learning Algorithms Using R Programming |
| 16. | | CI4291 | Asp.Net MVC Lab (PE Lab) | 1. Develop dynamic web application using ASP.NET.<br>2. Apply front end technologies to make web application responsive and fast.<br>3. Develop web application using MVC and Entity framework.<br>4. Build web services in ASP.NET. |
| 17. | | CI435 | PHP<br>(PE Lab) | 1. Develop a complete web application that includes Front-end, Back-end and Data-exchange technologies.<br>2. Apply the syntax, semantics, and basics of PHP programming language to develop web application.<br>3. Create PHP scripts capable of inserting and modifying data in a MySQL database.<br>4. Build web applications using advanced PHP framework.<br>5. Deploy a local web server and local install of a database |

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| 18. | | CI4271 | Capstone Project Phase- II | 1. Apply the theoretical and practical knowledge of CS/IT Engineering for product/service development<br>2. Identify and analyze engineering problems to provide IT based solutions<br>3. Design efficient algorithms for better products/services<br>4. Develop the project using modern IT tools, techniques and technologies<br>5. Adopt recent industry practices for project development<br>6. Improve the ability to work in teams<br>7. Develop effective presentation and communication skills through projects.<br>8. Manage the project in terms of scope, cost, time and quality of project as defined by stakeholders. |

K. E. Society's

**Rajarambapu Institute of Technology, Rajaramnagar**

(An Empowered Autonomous Institute, affiliated to SUK)

**UG Program**

# • Mechanical Engineering

- **Department Name: - Mechanical Engineering**
- **UG Program Name: - Mechanical Engineering**
- **Vision and Mission: -**

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| **Vision** | To transform the department into center of excellence by synergizing teaching, learning and research to produce globally competent, innovative and entrepreneurial Mechanical Engineers. |
| **Mission** | • To develop state of the art facilities to stimulate faculty, staff and students to create, analyze, apply and disseminate knowledge.<br>• To build the competency to transform students into globally competent mechanical engineers by imparting quality education.<br>• To collaborate with research organizations, reputed educational institutions, industries and alumni for excellence in teaching, research and consultancy practices |

**Program Educational Objectives (PEO's)**

1. Graduates will contribute to social reformation through their devotion in science and technology leading to uplifted standard of living.
2. Graduates will provide solutions to global technological challenges being entrepreneurs, consultants and researchers following ethical practices.
3. Graduates will update themselves through lifelong learning such as higher studies, cutting edge research, skill enhancement and other professional activities.

| Sr. No. | Program Outcomes |
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| 71. | Apply the knowledge of mathematics, science, engineering fundamentals, and mechanical engineering to the solution of complex engineering problems. |
| 72. | Identify, formulate, review research literature, and analyze complex mechanical engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| 73. | Design solutions for complex mechanical 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. |
| 74. | 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. |

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| 75. | Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex mechanical engineering activities with an understanding of the limitations. |
| 76. | 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 practices. |
| 77. | Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| 78. | Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices. |
| 79. | Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| 80. | Communicate effectively on complex mechanical 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. |
| 81. | 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. |
| 82. | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes. |

| Sr. No. | Program Specific Outcomes |
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| **PSO_1** | Use Company standards, national and international standards like IS, BS, SAE, ISO, ASTM, etc. for designing and manufacturing mechanical components and systems. |
| **PSO_2** | Engage professionally in industries or as an entrepreneur by applying manufacturing, design, thermal and management practices. |

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 1. | III | ME2094 | Mathematics for Mechanical Engineers | 1. Solve the differential equation using the appropriate concept. |
| | | | | 2. Determine the Laplace & inverse Laplace transform of various functions. |
| | | | | 3. Solve Problems on different probability distributions. |
| | | | | 4. Develop Fourier series of periodic functions. |
| 2. | III | ME2114 | Manufacturing Processes and Machine Tools | 1. Select suitable Engineering forming process for production of component of required specification |
| | | | | 2. Select casting as manufacturing process suitable for the component design and production volume |
| | | | | 3. Select suitable furnaces in casting process as per requirement. |
| | | | | 4. Select appropriate joining process for given application. |
| | | | | 5. Illustrate and identify main parts of machine tools for metal cutting operations. |
| | | | | 6. Describe the Construction of different components of precision machines. |
| 3. | III | ME2134 | Engineering Thermodynamics | 1. Apply thermodynamics principles to mechanical engineering applications |
| | | | | 2. Describe entropy, change in entropy and increase of entropy principle. |
| | | | | 3. Differentiate between available and unavailable energy with examples. |
| | | | | 4. Recognize the properties of pure substances and use thermodynamic property tables charts. |
| | | | | 5. Apply mathematical fundamental to study the properties of steam gas and gas mixtures |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| | | | | 6. Explain the air and vapour power cycles and calculate cycle performance. |
| 4. | III | ME2154 | Engineering Mechanics | 1. Calculate resultant force of coplanar force system. |
| | | | | 2. Analyze engineering problems applying conditions of equilibrium |
| | | | | 3. Determine centroid & moment of inertia of the geometrical plane lamina. |
| 5. | III | CEMD201 | Building Construction and Planning | 1. Suggest appropriate materials for building construction applications. |
| | | | | 2. Prepare a functional design of components of the building. |
| | | | | 3. Design and draw residential building using principles of planning and bye-laws. |
| | | | | 4. Prepare plumbing and electrification plan for the building. |
| | | | | 5. Explain properties of building finishing materials and application procedure. |
| 6. | III | CSMD201 | Introduction to Data Structures | 1. Compare between linear and nonlinear data structures |
| | | | | 2. Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | 3. Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | 4. Determine a suitable data structure and algorithm to solve a real world problem |
| 7. | III | EEMD201 | Electrical Power Generation | 1. List the main components of different power plants |
| | | | | 2. Describe the operation of various power plants used for electrical power generation. |
| | | | | 3. Explain working principles of various power plants |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| | | | | 4. Compare different power plants based on advantages, limitations and future prospects |
| | | | | 5. Draw layout of electrical power plants. |
| | | | | 6. Explore alternate electrical energy resources for future needs and challenges. |
| 8. | III | ECMD201 | Electronics Devices and Applications | 1. Describe the fundamental concepts of electronics and working principles of different devices. |
| | | | | 2. Analyze different analog and digital electronics circuits. |
| | | | | 3. Design digital electronics circuits with truth table and logic diagram. |
| 9. | III | CIMD201 | Data Structures | 1. Explain the basic terminologies of data structures. |
| | | | | 2. Write algorithms for operation performed on data structure array with its types. |
| | | | | 3. Demonstrate the working of stack, queue performed on data structures. |
| | | | | 4. Compare static and dynamic representations of data structures |
| | | | | 5. Choose appropriate data structure while developing solution to the problem. |
| 10. | III | MEMD203 | Design Thinking | 1. Identify the new product opportunities and sources of new product ideas. |
| | | | | 2. Elaborate the product life cycle and product design process. |
| | | | | 3. Integrate the customer and end-consumer needs into design process. |
| | | | | 4. Assimilate the various product characteristics to design a novel product |
| | | | | 5. Participate effectively in group work sessions and teams to become acquainted with the |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| | | | | importance of teamwork and collaboration that is critical to new product success |
| 11. | III | MCMD201 | Fundamentals of Mechatronics | 1. Identify various elements of mechatronics systems. |
| | | | | 2. Select appropriate sensor for different applications. |
| | | | | 3. Select appropriate Actuator and drives for different mechatronics application. |
| | | | | 4. Identify suitable controller/algorithms for specific mechatronic application. |
| | | | | 5. Analyze different circuits used for signal conditioning. |
| | | | | 6. Develop mechatronic system for various applications |
| 12. | III | AIMD201 | Object Oriented Programming | 1. Understand the basic object oriented programming concepts and apply them in problem solving. |
| | | | | 2. Illustrate inheritance concepts for reusing the program. |
| | | | | 3. Implement program using loops, decision statements and functions in Python. |
| | | | | 4. Plot data using appropriate Python visualization libraries. |
| 13. | III | **RAMD201** | **Fundamentals of Robotics & Automation** | 1. Differentiate various robotic configurations and performance metrics. |
| | | | | 2. Compare various end effectors, sensors, and drive systems in robotic applications. |
| | | | | 3. Illustrate kinematic and dynamic principles applied to robotic systems. |
| | | | | 4. Outline robot programming solutions for diverse applications. |
| | | | | 5. Distinguish various types and aspects of automation. |
| | | | | 6. Relate the knowledge of Programmable Logic |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | Controllers (PLCs) to industrial automation tasks |
| 14. | III | ME2174 | Computer Programming C++ Lab | 1. Build Object Oriented Programs. |
| | | | | 2. Elaborate the concepts of "inline function", "friend function", "function overloading" and "operator overloading". |
| | | | | 3. Extend the program by using inheritance. |
| | | | | 4. Use memory management technique "constructors" & "destructors". |
| 15. | III | ME2314 | Engineering Mechanics Lab | 1. Verify law of polygon of forces, law of triangle of forces and principle of moment. |
| | | | | 2. Verify Lami's theorem. |
| | | | | 3. Compare coefficient of friction of various surfaces in contact. |
| | | | | 4. Correlate theoretical and practical results of support reactions and Centroid of plane lamina. |
| | | | | 5. Analyze a simple truss. |
| 16. | III | ME2334 | Machine Drawing Lab | 1. Prepare free hand sketches of engineering and working drawings with dimensions following proper BIS conventions. |
| | | | | 2. Develop details and assembly drawings using part drawings of machine components with dimensions using CAD. |
| | | | | 3. Apply limits and tolerances to part and assemblies and choose appropriate fits. |
| | | | | 4. Interpret the symbols of welded, machining and surface roughness on the component drawings. |
| | | | | 5. Apply the geometrical dimensioning and tolerances to the mechanical components. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 6. Prepare details and assembly production drawings using actual measurements of part drawings of machine components with dimensions using CAD |
| 17. | III | ME2354 | Workshop Practice -I | 1. Demonstrate effect of variables such as Voltage, current on welding process. |
| | | | | 2. Produce given joint by MIG welding process. |
| | | | | 3. Produce welding run on S.S. by TIG welding. |
| | | | | 4. Produce welding run on Aluminum by TIG welding. |
| | | | | 5. Produce given job with proper taper and V threading within dimensional tolerances |
| 18. | III | ME2374 | Technical Aptitude -I | 1. Apply the fundamental knowledge to solve the mechanical engineering problems. |
| | | | | 2. Develop the ability of problem solving. |
| 19. | III/IV | SH2634 | Professional Leadership Skills | 1. Explain the traits of a leadership through real life examples. |
| | | | | 2. Exhibit the ability to work effectively in team. |
| | | | | 3. Prepare a presentation as per the audience and context requirements. |
| 20. | III/IV | SH2614 | Interpersonal Skills | 1. Exhibit interpersonal communication skills. |
| | | | | 2. Demonstrate decision-making skills. |
| | | | | 3. Apply conflict resolution styles appropriate in different situations. |
| | | | | 4. Demonstrate skills to manage balance in work and life. |
| 21. | III/IV | SH2694 | | 1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | Innovation Tools and Methods for Entrepreneurs | 2. Apply User Journey Map to the selected problem to show user interaction at various stages |
| | | | | 3. Analyze the solutions provided by competitors for effectiveness and gaps if any. |
| 22. | III/IV | SH2594 | Personal Effectiveness and Body Language | 1. Develop skills to build self-esteem and positive attitude. |
| | | | | 2. Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | 3. Demonstrate responsiveness towards time, stress, and health issues. |
| | | | | 4. Interpret the non-verbal behavior of a person. |
| 23. | III | SH2734 | German Language - Level III | 1. Interpret the language if the next person is speaking slowly and clearly. |
| | | | | 2. Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | 3. Demonstrate the language by self-introduction in German with simple sentences. |
| 24. | IV | SH2644 | German Language - Level IV | 1. Interpret the language if the next person is speaking slowly and clearly. |
| | | | | 2. Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | 3. Demonstrate the language by self-introduction in German with simple sentences. |
| 25. | III | SH2714 | Japanese Language - Level III | 1. Make use of basic conversations in various situations. |
| | | | | 2. Identify the sentence patterns. |
| | | | | 3. Explain insights about the communication required for living in Japan. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 4. Interpret Japanese work ethics required in their professional career. |
| 26. | IV | SH2624 | Japanese Language - Level IV | 1. To be able to make basic conversations in various situations. |
| | | | | 2. To recognize the sentence patterns. |
| | | | | 3. To improve Japanese Language proficiency. |
| | | | | 4. To give students insights about the communication required for living in Japan. |
| | | | | 5. To expose students to the Japanese work ethics required in their professional careers. |
| 27. | IV | ME216 | Fluid Mechanics and Turbomachinery | 1. Define, calculate, and measure properties of fluid |
| | | | | 2. Apply Continuity equation, Bernoulli's equation, Equation of motion and Momentum equation for different flow system |
| | | | | 3. Estimate forces acting on fluid & different energy losses in fluid flow. |
| | | | | 4. Estimate forces acting on bodies submerged in fluid. |
| | | | | 5. Explain construction, working of turbo machines and select appropriate hydraulic machine for specific applications |
| | | | | 6. Perform basic hydraulic/thermal design and interpret performance characteristic curves. |
| 28. | IV | ME2124 | Mechanics of Solids | 1. Determine types of stresses and strains induced in any machine component. |
| | | | | 2. Draw Shear force and bending moment diagram for different types of beam. |
| | | | | 3. Develop bending stress distribution and shear stress |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | distribution for various cross sections of beam. |
| | | | | 4. Estimate the slope and deflection of beams by analytical and graphical method |
| | | | | 5. Find the principal stress and strain for plain stress system |
| | | | | 6. Analyze axially loaded column for different end conditions. |
| 29. | IV | ME2144 | Material Science & Metallurgy | 1. Explain different alloys, their properties and applications by referring equilibrium diagrams. |
| | | | | 2. Determine mechanical properties by destructive testing methods. |
| | | | | 3. Detect flaws in components by non-destructive testing methods. |
| | | | | 4. Select suitable heat treatment to achieve desired changes in mechanical properties of steels. |
| | | | | 5. Select suitable material for given engineering applications. |
| | | | | 6. Explain manufacturing of a component by using powder metallurgy. |
| 30. | IV | CEMD202 | Building Estimation and Valuation | 1. Explain the types and basic requirements of the estimate. |
| | | | | 2. Explain measurement sheet, abstract sheet, and detailed specifications of different construction items. |
| | | | | 3. Prepare detailed estimate of load bearing structure and framed structure. |
| | | | | 4. Prepare rate analysis and bar bending schedule of different construction items. |
| | | | | 5. Explain the tenders and contracts. |
| | | | | 6. Describe basic terms of valuation. |
| 31. | IV | CSMD202 | | 1. Understand the basic object oriented programming |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | Problem Solving using JAVA | concepts and apply them in problem solving. |
| | | | | 2. Apply concept of inheritance for code reusability. |
| | | | | 3. Develop Programs using multithreading. |
| | | | | 4. Develop data-centric applications using JDBC. |
| | | | | 5. Design the basics of java console and GUI based programming |
| 32. | IV | EEMD202 | Power System | 1. Write the basic working principles of different generating sources. |
| | | | | 2. Analyze different types of loads |
| | | | | 3. Explain importance of power factor and tariffs in power system. |
| | | | | 4. Identify various components in power transmission and distribution system. |
| | | | | 5. Select substation equipments as per requirement. |
| 33. | IV | ECMD202 | Electronics Communication Systems | 1. Describe different communication systems. |
| | | | | 2. Explain applications of analog and digital modulation techniques. |
| | | | | 3. Analyze different modulation and demodulation techniques. |
| | | | | 4. Explain the use of satellite communication. |
| 34. | IV | CIMD202 | Computer Algorithms | 1. Analyzing asymptotically the performance of algorithms. |
| | | | | 2. Compare and analyze searching and sorting algorithms. |
| | | | | 3. Apply different algorithm design techniques to solve problems like job sequencing, |
| | | | | 4. knapsack, TSP, finding shortest path etc. |
| | | | | 5. Apply backtracking method to solve problems like N-queens, graph coloring, sum of subsets etc. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 35. | IV | MEMD204 | Behavioral Engineering and Design | 1. Explain key concepts and theories related to influencing user behavior in product design. |
| | | | | 2. Utilize psychological principles to develop product designs that effectively address user needs and preferences. |
| | | | | 3. Create products that demonstrate high levels of user engagement, measured through metrics such as adoption rates and user interaction patterns. |
| | | | | 4. Develop products that prioritize user satisfaction and usability, as measured through user testing and feedback. |
| | | | | 5. Incorporate aesthetic appeal and ergonomic considerations into product designs, assessed through objective criteria such as user comfort and visual appeal ratings. |
| | | | | 6. Analyze user feedback and iteratively improve designs to enhance user experience, measured by improvements in user satisfaction scores or usability metrics. |
| 36. | IV | MCMD202 | Industrial Fluid Power | 1. Describe the structure and function of common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors etc. |
| | | | | 2. Model and analyze common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors. |
| | | | | 3. Create & simulate basic hydraulic and pneumatic circuit diagrams for different applications. |
| | | | | 4. Design, develop & analyze simple hydraulic and pneumatic systems for given task |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 37. | IV | AIMD202 | Data structure & Algorithms | 1. Compare between linear and nonlinear data structures |
| | | | | 2. Describe the characteristics of various data structure such as stacks, queues, trees, graphs and Hash tables. |
| | | | | 3. Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | 4. Determine a suitable data structure and algorithm to solve a real world problem |
| 38. | IV | RAMD202 | Sensors & Actuators | 1. Explain the functioning of various sensors and transducers |
| | | | | 2. Calibrate the transducers such as accelerometers, microphones and strain gauges. |
| | | | | 3. Explain the characteristics of various sensors and transducers |
| | | | | 4. Describe the process and need for calibration. |
| | | | | 5. Choose the sensor for measurement of few parameters. |
| | | | | 6. Use the appropriate sensor and calibrate |
| 39. | IV | SH202 | मराठी भाषिक कौशल्यविकास | 1. भाषा आणि व्यक्तिमत्व विकास यांमधील सहसंबंध स्पष्ट करू शकेल |
| | | | | 2. भाषिक कौशल्यविकास करू शकेल |
| | | | | 3. कथा या मराठी साहित्य प्रकाराचे विश्लेषण करू शकेल |
| | | | | 4. एकांकिका या मराठी साहित्य प्रकाराच्या विश्लेषणाची क्षमता प्राप्त करेल |
| 40. | IV | SH204 | हिंदी कथा साहित्य एवं प्रयोजमूलक हिंदी | 1. विद्यार्थियों में मानवीय संवेदनाओं के विकास के साथ नवीन सामाजिक सांस्कृतिक बोधऔर जीवन मूल्यों का विकास होगा। |
| | | | | 2. विद्यार्थियों में साहित्य के माध्यम से कलात्मक गुणों की अभिवृद्धि होगी कला की साहित्यिक विधाओं के प्रति अभिरुचि जागृत होगी तथा रचनात्मक कौशल्य को बढ़ावा मिलेगा। |
| | | | | 3. विद्यार्थियों में नए वैश्विक मूल्यों के प्रति सजगता को बढ़ावा मिलेगा एवं मूल्यवादी दृष्टि के प्रति |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | दायित्व बोध उत्पन्न होगा।छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| | | | | 4. छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| 41. | IV | SH2174 | Environmental Science | 1. Apply interdisciplinary knowledge from various fields of science and engineering to address environmental issues. |
| | | | | 2. Evaluate environmental impacts of human activities on the environment. |
| | | | | 3. Use scientific approach to identify and solve environment related problems. |
| | | | | 4. Design sustainable solutions to address environmental challenges. |
| | | | | 5. Participate in group work to become acquainted with the importance of teamwork, collaboration |
| | | | | 6. Develop presentation and report writing skills. |
| 42. | IV | ME2204 | Fluid Mechanics and Turbomachinery Lab | 1. Measure discharge through the fluid system |
| | | | | 2. Verify and apply Bernoulli's Theorem. |
| | | | | 3. Calculate various losses through pipes. |
| | | | | 4. Evaluate various efficiencies of pumps, compressors and turbines. |
| | | | | 5. Draw performance characteristic curves for pumps, compressors and turbines |
| 43. | IV | ME2224 | CAD Modeling Lab | 1. Construct accurate sketches of machine parts using CAD software. |
| | | | | 2. Develop 3D models of machine parts by applying essential modeling commands. |
| | | | | 3. Assemble multiple machine components into functional |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | assemblies using advanced CAD tools. |
| | | | | 4. Evaluate detailed drawing views, including various projections and annotations, for technical accuracy and completeness. |
| 44. | IV | ME2244 | Material Science & Metallurgy Lab | 1. Explain different alloys, their properties and applications by referring equilibrium diagrams. |
| | | | | 2. Determine mechanical properties by destructive testing methods |
| | | | | 3. Detect flaws in components by non-destructive testing methods |
| | | | | 4. Select Suitable heat treatment to achieve desired changes in mechanical properties of steels |
| | | | | 5. Select suitable material for given engineering application |
| | | | | 6. Explain manufacturing of a component by using powder metallurgy |
| 45. | IV | ME2344 | Workshop Practice -II | 1. Demonstrate effect of variables such as speed, feed and depth of cut on machining process. |
| | | | | 2. Produce given job with proper taper fitting and within dimensional tolerances ± 0.2 mm. on diameter and ± 0.5 mm. on length. (Job – b) |
| | | | | 3. Produce given job with proper V threading fitting and within dimensional tolerances ± 0.2 m.m. on diameter and ± 0.5 m.m. on length. (Job – c) |
| | | | | 4. Produce given job with proper V threading fitting and within dimensional tolerances |
| 46. | IV | ME2364 | Technical Aptitude -II | 1. Apply the fundamental knowledge to solve mechanical engineering problems. |
| | | | | 2. Develop the ability of problem solving. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 47. | V | ME3114 | Heat and Mass Transfer | 1. Explain modes of heat transfer and solve steady and unsteady state heat conduction problems |
| | | | | 2. Apply the principles of radiation heat transfer to engineering problems |
| | | | | 3. Develop and use various correlations to solve convection problems |
| | | | | 4. Analyse and design an indirect tube type heat exchanger |
| 48. | V | ME313 | Kinematics and Dynamics of Machines | 1. Select suitable mechanism to get desired motion |
| | | | | 2. Analyze the mechanism for velocity and acceleration |
| | | | | 3. Demonstrate the gyroscopic effect and functioning of governors |
| | | | | 4. Evaluate dynamic forces & its effects on mechanical system |
| | | | | 5. Analyze vibration of single degrees of freedom system |
| 49. | V | ME3314 | Mechanics of Composite Material | 1. Choose suitable composite materials based on field applications |
| | | | | 2. Explain different fabrication processes and perform cost comparison. |
| | | | | 3. Compute composite properties for given fraction of fibers and matrix. |
| | | | | 4. Design lamina to bring tailor maid properties in composite material. |
| | | | | 5. Predict failure of composite laminates by selecting appropriate failure criteria. |
| | | | | 6. Design laminate for given loading conditions. |
| 50. | V | ME333 | Engineering Optimization | 1. Apply necessary and sufficient conditions for a given optimization problem for optimality. |
| | | | | 2. Select appropriate solution methods and strategies for |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | solving an optimization problem |
| | | | | 3. Interpret and analyze the solution obtained by specific method |
| 51. | V | ME3354 | Fracture Mechanics | 1. Apply the basic principles of Linear elastic fracture mechanics. |
| | | | | 2. Design the engineering components using elastic-plastic fracture mechanics principles. |
| | | | | 3. Explain the process of crack growth and arrest in the presence of creep. |
| | | | | 4. Compare the fracture behavior in metals and non-metals. |
| | | | | 5. Analyze the crack growth under fatigue loading. |
| | | | | 6. Choose the suitable computational fracture mechanics approach to solve the real mechanical engineering problem. |
| 52. | V | ME336 | Python Programing | 1. Understand Python code for basic programming tasks. |
| | | | | 2. Acquire skills in handling and visualizing engineering data using Python. |
| | | | | 3. Write object-oriented Python programs. |
| | | | | 4. Apply numerical computing techniques to solve mechanical engineering problems. |
| | | | | 5. Develop graphical user interfaces for engineering applications. |
| | | | | 6. Use Python for automating tasks and extracting information from websites for engineering applications |
| 53. | V | ME3414 | | 1. Illustrate concepts related to energy audits. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | Cogeneration and Waste Heat Utilization | 2. Summarize the energy scenario and emphasize the importance of energy conservation. |
| | | | | 3. Explain the principles of Co-generation and Regeneration. |
| | | | | 4. Demonstrate various techniques for waste heat recovery. |
| | | | | 5. Explain the elements incorporated in thermal utilities for efficient operation. |
| | | | | 6. Describe various measures for energy conservation and analyze the financial implications for different thermal utilities. |
| 54. | V | ME343 | Alternative sources of energy | 1. Explain the basic renewable energy sources like solar, wind ,biomass etc. |
| | | | | 2. Explain various advantages and disadvantages of renewable energy sources. |
| | | | | 3. Illustrate with different standalone off grid energy sources. |
| | | | | 4. Explain different technology associate with solar, wind, biomass and other renewable energy sources |
| 55. | V | ME345 | Hybrid and Electric Vehicles | 1. Identify the need for hybrid vehicles in today's context. |
| | | | | 2. Explain the working of Electric Vehicles and recent trends. |
| | | | | 3. Describe different configurations of electric and hybrid electric drive trains |
| | | | | 4. Explain the design methodology and control strategies of hybrid drive trains. |
| | | | | 5. Discuss different energy sources and drives required for hybrid vehicles. |
| | | | | 6. Explain the fuel cell technology for hybrid vehicle applications. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 56. | V | ME3514 | World Class Manufacturing | 1. Explain characteristics of world class organization. |
| | | | | 2. Plot control charts and comment on the process. |
| | | | | 3. Elaborate the concept of TQM. |
| | | | | 4. Demonstrate the 8 pillars of Total productive maintenance (TPM). |
| | | | | 5. Demonstrate the 13 pillars of Toyota production system (TPS). |
| | | | | 6. Explain the six sigma methodologies. |
| 57. | V | ME3534 | Non Traditional Machining Processes | 1. Compare the various nontraditional machining processes |
| | | | | 2. Discuss the operational principles, advantages applications, limitations of the various non-traditional machining processes |
| | | | | 3. Explain the material removal mechanism, effect of parameters/ factors associated with the processes on the machining performance. |
| | | | | 4. Select a process /a combination of processes for a specific application/ need/situation depending upon the availability of sources. |
| 58. | V | ME359 | Operations Research | 7. Identify the breadth of quantitative decision situation that arise in engineering. |
| | | | | 8. Develop skills needed for the mathematical modelling of real world decision situations. |
| | | | | 9. Choose appropriate techniques and methodology to solve the problems. |
| | | | | 10. Ability to work in a team specifically to solve the larger problems. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 59. | V | ME363 | Quality Management System | 1. Explain the principles of Quality Management. |
| | | | | 2. Discuss the role of quality management gurus in Quality Management. |
| | | | | 3. Select and apply appropriate quality management tools and techniques for Quality assurance and control. |
| | | | | 4. Describe quality management principles for service sector. |
| | | | | 5. Discuss the importance of Quality management system in the organization |
| 60. | V | ME3594 | Production and Operation Management | 1. Select appropriate production and operation strategies based on situation |
| | | | | 2. Explain the strategic importance of product and service design |
| | | | | 3. Describe the importance of process selection and evaluate its influence on the organization. |
| | | | | 4. Schedule the jobs so as to complete them in minimum makespan time |
| | | | | 5. Apply recent production management trends like JIT and lean philosophy in manufacturing field. |
| | | | | 6. Apply supply chain strategies for various industrial applications. |
| 61. | V | ME361 | Sensors and Actuators in Robotic Technology | 1. Select the sensor for robotic application and design the systems. |
| | | | | 2. Explain image processing technique |
| | | | | 3. Select the actuators and configuring the parameters of Actuators |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 62. | V | OE347 | New Product Design and Development | 1. Identify the new product opportunities and sources of new product ideas. |
| | | | | 2. Elaborate the product life cycle and product design process. |
| | | | | 3. Integrate the customer and end-consumer needs into design process. |
| | | | | 4. Apply the concepts and tools like DFMA, VE and QFD in design process |
| | | | | 5. Assimilate the various product characteristics to design a novel product |
| | | | | 6. Participate in group work sessions and teams to become acquainted with the importance of teamwork and collaboration that is critical to new product success |
| 63. | V | OE349 | Non-conventional Energy Sources | 1. Identify the need of requirement of renewable energy source |
| | | | | 2. Summarize the various available energy sources. |
| | | | | 3. Illustrate different technologies essential for conversion of renewable energy sources. |
| | | | | 4. Evaluate the performance of energy conversion systems for maximum efficiency |
| | | | | 5. Compare the various renewable energy technologies. |
| | | | | 6. Select appropriate renewable energy technology for specific application |
| 64. | V | OE351 | Hydrogen and Fuel Cell Technology | 1. Choose proper energy storage systems hydrogen and applications |
| | | | | 2. Explain the different types of fuel cell technologies, fuels and membrane used in it |
| | | | | 3. Design and Compare performance of fuel cell |
| 65. | V | ATMD301 | | 1. Discuss the basics of vehicle collision and its effects. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | Automotive Safety & Ergonomics | 2. Summarize the various safety concepts used in passenger cars. |
| | | | | 3. Explain use of ergonomics in automotive design. |
| | | | | 4. Explain the human response to impact. |
| | | | | 5. Explain the use of various systems used in automobiles for safety & ergonomic considerations. |
| 66. | V | CEMD301 | Infrastructure Engineering | 1. Apply the knowledge of geometric design in road construction. |
| | | | | 2. Identify the quality parameters of pavement materials and various methods of road construction. |
| | | | | 3. Discuss the various aspects of airport engineering. |
| | | | | 4. Explain design parameters of railway engineering and it's component parts. |
| | | | | 5. Summaries the different off shore structures for dock and harbors. |
| 67. | V | CSMD301 | Fundamentals of Database Systems | 1. Describe the purpose and nature of the database system for storing and fast access to the data |
| | | | | 2. Identify various protocols, issues, and techniques related to transaction management for a consistent & and stable database |
| | | | | 3. Draw E-R models to represent simple database application scenarios |
| | | | | 4. Design the queries to manipulate and access data using procedural and non-procedural languages |
| | | | | 5. Apply relational database design concepts to remove data redundancy and to retrieve data easily |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 6. Perform operation on Unstructured data |
| 68. | V | EEMD301 | **Electrical Machines** | 1. Describe behavior of dc machine. |
| | | | | 2. Explain the working principle of 1-Phase and 3-Phase transformers. |
| | | | | 3. Explain working of different induction motors. |
| | | | | 4. Select the relevant electrical machines for different applications |
| | | | | 5. Interpret the relevant fractional horse power motor for different applications |
| 69. | **V** | ECMD301 | Advanced Communication Techniques | 1. Explain the principles of antenna and wave propagation. |
| | | | | 2. Understand basic antenna parameters and their types. |
| | | | | 3. Discuss the evolution, requirements, and challenges of 5G communication systems. |
| | | | | 4. Understand and compare various communication techniques. |
| | | | | 5. Communicate effectively on complex engineering topics related to modern communication techniques |
| 70. | V | CIMD301 | Introduction of DBMS | 1. Describe the fundamental elements of relational database management systems. |
| | | | | 2. Design ER-models to represent simple database application scenarios. |
| | | | | 3. Write SQL query to perform various operations on the database. |
| | | | | 4. Analyze principle of integrity constraints, Hashing and Indexing on databases. |
| | | | | 5. Illustrate the transaction management, concurrency control and crash recovery |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 71. | V | MEMD301 | Manufacturing and Assembly Processes | 1. Select appropriate manufacturing process suitable for the component design and production volume |
| | | | | 2. Select appropriate joining process for given application. |
| | | | | 3. Select appropriate machine tools for machining operations. |
| | | | | 4. Select appropriate finishing process for given product. |
| | | | | 5. Explain concept of automation in manufacturing. |
| | | | | 6. Explain and select appropriate Non Traditional machining process and machine with constructional details for engineering component. |
| 72. | V | MCMD301 | Sensor and Instrumentation | 1. Understand the fundamental principles of various sensors and transducers. |
| | | | | 2. Analyze the characteristics, advantages, and limitations of different sensor types. |
| | | | | 3. Apply appropriate signal conditioning techniques to improve sensor output accuracy and integrate sensors into mechatronic systems for real-time data acquisition and control. |
| | | | | 4. Select appropriate sensors for specific mechatronic systems used in real life applications |
| 73. | V | AIMD301 | Machine Learning | 1. Utilize machine learning techniques and understand the basic theory underlying machine learning. |
| | | | | 2. Articulate supervised, unsupervised and reinforcement learning |
| | | | | 3. Identify the basic concepts of learning and decision trees. |
| | | | | 4. Utilize Bayesian techniques for problems appear in machine learning |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5. Perform statistical analysis of machine learning techniques. |
| 74. | V | ATMD303 | Automobile Engineering Lab | 1. Differentiate between S.I. and C.I. engines. |
| | | | | 2. Test engines and plot performance characteristics curves. |
| | | | | 3. Describe the working of various automotive systems |
| 75. | V | CEMD303 | Smart Cities & Sustainable Development | 1. Develop a critical understanding of the different concept and ideologies of smart cities. |
| | | | | 2. Analyse the different approaches toward planning and development of smart cities on global level. |
| | | | | 3. Assess the existing state and approach of Smart city Mission in India. |
| | | | | 4. Comprehend the concept of resilience and sustainable development and its measurement. |
| | | | | 5. Evaluate the present status of sustainability and rating systems initiatives within the Indian context. |
| 76. | V | CSMD303 | Object-oriented Programming in Python | 1. Demonstrate a comprehensive understanding of Python syntax, data types, and basic operations. |
| | | | | 2. Make use of common Python libraries for data manipulation. |
| | | | | 3. Implement lists, tuples, sets, and dictionaries for effective data handling. |
| | | | | 4. Apply principles of OOP, including classes, objects, inheritance, and polymorphism |
| 77. | V | EEMD303 | Electrical Technology | 1. Demonstrate speed control methods of electrical machines. |
| | | | | 2. Analyze performance of DC motor and induction motor for speed control applications. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Implement power electronic circuits for given application. |
| | | | | 4. Measure electrical quantities using electrical and electronic instruments |
| 78. | V | ECMD303 | Electronic Product Design | 1. Elaborate product design processes. |
| | | | | 2. Explain various aspects of PCB design. |
| | | | | 3. Differentiate product-testing methods. |
| | | | | 4. Create various documents for the product. |
| 79. | V | CIMD303 | OOP using Java | 1. Explain the concepts and terminologies in object-oriented concepts and java programming language. |
| | | | | 2. Apply object-oriented programming features and concepts for solving given problem. |
| | | | | 3. Develop the java application using the collection framework to solve real word problem. |
| | | | | 4. Apply the concepts exception handling to develop error free codes. |
| | | | | 5. Utilize the concepts of package to develop efficient codes. |
| 80. | V | MEMD303 | Refrigeration and Air Conditioning | 1. Explain the basic laws of thermodynamics, working of various RAC systems, psychrometric process of air, applications of RAC systems. |
| | | | | 2. Summarise the properties of refrigerants. |
| | | | | 3. Calculate performance of refrigeration and air conditioning system. |
| 81. | V | MCMD303 | Industrial Automation | 1. Explore the architecture of PLC and its functions. |
| | | | | 2. Execute the various instructions and logic in PLC. |
| | | | | 3. Develop the PLC program for various applications. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 4. Design and develop the SCADA, DCS system for various applications |
| 82. | V | AIMD303 | Business Intelligence | 1. Articulate data pre-processing techniques |
| | | | | 2. Analyze the data modeling required for business intelligence related tasks |
| | | | | 3. Determine the role of statistical techniques in data analysis tasks |
| | | | | 4. Identify big data analysis techniques |
| | | | | 5. Utilize different reporting/visualization tool |
| 83. | V | SH3034 | Scholastic Aptitude-I | 1. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | 2. Explain the basic aptitude terms like percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | 3. Develop a bridge in analogies, series and visualizing directions. |
| | | | | 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams |
| 84. | V | ME3214 | Heat and Mass Transfer Lab | 1. Determine the thermal conductivity of materials and compute heat conduction through a fin and a composite wall. |
| | | | | 2. Compute heat transfer coefficient in natural as well as forced convection environment. |
| | | | | 3. Determine the emissivity and Stefan-Boltzmann constant for radiative heat transfer |
| | | | | 4. Compare the performance of heat exchanger |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5. Determine critical heat flux of material/Examine film wise and drop wise condensation phenomenon |
| 85. | V | ME3234 | Kinematics and Dynamics of Machines Lab | 1. Estimate moment of inertia of Irregular shape bodies. |
| | | | | 2. Analyse the controlling force and stability of governor. |
| | | | | 3. Investigate the stability of spinning bodies due to gyroscopic effect. |
| | | | | 4. Apply the theoretical knowledge to balance the rotary systems |
| | | | | 5. Determine the natural frequency, vibration level, damped frequency and resonant frequency of any vibratory system |
| | | | | 6. Recognize the whirling speed conditions of shaft and methods to eliminate it |
| 86. | V | ME3254 | Software Training Lab-I : NX-CAM | 1. Develop the sketches for the engineering components |
| | | | | 2. Develop the part model for the engineering components |
| | | | | 3. Generate the toolpath for the machining of engineering component on CNC machines. |
| | | | | 4. Simulate the toolpath for the machining of engineering component on CNC machines. |
| | | | | 5. Generate process sheet and CNC part programs. |
| 87. | V | ME3254 | Software Training Lab-I : NX-CAD | 1. Use NX CAD module for the 3D modelling and assembly. |
| | | | | 2. Create the detailed drawing of machine components including GD&T |
| 88. | V | ME3254 | Software Training Lab-I : MATLAB | 1. Write a MATLAB code and solve the mechanical engineering problems. |
| | | | | 2. Point out the salient features and relationship between dependent |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | and independent variables by ploting the graph. |
| 89. | V | ME3254 | Software Training Lab-I : Software Development using C++ | 1. Write C++ code to solve the mechanical engineering problems. |
| | | | | 2. Use file handling operations to solve mechanical engineering problems handling large data. |
| | | | | 3. Draw production drawing as per the design calculations |
| 90. | V | ME3814 | Technical Aptitude -III | 1. Apply the fundamental knowledge to solve the mechanical engineering problems. |
| | | | | 2. Develop the ability of problem solving. |
| 91. | V | ME3834 | Summer Internship | 1. Apply the Technical knowledge in real industrial situations. |
| | | | | 2. Formulate Technical reports/projects. |
| | | | | 3. Develop and refine oral and written communication skills. |
| | | | | 4. Explain the activities and functions of business professionals. |
| 92. | VI | ME3104 | Finite Element Method | 1. Applying appropriate approximate method to solve the equations from the perspective of finite element method. |
| | | | | 2. Select the appropriate element type and element numbers to obtain accurate solutions for the given engineering problem. |
| | | | | 3. Recommend suitable shape functions and comment on the requirement of convergence criteria. |
| | | | | 4. Calculate the stiffness matrix, load vectors and analyse the solid mechanics problems. |
| | | | | 5. Construct the characteristics matrix, load vectors and solve thermal related problems. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 6. Explain the assembly and solution process in the finite element method. |
| 93. | VI | ME3124 | Applied Thermal Engineering | 1. Differentiate SI and CI engine, cycles, and relate various performance parameters. |
| | | | | 2. Analyze the performance of vapour compression refrigeration systems. |
| | | | | 3. Estimate the performance of steam boilers. |
| | | | | 4. Design a steam nozzle for given condition and calculate nozzle efficiency. |
| | | | | 5. Compute efficiency and power developed by impulse and reaction turbines. |
| | | | | 6. Calculate vacuum, condenser efficiency, cooling water required for condensing and compare environmental pollution norms. |
| 94. | VI | ME3144 | Design of Machine Elements | 1. Apply the fundamentals for design and selection of materials for various elements. |
| | | | | 2. Design of joints for mechanical applications |
| | | | | 3. Design a simple machine component like shafts using theories of failure. |
| | | | | 4. Design the spring and power screw. |
| | | | | 5. Analyze a component subjected to fluctuating load. |
| | | | | 6. Design of gears for industrial applications. |
| 95. | VI | ME316 | Research Methodology | 1. Select, analyse and interpret research evidences published on a topic to establish a suitable research problem/issue or opportunity to explore further. |
| | | | | 2. Design the research study using a suitable paradigm, associated methodologies and methods of data collection and analysis. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Write a research proposal (research blueprint) describing the topic. |
| | | | | 4. Demonstrate the ability to use statistical software to solve problems |
| 96. | VI | ME322 | Industrial Robotics | 1. Explain the fundamental concepts of robots. |
| | | | | 2. Model forward and inverse kinematics of robot manipulators. |
| | | | | 3. Select end effector and sensor for particular application |
| | | | | 4. Write a program for a robot to perform tasks in industrial applications |
| 97. | VI | ME328 | Smart Material and Systems | 1. Describe the behaviour and applicability of various smart materials. |
| | | | | 2. Demonstrate the design methods of smart sensors and actuators. |
| | | | | 3. Model smart sensors and actuators for specific application. |
| | | | | 4. Demonstrate the techniques of fabrication of smart systems. |
| | | | | 5. Design simple smart system for specific application |
| 98. | VI | ME3304 | Engineering Acoustics | 1. Determine acoustic parameters of sound waves in decibel levels for pressure, power and intensity. |
| | | | | 2. Calculate sound levels 1-D wave for air-borne sound. |
| | | | | 3. Estimate absorption coefficient for different acoustic materials. |
| | | | | 4. Measure sound levels of any systems/product and reduce it up to audible range by using suitable method. |
| 99. | VI | ME3364 | Energy Conservation & Management | 1. Summarize energy scenario and the need for energy conservation. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2. Conduct energy audit of a system |
| | | | | 3. Illustrate various techniques of waste heat recovery and cogeneration. |
| | | | | 4. Identify energy conservation measures in various thermal utilities. |
| | | | | 5. Summarize different financial terms and techniques used in Energy Conservation |
| 100. | VI | ME3384 | Gas Turbine & Jet Propulsion | 1. Compare ideal and real cycles of gas turbines |
| | | | | 2. Illustrate different techniques used in jet propulsion |
| | | | | 3. Explain centrifugal compressor used in gas turbines and jet propulsion |
| | | | | 4. Design axial flow compressor used in gas turbines and jet propulsion |
| | | | | 5. Analyze combustion system of the gas turbines |
| | | | | 6. Evaluate the different turbines used in gas turbine and jet propulsion |
| 101. | VI | ME340 | Computational Fluid Dynamics (CFD) | 1. Derive governing equations for fluid dynamics and heat transfer. |
| | | | | 2. Develop finite difference implicit & explicit algorithms for fluid flow and heat transfer problems. |
| | | | | 3. Develop finite volume algorithms for fluid dynamics equations. |
| | | | | 4. Select appropriate grid generation methods for CFD analysis. |
| | | | | 5. Apply different CFD Techniques to various fluid flow problems |
| 102. | VI | ME3424 | Alternative Fuels | 1. Justify the need of alternative fuels for IC engines. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2. Select alternative fuels to IC engines |
| | | | | 3. Analyze engine performance using blended fuels |
| | | | | 4. Explain the working of electrical and solar-powered vehicles |
| 103. | VI | ME3484 | Computer Integrated Manufacturing | 1. Describe and classify computer-integrated manufacturing systems (CIMS) |
| | | | | 2. Explain the principle of operation of CNC machine |
| | | | | 3. Describe part family forming methods |
| | | | | 4. Perform quantitative analysis of Flexible Manufacturing Systems (FMS) |
| | | | | 5. Analyze various computer integrated planning and control techniques |
| | | | | 6. Explain the modern trends in Manufacturing like Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing. |
| 104. | VI | ME3504 | Total Productive Maintenance | 1. Explain the objectives of Total Productive Maintenance (TPM) |
| | | | | 2. Determine the Overall Equipment Effectiveness (OEE) |
| | | | | 3. Explain the 12 steps of TPM implementation |
| | | | | 4. Explain the Pillars of TPM. |
| | | | | 5. Describe Computerized Maintenance Management System (CMMS) |
| | | | | 6. Explain tools in TPM. |
| 105. | VI | ME3524 | Tool Engineering | 1. Explain the mechanism of metal cutting. |
| | | | | 2. Analyze the effect of various parameters such as process variables, cutting tool materials etc. on the performance of machining. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Explain the importance of the various elements of tool geometry of single and multi-point cutting tools. |
| | | | | 4. Design jigs and fixtures for given components. |
| | | | | 5. Design press tools for cutting and forming press working operations. |
| | | | | 6. Estimate machining cost. |
| 106. | VI | ME3544 | Industrial Organization and Management | 1. Recognize the factors that influence business environment and visualize their effect on business. |
| | | | | 2. Appraise the scope and objectives of functional areas of business and their integration. |
| | | | | 3. Formulate an effective and efficient solution for business problems. |
| | | | | 4. Identify several ways in which financial accounting information is used to make business decisions. |
| | | | | 5. Apply engineering economics principles for evaluation of a business |
| 107. | VI | ME364 | Supply Chain Management | 1. Explain key issues in the supply chain management. |
| | | | | 2. Develop a framework for network design decision. |
| | | | | 3. Describe the information required to produce an aggregate plan. |
| | | | | 4. Devise the inventory system. |
| | | | | 5. Develop appropriate strategic alliances |
| | | | | 6. Select methodologies to evaluate supply chain design decision |
| 108. | VI | ME368 | Robot Dynamics and Applications | 1. Identify various types of Robots for industrial applications with sound knowledge of the positioning system. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2. Explain the rigid body motion and its transformation mathematically. |
| | | | | 3. Solve and model the kinematics equations of various manipulator |
| | | | | 4. Solve and model the differential motion and dynamics of various manipulator configurations. |
| | | | | 5. Compute the collision-free trajectory planning. |
| | | | | 6. Identify the challenges and control problems in manipulator robotics |
| 109. | VI | OE3284 | **Supply Chain Management** | 1. Identify the role and key issues in the supply chain management. |
| | | | | 2. Select appropriate SC strategies under given situations. |
| | | | | 3. Design the inventory system and level at various locations in supply chain. |
| | | | | 4. Specify the distribution and transportation requirements. |
| | | | | 5. Develop appropriate strategic alliances for enhancing the performance of SC |
| | | | | 6. Describe different strategies used to mitigate risk in global supply chain |
| 110. | VI | OE3324 | Entrepreneurship Development | 1. Identify, analyze and select business opportunity |
| | | | | 2. Apply design thinking process for selected business idea. |
| | | | | 3. Prepare business model canvas for selected business idea and analyze it. |
| | | | | 4. Prepare business plan. |
| | | | | 5. Apply basic fundamental of finance, costing and accounting for selected project |
| | | | | 6. Formulate detailed project report and make appraisal of it |
| 111. | VI | OE356 | Project Management | 1. Explain concept of project Management, |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2. Prepare project analysis |
| | | | | 3. Prepare technical appraisal of selected project. |
| | | | | 4. Prepare financial appraisal of selected project. |
| | | | | 5. Apply different techniques for project management. |
| 112. | VI | ATMD302 | Electric Vehicles | 1. Articulate the need of EVs and HEVs in today's transportation context. |
| | | | | 2. Design an electric vehicle for given requirements. |
| | | | | 3. Design a hybrid electric vehicle for given requirements. |
| | | | | 4. Elaborate fuel cell technology for vehicular application |
| 113. | VI | CEMD302 | Environmental Engineering | 1. Explain importance of water and wastewater analysis for various parameters. |
| | | | | 2. Discuss impact of pollution on man, animal and plants. |
| | | | | 3. Prepare layout of water and wastewater treatment process. |
| | | | | 4. Design Water and Wastewater Treatment Plant. |
| | | | | 5. Apply AI tools for impact of humans on environment |
| 114. | VI | CSMD302 | Artificial Intelligence | 1. Understand the basic concepts and techniques of Artificial Intelligence. |
| | | | | 2. Apply AI algorithms for solving typical practical problems. |
| | | | | 3. Describe appropriate knowledge representation schemes in AI. |
| | | | | 4. Apply reasoning schemes in AI. |
| | | | | 5. Analyze the planning schemes for goal stack. |
| | | | | 6. Evaluate performance of solution for constraint satisfaction problem |
| 115. | VI | EEMD302 | Smart Grid | 1. Summarize the concept and future of smart grid |
| | | | | 2. Develop smart grid architecture |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Compile various smart grid technologies |
| | | | | 4. Identify communication and information technologies for smart grid |
| | | | | 5. Elaborate distributed generation and storage technologies |
| | | | | 6. Recommend smart metering and distribution automation |
| 116. | VI | ECMD302 | Industrial Electronics | 1. Identify basics Power Electronics devices and components. |
| | | | | 2. Illustrate use of Power Electronics. |
| | | | | 3. Develop PLC logic using ladder programming. |
| | | | | 4. Analyze industrial electronics applications. |
| 117. | VI | CIMD302 | Software Engineering | 1. Describe fundamental concepts in software engineering and project management |
| | | | | 2. Practice software process models for the undertaken software problems |
| | | | | 3. Design function-oriented and object oriented models using modern tools. |
| | | | | 4. Identify classes and build the domain model using advanced concepts in object, dynamic and functional modeling. |
| | | | | 5. Analyze existing software systems using function and object-oriented analysis. |
| | | | | 6. Design models using UML diagrams for software systems: use case, class, sequence, collaboration, activity, state chart diagrams, component and deployment |
| 118. | VI | MEMD302 | Power Plant Engineering | 1. Explain economics of power generation and energy scenario |
| | | | | 2. Explain improvisations in Rankine cycle and its effect on performance |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Analyze thermodynamics gas power cycles and effect of various parameter on efficiency. |
| | | | | 4. Analyze different techniques for improvement of efficiency of gas turbine plant |
| | | | | 5. Explain construction and working of nuclear power plants and its subsystems |
| | | | | 6. Explain construction and working of different renewable energy power plants |
| 119. | VI | MCMD302 | Industrial Robotics | 1. Explain the basic concepts of Robots. |
| | | | | 2. Select an end effector and sensor for application. |
| | | | | 3. Explain drives and controls for robotic system. |
| | | | | 4. Develop program for robot to perform tasks in industrial applications |
| 120. | VI | AIMD302 | Principles ofArtificial Intelligence | 1. Articulate basic concepts and techniques of Artificial Intelligence. |
| | | | | 2. Apply AI algorithms for solving typical practical problems. |
| | | | | 3. Designate appropriate knowledge representation schemes in AI. |
| | | | | 4. Analyze reasoning schemes in AI. |
| 121. | VI | SH3064 | Scholastic Aptitude-II | 1. Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | 2. Use the basic aptitude terms like percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | 3. Develop a bridge in analogies, series and visualizing directions. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 4. Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams |
| 122. | VI | ME3644 | Software Training Lab-II :ABAQUS | 1. Analyse the component from structural and thermal perspective and comment on the feasibility of obtained solutions. |
| | | | | 2. Compare the results of ABAQUS with other approaches like analytical and experimental results. |
| 123. | VI | ME3644 | Software Training Lab-II : HyperMesh | 1. Use simulation and analysis software in Mechanical Engineering. |
| | | | | 2. Develop solution for the Mechanical Engineering problems using simulation and analysis software |
| 124. | VI | ME3644 | Software Training Lab-II :Computational Fluid Dynamics | 1. Formulate problems in fluid flow and heat transfer. |
| | | | | 2. Apply initial and boundary conditions to solve heat transfer problems. |
| | | | | 3. Use ANSYS-Fluent for solving real life engineering problems |
| 125. | VI | ME3644 | Software Training Lab-II : ANSYS | 1. Apply finite element method to solve problems in solid mechanics and heat transfer. |
| | | | | 2. Formulate and solve problems in one dimensional structure including trusses, beams and frames. |
| | | | | 3. Choose proper element as per the application |
| 126. | VI | ME3664 | Applied Thermal Engineering Lab | 1. Explain the various thermodynamic process of thermal systems |
| | | | | 2. Perform the experimentation of thermal systems |
| | | | | 3. Analyse the performance of thermal systems |
| 127. | VI | ME3744 | Technical Aptitude-IV | 1. Apply the fundamental knowledge to solve the |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | mechanical engineering problems. |
| | | | | 2. Develop the ability of problem solving. |
| 128. | VI | ME3764 | Capstone project Phase I | 1. Convert an open-ended problem statement into a statement of work or a set of design specifications |
| | | | | 2. Identify the literature gap by conducting a survey of several available literature in the preferred field of study. |
| | | | | 3. Decompose the problem/task into subtasks, prioritizes subtasks, and establish a timetable and milestones by which progress may be evaluated. |
| | | | | 4. Select and apply the appropriate design of experiments, experimental setup, models, or simulation technique for the project task. |
| | | | | 5. Collaborates with team members of diverse backgrounds and perspectives to achieve a common goal. |
| | | | | 6. Produce usable documents of record regarding the design process and design state and communicate effectively. |
| 129. | VII | ME4014 | Industrial Engineering | 1. Apply various methods of method study and time study to improve productivity. |
| | | | | 2. Use value analysis technique in engineering projects. |
| | | | | 3. Select the plant location and design appropriate type of layout along with material handling system. |
| | | | | 4. Plan production activities using tool like capacity and aggregate planning |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5. Design the inventory system using appropriate inventory model |
| | | | | 6. Implement project management knowledge, tools and techniques to achieve project success. |
| 130. | VII | ME4113 | Engineering Acoustics | 1. Determine acoustic parameters in terms of decibel levels for pressure, power, intensity and impedance. |
| | | | | 2. Calculate sound levels by applying 1-d wave equation for air-borne and structure borne sound |
| | | | | 3. Estimate absorption coefficient for different acoustic materials. |
| | | | | 4. Measure sound levels for mechanical systems and reduce it up to audible range by using suitable method. |
| 131. | VII | ME4153 | Machine Tool Design | 1. Select & design proper transmission system for machine tool |
| | | | | 2. Decide layout of machine tool |
| | | | | 3. Select proper speed & feed boxes & design the same. |
| | | | | 4. Design machine tool structure-Bed, Columns & Housings, Select & Design Guide ways & slide ways, spindle. |
| | | | | 5. Determine dynamic characteristics of machine tool & carry stability analysis using FEA |
| | | | | 6. Design control systems in machine tools and SPM. |
| 132. | VII | ME4153 | Mechanical System Design | 1. Select brake and clutch based on functional requirements of automobile transmission systems. |
| | | | | 2. Calculate the stresses induced in pressure vessel subjected to various types of loading |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Apply design principles and obtain suitable dimensions for IC Engine components. |
| | | | | 4. Design the flat belt conveyor systems for suitable applications. |
| | | | | 5. Design the machine tool gear box for different speeds and torques at driven shaft. |
| | | | | 6. Apply statistical considerations for design. |
| 133. | VII | ME4173 | Alternative Fuels | 1. Justify the need of alternative fuels for IC engines |
| | | | | 2. Select alternative fuels to IC engines |
| | | | | 3. Analyze engine performance using blended fuels |
| | | | | 4. Explain the working of electrical and solar- powered vehicles |
| 134. | VII | ME4192 | Cryogenics | 1. Summarize the applications of low temperature engineering in various fields. |
| | | | | 2. Discuss the properties of materials and cryogenic fluids at low temperature. |
| | | | | 3. Compare cryogenic Liquefaction systems. |
| | | | | 4. Describe Cryogenic Refrigeration and Measurement Systems. |
| | | | | 5. Calculate performance of gas separation systems. |
| | | | | 6. Explain the methods of fluid storage, transfer, insulation and vacuum technology in cryogenics. |
| 135. | VII | ME4213 | Solar Energy | 1. Explain energy scenario and necessity of solar energy |
| | | | | 2. Illustrate basic of solar radiation |
| | | | | 3. Explain effect of solar energy transmission on various structures / surfaces. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 4. Design and compare solar collector |
| | | | | 5. Write different application of solar energy |
| | | | | 6. Explain various solar electric conversion system |
| 136. | VII | ME4232 | Industrial Automation and Robotics | 1. Explain manufacturing automation. |
| | | | | 2. Analyze transfer lines for its efficiency and effect of break downs |
| | | | | 3. Analyze automated assembly lines for its efficiency and effect of defective components |
| | | | | 4. Analyze forward and reverse kinematics of robot. |
| | | | | 5. Perform economic analysis of robot |
| 137. | VII | ME4253 | Production and operations Management | 1. Select appropriate production and operation strategies based on situation |
| | | | | 2. Plan the capacity based on the demand pattern and prepare the manufacturing schedule based on the production plan |
| | | | | 3. Apply Lean tools for manufacturing and services operation |
| | | | | 4. Implement recent production management trends like just in philosophy and lean manufacturing in manufacturing field |
| | | | | 5. Apply engineering economics, principles for managing production function |
| 138. | VII | ME4313 | Mechanical Vibrations | 1. Define and use the fundamental terms of vibration in design. |
| | | | | 2. Find natural frequencies and mode shapes of 2DOF and Multi DOF systems. |
| | | | | 3. Describe methods of vibration control. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 4. Select instrument and transducers for vibration measurement |
| | | | | 5. Analyze and interpret vibration data. |
| 139. | VII | ME4333 | Experimental Mechanics | 1. Select the appropriate method of stress analysis to solve the mechanical engineering problem |
| | | | | 2. Apply the concept of transmission photo elesticity and determine the principle stress and direction at the critical point |
| | | | | 3. Use the principle of three dimensional photo elasticity and estimate the state of stress |
| | | | | 4. Evaluate pertinent stress detail at a point by employing stress frizzing and slicing technique in the three dimensional component |
| | | | | 5. Determine stress and strain by using photo elastic coating or brittle coating technique |
| | | | | 6. Design the experimental methodology to measure the strain by using strain gauge technology |
| 140. | VII | ME4352 | Automobile Engineering | 1. Explain anatomy of an automotive vehicle with location of different parts and systems |
| | | | | 2. Expound various configurations of transmission systems and auxiliary components |
| | | | | 3. Compute different performance parameters of an automobile |
| | | | | 4. Differentiate between various types of braking system with its specific features |
| | | | | 5. Explain various steering and suspension system. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 6. Elucidate working of automotive electronic components and electrical systems. |
| 141. | | ME4373 | I. C. Engine | 1. Differentiate between various configuration of engine and draw valve timing and port timing diagram |
| | | | | 2. Analyse and differentiate between theoretical air standards, theoretical fuel air and actual cycles |
| | | | | 3. Calculate the design and operating parameters of fuel-supply system of SI engine and analyses mixture requirement at different loads and speeds |
| | | | | 4. Compare different types of ejection systems and calculate quantity of fuel and size of nozzle orifice |
| | | | | 5. Explain the stages of combustions I SI and CI engines and effect of various operating parameters on combustion |
| | | | | 6. Explain methods of Measurement different performance parameters and prepare heat balance sheet |
| | | | | 7. Recognize alternative fuels for IC engines with properties and compare different pollution norms |
| | | | | 8. Correlate various resent trends in IC Engines |
| 142. | VII | ME4393 | Refrigeration and Air Conditioning | 1. Apply basic laws to analyze various types of refrigeration systems |
| | | | | 2. Determine the psychometric properties of moist air |
| | | | | 3. Calculate the cooling load of given building/application |
| | | | | 4. Select the fan for given application |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5. Design a duct for given air conditioning application |
| | | | | 6. Choose the suitable AHU component such as air inlet, outlet devices etc. |
| 143. | VII | ME4413 | Mechatronics System Design | 1. Demonstrate the importance of integration of Mechanical, Electronics, computers and control in the design of Mechatronics system. |
| | | | | 2. Describe/identify key elements of sensors and transducers and techniques of interfacing with PLC, Microprocessor, Microcontroller etc. |
| | | | | 3. Apply a systematic approach to the design process for Mechatronics systems. (Concurrent engineering). |
| | | | | 4. Create system modeling of basic models and analyze. |
| | | | | 5. Demonstrate the practical application of mechatronics systems in areas such as manufacturing, automobile systems and robotics. |
| | | | | 6. Develop the capacity to think creatively and independently about new design problems and challenges. |
| 144. | VII | ME4433 | Manufacturing Simulation | 1. Explain concepts of Modelling and simulation |
| | | | | 2. Develop model frameworks for discrete –event simulation |
| | | | | 3. Analyze input and output data of simulation model |
| | | | | 4. Construct software models for manufacturing, logistics and material handling problems |
| | | | | 5. Develop simulation model for a system and verify, validate the model |
| 145. | VII | ME4453 | | 1. To select the proper casting technique |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | Casting Design and Simulation | 2. To develop casting process for new product |
| | | | | 3. To design the gating / risering system for casting |
| 146. | VII | ME4053 | Industrial Engineering and Quality Control Lab | 1. Perform work and method study at given work station by using suitable industrial engineering tools. |
| | | | | 2. Design the work system for the given application |
| | | | | 3. Apply inventory management principles for controlling the inventory |
| | | | | 4. Conduct process capability analysis |
| | | | | 5. Use modern tools and techniques for solving industrial engineering problems. |
| 147. | VII | ME4073 | Advanced Machining Lab | 1. Develop CNC program and simulate it on CNC Simulation Software for a given job. |
| | | | | 2. Perform Set-up operation for CNC Turning Operations. |
| | | | | 3. Produce a job with given specifications on CNC Turning Machine. |
| | | | | 4. Perform Set-up operation for CNC Milling Operations. |
| | | | | 5. Produce a job with given specifications on CNC Milling Machine. |
| 148. | VII | ME4493 | Software Training-II | 1. Use simulation and analysis software in Mechanical Engineering. |
| | | | | 2. 2. Develop solution for the Mechanical Engineering problems using simulation and analysis software. |
| 149. | VII | ME4553 | Mechanical Vibrations Lab | 1. Estimate natural frequencies and mode shapes of given machine component. |
| | | | | 2. Find modal parameters of vibratory system. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Control the vibration by using principle of DVA. |
| | | | | 4. Use vibration measurement technique for fault diagnosis and machinery health monitoring |
| 150. | VII | ME4573 | Experimental Stress Analysis Lab | 1. Use Photo elastic technique to measure state od stress in the machine component |
| | | | | 2. Apply strain gauge technique to determine state of strain at the critical location in the structural member |
| 151. | VII | ME4593 | Automobile Engineering Lab | 1. Explain the structure of an automobile. |
| | | | | 2. Describe and Design transmission systems of an automobile. |
| | | | | 3. Demonstrate and select different types of an automobile systems. |
| | | | | 4. Test wheel balancing and wheel alignment. |
| | | | | 5. Model any automobile system/component |
| 152. | VII | ME4613 | I. C. Engine Lab | 1. Recognize the various parts, systems of IC engine, and disassemble IC engine |
| | | | | 2. Perform various tests on different engines: plot various operating characteristics and compare it with standards. |
| | | | | 3. Demonstrate and differentiate between fuel system of SI and CI engines. |
| | | | | 4. Measure and correlate various engine emission with standards |
| 153. | VII | ME4633 | Refrigeration and Air Conditioning | 1. Analyze the performance of various refrigeration system and air conditioning system / process |
| | | | | 2. Plot various refrigeration system and air conditioning processes using charts and tables. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Trouble shoot the refrigeration system and air conditioning system |
| 154. | VII | ME4653 | Mechatronics System Lab | 1. Demonstrate/select proper types of sensors/transducers for given task. |
| | | | | 2. Design signal conditioning circuits for various signal conditioning processes like signal level change, signal form change, filters, bridge circuits etc. |
| | | | | 3. Demonstrate ability of control and automation of simple devices such as motors, cylinders using PLC. |
| | | | | 4. Demonstrate the ability to create microcontroller programs and properly |
| 155. | VII | ME4673 | Manufacturing Simulation Lab | 1. Describe the nature of discrete-event simulation and the types of simulation models |
| | | | | 2. Illustrate the board applicability of discrete-event simulation to solve basic manufacturing systems problems. |
| | | | | 3. Design model considering as per constraints given |
| | | | | 4. Simulate the essential steps of the simulation methodology & interpret the result |
| 156. | VII | ME4673 | Casting Design and Simulation Lab | 1. Develop/Select appropriate orientation of the casting & parting plane |
| | | | | 2. Calculate modulus of casting & number of cavities in the mold |
| | | | | 3. Calculate of riser & gating system design |
| | | | | 4. Calculate the yield of the casting |
| 157. | VII | ME4323 | Material Handling Systems | 1. Explain the flow and type of movement of industrial goods |
| | | | | 2. Apply general rules for |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. the type of movement, and |
| | | | | 4. Identify the appropriate material handling systems to suit the said requirement |
| | | | | 5. Explain current trends in material handling. |
| 158. | VII | ME4343 | Aircraft Conceptual Design | 1. Understand the design process of aircraft and decide the aircraft configuration. |
| | | | | 2. Choose type of power plant as per flight regime. |
| | | | | 3. Decide the fuselage layout as per type of aircraft. |
| | | | | 4. Design the wing for type of aircraft and its wing loading. |
| | | | | 5. Accurately evaluate lift, drag and mass for design synthesis process. |
| | | | | 6. Examine the influence of various design requirements on the configuration of an aircraft to derive an optimized design. |
| 159. | VII | ME4363 | Process Equipment Design | 1. Apply the role of design engineer in designing procedures of various process equipments. |
| | | | | 2. Design important components like flange coupling, heat transfer equipment, Distillation columns, absorber, extractor. |
| | | | | 3. Develop the heat exchanger data sheet and test the design for safety. |
| | | | | 4. Design storage vessels, pressure vessels and various parts of vessels to apply key criteria involved in the design of internal pressure vessels as per IS code. |
| | | | | 5. Develop relation between equipment design, safety and environment. |
| 160. | VII | ME4383 | | 1. Comprehensive fundamental and technical knowledge of sensors and transducers used in |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | Autotronics and Vehicle Intelligence | auto vehicles and vehicle intelligence |
| | | | | 2. Ability to understand, analyze and use various SI and CI management systems. |
| | | | | 3. Become familiar with advanced comfort and safety systems and electric hybrid vehicles. |
| | | | | 4. To acquire the knowledge in intelligent technologies applied in modern automotive systems |
| 161. | VII | ME4403 | Special Purpose Vehicles | 1. Explain special purpose vehicle and different systems used in them |
| | | | | 2. Understand constructional & working features of earth moving machines |
| | | | | 3. Select instruments for special purpose vehicles |
| | | | | 4. Understand farm tractors and working features of farm equipments |
| | | | | 5. Understand mobile cranes & it's working |
| | | | | 6. Understand tracking, articulated and multi – axle vehicles. |
| 162. | VII | ME4423 | Hybrid & Electrical Vehicles | 1. Understand the need of hybrid vehicles in today's context |
| | | | | 2. Understand working of electric Vehicles and recent trends |
| | | | | 3. Describe design steps of a hybrid vehicle for given requirements |
| | | | | 4. Explain hybrid drive trains |
| | | | | 5. Discuss different Energy sources and drives required for hybrid vehicles. |
| | | | | 6. Discuss fuel cell technology for hybrid vehicle application |
| 163. | VII | ME4443 | Cogeneration and Waste Heat Recovery | 1. Summaries energy scenario and need for energy conservation |
| | | | | 2. Illustrate various techniques of waste heat recovery |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3. Describe the various methods of cogeneration |
| | | | | 4. Explain the various measures for energy conservation and financial applications for various thermal utilities |
| 164. | VII | ME4463 | Total Quality Management | 1. Explain principles of TQM and contribution of TQM Gurus. |
| | | | | 2. Select appropriate tools and techniques for controlling, improving and measuring quality |
| | | | | 3. Apply DMAIC process of six sigma for the quality improvements |
| | | | | 4. Appraise the organizational, Communication and teamwork requirements for effective quality management |
| | | | | 5. Use statistical tools for quality Control |
| | | | | 6. Select suitable Quality Management System for the given industry |
| 165. | VII | ME4483 | Microelectromechanical Systems (MEMS) | 1. Discuss basics, nature and applications of MEMS and Microsystem for various Fields |
| | | | | 2. Identify and select specific material for manufacturing of MEMS and its packaging |
| | | | | 3. Analyze and select the different techniques in MEMS technology as per requirement of application |
| | | | | 4. Choose micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process |
| | | | | 5. Design and develop MEMS for various applications |
| | | | | 6. Design packaging of MEMS as per requirement |
| 166. | VIII | OE4361 | | 1. Develop administrative, organizational and planning |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | Engineering Management & Economics (Online Course) | skills to execute engineering project. |
| | | | | 2. Develop bar chart/mile stone chart for the project. |
| | | | | 3. Analyze profit/cost data and carry out economic analysis to take optimal decision. |
| | | | | 4. Calculate depreciation as per various methods. |
| 167. | VIII | OE4381 | Finance for Engineers (Online Course) | 1. Discuss the fundamental aspects of accounting and finance. |
| | | | | 2. Apply rules of accounting while recording transactions. |
| | | | | 3. Prepare financial statements and analyze financial position of the firm by applying various techniques. |
| | | | | 4. Describe the various long term sources of finance available for the business organization. |
| 168. | VIII | IP4023 | Internship & Project | **1. Internship** |
| | | | | 1. Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services) |
| | | | | 2. Develop an attitude to adjust with the company culture, work norms, code of conduct. |
| | | | | 3. Recognize and follow the safety norms, Code of conduct. |
| | | | | 4. Demonstrate the ability to observe, analyse and document the details as per the industry practices. |
| | | | | 5. Interpret the processes, systems and procedures and to relate to the theoretical concepts-studies. |
| | | | | 6. Develop the leadership abilities, communication. |
| | | | | 7. Demonstrate project management and finance sense |
| | | | | **2. Project** |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 1. Identify the project/problem in the domain of a program relevant for the company. |
| | | | | 2. Compile the information to the pertaining to the problem identified. |
| | | | | 3. Analyze the information using the statistical tools/ techniques. |
| | | | | 4. develop the feasible solution for given problem. |
| | | | | 5. Analyze the impact of the project on the performance of company/department. |
| 169. | VIII | RE4043 | Research Project | 1. Investigate the technical literature. |
| | | | | 2. Recognize and evaluate theories, practices, and/or research on a chosen topic by conducting a thorough literature review and submitting a written integrative, critical summary of the current literature. |
| | | | | 3. Design a research problem and develop a methodology. |
| | | | | 4. Develop and implement an advanced original research or creative project. |
| | | | | 5. Develop the ability to explain the conceptual viability of the project and describe the major components involved. |
| | | | | 6. Develop the ability to explain how the project will impact the relevant body of work. |
| | | | | 7. Develop advanced discipline-relevant skills and competencies. |
| | | | | 8. Construct an accurate record of research performed. |
| | | | | 9. Write a research report and paper. |
| 170. | VIII | ED4103 | Project Management | 1. Prepare business Plan for selected business. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2. Make risk analysis & market analysis of selected project. |
| | | | | 3. Make risk analysis & market analysis of selected project |
| | | | | 4. Make financial appraisal of selected project. |
| 171. | VIII | ED4043 | Commercial Aspects of the Project | 1. Interpret basic Financial Terminologies. |
| | | | | 2. Prepare & analyze financial statements. |
| | | | | 3. Prepare financial Plan for venture. |
| | | | | 4. Apply basic principles of marketing for various products. |
| | | | | 5. Prepare market survey. |
| | | | | 6. Apply knowledge of marketing management for selected business. |
| 172. | VIII | ED4063 | Entrepreneurship Development Program (EDP) | 1. Apply knowledge of engineering, economics, marketing and finance for formulation of business plan, starting & managing new business. |
| 173. | VIII | ED4083 | Entrepreneurship Development Project | 1. Apply knowledge of engineering, economics, marketing and finance for preparation of project report. |
| | | | | 2. Make commercial, technical and financial appraisal of project. |

- **Department Name: Mechanical Engineering Department**
- **PG Program Name: M. Tech Design Engineering**
- **Vision:**

  To transform the department into center of excellence by synergizing teaching, learning and research to produce globally competent, innovative and entrepreneurial Mechanical Engineers

- **Mission**

- To develop state-of–the-art facilities to stimulate faculty, staff and students to create, analyze, apply and disseminate knowledge.

- To build the competency to transform students into globally competent mechanical engineers by imparting quality education.

- To collaborate with research organizations, reputed educational institutions, industries and alumni for excellence in teaching, research and consultancy practices

| Sr. No. | Program Outcomes |
|---|---|
| 1. | Independently carry out research /investigation and development work to solve practical problems. |
| 2. | Write and present a substantial technical report/document |
| 3. | Demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program |
| 4. | Accomplish collaborative and multi-disciplinary scientific research with consideration of professional, legal, and ethical issues. |
| 5. | Manage the projects and its financial aspects on the strength of engineering knowledge and management principles. |
| 6. | Engage in lifelong learning to address contemporary issues through independent and reflective learning. |

**Programme Educational Objective (PEO):**

**PEO1**: - Students will apply knowledge of design engineering to pursue successful career in the field of Mechanical Engineering.

**PEO2**: - Students will become innovators, entrepreneurs to design and develop products and services to address social, technical and business challenges.

**PEO3**: - Students will engross in lifelong learning such as higher studies, research and

other continuous professional development activities.

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1 | I | MDE1016 | Advanced Solid Mechanics | Co:1 Analyze mechanical components based on stress and strain point of view. |
| | | | | Co:2 Formulate constitutive matrix for isotropic materials and establish the relationship between elastic constants. |
| | | | | Co:3 Use energy methods to solve structural problem. |
| | | | | Co:4 Select appropriate analogy like membrane, fluid flow, electrical to solve torsion problem. |
| | | | | Co:5 Design pressure vessel and rotating disks under given constraints |
| | | | | Co:6 Evaluate deformation and stresses between two contact bodies with point and line contact. |
| 2 | I | MDE1026 | Finite Element Methods | Co:1 Apply the knowledge of mathematics and engineering to solve problems in stripped structural and thermal engineering by approximate and numerical methods |
| | | | | Co:2 Solve problems in 1-D structural systems involving bars, trusses, beams, and frames. |
| | | | | Co:3 Develop 2-D and 3-D FE formulations involving triangular, quadrilateral elements and higher order elements. |
| | | | | Co:4 Apply the knowledge of FEM for stress analysis, model analysis, heat transfer analysis and flow analysis. |
| | | | | Co:5 Develop algorithms and FE code for solving design problems and adapt commercial packages for complex problems |
| 3 | I | MDE1036 | Computer Aided Design | Co:1 Describe the principles of CAD systems, the implementation of these principles, and its connections to CAM and CAE systems. |
| | | | | Co:2 Demonstrate 2D, 3D transformations and projection transformations. |
| | | | | Co:3 Describe various approaches of geometric modelling. |
| | | | | Co:4 Represent 2D and 3D entities mathematically. |
| 4 | I | MDE1046 | Mechanics of Composite | Co:1 Understand the basic concepts and difference between composite materials with conventional materials. |

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| | | | Materials (Programme Elective - I) | Co:2 Apply the knowledge of constituent materials in defining the average properties and response of composite materials on macroscopic level. |
| | | | | Co:3 Apply knowledge for finding failure envelopes and stress-strain plots of laminates. |
| | | | | Co:4 Develop a clear understanding to utilize subject knowledge using computer programs to solve problems at structural level. |
| 5 | I | MDE1056 | Design for Manufacturing & Assembly (Programme Elective - I) | Co:1 Apply the proper manufacturing process to a new product development process. |
| | | | | Co:2 Identify the factors contributing reduction in assembly time and to incorporate assembly & disassembly guidelines in product design. |
| | | | | Co:3 Utilize reliability concepts, failure analysis tools and techniques and accelerated life test methods for improving product life cycle. |
| | | | | Co:4 Calculate the factors controlling cost and time required for the product maintenance and utilize this information for design for maintenance. |
| 6 | I | MDE1066 | Experimental Mechanics (Programme Elective - I) | Co:1 Determine direction and magnitude of principal stresses by using various techniques of Experimental Stress Analysis. |
| | | | | Co:2 Solve two and three dimensional problems of stress-strain analysis in the field of mechanical engineering. |
| | | | | Co:3 Formulate solutions using digital image processing technique. |
| 7 | I | MDE1076 | Reliability Engineering (Programme Elective - I) | Co:1 Apply the concepts of Reliability, Availability and Maintainability. |
| | | | | Co:2 Develop hazard-rate models to know the behaviour of components. |
| | | | | Co:3 Build system reliability models for different configurations. |
| | | | | Co:4 Assess reliability of components and systems using field and test data. |
| | | | | Co:5 Implement strategies for improving reliability of repairable and non-repairable systems |
| 8 | I | MDE1291 | Reverse Engineering and Benchmarking (Programme Elective - I) | Co:1 Interpret the Reverse Engineering (RE) Methodology |
| | | | | Co:2 Appraise the Computer Aided Reverse Engineering Technology |
| | | | | Co:3 Design experiments to evaluate a Reverse Engineering tool |
| | | | | Co:4 Analyse disassemble products and specify the interactions between its subsystems and their functionality |

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| 9 | I | MDE1086 | Advanced Engineering Materials (Programme Elective - II) | Co:1 Analyse the importance of various engineering materials (metals, polymers, ceramics, composites, Semi-conductor). |
| | | | | Co:2 Recite polymers, ceramics and composites, their manufacturing techniques, properties and applications. |
| | | | | Co:3 Propose appropriate ceramics, glass, plastics and polymers for different applications. |
| | | | | Co:4 Understand and apply Electrical, Thermal, Optical and Magnetic Properties of metals, ceramics, polymers and composites for various applications. |
| | | | | Co:5 Adapt economic considerations in usage and recycling of materials in human use. |
| | | | | Co:6 Apply nano materials and nanocomposites for various applications. |
| 10 | I | MDE1096 | Industrial Tribology (Programme Elective - II) | Co:1 Determine tribological parameters of mechanical systems analytically by using suitable theories of friction and theories of wear. |
| | | | | Co:2 Select hydrostatic step bearing for real life application in mechanical engineering based on axial load applied and lubricant available. |
| | | | | Co:3 Calculate the maximum load carrying capacity and pressure equation for hydrodynamic thrust bearing by using engineering principles. |
| | | | | Co:4 Evaluate elasto-hydrodynamic lubrication occurred in gears, cams and rolling element bearing by using hertz and ertel-grubin equation. |
| | | | | Co:5 Estimate pressure distribution in gas lubricated bearings by applying reynolds equation for gas lubrication within elastic limits. |
| 11 | I | MDE1106 | Advanced Mathematical Methods in Engineering (Programme Elective - II) | Co:1 Evaluate Fourier Series for given function and apply it to solve the partial differential equations in Engineering problems. |
| | | | | Co:2 Apply the specific method of solution of partial differential equations for solving the given problems |
| | | | | Co:3 Formulate and solve a boundary value problem (Partial differential equation, boundary and initial conditions). |
| | | | | Co:4 Estimate numerically the solution of given algebraic equation. |
| 12 | I | MDE1116 | Smart Materials and Systems (Programme Elective - II) | Co:1 Describe the behaviour and applicability of various smart materials. |
| | | | | Co:2 Demonstrate knowledge of the physical principles underlying the behaviour of smart materials. |
| | | | | Co:3 Describe the basic principles and mechanisms of the stimuli-response for the most important smart materials. |

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| | | | | Co:4 Design simple models for smart structures & materials. |
| 13 | I | MDE1301 | Safety Engineering and Management (Programme Elective - II) | Co:1 List out and describe the various functions and activities of safety engineering department. |
| | | | | Co:2 Provide knowledge on design features for a process industry and safety in the operation of various equipment in industry |
| | | | | Co:3 Carry out a safety audit and prepare a report for the audit. |
| | | | | Co:4 Prepare an accident investigation report and estimate the cost due to accident. |
| | | | | Co:5 Evaluate the safety performance of an organization from accident records. |
| | | | | Co:6 Identify various agencies, support institutions and government organizations involved in safety training and promotion. |
| 14 | I | MDE1126 | Stress Analysis Software Lab | Co:1 Solve 1D, 2D and 3D structural analysis problems using the ANSYS software |
| | | | | Co:2Evaluate dynamic behavior of components |
| | | | | Co:3Appraise Linear buckling concept in Design of members which are succumbed to buckling |
| | | | | Co:4 Solve structural analysis problems subjected to fatigue load. |
| | | | | Co:5 Appraise steady state and transient thermal concept in design of members. |
| | | | | Co:6 Apply basics of MATLAB programming for Engineering applications. |
| 15 | I | MDE1136 | Design Engineering Lab-I | Co:1 Determine and analyze the stresses and strains in machine component. |
| | | | | Co:2 Analyze the stresses and strains on combined bending and torsion. |
| | | | | Co:3 Experiment on demonstration of photoelastic techniques. |
| | | | | Co:4 Calibration of the photoelastic constant, determination of the stress field in a beam under bending. |
| | | | | Co:5 Determine stress and strain fields using DIC. |
| | | | | Co:6 Measure friction and wear using pin on disc. |
| | | | | Co:7 Find lubricant properties using 4-ball tester. |
| 16 | I | SHP5512 | Technical Communication | Co:1 Use grammatically correct sentences in different types of technical writings. |
| | | | | Co:2 Apply technical writing skills to improve readability of documents. |
| | | | | Co:3 Demonstrate professional skills required in job interviews and at workplace. |
| 17 | II | MDE1146 | Mechanical Vibrations | Co:1 Derive and interpret equation of motions of multi-degrees of freedom systems. |

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| | | | | Co:2 Derive and interpret equation of motions of continuous systems. |
| | | | | Co:3 Derive and interpret response of the system subjected to Transient vibrations. |
| | | | | Co:4 Analyze the systems with Non-linear vibrations. |
| | | | | Co:5 Select suitable instrument and transducers for vibration measurement. |
| 18 | II | MDE1156 | Advanced Design of Mechanisms | Co:1 Design mechanism to meet certain motion as per defined application. |
| | | | | Co:2 Apply the graphical and analytical techniques commonly used in the synthesis of mechanisms. |
| | | | | Co:3 Design higher pair kinematic linkages for a given applications. |
| 19 | II | MDE1166 | Acoustics and Noise Control (Programme Elective - III) | Co:1 Determine acoustic parameters in terms of decibel levels for pressure, power, intensity and impedance. |
| | | | | Co:2 Formulate 1- d wave equation for air-borne sound. |
| | | | | Co:3 Estimate absorption coefficient for different acoustic materials. |
| | | | | Co:4 Measure sound levels for mechanical systems and reduce it up to audible range by using suitable method. |
| 20 | II | MDE1176 | Fracture Mechanics (Programme Elective - III) | Co:1 Apply the basic principles of Linear elastic fracture mechanics. |
| | | | | Co:2 Design the engineering components using elastic-plastic fracture mechanics principles. |
| | | | | Co:3 Explain the process of crack growth and arrest in the presence of creep. |
| | | | | Co:4 Compare the fracture behavior in metals and non-metals. |
| | | | | Co:5 Analyze the crack growth under fatigue loading. |
| | | | | Co:6 Choose the suitable computational fracture mechanics approach to solve the real mechanical engineering problem. |
| 21 | II | MDE1186 | Product Design and Development (Programme Elective - III) | Co:1 Explore and analyse product development processes used in product design and development. |
| | | | | Co:2 Apply various product development techniques. |
| | | | | Co:3 Analyse, evaluate and apply design consideration like concurrent engineering, aesthetic and ergonomics for industrial product design. |
| | | | | Co:4 Apply different methods, tools and technique to create new product design for consumer product. |
| 22 | II | MDE1196 | Additive Manufacturi | Co:1 Describe the Importance of AM technologies in Manufacturing. |

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| | | | ng (Programme Elective - III) | Co:2 Classify and select additive manufacturing processes for a given application. |
| | | | | Co:3 Design for manufacture for AM and carry out Process Analysis. |
| | | | | Co:4 Point out the software issues addressed in additive manufacturing process. |
| | | | | Co:5 Identify the Different methods for Post-processing of AM parts. |
| | | | | Co:6 Suggest the Applications of AM in Automobile, Aerospace, and Bio-medical etc. |
| 23 | II | MDE1311 | Design of Pressure Vessels and Piping (Programme Elective - III) | Co:1 Apply the design consideration of pressure vessel. |
| | | | | Co:2 Design the support of the pressure vessel. |
| | | | | Co:3 Design nozzle for pressure vessel. |
| | | | | Co:4 Design piping system for pressure vessel. |
| 24 | II | MDE1206 | Rotor Dynamics (Programme Elective - IV) | Co:1 Model the Rotor bearing systems and formulate the governing equations. |
| | | | | Co:2 Describe the role of damping, gyroscopic, centrifugal, stiffness and inertial effects on rotors |
| | | | | Co:3 Compute the critical speeds and stability limits for rotors under axial, transverse and torsional modes |
| | | | | Co:4 Analyse the rotor bearing systems using transfer matrix method and Finite Element Method. |
| | | | | Co:5 Compute the transient response of rotors. |
| 25 | II | MDE1216 | Design for Optimization (Programme Elective - IV) | Co:1 Identify and apply mathematical models in optimization method. |
| | | | | Co:2 Recognize the suitable method of optimization in nonlinear programming with and without constraints. |
| | | | | Co:3 Apply optimization method for static and dynamic applications. |
| | | | | Co:4 Apply knowledge of design of experiment to complex system. |
| | | | | Co:5 Use genetic algorithm, ANN and Fuzzy logic to optimize various design parameters. |
| 26 | II | MDE1226 | Robotics (Programme Elective - IV) | Co:1 Comprehend basic terminologies and concepts associated with Robotics and Automation. |
| | | | | Co:2 Demonstrate comprehension of various Robotic sub-systems. |
| | | | | Co:3 Compute kinematics and dynamics to explain exact working pattern of robots. |
| | | | | Co:4 Design and select robots for Industrial and Non - Industrial applications. |

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| 27 | II | MDE1236 | Multi-Body Dynamics (Programme Elective - IV) | Co:1 Derive equations of motion for interconnected bodies in multi-body systems with three dimensional motion. |
| | | | | Co:2 Implement and analyze methods of formulating equations of motion for interconnected bodies. |
| | | | | Co:3 Write programs to solve constrained differential equations for analyzing multi-body systems. |
| | | | | Co:4 Simulate and analyze all types of static and dynamic behaviours of the multi-body systems. |
| | | | | Co:5 Lead team projects in academic research or the industry that require modelling and simulation of multi-body systems. |
| 28 | II | MDE1321 | Process Equipment Design | Co:1 Apply the role of design engineer in designing procedures of various process equipments. |
| | | | | Co:2 Design of pressure vessels as per standard codes. |
| | | | | Co:3 Develop the process equipments and test the design for safety. |
| | | | | Co:4 Apply the procedure for the planning of erection of process equipments. |
| 29 | II | MDE1246 | Research Methodology & IPR | Co:1 Formulate a research problem. |
| | | | | Co:2 Analyse research related information. |
| | | | | Co:3 Prepare and present research proposal/paper by following research ethics. |
| | | | | Co:4 Make effective use of computers and computing tools to search information, analyze information and prepare report. |
| | | | | Co:5 Describe nature and processes involved in development of intellectual property rights. |
| 30 | II | MDE1266 | Design Engineering Lab II | Co:1 Estimate natural frequency, damping factor, modal density of given component experimentally. |
| | | | | Co:2 Find experimental mode shapes of plates. |
| | | | | Co:3 Predict fault of machine by vibration and sound measurement**.** |
| | | | | Co:4 Solve and interpret the vibration engineering problems by using MATLAB codes. |
| 31 | II | MDE134 | Numerical Computation in MATLAB | Co:1 Apply basics of MATLAB programming for Engineering applications. |
| | | | | Co:2 Compute differentiation of single variable using MATLAB. |
| | | | | Co:3 Solve Numerical Integration problems using MATLAB. |
| | | | | Co:4 Solve Linear and Non Linear equations using MATLAB. |
| | | | | Co:5 Solve Linear Least Square Regression problems using MATLAB. |

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| | | | | Co:6 Solve Ordinary Differential Equation using MATLAB |
| 32 | II | MDE1276 | Mini Project | Co:1 Identify structural engineering problems reviewing available literature. |
| | | | | Co:2 Study different techniques used to analyze complex structural systems. |
| | | | | Co:3 Work on the solutions given and present solution by using his/her technique applying engineering principles. |
| 33 | II | MDE1286 | Seminar | Co:1 Survey the literature such as books, national/international refereed journals and contact resource persons for the selected topic of Seminar. |
| | | | | Co:2 Learn to write technical reports. |
| | | | | Co:3 Develop oral and written communication skills to present and defend their work in front of Department Post Graduate Committee. |
| 34 | II | SHP553 | Framework of Indian Constitution | Co:1 Realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution. |
| | | | | Co:2 Identify the importance of fundamental rights as well as fundamental duties. |
| | | | | Co:3 Understand the functioning of Union, State and Local Governments in Indian federal system. |
| | | | | Co:4 Learn procedure and effects of emergency, composition and activities of election commission and amendment procedure. |
| 35 | III | MDE2016 | Industry Internship | Co:1 Identify the real applications and practices of courses studied, at industry level |
| | | | | Co:2 Recognize various modeling, analysis and validation techniques adopted at industries |
| | | | | Co:3 Demonstrate the issues at design, manufacturing and assembly levels |
| | | | | Co:4 Summarize and present technical data in report format. |
| 36 | III | MOE2011 | Artificial Intelligence – Machine Learning (Open Elective) | Co:1 Describe central machine learning methods and techniques and how they relate to artificial intelligence. |
| | | | | Co:2 Differentiate between supervised and unsupervised learning techniques. |
| | | | | Co:3 Apply the ML algorithms to a real-world problem. |
| | | | | Co:4 Optimize the models learned and report on the expected accuracy that can be achieved by applying the models. |
| | | | | Co:5 Evaluate a given problem and apply appropriate machine learning technique. |

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| 37 | III | MOE2021 | Creative Thinking: Tools & Techniques (Open Elective) | Co:1 Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios. |
| | | | | Co:2 Apply different brainstorming techniques in group activities. |
| | | | | Co:3 Be proficient in the application of the 6 thinking hats tool in different life scenarios. |
| | | | | Co:4 Develop a systematic approach to idea generation through the use of morphological analysis. |
| | | | | Co:5 Innovate on an existing product, service or situation applying the SCAMPER method. |
| | | | | Co:6 Get confident with the theory of inventive problem solving, called TRIZ. |
| 38 | III | MOE2031 | MOOC Course (Open Elective) | Co:1 Identify the real applications and practices of courses studied, at industry level |
| | | | | Co:2 Recognize various modelling, analysis and validation techniques adopted at industries. |
| | | | | Co:3 Demonstrate the issues at design, manufacturing and assembly levels. |
| | | | | Co:4 Summarize and present technical data in report format. |
| 39 | III | MOE2041 | Condition Monitoring and Signal Processing (Open Elective) | Co:1 Identify the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors. |
| | | | | Co:2 Analyze for machinery condition monitoring and explain how this compliments monitoring the condition. |
| | | | | Co:3 Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure. |
| | | | | Co:4 Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system. |
| | | | | Co:5 Identify vibration measurement, lubrication oil analysis. |
| 40 | III | MOE2051 | Aircraft Conceptual Design (Open Elective) | Co:1 Analyze the design process of aircraft and decide the aircraft configuration. |
| | | | | Co:2 Choose type of power plant as per flight regime. |
| | | | | Co:3 Design the fuselage layout as per type of aircraft. |
| | | | | Co:4 Design the wing for type of aircraft and its wing loading. |
| | | | | Co:5 Evaluate lift, drag and mass for design synthesis. |

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| | | | | Co:6 Examine the influence of various design requirements on the configuration of an aircraft to derive an optimized design. |
| 41 | III | MDE2060 | Augmented Reality and Virtual Reality (Open Elective) | Co:1 Define the basic concepts of Virtual and Augmented Reality |
| | | | | Co:2 Identify the differences in AR/VR concepts and technologies |
| | | | | Co:3 Describe the fundamental concepts relating to Virtual Reality such as presence, immersion, and engagement |
| | | | | Co:4 Evaluate usability of AR/VR applications and critique their use of AR/VR capabilities |
| | | | | Co:5 Design and prototype effective AR/VR applications using UNITY platform for various application. |
| 42 | III | MDE2070 | Industrial Instrumentation (Open Elective) | Co:1 Elaborate working principal of different transducers. |
| | | | | Co:2 Select suitable transducer/sensor for specific application. |
| | | | | Co:3 Justify the use of specific measurement technique for specific task. |
| | | | | Co:4 Evaluate the Calibration and Interfacing of the transducers. |
| 43 | III | MDE2080 | Advanced Mechatronics Systems (Open Elective) | Co:1 Explain Mechatronics System. |
| | | | | Co:2 Analyze the Mechatronics Based System. |
| | | | | Co:3 Model, simulate, and verify the mechatronics systems. |
| | | | | Co:4 Identify Electrical, Hydraulic and Pneumatic Components. |
| 44 | III | MDE2026 | Dissertation Stage-I | Co:1 Explain the contributions of various researchers in the field of design engg after carrying out literature survey from reputed journals. |
| | | | | Co:2 Recognize the gap in the research and define a problem statement. |
| | | | | Co:3 Explain significance and applicability of problem statement. |
| | | | | Co:4 Summarize and present technical data in report format. |
| 45 | III | MDE2036 | Dissertation Stage-II | Co:1 Outline the work plan for problem statement. |
| | | | | Co: 2 Identify the proper modelling and analysis tool. |
| | | | | Co:3 Reproduce the preliminary results of problem statement. |
| | | | | Co:4 Summarize and present technical data in report format. |
| 46 | IV | MDE2046 | Dissertation Stage-III | Co:1 Explain the issues related to method adopted in solving the problem |
| | | | | Co:2 Select proper technique in solving the problem |

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| | | | | Co:3 Compare the results with available literature |
| 47 | IV | MDE2056 | Dissertation Stage-IV | Co:1 Design new methodology to address the problem |
| | | | | Co:2 Justify the results obtained from new methodology |
| | | | | Co:1 Write technical report and defend work |

- **Department Name:- Mechanical Engineering**
- **PG Program Name:- Mechanical Engineering (Thermal Engineering)**
- **Vision:**

  To transform the department into center of excellence by synergizing teaching, learning and research to produce globally competent, innovative and entrepreneurial Mechanical Engineers

  - Mission
  - To develop state-of–the-art facilities to stimulate faculty, staff and students to create,analyze, apply and disseminate knowledge.
  - To build the competency to transform students into globally competent mechanical engineersby imparting quality education.
  - To collaborate with research organizations, reputed educational institutions, industries andalumni for excellence in teaching, research and consultancy practices

| Sr. No. | Program Outcomes |
|---|---|
| 1. | To independently carry out research /investigation and development work to solve practical problems |
| 2. | To write and present a substantial technical report/document |
| 3. | To demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than therequirements in the appropriate bachelor program. |
| 4. | To accomplish collaborative and multi-disciplinary scientific research with consideration of professional, legal, and ethical issues. |
| 5. | To Manage the projects and its financial aspects on the strength of engineering knowledge and management principles. |
| 6. | To Engage in lifelong learning to address contemporary issues through independent and reflective learning. |

**Programme Educational Objectives for the M. Tech Mechanical Thermal Engineering**

**PEO1: -** Graduates will apply concepts of thermal engineering to design, model, simulate andsolve problems to develop energy efficient systems to pursue successful career in the field ofMechanical Engineering and allied sciences.

**PEO2:** - Graduates will have technical competency in thermal engineering or related areas to become

innovators, academicians and provide services to address technical, business and social challenges.

**PEO3: -** Graduates will involve in lifelong learning such as higher studies, research to maintain professionalism and ethical standards.

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 1 | I | SHP5132 | Numerical Methods and Optimization Techniques | Co:1 Apply the methods for solving algebraic, transcendental and linear equations. |
| | | | | Co:2 Solve single variable optimization problems |
| | | | | Co:3 Apply the methods for curve fitting using regression and interpolation techniques. |
| | | | | Co:4 Apply the methods to solve differentiation and integration numerical. |
| | | | | Co:5 Solve ordinary and partial differential equations |
| | | | | Co:6 Analyze the variance and explain the different research designs. |
| 2 | I | MTE1012 | Classical and Statistical Thermodynamics | Co:1 Explain different behaviour of gases and thermodynamic relations |
| | | | | Co:2 Interpret thermodynamics property relations to various mixtures and solutions. |
| | | | | Co:3 Compare thermodynamics equilibrium of system |
| | | | | Co:4 Explain the kinetic theory of gases. |
| | | | | Co:5 Apply the principle of statistical thermodynamics to the various processes. |
| | | | | Co:6 Develop and analyze the various thermodynamic cycles. |

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| 3 | I | MTE1023 | Advanced Heat Transfer | Co:1 Analyze heat conduction and Radiation |
| | | | | Co:2 Develop a solution to heat convection to external laminar flow |
| | | | | Co:3 Formulate heat convection to internal laminar flow. |
| | | | | Co:4 Examine heat convection in turbulent flow |
| | | | | Co:5 Interpret convection with phase change |
| | | | | Co:6 Solve heat transfer problem numerically |
| 4 | I | MTE1032 | Energy Conservation and Management ( Program Elective I ) | Co:1 Analyze present energy scenario and the need for energy conservation. |
| | | | | Co:2 Conduct energy audit of any system |
| | | | | Co:3 Illustrate various techniques of waste heat recovery and cogeneration. |
| | | | | Co:4 Identify energy conservation measures for various thermal utilities. |
| | | | | Co:5 Summarize different financial terms and techniques used in Energy Conservation. |
| 5 | I | MTE1042 | Design of Pumps, Compressor and Blower ( Program Elective I ) | Co:1 Select suitable pump, blower, fan and compressor for a given application. |
| | | | | Co:2 Design pump, blower, fan or compressor for a given application. |
| | | | | Co:3 Analyze the performance of compressor and pump |
| | | | | Co:4 Model and simulate pump, blower, fan and compressor. |

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| 6 | I | MTE1052 | Gas Turbine and Jet Propulsion ( Program Elective I ) | Co:1 Describe the ideal and real thermodynamic cycles of air-breathing engines and Industrial gas turbines. |
| | | | | Co:2 Design the blading, study the velocity triangles and estimate the performance of centrifugal and axial flow compressors. |
| | | | | Co:3 Explain the combustion process and design the combustion chamber of a gas turbine. |
| | | | | Co:4 Design the blading, study the velocity triangles and estimate the performance of axial and radial in-flow turbines. |
| | | | | Co:5 Analyze off-design performance and matching of the components of a gas turbine. |
| 7 | I | MTE1062 | Finite Element Method for Thermal Engineering ( Program Elective I ) | Co:1 Establish the mathematical model for the complex analysis problems and predict the nature of the solution. |
| | | | | Co:2 Formulate element characteristic matrices and vectors. |
| | | | | Co:3 Identify the boundary conditions and their incorporation into FE equation |
| | | | | Co:4 Analyze simple geometry problems for Thermal and stress analysis. |
| | | | | Co:5 Interpret the analysis results for the improvement or modification of the system |
| 8 | I | MTE1072 | Advanced I. C. Engines and Electric Vehicles ( Program Elective II ) | Co:1 Analyze the gas exchange and charge motion in engines. |
| | | | | Co:2 Design and develop basic schemes of electric vehicles and hybrid electric vehicles. |

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| | | | | Co:3 Choose proper energy storage systems, electric machine and drive train for vehicle applications. |
| | | | | Co:4 Analyze various communication protocols and technologies used in vehicle networks. |
| 9 | I | MTE1082 | Experimental Methods in Thermal Engineering<br>( Program Elective II ) | Co:1 Identify the suitable instrument for measuring transport parameters and estimate error |
| | | | | Co:2 Detect suitable range of pressure gauge and compute its dynamic response. |
| | | | | Co:3 Distinguish different flow visualization methods and temperature measurements. |
| | | | | Co:4 Determine thermal conductivity in solids, liquids and gases and radiation measurements |
| | | | | Co:5 Develop transfer function of given mechanical system by using concept of control system. |
| | | | | Co:6 Explain applications of thermal materials. |
| 10 | I | MTE1092 | Alternative Fuel Technology<br>(Program Elective II) | Co:1 To Identify the need for alternate fuels and characterize prospective alternate fuels. |
| | | | | Co:2 To Interpret the properties and performance characteristics of liquid fuels like gasoline, alcohol, vegetable oils in both SI and CI engines. |
| | | | | Co:3 To Compare the properties and performance characteristics of gaseous fuels like LPG, CNG, and Hydrogen. |
| | | | | Co:4 To Judge the scope and limitation of different alternate fuels. |

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| 11 | I | MTE1102 | Power Plant Engineering (Program Elective II) | Co:1 Explain analytical and technological aspects of power plant design, systems and their effects. |
| | | | | Co:2 Analyze and explain various power plants. |
| | | | | Co:3 Summarize advanced power cycles. |
| | | | | Co:4 Recognize environmental issues. |
| | | | | Co:5 Estimate economics of power plants. |
| 12 | I | MTE1112 | Modelling Lab | Co:1 Model the components of thermal system using suitable software. |
| | | | | Co:2 Create computational domain for selected geometry. |
| | | | | Co:3 Generate mesh and refine mesh elements of given geometry. |
| 13 | I | MTE1122 | Thermal Engineering Lab - I | Co:1 Conduct test and interpret the theoretical and experimental data of conduction and convection experiments. |
| | | | | Co:2 Relate the theory and the experimentation pertaining to thermal system. |
| | | | | Co:3 Examine various thermal systems |
| 14 | I | MTE1132 | Computational Engineering Lab | Co:1 Develop codes for numerical methods to tackle simple thermal problems. |
| | | | | Co:2 Simulate codes of computational methods of given conditions. |
| | | | | Co:3 Analyze and validate output of written codes with analytical solution. |
| 15 | I | SHP5511 | Technical Communication | Co:1 Use grammatically correct sentences in different types of technical writings. |

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| | | | | Co:2 Apply technical writing skills to improve readability of documents. |
| | | | | Co:3 Demonstrate professional skills required in job interviews and at workplace. |
| 16 | II | MTE2012 | Computational Fluid Dynamics | Co:1 Derive governing equations for fluid dynamics and heat transfer. |
| | | | | Co:2 Develop finite difference algorithms for fluid flow and heat transfer problems. |
| | | | | Co:3 Develop finite volume algorithms for fluid dynamics equations. |
| | | | | Co:4 Select appropriate grid generation methods for CFD analysis. |
| | | | | Co:5 Apply different CFD Techniques to various fluid flow problems |
| 17 | II | MTE2022 | Design of Thermal System | Co:1 Illustrate basic principles of modeling and optimization of design of thermal systems. |
| | | | | Co:2 Design thermal systems. |
| | | | | Co:3 Analyze thermal system. |
| 18 | II | MTE2032 | Design of Heat Transfer Equipment ( Program Elective – III ) | Co:1 Select suitable heat exchanger for particular application. |
| | | | | Co:2 Design of heat exchanger. |
| | | | | Co:3 Design and analyse boiler furnace. |
| | | | | Co:4 Analyse different heat transfer equipments. |
| 19 | II | MTE2042 | Cryogenics Engineering ( Program Elective – III ) | Co:1 Apply the basic principles of low temperature engineering. |
| | | | | Co:2 Explain the behaviour of solids and liquid at low temperatures |
| | | | | Co:3 Analyze cryogenic systems. |

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| | | | | Co:4 Discuss gas separation systems. |
| | | | | Co:5 Design Heat Exchangers for Cryogenic System. |
| 20 | II | MTE2052 | Food Processing, Preservation and Transport<br>( Program Elective – III ) | Co:1 Analyze mechanism of food spoilage |
| | | | | Co:2 Design suitable food processing and preservation system |
| | | | | Co:3 Select suitable cold storage system |
| | | | | Co:4 Design and analysis transport system of preserved foods |
| | | | | Co:5 Model the preservation system |
| 21 | II | MTE2062 | Battery Thermal Management System<br>( Program Elective – III ) | Co:1 Illustrate major functions and parts of a battery-management system. |
| | | | | Co:2 Design various configurations of battery pack and recent trends in battery pack. |
| | | | | Co:3 Compute stored energy in a battery pack. |
| | | | | Co:4 Measure and control current, temperature, and isolation in battery-management system |
| 22 | II | MTE2072 | Heating Ventilation Air Conditioning and Refrigeration Systems<br>( Program Elective – IV ) | Co:1 Explain different vapor compression refrigeration system and refrigerants. |
| | | | | Co:2 Design of cooling and heating components of refrigeration system |
| | | | | Co:3 Explain fundamentals of air conditioning and estimate cooling load on the building by considering various heat sources |
| | | | | Co:4 Illustrate various air conditioning systems. |

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| | | | | Co:5 Design ducting systems and select air distribution system. |
| | | | | Co:6 Explain air handling units in various applications. |
| 23 | II | MTE2082 | Theory and Technology of Fuel Cells ( Program Elective – IV ) | Co:1 Demonstrate various configuration of fuel cell. |
| | | | | Co:2 Explain Low and high temperature fuel cell and modelling practices. |
| | | | | Co:3 Analyse operating parameters of fuel cell |
| | | | | Co:4 Explain various fuelling technologies. |
| | | | | Co:5 Illustrate fuels, processing and systems. |
| | | | | Co:6 Analyse Fuel cycles and give its applications. |
| 24 | II | MTE2092 | Cogeneration and Waste Heat Management ( Program Elective – IV ) | Co:1 Estimate and quantify available waste heat |
| | | | | Co:2 Explore different waste heat recovery systems |
| | | | | Co:3 Explain economics of cogeneration and waste heat recovery systems |
| | | | | Co:4 Illustrate different cogeneration techniques. |
| 25 | II | MTE2102 | Advanced Thermal Storage Technology ( Program Elective – IV ) | Co:1 Select thermal storage systems and the storage materials |
| | | | | Co:2 Develop a model and analyze the thermal storage systems |
| | | | | Co:3 Explain applications of thermal storage systems |
| 26 | II | MTE2112 | | Co:1 Formulate a research problem. |

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| | | | Research Methodology & IPR | Co:2 Analyse research related information. |
| | | | | Co:3 Prepare and present research proposal/paper by following research ethics. |
| | | | | Co:4 Make effective use of computers and computing tools to search information, analyze information and prepare report. |
| | | | | Co:5 Describe nature and processes involved in development of intellectual property rights |
| 27 | II | MTE2122 | Computational Fluid Dynamics Lab | Co:1 Formulate problems in fluid flow and heat transfer. |
| | | | | Co:2 Apply initial and boundary conditions to solve heat transfer problems. |
| | | | | Co:3 Use ANSYS-Fluent for solving real life engineering problems |
| 28 | II | MTE2132 | Thermal Engineering Lab-II | Co:1 Evaluate COP of different refrigeration systems. |
| | | | | Co:2 Estimate cooling load needed for given space. |
| | | | | Co:3 Design a refrigeration and air conditioning system for given application. |
| | | | | Co:4 Calculate efficiency and effectiveness of different types of heat exchangers. |
| 29 | II | MTE2142 | Seminar | Co:1 Review of literature related to thermal engineering |
| | | | | Co:2 Write technical reports. |

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| | | | | Co:3 Develop skills to present the findings. |
| 30 | II | SHP552 | Framework of Indian Constitution | Co:1 Realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution. |
| | | | | Co:2 Identify the importance of fundamental rights as well as fundamental duties. |
| | | | | Co:3 Understand the functioning of Union, State and Local Governments in Indian federal system. |
| | | | | Co:4 Learn procedure and effects of emergency, composition and activities of election commission and amendment procedure. |
| 31 | III | MTE3012 | Industry Internship | Co:1 Identify the real applications and practices of courses studied, at industry level |
| | | | | Co:2 Recognize various modeling , analysis and validation techniques adopted at industries. |
| | | | | Co:3 Demonstrate the issues at design, manufacturing and assembly levels. |
| | | | | Co:4 Summarize and present technical data in report format. |
| 32 | III | MOE2011 | Artificial Intelligence – Machine Learning (Open Elective) | Co:1 Describe central machine learning methods and techniques and how they relate to artificial intelligence. |
| | | | | Co:2 Differentiate between supervised and unsupervised learning techniques. |
| | | | | Co:3 Apply the ML algorithms to a real-world problem. |

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| | | | | Co:4 Optimize the models learned and report on the expected accuracy that can be achieved by applying the models. |
| | | | | Co:5 Evaluate a given problem and apply appropriate machine learning technique. |
| 33 | III | MOE2021 | Creative Thinking: Tools & Techniques (Open Elective) | Co:1 Comprehend importance in tackling global challenges as well as in everyday problem-solving scenarios. |
| | | | | Co:2 Apply different brainstorming techniques in group activities. |
| | | | | Co:3 Be proficient in the application of the 6 thinking hats tool in different life scenarios. |
| | | | | Co:4 Develop a systematic approach to idea generation through the use of morphological analysis. |
| | | | | Co:5 Innovate on an existing product, service or situation applying the SCAMPER method. |
| | | | | Co:6 Get confident with the theory of inventive problem solving, called TRIZ. |
| 34 | III | MOE2031 | MOOC Course (Open Elective) | Co:1 Identify the real applications and practices of courses studied, at industry level |
| | | | | Co:2 Recognize various modelling, analysis and validation techniques adopted at industries. |
| | | | | Co:3 Demonstrate the issues at design, manufacturing and assembly levels. |
| | | | | Co:4 Summarize and present technical data in report format. |
| 35 | III | MOE2041 | Condition Monitoring and | Co:1 Identify the maintenance scheme, their scope and limitations – apply the |

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| | | | Signal Processing (Open Elective) | maintenance strategies to various problems in the industrial sectors. |
| | | | | Co:2 Analyze for machinery condition monitoring and explain how this compliments monitoring the condition. |
| | | | | Co:3 Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure. |
| | | | | Co:4 Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system. |
| | | | | Co:5 Identify vibration measurement, lubrication oil analysis. |
| 36 | III | MOE2051 | Aircraft Conceptual Design (Open Elective) | Co:1 Analyze the design process of aircraft and decide the aircraft configuration. |
| | | | | Co:2 Choose type of power plant as per flight regime. |
| | | | | Co:3 Design the fuselage layout as per type of aircraft. |
| | | | | Co:4 Design the wing for type of aircraft and its wing loading. |
| | | | | Co:5 Evaluate lift, drag and mass for design synthesis. |
| | | | | Co:6 Examine the influence of various design requirements on the configuration of an aircraft to derive an optimized design. |
| 37 | III | MDE2060 | Augmented Reality and | Co:1 Define the basic concepts of Virtual and Augmented Reality |

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| | | | Virtual Reality (Open Elective) | Co:2 Identify the differences in AR/VR concepts and technologies |
| | | | | Co:3 Describe the fundamental concepts relating to Virtual Reality such as presence, immersion, and engagement |
| | | | | Co:4 Evaluate usability of AR/VR applications and critique their use of AR/VR capabilities |
| | | | | Co:5 Design and prototype effective AR/VR applications using UNITY platform for various application. |
| 38 | III | MDE2070 | Industrial Instrumentation (Open Elective) | Co:1 Elaborate working principal of different transducers. |
| | | | | Co:2 Select suitable transducer/sensor for specific application. |
| | | | | Co:3 Justify the use of specific measurement technique for specific task. |
| | | | | Co:4 Evaluate the Calibration and Interfacing of the transducers. |
| 39 | III | MDE2080 | Advanced Mechatronics Systems (Open Elective) | Co:1 Explain Mechatronics System. |
| | | | | Co:2 Analyze the Mechatronics Based System. |
| | | | | Co:3 Model, simulate, and verify the mechatronics systems. |
| | | | | Co:4 Identify Electrical, Hydraulic and Pneumatic Components. |
| 40 | III | MTE3022 | Dissertation Phase I | Co:1 Explain the contributions of various researchers in the field of thermal engineering after carrying out literature survey from reputed journals |
| | | | | Co:2 Recognize the gap in the research and define a problem statement |

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|---|---|---|---|---|
| | | | | Co:3 Explain significance and applicability of problem statement |
| | | | | Co:4 Summarize and present technical data in report format |
| 41 | III | MTE3032 | Dissertation Phase II | Co:1 Outline the work plan for problem statement |
| | | | | Co:2 Identify the proper modeling and analysis tool |
| | | | | Co:3 Reproduce the preliminary results of problem statement |
| | | | | Co:4 Summarize and present technical data in report format |
| 42 | IV | MTE4012 | Dissertation Phase III | Co:1 Explain the issues related to method adopted in solving the problem |
| | | | | Co:2 Select proper technique in solving the problem |
| | | | | Co:3 Compare the results with available literature. |
| 43 | IV | MTE4022 | Dissertation Phase - IV | Co:1 Design new methodology to address the problem |
| | | | | Co:2 Justify the results obtained from new methodology |
| | | | | Co:3 Write technical report and defend work. |

K. E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Empowered Autonomous Institute, affiliated to SUK)

# • Mechatronics Engineering

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## UG Program 2024-25

- **Department Name :-Mechatronics Engineering**
- **UG Program Name :-B. Tech**
- **Vision and Mission :-**

| | |
|---|---|
| **Vision** | To serve as a pioneering transdisciplinary department dedicated to transform students to professional graduate to cater the needs of Industry and Society. |
| **Mission** | **1.** Preparing graduates to meet industry demands through the provision of high-quality education.<br>2. Creating an educational environment that nurtures research, innovation, creativity and entrepreneurship.<br>3. Nurturing professionalism, ethical standards, core human values and the culture of life long learning. |

| Sr. No. | Program Outcomes |
|---|---|
| 83. | Apply the knowledge of mathematics, science, engineering fundamentals and Mechatronics engineering to the solution of complex engineering problems. |
| 84. | Identify, formulate, review research literature, and analyze complex Mechatronics engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. |
| 85. | Design solutions for complex Mechatronics 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. |
| 86. | 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. |
| 87. | Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex Mechatronics engineering activities with an understanding of the limitations. |
| 88. | 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. |
| 89. | Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development. |
| 90. | Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| 91. | Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings. |
| 92. | Communicate effectively on complex Mechatronics 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. |

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|---|---|
| 93. | 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. |
| 94. | 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. |

| Sr. No. | Program Specific Outcomes |
|---|---|
| 6. | Innovate & design mechatronics systems & components using national and international standards like IS BS, SAE, ISO, ASTM to meet required specifications. |
| 7. | Ensure optimized system performance by analyzing & constant improvement in design & enhancing intelligence capability of the system. |
| 8. | Lead professional practices in Industries or as an entrepreneur by applying management principles & practices. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1. | III | **MC2011** | **Engineering Mathematics for Mechatronics Engineering** | 1.Illustrate curve fitting concepts in Mechatronics related problems. |
| | | | | 2.Compute problems on probability distribution by using different formulae. |
| | | | | 3.Evaluate differential equation using appropriate concept. |
| | | | | 4.Analyze the problem and apply the concept of partial differential equations. |
| | | | | 5.Evaluate Laplace & inverse Laplace transform of function and solve ordinary differential equations and linear time invariant systems. |
| | | | | 6.Develop Fourier series of periodic functions. |
| 2. | III | **MC2031** | **Analog and Digital Electronics** | 1. Explain working principles of electronic devices |
| | | | | 2. Illustrate applications of analog and digital electronic circuits. |
| | | | | 3. Analyze various analog and digital circuits. |
| | | | | 4. Design applications using electronic devices and circuits. |
| 3. | III | **MC2051** | **Industrial Fluid Power** | 1.Describe the structure and |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | function of common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors etc. |
| | | | | 2.Model and analyze common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors. |
| | | | | 3.Create & simulate basic hydraulic and pneumatic circuit diagrams for different applications. |
| | | | | 4.Design, develop & analyze simple hydraulic and pneumatic systems for given task. |
| 4. | III | **MC2071** | **Engineering Mechanics** | 1.Calculate resultant force of co-planar force system. |
| | | | | 2.Analyze engineering problems applying conditions of equilibrium. |
| | | | | 3.Determine centroid & moment of inertia of the geometrical plane lamina. |
| 5. | III | **CEMD201** | **Building Construction and Planning** | 1.Suggest appropriate materials for building construction applications. |
| | | | | 2.Prepare a functional design of components of the building. |
| | | | | 3.Design and draw residential building using principles of planning and bye-laws. |
| | | | | 4.Prepare plumbing and electrification plan for the building. |
| | | | | 5.Explain properties of building finishing materials and application procedure. |
| 6. | III | **CSMD201** | **Introduction to Data Structures** | 1.Compare between linear and nonlinear data structures |
| | | | | 2.Describe the characteristics of various data structure such as |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | stacks, queues, trees, graphs and Hash tables. |
| | | | | 3.Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | 4 .Determine a suitable data structure and algorithm to solve a real world problem |
| 7. | III | **EEMD201** | **Electrical Power Generation** | 1.List the main components of different power plants |
| | | | | 2.Describe the operation of various power plants used for electrical power generation. |
| | | | | 3.Explain working principles of various power plants |
| | | | | 4.Compare different power plants based on advantages, limitations and future prospects |
| | | | | 5.Draw layout of electrical power plants. |
| | | | | 6.Explore alternate electrical energy resources for future needs and challenges. |
| 8. | III | **ECMD201** | **Electronics Devices and Applications** | 1.Describe the fundamental concepts of electronics and working principles of different devices. |
| | | | | 2.Analyze different analog and digital electronics circuits. |
| | | | | 3.Design digital electronics circuits with truth table and logic diagram. |
| 9. | III | **CIMD201** | **Data Structures** | 1.Describe the basic terminologies of data structures. |
| | | | | 2.Examine the linear data structure array with its types. |
| | | | | 3.Demonstrate the working of stack, queue performed on data structures. |
| | | | | 4.Illustrate the working of linked list. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5.Discuss Tree terminologies and their Applications. |
| | | | | 6. Elaborate Graph terminologies with their types. |
| 10. | III | **MEMD203** | **Design Thinking** | 1.Identify the new product opportunities and sources of new product ideas. |
| | | | | 2.Elaborate the product life cycle and product design process. |
| | | | | 3.Integrate the customer and end-consumer needs into design process. |
| | | | | 4.Assimilate the various product characteristics to design a novel product |
| | | | | 5.Participate effectively in group work sessions and teams to become acquainted with the importance of teamwork and collaboration that is critical to new product success |
| 11. | III | **MCMD201** | **Fundamentals of Mechatronics** | 1.Identify various elements of mechatronics systems. |
| | | | | 2.Select appropriate sensor/Actuator/controller/control algorithm for different applications. |
| | | | | 4. Develop PLC/ microcontroller-based applications. |
| 12. | III | **AIMD201** | **Object Oriented Programming** | 1.Identify and integrate basic object-oriented programming concepts and apply them in problem-solving |
| | | | | 2.Construct and test inheritance concepts for reusing the program. |
| | | | | 3.Develop and test a program using loops, decision statements, and functions in Python. |
| | | | | 4.Evaluate the given Plot data using appropriate Python visualization libraries. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 13. | III | **RAMD201** | **Fundamentals of Robotics & Automation** | 1.Differentiate various robotic configurations and performance metrics. |
| | | | | 2.Compare various end effectors, sensors, and drive systems in robotic applications. |
| | | | | 3.Illustrate kinematic and dynamic principles applied to robotic systems. |
| | | | | 4.Outline robot programming solutions for diverse applications. |
| | | | | 5.Distinguish various types and aspects of automation. |
| | | | | 6.Relate the knowledge of Programmable Logic Controllers (PLCs) to industrial automation tasks. |
| 14. | III | **MC2511** | **Analog and Digital Electronics Lab** | 1.Analyze electronic circuits as per requirements. |
| | | | | 2. Conduct an experiment to observe response. |
| | | | | 3. Calculate different parameters from experimental results and plot the response. |
| | | | | 4. Interpret results of experiment and compare with measured values. |
| | | | | 5. Improve the ability to communicate effectively through written lab journals. |
| 15. | III | **MC2531** | **Industrial Fluid Power Lab** | 1.Demonstrate & identify various components of Hydraulics & Pneumatic System along with standard symbols. |
| | | | | 2. Design & analyze basic hydraulic and pneumatic circuits using training kits. |
| | | | | 3. Design & analyze electrohydraulic and electropneumatic circuits using training kits. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 4. Use Automation Studio software to design & simulate the fluid power circuits. |
| 16. | III | **MC2551** | **Workshop Practice –I** (Electrical Machines Lab) | 1.Perform experiments on AC and DC machines. |
| | | | | 2.Demonstrate testing and control of various electrical machines. |
| | | | | 3.Plot the characteristics of various electrical machines. |
| | | | | 4.Analyse the performance parameters of electrical machines. |
| | | | | 5.Compare the performances of the electrical machines. |
| 17. | **III** | **MC2571** | **Machine Drawing and CAD Modeling Lab** | 1.List and draw different standard parts like fasteners and keys. |
| | | | | 2.Inspect Limit, fits and tolerances from sketches of machine parts. |
| | | | | 3.Model machine parts using CAD software. |
| | | | | 4.Assemble machine Parts by using CAD tool. |
| | | | | 5.Generate detailed drawing views. |
| | | | | 6.Create surface features using surface tools. |
| 18. | **III** | **MC2591** | **Engineering Mechanics Lab** | 1.Verify law of polygon of forces, law of triangle of forces and principle of moment. |
| | | | | 2.Verify Lami's theorem. |
| | | | | 3.Compare the coefficient of friction of various surfaces in contact. |
| | | | | 4.Correlate theoretical and practical results of support reactions and Centroid of plane lamina. |
| | | | | 5.Analyze a simple truss. |
| 19. | **III** | **MC2611** | **Technical Aptitude -I** | 1.Apply the knowledge acquired during the course work. |
| | | | | 2. Develop the ability of problem solving. |
| 20. | **III/IV** | **SH2634** | **Professional Leadership Skills** | 1.Explain the traits of a leadership through real life examples. |
| | | | | 2.Exhibit the ability to work effectively in team. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3.Prepare a presentation as per the audience and context requirements. |
| 21. | III/IV | SH2614 | Interpersonal Skills | 1.Exhibit interpersonal communication skills. |
| | | | | 2. Demonstrate decision-making skills. |
| | | | | 3. Apply conflict resolution styles appropriate in different situations. |
| | | | | 4. Demonstrate skills to manage balance in work and life. |
| | | | | 5. Apply Jeevanvidya wisdom in day-to-day life. |
| 22. | III/IV | SH2694 | Innovation Tools and Methods for Entrepreneurs | 1.Explain structured approach to define the problem with every possible detail, identify conflicts and solve them. |
| | | | | 2.Apply User Journey Map to the selected problem to show user interaction at various stages. |
| | | | | 3.Analyse the solutions provided by competitors for effectiveness and gaps if any. |
| 23. | III/IV | SH2594 | Personal Effectiveness and Body Language | 1.Develop skills to build self-esteem and a positive attitude. |
| | | | | 2. Develop interpersonal skills characterized by effective communication and conflict resolution. |
| | | | | 3. Discover ways to overcome procrastination. |
| | | | | 4. Demonstrate responsiveness towards stress and health issues. |
| | | | | 5.Interpret the non-verbal behavior of a person. |
| 24. | III | SH2734 | German Language-III | 1.Interpret the language if the next person is speaking slowly and clearly. |
| | | | | 2.Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | 3.Demonstrate the language by self-introduction in German with simple sentences. |
| 25. | III | SH2714 | Japanese Language - Level III | 1.Make use of basic conversations in various situations. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Identify the sentence patterns. |
| | | | | 3.Explain insights about the communication required for living in Japan. |
| | | | | 4.Interpret Japanese work ethics required in their professional career. |
| 26. | IV | MC2021 | Strength of Materials | 1.Determine different types of stresses and strains induced in any machine component. |
| | | | | 2.Develop shear force and bending moment diagram for different types of beams. |
| | | | | 3.Determine stress distribution for various cross sections of beam. |
| | | | | 4.Estimate the deflection of beams by analytical and graphical method. |
| | | | | 5.Analyze axially loaded column for different end conditions. |
| 27. | IV | MC2041 | Microcontrollers and Embedded systems | 1. Understand the fundamentals of embedded systems. |
| | | | | 2. Write embedded C programs for on chip and off chip peripherals. |
| | | | | 3. Interface peripherals with microcontroller. |
| | | | | 4. Design the embedded system using microcontroller. |
| 28. | IV | MC2061 | Kinematics & Dynamics of Machines | 1. Perform the mobility analysis of mechanism. |
| | | | | 2. Determine kinematic analysis (Velocity, acceleration) for a given mechanism using analytically and graphically method |
| | | | | 3. Construct different types of cam profile for a given condition |
| | | | | 4. Apply appropriate power transmission method for mechanical system |
| | | | | 5. Apply different techniques to balance the rotary and reciprocating systems |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 6. Evaluate and analyze the parameters affecting on stability of spinning and rotating bodies. |
| 29. | IV | MC2081 | Manufacturing Technologies | 1.Explain casting as manufacturing process suitable for the component design and production volume. |
| | | | | 2.Select appropriate joining process for given application. |
| | | | | 3.Select suitable Engineering forming process for production of component of required specification. |
| | | | | 4.Select machine tools for metal cutting operations. |
| | | | | 5.Describe the non-traditional machining processes. |
| 30. | IV | CEMD202 | Building Estimation and Valuation | 1.Explain the types and basic requirements of the estimate. |
| | | | | 2.Explain measurement sheet, abstract sheet, and detailed specifications of different construction items. |
| | | | | 3.Prepare detailed estimate of load bearing structure and framed structure. |
| | | | | 4.Prepare rate analysis and bar bending schedule of different construction items. |
| | | | | 5.Explain the tenders and contracts. |
| | | | | 6.Describe basic terms of valuation. |
| 31. | IV | CSMD202 | Problem Solving using JAVA | 1.Understand the basic object-oriented programming concepts and apply them in problem solving. |
| | | | | 2.Apply concept of inheritance for code reusability. |
| | | | | 3.Develop Programs using multithreading. |
| | | | | 4.Develop data-centric applications using JDBC. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5.Design the basics of java console and GUI based programming |
| 32. | IV | EEMD202 | Power System | 1.Write the basic working principles of different generating sources. |
| | | | | 2.Analyze different types of loads |
| | | | | 3.Explain importance of power factor and tariffs in power system. |
| | | | | 4.Identify various components in power transmission and distribution system. |
| | | | | 5.Select substation equipments as per requirement. |
| 33. | IV | ECMD202 | Electronics Communication Systems | 1.Describe different communication systems. |
| | | | | 2.Explain applications of analog and digital modulation techniques. |
| | | | | 3.Analyze different modulation and demodulation techniques. |
| | | | | 4.Explain the use of satellite communication. |
| 34. | IV | CIMD202 | Computer Algorithms | 1.Analysing asymptotically the performance of algorithms. |
| | | | | 2.Compare and analyse searching and sorting algorithms. |
| | | | | 3.Apply different algorithm design techniques to solve problems like job sequencing, |
| | | | | 5.knapsack, TSP, finding shortest path etc. |
| | | | | 6.Apply backtracking method to solve problems like N-queens, graph coloring, sum of subsets etc. |
| 35. | IV | MEMD204 | Behavioral Engineering and Design | 1.Explain key concepts and theories related to influencing user behavior in product design. |
| | | | | 2.Utilize psychological principles to develop product designs that effectively address user needs and preferences. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3.Create products that demonstrate high levels of user engagement, measured through metrics such as adoption rates and user interaction patterns. |
| | | | | 4.Develop products that prioritize user satisfaction and usability, as measured through user testing and feedback. |
| | | | | 5.Incorporate aesthetic appeal and ergonomic considerations into product designs, assessed through objective criteria such as user comfort and visual appeal ratings. |
| | | | | 6.Analyze user feedback and iteratively improve designs to enhance user experience, measured by improvements in user satisfaction scores or usability metrics. |
| 36. | **IV** | **MCMD202** | **Industrial Fluid Power** | 1.Describe the structure and function of common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors etc. |
| | | | | 2.Model and analyze common hydraulic and pneumatic components such as cylinders, valves, pumps, and motors. |
| | | | | 3.Create & simulate basic hydraulic and pneumatic circuit diagrams for different applications. |
| | | | | 4.Design, develop & analyze simple hydraulic and pneumatic systems for given task. |
| 37. | **IV** | **AIMD202** | **Data Structures & Algorithms** | 1.Compare between linear and nonlinear data structures |
| | | | | 2.Describe the characteristics of various data structure such as |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | stacks, queues, trees, graphs and Hash tables. |
| | | | | 3.Analyze various searching and sorting algorithms and apply it to solve particular problem. |
| | | | | 4.Determine a suitable data structure and algorithm to solve a real world problem |
| 38. | **III** | **RAMD202** | **Sensors & Actuators** | 1.Explain the functioning of various sensors and transducers |
| | | | | 2.Calibrate the transducers such as accelerometers, microphones and strain gauges. |
| | | | | 3.Explain the characteristics of various sensors and transducers |
| | | | | 4.Describe the process and need for calibration. |
| | | | | 5.Choose the sensor for measurement of few parameters. |
| | | | | 6.Use the appropriate sensor and calibrate |
| 39. | **I/II** | **SH202** | मराठी भाषिक कौशल्यविकास | १. भाषा आणि व्यक्तिमत्व विकास यांमधील सहसंबंध स्पष्ट करू शकेल |
| | | | | २. भाषिक कौशल्यविकास करू शकेल |
| | | | | ३. कथा या मराठी साहित्य प्रकाराचे विश्लेषण करू शकेल |
| | | | | ४. एकांकिका या मराठी साहित्य प्रकाराच्या विश्लेषणाची क्षमता प्राप्त करेल |
| 40. | **I** | | **Hindi** | 1.विद्यार्थियों में मानवीय संवेदनाओं के विकास के साथ नवीन सामाजिक सांस्कृतिक बोधऔर जीवन मूल्यों का विकास होगा। |
| | | | | 2.विद्यार्थियों में साहित्य के माध्यम से कलात्मक गुणों की अभिवृद्धि होगी कला की साहित्यिक विधाओं के प्रति अभिरुचि जागृत होगी तथा रचनात्मक कौशल्य को बढ़ावा मिलेगा। |
| | | | | 3.विद्यार्थियों में नए वैश्विक मूल्यों के प्रति सजगता को बढ़ावा मिलेगा एवं मूल्यवादी दृष्टि के प्रति दायित्व बोध उत्पन्न होगा।छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| | | | | 4.छात्र व्यवहार में हिंदी भाषा का उचित प्रयोग कर सकेंगे। |
| 41. | **IV** | **SH2174** | **Environmental Science** | 1.Apply interdisciplinary knowledge in environmental science by integrating concepts |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | and principles from various fields of science and engineering to address environmental issues. |
| | | | | 2.Evaluate environmental impacts of human activities on ecosystems and on the environment. |
| | | | | 3.Use scientific approach to identify and solve environment related problems. |
| | | | | 4.Design sustainable solutions to address environmental challenges by considering renewable energy sources, waste management strategies conservation measures, and environmental policies. |
| | | | | 5.Participate in group work to become acquainted with the importance of teamwork, collaboration. |
| | | | | 6.Develop presentation and report writing skills. |
| 42. | **IV** | **MC2501** | **Microcontrollers and Embedded System Lab** | 1 .Write embedded C programs for on chip and off chip peripherals. |
| | | | | 2. Interface peripherals with PIC microcontroller. |
| | | | | 3. Compile debug and test logic on PIC microcontroller. |
| 43. | **IV** | **MC262** | **Robot Operating System Lab** | 1.Illustrate the basics of Robot operating system simulation interface. |
| | | | | 2. Explain basic Linux commands for ROS installation. |
| | | | | 3. Demonstrate node concepts in multi-Robot system communication. |
| | | | | 4. Apply basic robotic actions with Robotic arm. |
| | | | | 5. Analyze the robotic prototypes used in various industries. |
| | | | | 6. Demonstrate various actions using humanoid robots. |
| 44. | **IV** | **MC2541** | **Workshop Practice –II** | 1.Demonstrate effect of variables such as speed, feed, and depth of cut on machining process. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Produce given joint by MIG welding process. |
| | | | | 3.Produce welding run on S.S. by TIG welding. |
| | | | | 4. Produce given job with proper taper and V threading within dimensional tolerances ± 0.2 mm. on diameter and ± 0.5 mm. on length. (Job – A) |
| 45. | **IV** | **MC2561** | **Technical Aptitude -II** | 1.Apply the knowledge acquired during the course work. |
| | | | | 2. Develop the ability of problem solving. |
| 46. | **IV** | **SH 2644** | **German Language - Level IV** | 1.Interpret the language if the next person is speaking slowly and clearly. |
| | | | | 2.Make use of the language in routine life with the routing topics like family, shopping, work etc. |
| | | | | 3.Demonstrate the language by self-introduction in German with simple sentences. |
| 47. | **IV** | **SH2624** | **Japanese Language - Level IV** | 1.To be able to make basic conversations in various situations. |
| | | | | 2.To recognize the sentence patterns. |
| | | | | 3.To improve Japanese Language proficiency. |
| | | | | 4. To give students insights about the communication required for living in Japan. |
| | | | | 5.To expose students to the Japanese work ethics required in their professional careers. |
| 48. | **V** | **MC3011** | **Industrial Automation** | 1.Explore the architecture of PLC and its functions. |
| | | | | 2.Execute the various instructions and logic in PLC. |
| | | | | 3.Develop the PLC program for various applications. |
| | | | | 4.Design and develop the SCADA, DCS system for various applications. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 49 | V | MC3031 | Sensor and Instrumentation | 1.Explain the fundamental principles of various sensors and transducers. |
| | | | | 2.Analyze the characteristics, advantages, and limitations of different sensor types. |
| | | | | 3.Select and integrate sensors into mechatronic systems for real-time data acquisition and control. |
| | | | | 4.Apply appropriate signal conditioning techniques to improve sensor output accuracy. |
| | | | | 5.Develop mechatronic systems using appropriate sensors for real-life applications. |
| 50 | V | MC3051 | Control Engineering | 1.Design mathematical model for electrical, mechanical and electromechanical system. |
| | | | | 2.Evaluate transient and steady state behaviour of systems using standard test signals. |
| | | | | 3.Solve the linear and non-linear systems for absolute stability and relative stability. |
| | | | | 4.Design a stable control system satisfying requirements of stability and reduced steady state error. |
| | | | | 5.Analyse of control systems using the state space approach. |
| 51 | V | MC307 | Database Management systems | 1.Illustrate the design principles for database design, ER model and normalization. |
| | | | | 2.Demonstrate the basics of query evaluation and heuristic query optimization techniques. |
| | | | | 3.Apply Concurrency control and recovery mechanisms for the desirable database problem. |
| | | | | 4.Compare the basic database storage structure and access techniques including B Tree, B+ Tress and hashing. |
| | | | | 5.Review the fundamental view on unstructured data and its management.. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 52 | V | MC3091 | Condition Monitoring | 1.Explain the maintenance techniques for condition monitoring in industries. |
| | | | | 2.Select the methods of vibration control. |
| | | | | 3.Accumulate the data for analysis using vibration acquisition equipment. |
| | | | | 4.Apply modern technologies for effective signal analysis and fault diagnosis. |
| | | | | 5.Monitor and analyze the method of failure analysis used for different applications. |
| 53 | V | MC3111 | Battery And Fuel Cell Technology | 1.Explain the electric vehicle and hybrid vehicles technology, environmental and current status. |
| | | | | 2.Justify Energy Storage Requirement in Hybrid and Electric Vehicles and elaborate the Battery Fundamental Characteristics |
| | | | | 3.Discuss the construction, electrochemistry, technology, and applications of selected primary batteries. |
| | | | | 4.Discuss the construction, electrochemistry, technology, and applications of selected Secondary batteries. |
| | | | | 5.Evaluate different batteries or fuel cells in order to select a suitable battery or fuel cell for given application. |
| | | | | 6.Select suitable, membrane, fuel (for fuel cell) and drive line for developing electric vehicles. |
| 54 | V | MC 3131 | Industrial Organization and Management | 1.Recognize the factors that influence the business environment and visualize their effect on business. |
| | | | | 2.Evaluate the scope and objectives of functional areas of business and their integration. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3.Formulate an effective and efficient solution for business problems. |
| | | | | 4.Identify several ways in which financial accounting information is used to make business decisions. |
| | | | | 5.Apply engineering economics principles for evaluation of a business. |
| 55 | V | MC3151 | Material Handling Systems | 1.Explain fundamental principles and concepts of material handling systems. |
| | | | | 2.Select and apply specific material handling system for respective applications. |
| | | | | 3.Choose an automatic transfer mechanisms and feed mechanism in material handling systems. |
| | | | | 4.Analyze usage of RGV's, AVG's, storage, retrieval Systems and use of recent technologies in advanced material handling systems. |
| 56 | V | OE353 | Factory Automation | 1.Recognise various automation technologies in manufacturing and process industries. |
| | | | | 2.Select various automation tools and methods in the manufacturing industry. |
| | | | | 3.Implement various control and automation methods in process industries. |
| | | | | 4.Analyse automation systems for manufacturing and process industries. |
| 57 | V | OE355 | Cyber Physical Systems | 1.Understand the need and purpose of the different components of CPS |
| | | | | 2.Design physical system depends on its requirements |
| | | | | 3.Develop the ability to interact with cyber-physical systems protocols |
| | | | | 4.Analyze common methods used to secure cyber-physical systems |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 58 | V | CEMD301 | Infrastructure Engineering | 1.Apply the knowledge of geometric design in road construction. |
| | | | | 2.Identify the quality parameters of pavement materials and various methods of road construction. |
| | | | | 3.Discuss the various aspects of airport engineering. |
| | | | | 4.Explain design parameters of railway engineering and it's component parts. |
| | | | | 5.Summaries the different offshore structures for dock and harbors. |
| 59 | V | CSMD301 | Fundamentals of Database Systems | 1.Describe the purpose and nature of the database system for storing and fast access to thedata |
| | | | | 2.Identify various protocols, issues, and techniques related to transaction management for a consistent & and stable database |
| | | | | 3.Draw E-R models to represent simple database application scenarios |
| | | | | 4.Design the queries to manipulate and access data using procedural and non-procedural languages |
| | | | | 5.Apply relational database design concepts to remove data redundancy and to retrieve data easily |
| | | | | 6.Perform operation on Unstructured data. |
| 60 | V | EEMD301 | Electrical Machines | 1.Describe behavior of dc machine. |
| | | | | 2.Explain the working principle of 1-Phase and 3-Phase transformers. |
| | | | | 3.Explain working of different induction motors. |
| | | | | 4.Select the relevant electrical machines for different applications |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5.Interpret the relevant fractional horsepower motor for different applications |
| 61 | V | ECMD301 | Advanced Communication Systems | 1.Explain the principles of antenna and wave propagation. |
| | | | | 2.Understand basic antenna parameters and their types. |
| | | | | 3.Discuss the evolution, requirements, and challenges of 5G communication systems. |
| | | | | 4.Understand and compare various communication techniques. |
| | | | | 5.Communicate effectively on complex engineering topics related to modern communication techniques. |
| 62 | V | CIMD301 | Introduction of DBMS | 1.Describe the fundamental elements of relational database management systems. |
| | | | | 2.Design ER-models to represent simple database application scenarios. |
| | | | | 3.Write SQL query to perform various operations on the database. |
| | | | | 4.Analyze principle of integrity constraints, Hashing and Indexing on databases. |
| 63 | V | MEMD305 | Product Design Tools and Techniques | 1.Explain the basic principles of engineering design. |
| | | | | 2.Design products for ease of manufacturing and assembly. |
| | | | | 3.Apply value engineering and concurrent engineering principles in product design. |
| | | | | 4.Apply reverse engineering on a product. |
| | | | | 5.Apply various prototyping techniques, including rapid prototyping technologies. |
| 64 | V | MCMD301 | Sensor and Instrumentation | 1.Explain the fundamental principles of various sensors and transducers. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Analyze the characteristics, advantages, and limitations of different sensor types. |
| | | | | 3.Select and integrate sensors into mechatronic systems for real-time data acquisition and control. |
| | | | | 4.Apply appropriate signal conditioning techniques to improve sensor output accuracy. |
| | | | | 5.Develop mechatronic systems using appropriate sensors for real-life applications. |
| 65 | V | AIMD301 | Machine Learning | 1.Utilize machine learning techniques and understand the basic theory underlying machine learning. |
| | | | | 2.Articulate supervised, unsupervised and reinforcement learning |
| | | | | 3.Identify the basic concepts of learning and decision trees. |
| | | | | 4.Utilize Bayesian techniques for problems appear in machine learning |
| | | | | 5.Perform statistical analysis of machine learning techniques. |
| 66 | V | RAMD301 | Kinematic & Dynamics for Robots | 1.Select the type of mechanism for the robotic applications |
| | | | | 2.Perform kinematic analysis and synthesis of mechanisms. |
| | | | | 3.Perform forward and inverse kinematics of robots |
| | | | | 4.Perform workspace analysis for different types of robots |
| | | | | 5.Design robot manipulators based on dynamic analysis |
| | | | | 6.Perform forward and inverse dynamics of robots |
| 67 | V | CEMD303 | Smart Cities & Sustainable Development | 1.Develop a critical understanding of the different concept and ideologies of smart cities. |
| | | | | 2.Analyse the different approaches toward planning and development of smart cities on global level. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3.Assess the existing state and approach of Smart city Mission in India. |
| | | | | 4.Comprehend the concept of resilience and sustainable development and its measurement. |
| | | | | 5.Evaluate the present status of sustainability and rating systems initiatives within the Indian context. |
| 68 | V | CSMD303 | Object-oriented Programming in Python | 1.Demonstrate a comprehensive understanding of Python syntax, data types, and basic operations. |
| | | | | 2.Make use of common Python libraries for data manipulation. |
| | | | | 3.Implement lists, tuples, sets, and dictionaries for effective data handling. |
| | | | | 4.Apply principles of OOP, including classes, objects, inheritance, and polymorphism. |
| 69 | V | EEMD303 | Electrical Technology Lab | 1.Demonstrate speed control methods of electrical machines. |
| | | | | 2.Analyze performance of DC motor and induction motor for speed control applications. |
| | | | | 3.Implement power electronic circuits for given application. |
| | | | | 4.Measure electrical quantities using electrical and electronic instruments. |
| 70 | V | ECMD303 | Electronic Product Design | 1.Elaborate product design processes. |
| | | | | 2.Explain various aspects of PCB design. |
| | | | | 3.Differentiate product-testing methods. |
| | | | | 4.Create various documents for the product. |
| 71 | V | CIMD303 | OOP using Java | 1.Explain the concepts and terminologies in object-oriented concepts and java programming language. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Apply object-oriented programming features and concepts for solving given problem. |
| | | | | 3.Develop the java application using the collection framework to solve real word problem. |
| | | | | 4.Apply the concepts exception handling to develop error free codes. |
| | | | | 5.Utilize the concepts of package to develop efficient codes. |
| 72 | V | MEMD307 | Design and Prototyping | 1.Use CAD software to create detailed CAD models and designs. |
| | | | | 2.Explain the workflow and settings for effective additive manufacturing. |
| | | | | 3.Simulate the 3D printing process to identify and correct potential issues before actual printing. |
| | | | | 4.Print a 3D component based on CAD models. |
| 73 | V | MCMD303 | Industrial Automation | 1.Explore the architecture of PLC and its functions. |
| | | | | 2.Execute the various instructions and logic in PLC. |
| | | | | 3.Develop the PLC program for various applications. |
| | | | | 4.Design and develop the SCADA, DCS system for various applications. |
| 74 | V | AIMD303 | Business Intelligence | 1.Articulate data pre-processing techniques |
| | | | | 2.Analyze the data modeling required for business intelligence related tasks |
| | | | | 3.Determine the role of statistical techniques in data analysis tasks |
| | | | | 4.Identify big data analysis techniques |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 5.Utilize different reporting/visualization tool |
| 75 | V | RAMD303 | Robot Programming Lab. | 1.Explain Robot programming ecosystem. |
| | | | | 2.Create reusable code for robot powered applications. |
| | | | | **3.Design a custom robot using programming**. |
| | | | | 4.Simulate and control the robot using ROS. |
| 76 | V | MC3511 | Industrial Automation Lab | 1.Develop the PLC program for the implementation of logic gates |
| | | | | 2.Develop the PLC program for controlling the parameters and applications like Pressure, bottle filling, cylinder actuation and elevator control. |
| | | | | 3.Develop the PLC program for various applications like identifying the necessity of using Supervisory Control and Data Acquisition (SCADA) for complex projects**.** |
| | | | | 4.Develop HMI, SCADA programme for various applications. |
| 77 | V | MC3531 | Sensors and Instrumentation Lab | 1.To understand tem1s and sensors used in engineering applications. |
| | | | | 2. Able to design necessary signal conditioning circuits for various sensors. |
| 78 | V | MC3551 | Control Engineering Lab | 1.Develop transfer function of block diagrams using MATLAB. |
| | | | | 2.Analyze response of control systems to various input conditions. |
| | | | | 3.Design a control system using root locus method. |
| | | | | 4.Prepare state space representation for given control system using various programming methods. |
| 79 | V | MC3571 | Technical Aptitude-III | 1.Apply the knowledge acquired during the course work. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Develop the ability of problem solving. |
| 80 | V | SH3034 | Scholastic Aptitude-I | 1.Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | 2.Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | 3.Develop a bridge in analogies, series and visualizing directions. |
| | | | | 4.Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams. |
| 81 | V | MC3591 | Summer Internship | 1.Apply the Technical knowledge in real industrial situations. |
| | | | | 2.Formulate Technical reports/projects. |
| | | | | 3.Develop and refine oral and written communication skills. |
| | | | | 4.Explain the activities and functions of business professionals. |
| | | | | 5.Discuss knowledge of the industry in which the internship is done. |
| 82 | VI | MC3021 | Machine Design | 1. Identify the customers need, formulate the problem and draw the design specifications. |
| | | | | 2 Apply the theories of failure for designing the machine elements. |
| | | | | 3 Design a simple machine component like levers, bolted & welded joints, shafts, keys and springs. |
| | | | | 4 Select a bearing and power transmission elements for given application |
| | | | | 5. Design a spur gear for a given application |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 6. Design a component against fluctuating load. |
| 83 | VI | MC3041 | Power Electronics and Drives | 1.Explain the characteristics, ratings and applications of power devices. |
| | | | | 2.Calculate the performance parameters of the converters and drives. |
| | | | | 3.Analyze the operation of power electronics converters and drives. |
| | | | | 4.Design power converters to meet the given requirements. |
| 84 | VI | MC3061 | Research Methodology | 1.Select on the literature in the field, analyze and interpret research evidence published on a topic to establish a suitable research problem/issue or opportunity to explore further. |
| | | | | 2.Design the research study using a suitable paradigm, associated methodologies and methods of data collection and analysis. |
| | | | | 3.Write a research proposal (research blueprint) describing the topic. |
| | | | | 4.Demonstrate the ability to use the statistical software to solve problems. |
| 85 | VI | MC3081 | Finite Element Methods | 1.Apply the finite element method for solid mechanics and Heat transfer problems to develop the models. |
| | | | | 2.Solve problems in one-dimensional structures including trusses and beams. |
| | | | | 3.Formulate FE characteristic equations for two-dimensional and three-dimensional problems. |
| | | | | 4.Analyze field problems like heat transfer and torsion by deriving element matrices and applying FEM formulations. |
| 86 | VI | MC310 | | 1.Apply the fundamentals of conduction heat transfer. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | **Thermal Management of Mechatronics System.** | 2.Distinguish between the basic modes of heat transfer. |
| | | | | 3.Design simple heat transfer systems using electric circuit elements. |
| | | | | 4.Analyse forced and free convection heat transfer situations. |
| 87 | **VI** | **MC312** | **Additive Manufacturing** | 1.Recognize the Importance of AM technologies in Manufacturing. |
| | | | | 2.Classify and select additive manufacturing processes for a given application. |
| | | | | 4.Design for manufacturing of AM and conduct Process Analysis |
| | | | | 5.Identify software issues related to additive manufacturing process. |
| | | | | 6.Select the suitable method for Post-processing of AM parts |
| | | | | 7.Identify the Applications of AM in Automobile, Aerospace, and Bio-medical etc. |
| 88 | **VI** | **MC3141** | **Digital Signal Processing** | 1.Characterize the signals mathematically in continuous time, discrete-time, and in the frequency domain. |
| | | | | 2.Analyze discrete-time systems using different transforms. |
| | | | | 3.Explain the digital signal processing algorithms. |
| | | | | 4.Design of different types of digital filters for various applications. |
| 89 | **VI** | **MC316** | **Industry 4.0 Technologies and IIoT** | 1.Recognise the role of Industry 4.0 and its historical evolution. |
| | | | | 2.Identify and describe the core technologies that underpin Industry 4.0, including IoT, Big Data, Cloud Computing, and Cyber-Physical Systems. |
| | | | | 3.Analyze the components of smart manufacturing systems, including digital twins, additive |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | manufacturing, robotics, and automation. |
| | | | | 4.Investigate the fundamental concepts and architectures of IIoT. |
| | | | | 5.Analyze the role of sensors, communication protocols, and data analytics in IIoT implementations. |
| 90 | **VI** | **MC3181** | **Wireless Sensor Network** | 1.Analyze single node network architecture of WSN. |
| | | | | 2.Classify routing and MAC layer protocol in WSN. |
| | | | | 3.Develop specific requirement applications in wireless sensor networks. |
| 91 | **VI** | **MC3201** | **Microelectromechanical Systems (MEMS)** | 1.Discuss the fundamentals, characteristics, and applications of MEMS and Microsystems across various domains. |
| | | | | 2.Identify and select specific material for manufacturing of MEMS and its packaging. |
| | | | | 3.Analyze and select the different techniques in MEMS technology as per requirement of application. |
| | | | | 4.Compare and choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process. |
| | | | | 5.Design and develop MEMS solutions tailored to meet the requirements of diverse applications. |
| | | | | 6.Design packaging solutions for MEMS devices based on specified criteria and application needs. |
| 92 | **VI** | **MC322** | **Process Control** | 1. Introduce technical terms and nomenclature associated with Process control domain. |
| | | | | 2.Build models using first principles approach as well as analyze models. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 3.Design, tune and implement PID Controllers to achieve desired performance for various processes |
| | | | | 4.Analyze Systems and design & implement control Schemes for various Processes. |
| | | | | 5.Identify, formulate, and solve problems in the Process Control Domain. |
| 93 | VI | OE344 | Supply Chain Analytics | 1.Identify the role and key issues in the supply chain management. |
| | | | | 2.Explain the important supply chain drivers and their significance in strategic planning. |
| | | | | 3.Estimate the demand using suitable demand forecasting method. |
| | | | | 4.Design the inventory system and level at various locations in supply chain. |
| | | | | 5.Design the supply chain network using appropriate network design methodology for the given problem. |
| | | | | 6.Describe the importance of handling uncertainty in supply chain using decision tree. |
| 94 | VI | OE346 | Mobile Robotics | 1.Identify and explain the main components of a robot, including sensors, actuators, and control systems. |
| | | | | 2.Solve forward and inverse kinematics problems for mobile robots. |
| | | | | 3.Apply basic motion planning algorithms such as A* and Dijkstra's algorithm. |
| | | | | 4.Apply Simultaneous Localization and Mapping. |
| | | | | 5.Implement inter-robot communication and human-robot interaction. |
| 95 | VI | CEMD302 | Environmental Engineering | 1.Explain importance of water and wastewater analysis for various parameters. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Discuss impact of pollution on man, animal and plants. |
| | | | | 3.Prepare layout of water and wastewater treatment process. |
| | | | | 4.Design Water and Wastewater Treatment Plant. |
| | | | | 5.Apply AI tools for impact of humans on environment. |
| 96 | **VI** | **CSMD302** | **Artificial Intelligence** | 1.Understand the basic concepts and techniques of Artificial Intelligence. |
| | | | | 2. Apply AI algorithms for solving typical practical problems. |
| | | | | 3. Describe appropriate knowledge representation schemes in AI. |
| | | | | 4. Apply reasoning schemes in AI. |
| | | | | 5. Analyze the planning schemes for goal stack. |
| | | | | 6. Evaluate performance of solution for constraint satisfaction problem. |
| 97 | **VI** | EEMD302 | **Smart Grid** | 1. Summarize the conceptand future of smart grid |
| | | | | 2. Develop smart grid architecture |
| | | | | 3. Compile various smart grid technologies |
| | | | | 4. Identify communication and information technologies for smart grid |
| | | | | 5. Elaborate distributed generation and storage technologies |
| | | | | 6. Recommend smart metering and distribution automation |
| 98 | **VI** | **ECMD302** | **Industrial Electronics** | 1.Identify basics Power Electronics devices and components. |
| | | | | 2.Illustrate use of Power Electronics. |
| | | | | 3.Develop PLC logic using ladder programming. |
| | | | | 4.Analyze industrial electronics applications. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 99 | VI | CIMD302 | Software Engineering | 1.Describe fundamental concepts in software engineering and project management |
| | | | | 2.Practice software process models for the undertaken software problems |
| | | | | 3.Design function-oriented and object-oriented models using modern tools. |
| | | | | 4.Identify classes and build the domain model using advanced concepts in object, dynamic and functional modeling. |
| | | | | 5.Analyze existing software systems using function and object-oriented analysis. |
| | | | | 6.Design models using UML diagrams for software systems: use case, class, sequence, collaboration, activity, state chart diagrams, component and deployment. |
| 100 | VI | MEMD304 | Marketing and Business Fundamentals for New Products | 1.Explain product positioning and branding strategies for new products |
| | | | | 2.Analyse market trends and consumer behaviour to identify opportunities for new product development. |
| | | | | 3.Develop pricing strategies and cost estimation techniques for new products |
| | | | | 4.Explain the basics of intellectual property rights and patents in the context of new product development |
| | | | | 5.Design distribution channels and sales strategies designed for a new product. |
| | | | | 6.Create effective marketing communication plans and launch strategies for new products. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 101 | VI | MCMD302 | Industrial Robotics | 1.Explain the basic concepts of Robots. |
| | | | | 2.Select an end effector and sensor for application. |
| | | | | 3.Explain drives and controls for robotic system. |
| | | | | 4.Develop program for robot to perform tasks in industrial applications. |
| 102 | VI | AIMD302 | Principles ofArtificial Intelligence | 1.Articulate basic concepts and techniques of Artificial Intelligence. |
| | | | | 2.Apply AI algorithms for solving typical practical problems. |
| | | | | 3. Designate appropriate knowledge representation schemes in AI. |
| | | | | 4.Analyze reasoning schemes in AI. |
| 103 | VI | RAMD302 | Industrial Automation & Control | 1.Explain need, basic elements, and systems of industrial automation. |
| | | | | 2.Develop PLC programming for various applications. |
| | | | | 3.Discuss various material handling and identification technologies. |
| | | | | 4.Explain basics of DCS and its interfacing |
| 104 | VI | MC3501 | Workshop Practice III | 1.Develop CNC program and simulate it on CNC Simulation Software/training kit for a given job. |
| | | | | 2.Perform Set-up operation for CNC Turning Operations. |
| | | | | 3.Perform Set-up operation for CNC Milling Operations. |
| | | | | 4.Perform Set-up operation for ECM Machine |
| | | | | 5. Perform Set-up operation for EDM Machine. |
| 105 | VI | MC352 | Power Electronics & Drive Lab | 1.Measure the parameters of power electronic devices, converters and drives. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Analyze the operation of the various converters and drives. |
| | | | | 3.Plot the characteristics/responses. |
| | | | | 4.Interpret the results of the experimentation. |
| 106 | VI | MC3541 | Data processing and visualization lab | 1.Set up and configure the Hadoop Using Cloudera. |
| | | | | 2.Map Reduce Programming Examples. |
| | | | | 3.Install and create database and collection CRUD document in Mongo DB. |
| | | | | 4.Creation of database and table using Hive. |
| | | | | 5.Analyze and use Pig Latin Basic Pig Shell. |
| | | | | 6.Experiment with Tableau Software. |
| 107 | VI | MC3561 | Technical Aptitude-IV | 1.Apply the knowledge acquired during the course work. |
| | | | | 2.Develop the ability of problem solving. |
| 108 | VI | SH3064 | Scholastic Aptitude-II | 1.Develop a thorough conceptual understanding and develop a logical approach towards solving Aptitude and Reasoning problems. |
| | | | | 2.Understand usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude terms of profits and interests |
| | | | | 3.Develop a bridge in analogies, series and visualizing directions. |
| | | | | 4.Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams |
| 109 | VI | MC3581 | Capstone Project Phase-I | 1.Convert an open-ended problem statement into a statement of work or a set of design specifications |
| | | | | 2.Produce usable documents of record regarding the design |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | process and design state and communicate effectively. |
| | | | | 3. Identify the literature gap by conducting a survey of several available literature in the preferred field of study |
| | | | | 4. Decompose problem/task into subtasks, prioritizes subtasks, and establishes a timetable and milestones by which progress may be evaluated. |
| | | | | 5. Select and apply the appropriate design of experiments, experimental setup, models, or simulation technique for the project task. |
| | | | | 6. Collaborates with team members of diverse backgrounds and perspectives to achieve a common goal. |
| 110 | **VII** | **MC4011** | **Design of Mechatronics System** | 1.Demonstrate key elements of mechatronics system design process. |
| | | | | 2.Apply a systematic approach to the design process of mechatronics systems. |
| | | | | 3.Create system modelling of basic models & analyse. |
| | | | | 4.Realize the concept of real time interfacing and data acquisition. |
| 111 | **VII** | **MC403** | **Machine Learning** | 1.Classify machine learning techniques |
| | | | | 2.Implement machine learning techniques suitable for problem solving |
| | | | | 3.Solve the problem using various deep learning techniques |
| | | | | 4.Describe various basic concept of Artificial Neural Networks |
| 112 | **VII** | **MC4051** | **Industrial Robotics** | 1.Explain the basic concepts of Robots. |
| | | | | 2.Select an end effector and sensor for application. |
| | | | | 3.Explain drives and controls for |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | robotic system. |
| | | | | 4.Develop program for robot to perform tasks in industrial applications. |
| 113 | VII | MC4071 | Building Automation | 1.Design building automation system by applying basic knowledge of electrical and electronics. |
| | | | | 2.Design HVAC system for buildings. |
| | | | | 3.Apply different techniques for fire alarm techniques. |
| | | | | 4.Access control system for building automation systems. |
| | | | | 5.Introduce digital simulation for development of application-oriented logic circuits. |
| 114 | VII | MC409 | Basics of Cloud Computing | 1.Describe fundamental concepts of cloud computing and its Architecture. |
| | | | | 2.Differentiate and analyze the components of various cloud platforms. |
| | | | | 3.Analyze the Key Components of Amazon Web Services (AWS) |
| | | | | 4.Analyze the applications of Cloud Computing in different domains. |
| 115 | VII | MC4111 | Machine Tool Design | 1.Select & design drive system for machine tool. |
| | | | | 2.Decide layout of machine tool. |
| | | | | 3.Design machine tool structure, guide ways and power screws. |
| | | | | 4.Determine dynamic characteristics of machine tool & carry stability analysis. |
| | | | | 5.Demonstrate control systems in machine tools and SPM. |
| 116 | VII | MC4131 | Fuzzy Logic and Neural Network | 1.Explain the basic concept of fuzzy sets, fuzzy logic & defuzzification. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Demonstrate the basics of Artificial Neural theory and programming of Microprocessors |
| | | | | 3.Analyze various techniques in feedback and feed forward Neural networks. |
| | | | | 4.Explain the principle of competitive neural networks and Adaptive resonance theory. |
| | | | | 5.Demonstrate the architecture and algorithm of Cognitron, Neo cognitron, the concepts of fuzzy associative memory and fuzzy systems. |
| 117 | **VII** | **MC4151** | **Hybrid and Electric Vehicle** | 1.Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources. |
| | | | | 2.Design and develop basic schemes of electric vehicles and hybrid electric vehicles. |
| | | | | 3.Choose proper energy storage systems for vehicle applications. |
| | | | | 4.Identify various communication protocols and technologies used in vehicle networks. |
| 118 | **VII** | **MC4171** | **Industrial Engineering** | 1.Apply industrial engineering tools to improve productivity |
| | | | | 2.Establish standard methods for job and compute standard times |
| | | | | 3.Decide the plant location and design appropriate type of layout and recommend suitable material handling system |
| | | | | 4.Plan production activities using tools like capacity and aggregate planning |
| | | | | 5.Design the inventory system using appropriate inventory model |
| | | | | 6.Implement project management knowledge, tools and techniques to achieve project success. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 119 | VII | MC421 | Emerging Smart Materials for Mechatronics Applications | 1.Develop familiarity with various smart materials and their applications. |
| | | | | 2.Design sensors and actuators using smart materials like piezoelectric materials and shape memory alloys (SMAs). |
| | | | | 3.Analyze vibration control and damping structures using smart materials. |
| | | | | 4.Interpret emerging technical literature related to smart materials and structures. |
| 120 | VII | MC4231 | Computer Network and Cyber Security | 1.Describe the various networking components and topologies. |
| | | | | 2.Illustrate the concepts, services and protocols used in Computer networks. |
| | | | | 3.Solve problems related to Ipv4 addressing. |
| | | | | 4.Describe fundamental terms in cybercrime and compare various cyber-attacks & offences. |
| | | | | 5.Demonstrate cyber forensics using modern tools & techniques. |
| | | | | 6.Construct a strategy for creating awareness about cyber security for e-bankong and legal issues among the social community. |
| 121 | VII | MC433 | Unmanned Aerial Vehicle | 1.Elaborate drone technology. |
| | | | | 2.Explain fundamentals and design principles of UAV. |
| | | | | 3.Understand Mechanical and Electrical components of UAV. |
| | | | | 4.Discuss the wide range of applications of drone. |
| | | | | 5.Classify various propulsion and controlling techniques for drone. |
| 122 | VII | MC4271 | VLSI Design | 1.Describe fundamentals of MOS circuits |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 2.Analyze the static and dynamic characteristics of CMOS circuit |
| | | | | 3.Apply knowledge of MOS circuit and fabrication process to solve the problems |
| | | | | 4.Design and implementation of combinational and sequential circuits |
| | | | | 5.Evaluate the performance of CMOS circuits |
| 123 | **VII** | **MC4511** | **Industrial Robotics Lab** | 1.To explain the basic principles of Robotic technology, configurations, control, an d programming of Robots. |
| | | | | 2.To choose the appropriate Sensor and Machine vision system for a given application |
| | | | | 3.To explain the basic principles of programming and apply it for typical Pick &place. |
| 124 | **VII** | **MC4531** | **Circuit Simulation and PCB Design Lab** | 1.Compare different circuit simulation and PCB layout design software |
| | | | | 2.Make schematic electronic circuits in the software |
| | | | | 3.Fabricate PCB using various tools |
| | | | | 4.Design and develop layout of PCB using PCB layout design tool with fabrication (free or licensed). |
| 125 | **VII** | **MC4551** | **Computer Network and Cyber Security Lab** | 1.After successful completion of the course, students will be able to, |
| | | | | 2.l. Demonstrate the use of various networking tools and utilities. |
| | | | | 3.Use the CISCO packet tracer and Packet Capturing and Analyzing tool i.e Wireshark. |
| | | | | 4.Configure and test the different network services. |
| | | | | 5.Install and configure the Kali Operating system |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 6.Demonstrate different cyber-attacks using Kali Linux. |
| | | | | 7.Demonstrate cyber forensic techniques using windows GUI Based tools and Kali Linux. |
| 126 | **VII** | **MC4571** | **VLSI Design Lab** | 1.Design and simulate schematic of various digital circuits |
| | | | | 2.Sketch layout of various digital block in cad tools. |
| | | | | 3.Analyze various parameters of VLSI logic circuits |
| | | | | 4.Interpret results and communicate effectively through written lab journals |
| 127 | **VII** | **MC467** | **Unmanned Aerial Vehicles Lab** | 1.Identify and assemble components of UAVs. |
| | | | | 2.Simulate and analyze drone flight using MATLAB or similar tools. |
| | | | | 3.Integrate and calibrate sensors for drone navigation. |
| | | | | 4.Perform autonomous missions using mission planner software. |
| | | | | 5.Apply basic computer vision techniques in drone operations. |
| 128 | **VIII** | **MC4711** | **Capstone Project Phase II** | 1.Select and apply the appropriate design of experiments, experimental setup, models, or simulation technique for the project task. |
| | | | | 2.Fabricate project or experimental setup or model and analyze the output of models/simulations to provide information for decisions |
| | | | | 3.Perform feasibility analysis and uses results to choose candidate solutions and evaluate the quality of solutions to select the best one |
| | | | | 4.Collaborates with team |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | members of diverse backgrounds and perspectives to achieve a common goal. |
| | | | | 5.Write a technical report and communicate effectively. |
| 129 | VIII | OE4382 | Finance for Engineers (Online Course) | 1.Discuss the fundamental aspects of accounting and finance. |
| | | | | 2.Apply theoretical knowledge and information for preparing various financial statements. |
| | | | | 3.Analyze the financial information for solving managerial problems. |
| | | | | 4.Evaluate financial performance of the organization for effective decision making. |
| 130 | VIII | OE4362 | Engineering Management & Economics (Online Course) | 1.Develop administrative, organizational, and planning skills to effectively manage and execute engineering projects. |
| | | | | 2.Create bar charts and milestone charts to track and manage project progress. |
| | | | | 3.Analyze profit and cost data, conducting economic evaluations to make informed, optimal decisions. |
| | | | | 4.Calculate depreciation using various methods. |
| 131 | VIII | IP4024 | Industry Internship & Project | **1. Internship** |
| | | | | 1.Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services) |
| | | | | 2.Develop an attitude to adjust with the company culture, work norms, code of conduct. |
| | | | | 3.Recognize and follow the safety norms, Code of conduct. |
| | | | | 4.Demonstrate the ability to observe, analyse and document |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | the details as per the industry practices. |
| | | | | 5.Interpret the processes, systems and procedures and to relate to the theoretical concepts-studies. |
| | | | | 6.Develop the leadership abilities, communication. |
| | | | | **2. Project** |
| | | | | 1.Identify the project/problem in the domain of a program relevant for the company. |
| | | | | 2.Compile the information to the pertaining to the problem identified. |
| | | | | 3.Analyse the information using the statistical tools/ techniques. |
| | | | | 4.develop the feasible solution for given problem. |
| | | | | 5.Analyse the impact of the project on the performance of company/department. |
| 132 | **VIII** | **OE4382** | **Finance for Engineers (Online Course)** | 1.Discuss the fundamental aspects of accounting and finance. |
| | | | | 2.Apply theoretical knowledge and information for preparing various financial statements. |
| | | | | 3.Analyze the financial information for solving managerial problems. |
| | | | | 4.Evaluate financial performance of the organization for effective decision making. |
| 134 | **VIII** | **OE4362** | **Engineering Management & Economics (Online Course)** | 1.Develop administrative, organizational, and planning skills to effectively manage and execute engineering projects. |
| | | | | 2.Create bar charts and milestone charts to track and manage project progress. |
| | | | | 3.Analyze profit and cost data, |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | conducting economic evaluations to make informed, optimal decisions. |
| | | | | 4.Calculate depreciation using various methods. |
| 135 | VIII | RE4044 | Research Internship | 1.Investigate the technical literature. |
| | | | | 2.Recognize and evaluate theories, practices, and/or research on a chosen topic by conducting a thorough literature review and submitting a written integrative, critical summary of the current literature. |
| | | | | 3.Design a research problem and develop a methodology. |
| | | | | 4.Develop and implement an advanced original research or creative project. |
| | | | | 5.Develop the ability to explain the conceptual viability of the project and describe the major components involved. |
| | | | | 6.Develop advanced discipline-relevant skills and competencies. |
| | | | | 7.Write a research report and paper. |
| 136 | VIII | ED4104 | Project Management (Online Course) | 1.Develop a Comprehensive Business Plan for selected business. |
| | | | | 2.Evaluate Project Viability Through Financial Appraisal. |
| | | | | 3.Analyze the Environmental and Technical Aspects of a Project. |
| | | | | 4.Apply Project Management Techniques. |
| | | | | 5.Assess the Commercial Feasibility of a Business Opportunity. |
| 137 | VIII | ED4044 | Commercial Aspects of the Project (Online | 1.Interpret basic Accounting and Financial Terminologies. |
| | | | | 2.Prepare & analyze financial |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | **Course)** | statements. |
| | | | | 3.Apply basic principles of marketing. |
| | | | | 4.Apply knowledge of marketing mix for any organization. |
| 138 | **VIII** | **ED4064** | **Entrepreneurship Development Program (EDP)** | 1. Apply knowledge of engineering, economics, marketing and finance for formulation of business plan, starting & managing new business. |
| 139 | **VIII** | **ED4084** | **Entrepreneurial Internship** | 1.Apply knowledge of engineering, economics, marketing and finance for preparation of project report. |
| | | | | 2.Make commercial, technical and financial appraisal of project. |
| 140 | **VIII** | **REH401** | **Intellectual Property Rights** | 1.Explain the basic concepts and importance of Intellectual Property Rights. |
| | | | | 2.Identify different types of intellectual property and their relevance in the technology sector. |
| | | | | 3.Analyze the legal aspects of IPR and its implications for innovation and business. |
| | | | | 4.Apply IPR principles to protect inventions, designs, and creative works. |
| | | | | 5.Evaluate the ethical and societal impact of IPR in a global context.. |
| 141 | **VIII** | **REH403** | **Research Project (Synopsis) Phase 1** | 1.Demonstrate an understanding of research methodology and project planning. |
| | | | | 2.Identify a research problem with clear objectives and questions. |
| | | | | 3.Conduct a systematic literature review using appropriate sources and tools. |
| | | | | 4.Develop a research synopsis with a well-defined |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | methodology and expected outcomes. |
| | | | | 5.Present research synopsis/proposal effectively. |
| 142 | VIII | REH405 | Research- Specific Core Course-1 (Online NPTEL Course) | 1.Explain the key concepts and insights gained from the NPTEL course |
| | | | | 2.Apply concepts, tools, and methodologies learned from the NPTEL course into their ongoing research project |
| | | | | 3.Analyze research-specific problems using the knowledge acquired from the online course. |
| | | | | 4.Identify the real life applications and practices of courses studied |
| 143 | VIII | REH402 | Research Project Phase 2 | 1.Apply appropriate analytical tools and techniques to process and interpret research. |
| | | | | 2.Identify and address challenges encountered during the research process. |
| | | | | 3.Prepare a comprehensive research report detailing the objectives, methodology, findings, and conclusions. |
| | | | | 4.Communicate research outcomes effectively through written and oral presentations. |
| | | | | 5.Demonstrate ethical guidelines and standards throughout the research process. |

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Rajarambapu Institute of Technology, Rajaramnagar
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# • Management Studies

- **Department Name :-Department of Management Studies**
- **PG Program Name :-Master of Business Administration (MBA)**
- **Vision and Mission :-**

**Vision:**

- Achieving excellence in academics and research to develop globally competent and socially responsible managers.

**Mission:**

- To leverage innovation and excellence in academic design, delivery and assessment to ensure ethical and holistic development of students for employability, entrepreneurship and higher education.
- To design and keep the curricula updated, based on changing needs of industry and society worldwide.
- To build and maintain world-class infrastructure, for sustained learning, development and research.
- To provide an environment that encourages creativity, analysis and critical thinking.

| Sr. No. | Program Outcomes |
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| 95. | **PO1:** Apply knowledge of management theories and practices to solve business problems. |
| 96. | **PO2:** Foster Analytical and critical thinking abilities for data-based decision making. |
| 97. | **PO3:** Ability to develop Value-based Leadership ability. |
| 98. | **PO4:** Ability to understand, analyze and communicate global, economic, legal, and ethical aspects of business. |
| 99. | **PO5:** Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment. |
| 100. | **PO6:** Be capable of self-education and clearly understand the value of lifelong learning. |
| 101. | **PO7:** Be familiar with modern statistical and software tools to analyze business problems. |
| 102. | **PO8:** To examine critically for self-assessment and take corrective measures accordingly without external feedback. |

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| Sr. No. | Program Specific Outcomes |
|---|---|
| 9. | NA |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 1. | I | MGC 1013 | Principles of Management | Co:1 Interpret classical & modern theories. |
| | | | | Co:2 Apply functions of management in real world scenarios |
| | | | | Co:3 Communicate effectively about management decisions. |
| | | | | Co:4 Analyze recent trends in live management case studies |
| | | | | Co:5 Evaluate the current business landscape and trends. |
| 2. | I | MGC1033 | Managerial Economics | Co:1 Evaluate microeconomic and macroeconomic variables and its implication in business decision making. |
| | | | | Co:2 Identify the competitive and global market for making larger presence and leadership. |
| | | | | Co:3 Assess and evaluate macroeconomic variables for selection of best alternatives to maximize profit and value of an organization |
| | | | | Co:4 Identify issues related to development and governance issue that hinder the development |
| | | | | Co:5 Analyse the sectoral development and policies initiated by the governments to improve. |
| 3. | I | MGC1053 | Financial Accounting and Analysis | Co:1 Comprehend the fundamental aspects concerning financial accounting and its analysis. |
| | | | | Co:2 Discuss the significance of preparation of various financial statements. |
| | | | | Co:3 Apply accounting theory and information for preparing various accounts and financial statements. |
| | | | | Co:4 Analyze the financial information by associating the tools and techniques for solving managerial problems. |
| | | | | Co:5 Evaluate financial performance of the organization for effective decision making. |
| 4. | I | MGC1073 | Legal & Business Environment | Co:1 Develop an understanding of micro and macro elements of the business environment. |
| | | | | Co:2 Identify the major and minor factors affecting the functioning of the business. |
| | | | | Co:3 Exhibit the understanding of essential laws that have a bearing on the conduct of business in India. |

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| | | | | Co:4 Evaluate the strategies adopted by the firm to deal with the various factors of the international, financial and technological environment. |
| | | | | Co:5 Analyze the dynamics of the business environment and its impact on the functioning of the business. |
| 5. | I | MGC1093 | Marketing Management | Co:1 Discuss Core concept of marketing and the role of marketing in business and society. |
| | | | | Co:2 Develop marketing strategies based on product, price, place and promotion. |
| | | | | Co:3 Analyse marketing problems and provide solution based on a critical examination of marketing information. |
| 6. | I | MGC1113 | Organizational Behaviour | Co:1 Analyze the conceptual anchors of Organizational behavior |
| | | | | Co:2 Identify personal dimensions of personality. Job satisfaction, motivation and learning |
| | | | | Co:3 Demonstrate the group dynamics and its applicability |
| | | | | Co:4 Explain organizational change and culture effect on working relationships |
| | | | | Co:5 Apply various leadership styles and conflict management strategies used in organizations. |
| 7. | I | MGC1133 | Quantitative Analysis | Co:1 Generate mathematical models of business scenarios |
| | | | | Co:2 Apply basic mathematical, statistical and optimization tools. |
| | | | | Co:3 Summarize data visually and numerically. |
| | | | | Co:4 Demonstrate analytical skill for solving business problems. |
| | | | | Co:5 Interpret results from decision making perspectives |
| 8. | I | MGC1153 | Indian Ethos and Business Ethics | Co:1 Interpret the variable values in morality |
| | | | | Co:2 Propose strategies for maximizing personal growth and productivity of employees. |
| | | | | Co:3 Apply value-based management and ethical practices in all functional areas of management |
| | | | | Co:4 Develop ethical decision-making capabilities |
| | | | | Co:5 Comprehend and practice the way of righteousness in the Indian mythological literature |
| 9. | I | MGC1170 | Leadership | Co:1 Develop critical thinking skills |
| | | | | Co:2 Explain different approaches to leadership. |
| | | | | Co:3 Apply leadership theories in real world business problems. |
| | | | | Co:4 Analyze leadership types and take appropriate decisions. |
| | | | | Co:5 Demonstrate ethical leadership practices |
| 10. | I | MGC1193 | | Co:1 Write business letters in a proper, formal format |
| | | | | Co:2 Demonstrate the methods of oral presentation both in a formal and informal environment |

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| | | | Business Communication Lab | Co:3 Review the importance of communication relative to securing employment, with emphasis on using both verbal and non-verbal communication and their impact |
| | | | | Co:4 Prepare the student with the communication tools-verbal, non-verbal and written-and the practical applications inherent in each |
| 11. | I | MGC1213 | Microsoft Office Specialist | Co:1 Demonstrate applying themes and layouts to slides. |
| | | | | Co:2 Demonstrate inserting pictures, graphics, shapes, and other things. |
| | | | | Co:3 Demonstrate working with sound and videos, master slides, smart art. |
| | | | | Co:4 Use existing PowerPoint presentations using advanced editing tools such as theme, layout, timing, and animation. |
| 12. | II | MGC1023 | Corporate Finance | Co:1 Discuss fundamental aspects of financial management |
| | | | | Co:2 Explain different sources available for raising funds for the business. |
| | | | | Co:3 Prepare various financial statement for effective decision making. |
| | | | | Co:4 Apply financial theory for taking financing & investment decision. |
| | | | | Co:5 Evaluate different proposals by applying various financial techniques. |
| 13. | II | MGC1043 | Operations Management | Co:1 Demonstrate fundamentals of operations management in a firm. |
| | | | | Co:2 Take decisions related to facility locations & layout. |
| | | | | Co:3 Analyze different aspects relating to designing & developing processes. |
| | | | | Co:4 Apply various aspects in Operations Planning and Control. |
| | | | | Co:5 Evaluate various modern practices in operations management |
| 14. | II | MGC1063 | Human Resource Management | Co:1 Effectively manage and plan key human resource functions within organizations |
| | | | | Co:2 Identify and analyze problems in the field of HRM and provide innovative solutions |
| | | | | Co:3 Appreciate the implications of increasing globalization for the management of human resources |
| | | | | Co:4 Evaluate and implement the new trends in HRM |
| | | | | Co:5 Analyze different current trends in compensation. |
| 15. | II | MGC1083 | Business Research Methods | Co:1 Apply the major types of research designs |
| | | | | Co:2 Formulate clearly defined research questions |
| | | | | Co:3 Analyze and summarize key issues and themes from existing literature |
| | | | | Co:4 Evaluate and conduct research |
| | | | | Co:5 Assess the ethical issues associated with the conduct of research |

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| 16. | II | MGC1103 | Managing for Sustainability | Co:1 Demonstrate a multi –stakeholder perspective in viewing CSR issues. |
| | | | | Co:2 Analyse the impact of CSR implementation on corporate culture. |
| | | | | Co:3 Evaluate the concept of corporate governance. |
| | | | | Co:4 Discuss open issues concerning the future evolution of corporate governance in the context of globalization. |
| 17. | II | MGC1123 | Management Information System | Co:1 Explain the role and significance of management information systems in business. |
| | | | | Co:2 Apply the decision support tools of information system to solve business problems. |
| | | | | Co:3 Identify the causes of information system success and failure. |
| | | | | Co:4 Implement the information system in various functional areas of management. |
| | | | | Co:5 Demonstrate the better usage of e-business, e-governance, AI etc |
| 18. | II | MGC1143 | Strategic Management | Co:1 Comprehend the basic concepts and principles of strategic management |
| | | | | Co:2 Analyze the competitive situation and strategic dilemma in dealing with dynamic business environment |
| | | | | Co:3 Demonstrate the knowledge and abilities in formulating strategies and strategic plans |
| | | | | Co:4 Evaluate challenges faced by managers in implementing and evaluating strategies based on the nature of business, industry, and cultural differences |
| 19. | II | MGC1163 | Aptitude Skills | Co:1 Evaluate critically key issues concerns with real life situation. |
| | | | | Co:2 Apply innovative thinking skill to solve the problems. |
| | | | | Co:3 Demonstrate various principle involved in solving mathematical problems. |
| | | | | Co:4 Evaluate assumptions used in analyzing quantitative data |
| 20. | II | MGC1183 | Data Analysis | Co:1 Develop proficiency in handling SPSS software. |
| | | | | Co:2 Analyse data sets using various descriptive and inferential statistical tools |
| | | | | Co:3 Develop decision making abilities |
| 21. | II | MGC1203 | Capstone Project Phase I | Co:1 Identify a Social / Business problem. |
| | | | | Co:2 Prepare a Synopsis for developing or solution for the identified problem. |
| | | | | Co:3 Design the survey tool |
| 22. | II | MGP1020 | International Business | Co:1 Describe the foundation of international business. |
| | | | | Co:2 Discuss the business operations of international organizations and multinational corporations. |
| | | | | Co:3 Analyze forms of foreign involvement. |
| | | | | Co:4 Discuss and apply international trade theory. |

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| 23. | II | MGP1040 | Total Quality Management for Business Excellence | Co:1 Discuss the nature, need and scope of total quality management and its relationship with operational and then business excellence |
| | | | | Co:2 Explain the quality of design, off-line control, losses and costs of quality |
| | | | | Co:3 Analyze statistical process control through process capability studies |
| | | | | Co:4 Develop total quality relationship with environment and safety systems |
| 24. | II | MGP1060 | Global Quality System | Co:1 Comprehend fundamental concepts of customer focused Quality systems and application of strategy in business organizations |
| | | | | Co:2 Analyze the role of cost of quality to detect internal and external failure cost |
| | | | | Co:3 Explain fundamentals of defect preventing mechanisms and their guidelines |
| | | | | Co:4 Apply quality certification system |
| | | | | Co:5 Identify & correct deviations in quality and their successful implementation |
| 25. | II | MGP1080 | Cross Cultural Study | Co:1 Increase their knowledge and sensitivity to other cultures |
| | | | | Co:2 Become aware of their own cultural strengths and weaknesses when working with people from other cultures |
| | | | | Co:3 To carry a basic analysis of cultural differences. |
| | | | | Co:4 Learn fundamental principles and acquire basic information on ways to build bridges between people from diverse cultures working together in some form of business of project. |
| | | | | Co:5 Identify and negotiate the obstacles to effective communication across cultures |
| 26. | III | MGC2013 | Entrepreneurship Development | Co:1 Discuss the values, attitudes and motivation for a plunge in entrepreneurship. |
| | | | | Co:2 Explain basic entrepreneurial skills and understanding to run a business efficiently and effectively. |
| | | | | Co:3 Develop and strengthen their entrepreneurial quality and motivation to start their own small-scale business/enterprise. |
| | | | | Co:4 Analyze the entrepreneurial ecosystem and design strategies accordingly |
| 27. | III | MGE2013 | Taxation Planning and Management | Co:1 Apply analytical reasoning tools to assess how taxes affect economic decisions for all taxpaying entities. |
| | | | | Co:2 Explain components of taxable income determination across taxable entities. |
| | | | | Co:3 Analyze tax issues by using research skills (including accessing and interpreting sources of |

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| | | | | | authoritative support) to identify and evaluate strengths, weaknesses and opportunities |
| | | | | Co:4 | Discuss tax conclusions and recommendations in a clear and concise manner to relevant stakeholders. |
| | | | | Co:5 | Apply technological skills necessary to undertake tax planning, compliance and research strategies. |
| 28. | III | MGE2023 | Healthcare and Hospital Management | Co:1 | Build competencies and provide expertise for hospital & healthcare management, operations and administration through learning of Hospital core and Support Services. |
| | | | | Co:2 | Provide the students an intensive, stimulating and challenging learning experience in the management and administration of Hospitals. |
| | | | | Co:3 | Acquaint the Students about Health Policy and Health Care Systems. |
| | | | | Co:4 | Acquaint the Students about different important services needed in a Hospital. |
| 29. | III | MGE2033 | Mentoring and Coaching | Co:1 | Evaluate the benefits of coaching and mentoring to an organization |
| | | | | Co:2 | Assess support of coaching and mentoring programmes in achieving business objective. |
| | | | | Co:3 | Develop guidelines and protocols for programmes based on accepted coaching and mentoring theory and practice. |
| | | | | Co:4 | Conduct formal and informal coaching conversations and begin to understand formal coaching relationships. |
| | | | | Co:5 | Evaluate the impact to an organization of establishing coaching and mentoring culture |
| 30. | III | MGE2043 | Warehouse Management | Co:1 | Explain the fundamental concepts of warehouse management. |
| | | | | Co:2 | Design warehouse layout. |
| | | | | Co:3 | Analyze different processes performed for managing warehouses. |
| | | | | Co:4 | Apply warehouse management system. |
| | | | | Co:5 | Discuss the role & importance of inventory & transportation in warehouse Management. |
| 31. | III | MGE2053 | Mall Management | Co:1 | Analyze the concepts and aspects needed for mall management. |
| | | | | Co:2 | Apply the operational and tenant management principles for malls. |
| | | | | Co:3 | Evaluate the marketing and promotional principals for the malls. |
| | | | | Co:4 | Illustrate the statutory requirements for the mall operations. |

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| 32. | III | MGE2063 | Change Management | Co:1 | Describe in general terms a number of change management theories and how they might apply in practice. |
| | | | | Co:2 | Articulate what change management is and why it is important in the contemporary business environment. |
| | | | | Co:3 | Discriminate between different types of change process for different purposes and outcomes. |
| | | | | Co:4 | Identify the steps in putting together an effective change management plan. |
| | | | | Co:5 | Apply critical thinking and problem solving skills to the analysis and resolution of change problems |
| 33. | III | MGE2073 | Commodity Markets | Co:1 | Explore the fundamental concepts of commodity market & derivative market. |
| | | | | Co:2 | Apply their knowledge of financial markets. |
| | | | | Co:3 | Analyze the dynamics of commodity exchange. |
| | | | | Co:4 | Explain various types of commodities. |
| | | | | Co:5 | Comprehend the workings of commodity market & derivative market. |
| 34. | III | MGE2083 | Food Retail Management | Co:1 | Identify variables for vast International Food Markets. |
| | | | | Co:2 | Analyses trends in Food Retailing and the challenges present in Food Retail operation and develop CRM strategy for food retail companies. |
| | | | | Co:3 | Measure the brand value of Food Retail organizations and their products. |
| | | | | Co:4 | Apply appropriate law of conducting food business. |
| | | | | Co:5 | Analyze the opportunities and threat associated with GMO Foods. |
| 35. | III | MGE2093 | Human Resource Audit | Co:1 | Discuss systematic methodology for evaluating HRD. |
| | | | | Co:2 | Examine the adequacy and appropriateness of the HRD systems, structures, styles, culture, and competencies. |
| | | | | Co:3 | Design Human Resource Audit Report |
| | | | | Co:4 | Identify the gaps between the current state and the standard. |
| | | | | Co:5 | Conduct the Human Resource Audit for the organization |
| 36. | III | MGE2103 | Small scales industries management | Co:1 | Understand small businesses and supporting organizations for its setup. |
| | | | | Co:2 | Identify Business Opportunities and plan according to survey. |
| | | | | Co:3 | Prepare project and develop the report according to planned idea and market. |
| | | | | Co:4 | Analyze the basic aspects of business and understand better to prepare for the same. |

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| | | | | Co:5 | Explain the Legal laws governing the business and environment. |
| 37. | III | MGE2113 | Total Quality Management | Co:1 | Understand the fundamental principles of Total Quality Management. |
| | | | | Co:2 | Develop an understanding on various ISO standards and quality systems. |
| | | | | Co:3 | Apply the tools and techniques of quality management to manufacturing and services processes. |
| | | | | Co:4 | Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implementable solutions to those. |
| 38. | III | MGE2123 | Search Engine Optimization | Co:1 | Discuss the search engine ranking of site by implementing the best practices. |
| | | | | Co:2 | Apply SEO strategies through inbound marketing. |
| | | | | Co:3 | Analyze new SEO innovations and changing search engine trends. |
| | | | | Co:4 | Apply Google Analytics and other metrics and tools to monitor progress in achieving search engine marketing goals. |
| 39. | III | MGE2133 | E-retailing | Co:1 | Identify and explain fundamental e-Retailing Online Merchandising Techniques. |
| | | | | Co:2 | Recognize and discuss the major E-Payment Security Challenges and Solutions. |
| | | | | Co:3 | Assess and discuss issues including Impact of E-retailing on traditional transportation system and opportunities. |
| | | | | Co:4 | Demonstrate an understanding of Concept of online pricing and dynamics pricing for E- retailing. |
| | | | | Co:5 | Analyze the impact of E-retailing on inventory security and Quality management |
| 40. | III | MGE2143 | Tourism Management | Co:1 | Apply skills associated with problem solving, creative and critical thinking, reflection and decision making to function effectively. |
| | | | | Co:2 | Explain range of leadership skills and abilities such as motivating others, leading changes, and resolving conflict |
| | | | | Co:3 | Analyze supervisory skills and competencies necessary to meet the needs of the ever demanding Travel and Tourism Industry. |
| | | | | Co:4 | Discuss importance of outstanding guest service quality, server-guest relationships, and ethics |
| 41. | III | MGE2153 | Export – Import Procedure & Documentation | Co:1 | Explain an overall perspective on import & export management. |
| | | | | Co:2 | Discuss an understanding towards export and import procedure and documentation. |
| | | | | Co:3 | Analyze processing of export order. |

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| | | | | Co:4 | Apply knowledge of managing risk involves in the import & export transactions. |
| 42. | III | MGE2160 | Social Media Marketing | Co:1 | Discuss the evolution of social media marketing and identify related ethical issues to communicate its impact on businesses. |
| | | | | Co:2 | Create S.M.A.R.T. social media goals to achieve successful online campaigns. |
| | | | | Co:3 | Design effective social media marketing strategies for various types of industries and businesses. |
| | | | | Co:4 | Identify the major social media marketing portals that can be used to promote a company, brand, product, service or person. |
| | | | | Co:5 | Evaluate a company's current situation, and provide solutions by identifying appropriate social media marketing portals. |
| 43. | III | MGM2013 | Sales and Distribution Management | Co:1 | Develop the knowledge of Selling and Distribution process in an organization. |
| | | | | Co:2 | Develop proficiency in industry in actual selling process and the management of selling personnel. |
| | | | | Co:3 | Demonstrate the knowledge needed to generate a leads and increase the sales in terms of volume and in monitory terms. |
| | | | | Co:4 | Analyze critical and strategic thinking, improve analytic skills and techniques, and enhance effective decision-making in sales and Distribution. |
| | | | | Co:5 | Identify the management challenges to construct & design Distribution Channel to find appropriate way to reach to the customers. |
| 44. | III | MGM2033 | Services Marketing | Co:1 | Identify the special management issues and unique challenges involved in marketing and managing services |
| | | | | Co:2 | Understand the expectations of customers and know how to translate this knowledge into genuine value for customers |
| | | | | Co:3 | Interpret service behavior and service consumption in the light of service-dominant marketing logic and articulate the outcome to service marketing management |
| | | | | Co:4 | Appreciate, modify, and/or extend new theories and concepts pertaining to explaining the characteristics of customers' purchasing and consumption behavior of services and service firms' marketing behavior |
| | | | | Co:5 | Apply new approaches to managing customer satisfaction and loyalty |
| 45. | III | MGM2053 | Retail Marketing | Co:1 | Acquire and apply relevant knowledge and skills to manage retail management issues |

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| | | | | Co:2 | Formulate creative yet feasible solutions for customer care, store care, merchandise care and retail strategies. |
| | | | | Co:3 | Discuss and analyze the latest strategies required for the development of retail marketing. |
| | | | | Co:4 | Identify and evaluate challenges and opportunities concerning the applications of the latest retail strategies. |
| | | | | Co:5 | Explain the factors relating to visual merchandising, such as store layouts and presentation. |
| 46. | III | MGM2073 | Consumer Behavior | Co:1 | Assess the relevance of consumer behavior to the entire marketing process. |
| | | | | Co:2 | Analyze the causes giving rise to consumer behavior with the theories. |
| | | | | Co:3 | Identify the learning process of consumer at from marketing respective. |
| | | | | Co:4 | Design communication strategies for attracting consumers. |
| | | | | Co:5 | Assess the impact of socio-cultural factors on consumer behavior. |
| 47. | III | MGM2093 | Customer Relationship Management | Co:1 | Explain and characterize the major concepts and framework of customer relationship management |
| | | | | Co:2 | Discuss the conceptual foundations of relationship marketing and its implications for further knowledge development in the field of business |
| | | | | Co:3 | Apply CRM practices and technologies to enhance the achievement of marketing, sales and service objectives throughout the customer life cycle. |
| | | | | Co:4 | Develop critical skills necessary for building and managing partnering relationships with customers and suppliers. |
| | | | | Co:5 | Analyze the benefits delivered by CRM, the contexts in which it is used, the technologies that are deployed and how it can be implemented |
| 48. | III | MGM2113 | Digital Marketing | Co:1 | Develop a deeper understanding of the changing digital marketing landscape. |
| | | | | Co:2 | Apply the latest digital marketing trends and skill sets needed for today's marketer. |
| | | | | Co:3 | Distinguish between the functions of various digital communication channels and select solutions appropriate to the needs of the organization and the end users. |
| | | | | Co:4 | Analyze the impact digital technologies have on consumer behavior; consumer research and customer relationships |

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| | | | | Co:5 | Apply to web based marketing tools with the view of incorporating new media into traditional media and marketing planning. |
| 49. | III | MGM2133 | Management of Marketing Communications | Co:1 | Discuss the basic concepts and terminology in advertising, with an emphasis on IMC |
| | | | | Co:2 | Analyze factors and importance of reaching the target audience through the development of effective media coverage planning, including preparation and justification of an advertising budget. |
| | | | | Co:3 | Refine critical thinking and decision-making in advertising campaign development through class activities and assignments. |
| | | | | Co:4 | Perform advertising monitoring, evaluating, & feedback systems in order to ascertain campaign effectiveness. |
| | | | | Co:5 | Participate in the development of creative solutions to address advertising and marketing communications challenges. |
| 50. | III | MGM2153 | Strategic Marketing Management | Co:1 | Apply strategic concepts and theories and their application in marketing environments. |
| | | | | Co:2 | Compare and contrast the key principles of marketing strategy |
| | | | | Co:3 | Research and analyze marketing strategies in different contexts |
| | | | | Co:4 | Identify and resolve well-defined problems reaching substantiated conclusions employing methods of analysis specific to marketing. |
| | | | | Co:5 | Employ strategies and processes, which assist independent learning. |
| 51. | III | MGH2013 | Compensation Management | Co:1 | Apply the knowledge to solve compensation related problems in organizations |
| | | | | Co:2 | Design rational and contemporary compensation systems in modern organizations |
| | | | | Co:3 | Design and maintain a pay system within the organization |
| | | | | Co:4 | Analyze and develop incentive programs |
| | | | | Co:5 | Explain the legally required employee benefits. |
| 52. | III | MGH2033 | Performance and Rewards Management | Co:1 | Identify and retain talent in an organization to deliver high performance. |
| | | | | Co:2 | Design an organization's performance management process. |
| | | | | Co:3 | Compare and contrast various organizational performance management programs and best practices |
| | | | | Co:4 | Plan effective performance management policies, practices to improve organizational, and employee performance. |

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| | | | | Co:5 | Evaluate the relationship amongst the components of total rewards. |
| 53. | III | MGH2053 | Organizational Development and Change | Co:1 | Apply theories and current research concerning individuals, groups, and organizations to the process of change |
| | | | | Co:2 | Identify organizational situations that would benefit from OD interventions. |
| | | | | Co:3 | Discuss the process of change as applied to organizational culture and human behavior |
| | | | | Co:4 | Explain the differences between insider and outsider approaches to consulting and OD interventions |
| | | | | Co:5 | Analyze ongoing activities within an organization and design the selected OD interventions. |
| 54. | III | MGH2073 | Industrial Relations and Labour Law's | Co:1 | Acquire a theoretical, practical and ethical perspective on many aspects of industrial relations. |
| | | | | Co:2 | Apply IR competencies to contribute to organizational capability & employee wellbeing. |
| | | | | Co:3 | Explain the various forms and causes of Industrial disputes. |
| | | | | Co:4 | Assess the collective bargaining process, including preparation, negotiation, and settlement. |
| | | | | Co:5 | Understand the statutory provisions concerning the grievance procedure in India. |
| 55. | III | MGH2093 | Human Resource Planning | Co:1 | Analyze the theory and concepts of human resource planning. |
| | | | | Co:2 | Identify the evolution of HRP throughout the organization. |
| | | | | Co:3 | Apply models and methods used in forecasting. |
| | | | | Co:4 | Describe the applications of a succession analysis & planning. |
| | | | | Co:5 | Evaluate the organization's planning program. |
| 56. | III | MGH2113 | Strategic and International Human Resource Management | Co:1 | Discuss the strategic and functional roles of HRM in various international contexts, especially in areas such as recruitment and selection, performance management& training. |
| | | | | Co:2 | Identify opportunities and challenges pertaining to international HRM; |
| | | | | Co:3 | Develop competency in dealing with cross cultural situations; |
| | | | | Co:4 | Analyze external forces (e.g. globalization, socio cultural changes, political and economic changes) that have the potential to shape international HRM. |
| | | | | Co:5 | Develop generic and transferable skills-especially in diagnosing international HRM issues |
| | | | | Co:6 | Conduct research for solving cases related to international HRM. |

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| 57. | III | MGH2133 | Training and Development | Co:1 | Understand the role and functions of training and development in organizations. |
| | | | | Co:2 | Identify principles and their implications for the effectiveness of training programs. |
| | | | | Co:3 | Assess training needs & evaluate employee training programmes. |
| | | | | Co:4 | Outline the issues and steps involved in designing and implementing a training program. |
| | | | | Co:5 | Design, training and development programs that can be delivered in the form of individual and group. |
| 58. | III | MGH2153 | Cross Cultural Management | Co:1 | Analyze the impact of culture on business practices. |
| | | | | Co:2 | Analyze the impact of national culture on organizational cultures. |
| | | | | Co:3 | Apply strategies for managing international teams and projects |
| | | | | Co:4 | Develop strategies for working in virtual and co-located multicultural teams. |
| | | | | Co:5 | Assess and leverage the impact of culture in management and other business functions. |
| 59. | III | MGH2173 | Conflict and Negotiation Management | Co:1 | Analyze the key practical and theoretical concepts of managing and resolving conflicts. |
| | | | | Co:2 | Describe the nature of small and large scale conflicts. |
| | | | | Co:3 | Articulate the theoretical and practical components of negotiation and mediation and explain the link between effective negotiation skills and effective leadership. |
| | | | | Co:4 | Analyse the types of conflict management styles. |
| | | | | Co:5 | Explain the link between effective negotiation skills and effective leadership |
| 60. | III | MGF2013 | Indian Financial System | Co:1 | Explain the key roles played in modern society by the financial products, markets and institutions, and various functions of market regulators. |
| | | | | Co:2 | Exhibit the understanding of the fundamentals of financial markets & define and illustrate some key financial terms, such as primary market and over-the-counter. |
| | | | | Co:3 | Apply the knowledge of the relative standing of the major financial services in India for various business organizations. |
| | | | | Co:4 | Describe the functions of banking & NBFC in the Current Scenario and discuss the various important aspects concerned with banking and non-banking organizations. |
| | | | | Co:5 | Analyze the need for mutual fund investment and also focus on another relative aspect of the mutual fund industry. |

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| 61. | III | MGF2033 | Financial Markets & Institutions | Co:1 | Interpret the role and determinants of interest rates and interaction of interest rates with money supply. |
| | | | | Co:2 | Assess the various theoretical concepts underlying money and capital markets. |
| | | | | Co:3 | Analyze the working of various markets for securities (including debt markets, equity markets, derivative markets) and its role in financial markets. |
| | | | | Co:4 | Comprehend significant aspects of banking business. |
| | | | | Co:5 | Compare and contrast the various non-bank operations. |
| 62. | III | MGF2053 | International Finance | Co:1 | Explain the fundamental of international business, finance as well as international financial markets. |
| | | | | Co:2 | Apply the knowledge of exchange rate mechanism for decision-making. |
| | | | | Co:3 | Apply the risk management strategies in foreign exchange operations. |
| | | | | Co:4 | Discuss long term and short-term asset and liability management techniques used in international business. |
| 63. | III | MGF2073 | Working Capital Management | Co:1 | Evaluate the importance of effective working capital Mgt. |
| | | | | Co:2 | Investigate funds flow cycles and their impact on working capital management objectives. |
| | | | | Co:3 | Formulate appropriate working capital management policies to achieve corporate objectives. |
| | | | | Co:4 | Apply corporate cash management, accounts receivable management, bank relations, and inventory management techniques to maximize the shareholders' value. |
| | | | | Co:5 | Evaluate comparative working capital management policies and their impact on the firm's profitability, liquidity, risk and operating flexibility. |
| 64. | III | MGF2093 | Mergers, Acquisition and Corporate Restructuring | Co:1 | Identify the key issues and concepts of mergers, acquisitions and Corporate Restructuring. |
| | | | | Co:2 | Analyze typical valuation strategies, pre and post-merger issues and challenges |
| | | | | Co:3 | Assess the funding alternatives available and the various aspects of financial restructuring in case of mergers, acquisitions. |
| | | | | Co:4 | Discuss the revival of sick units with special reference to the Law and its Procedure |
| | | | | Co:5 | Examine the impact of changing business scenario worldwide on Corporate Restructuring. |
| 65. | III | MGF2110 | Behavioral Finance | Co:1 | Discuss the basics of Conventional Finance. |
| | | | | Co:2 | Explain the cognitive biases and errors of judgment that affect financial decisions |

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| | | | | Co:3 | Analyze behavioral influences involving individuals investment decisions |
| | | | | Co:4 | Evaluate behavioral influences involving corporate financial decisions |
| | | | | Co:5 | Discuss important developments in this new area and the associated practical insights. |
| 66. | III | MGF2133 | Cost Analysis and Control | Co:1 | Discover the importance of analyzing and managing costs |
| | | | | Co:2 | Explain Activity-Based Costing (ABC) and Activity-Based Management (ABM) |
| | | | | Co:3 | Justify the importance of process costing and cost allocation |
| | | | | Co:4 | Develop important tools for planning and decision making |
| | | | | Co:5 | Evaluate and manage performance through strategic cost management |
| 67. | III | MGB2013 | Marketing Analytics | Co:1 | Apply marketing theories to given research problems and types of customer data. |
| | | | | Co:2 | Critically evaluate business problems and of determine the most appropriate analytical technique |
| | | | | Co:3 | Design an appropriate course of action based on empirical evidence. |
| | | | | Co:4 | Formulate and communicate marketing research findings for decision-making. |
| 68. | III | MGB2033 | HR Analytics | Co:1 | Explain basic concepts of HR Analytics |
| | | | | Co:2 | Apply Data Analytic techniques using software packages |
| | | | | Co:3 | Identify and use key HR Metrics. |
| | | | | Co:4 | Forecast budget numbers for HR costs |
| | | | | Co:5 | Measure workforce productivity and performance |
| | | | | Co:6 | Explore and visualize data |
| 69. | III | MGB2053 | Core Python Programming | Co:1 | Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python |
| | | | | Co:2 | Express different Decision-Making statements and Functions |
| | | | | Co:3 | Interpret Object oriented programming in Python |
| | | | | Co:4 | Summarize different File handling operations |
| | | | | Co:5 | Create and execute Python programs |
| 70. | III | MGB2073 | R Programming | Co:1 | Access online resources for R and import new function packages into the R workspace |
| | | | | Co:2 | Import, review, manipulate and summarize data--sets in R |
| | | | | Co:3 | Explore data--sets to create testable hypotheses and identify appropriate statistical tests |
| | | | | Co:4 | Apply appropriate statistical tests using R |
| | | | | Co:5 | Create and edit visualizations with R |

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| 71. | III | MGB2093 | Financial Analytics | Co:1 | Understand different entities and products in the financial markets. |
| | | | | Co:2 | Apply techniques for selecting investment avenues from different securities or asset classes. |
| | | | | Co:3 | Demonstrate Analytical Skills to calculate Bond yields to make an investment decision. |
| | | | | Co:4 | Analyse real-life proposals for financial investment in a meaningful manner. |
| | | | | Co:5 | Compare the currency exchange rates among different currency pairs. |
| 72. | III | MGB2113 | Data Mining | Co:1 | Discuss basic concept of Data Mining |
| | | | | Co:2 | Identify appropriate data mining algorithms to solve real world problems |
| | | | | Co:3 | Compare and evaluate different data mining techniques like classification, prediction, clustering and Association Rule Mining |
| | | | | Co:4 | Describe complex data types with respect to spatial and web mining. |
| 73. | III | MGB2133 | Business Intelligence | Co:1 | Explain role of mathematical models in business intelligence |
| | | | | Co:2 | Describe link between strategy and business analytics |
| | | | | Co:3 | Apply various statistical methods on available data |
| | | | | Co:4 | Design physical database |
| | | | | Co:5 | Apply Business Intelligence System in various areas of management. |
| 74. | III | MGO2013 | Materials Management & Inventory Control | Co:1 | Analyze need & importance of materials management in a firm. |
| | | | | Co:2 | Apply methods of classification, codification, specifications & standardization of materials. |
| | | | | Co:3 | Manage different issues relating to stores department. |
| | | | | Co:4 | Take decisions relating to inventory control by using different techniques. |
| | | | | Co:5 | Demonstrate the role and importance value analysis. |
| | | | | Co:6 | Take make or buy decisions relating to materials management. |
| 75. | III | MGO2033 | Operations Planning and Control | Co:1 | Analyze need & importance of operations planning and control in a firm. |
| | | | | Co:2 | Forecast demand of the products by applying various methods of demand forecasting. |
| | | | | Co:3 | Apply aggregate planning and master production scheduling for taking managerial decision. |
| | | | | Co:4 | Analyze the need & importance of resource requirements planning. |

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| | | | | Co:5 | Take decisions based on materials requirement planning & resource requirements planning. |
| 76. | III | MGO2053 | Global Operations Strategy | Co:1 | Emphasize the key role of operations strategies in bringing about the growth and profitability of organizations. |
| | | | | Co:2 | Apply different models in relation with operations strategies. |
| | | | | Co:3 | Describe different key drivers used for global operations. |
| | | | | Co:4 | Apply competency based, resource based and process based operations strategies. |
| 77. | III | MGO2073 | Managing Six Sigma | Co:1 | Understand the concept & philosophy of Six Sigma. |
| | | | | Co:2 | Apply quality function deployment techniques for creating customer driven organization. |
| | | | | Co:3 | Manage six sigma teams for achieving better results. |
| | | | | Co:4 | Apply different tools & techniques for managing Six Sigma. |
| | | | | Co:5 | Manage risk involved in the six-sigma projects. |
| 78. | III | MGO2093 | Purchase Management | Co:1 | Analyze the Role & Importance of purchase management in a firm. |
| | | | | Co:2 | Apply different criteria for vendor analysis & selection. |
| | | | | Co:3 | Apply different purchase strategies for achieving better results. |
| | | | | Co:4 | Describe the role & importance of buyer – seller relationship. |
| | | | | Co:5 | Evaluate various modern purchase practices. |
| 79. | III | MGO2113 | Lean Manufacturing System | Co:1 | Explain the concept & philosophy of lean manufacturing. |
| | | | | Co:2 | Analyze different control techniques used under lean manufacturing. |
| | | | | Co:3 | Describe different steps for applying lean in manufacturing and service sectors. |
| | | | | Co:4 | Describe the interrelationship of lean manufacturing with just in time system. |
| | | | | Co:5 | Analyze the role & importance of cellular manufacturing system in relation with lean manufacturing. |
| 80. | III | MGO2133 | Maintenance Management | Co:1 | Analyze the role and importance of maintenance management |
| | | | | Co:2 | Apply maintenance planning & scheduling technique for better results. |
| | | | | Co:3 | Apply total productive maintenance system in a firm. |
| | | | | Co:4 | Describe computerized maintenance management system. |

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| | | | | Co:5 | Manage different issues relating to safety and accident prevention. |
| 81. | III | MGO2153 | Manufacturing Systems Management | Co:1 | Apply just in time manufacturing practices in a firm. |
| | | | | Co:2 | Analyze the role & importance of benchmarking quality improvement system. |
| | | | | Co:3 | Analyze the planning & implementation of flexible manufacturing systems in a firm. |
| | | | | Co:4 | Apply theory of constraints tools in manufacturing for better performance. |
| | | | | Co:5 | Apply business process reengineering system and green manufacturing practices for improving overall productivity. |
| 82. | III | MGS2013 | Enterprise Resource Planning | Co:1 | Apply Enterprise tools and its role in integrating business process. |
| | | | | Co:2 | Demonstrate knowledge of ERP modules. |
| | | | | Co:3 | Summarize the concepts of reengineering. |
| | | | | Co:4 | Identify the management challenges to implement ERP. |
| 83. | III | MGS2033 | Software Project Management | Co:1 | Apply fundamental principles of Software Project Management. |
| | | | | Co:2 | Explain different methods and techniques used for Software project management. |
| | | | | Co:3 | Identify issues that could lead to IT project success or failure. |
| | | | | Co:4 | Identify and describe the key phases of project management. |
| | | | | Co:5 | Describe the responsibilities of IT project managers. |
| 84. | III | MGS2053 | Data Warehousing & Data Mining | Co:1 | Know the functionality of the various data mining and data-warehousing component. |
| | | | | Co:2 | Appreciate the strengths and limitations of various data mining and data warehousing models. |
| | | | | Co:3 | Explain the analyzing techniques of various data. |
| | | | | Co:4 | Describe different methodologies used in data mining and data ware housing. |
| | | | | Co:5 | Know the data-mining concept, application and their usage. |
| 85. | III | MGS2073 | Database Management Systems | Co:1 | Explain the basic concepts and the applications of database systems. |
| | | | | Co:2 | Design ER-models to represent simple database application scenarios. |
| | | | | Co:3 | Identify the data models for relevant problems. |
| | | | | Co:4 | Explain & use design principles for logical design of databases, including the E -R method and normalization approach. |

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| | | | | Co:5 | Understand the different issues involved in the design and implementation of a database system. |
| 86. | III | MGS2093 | Information System Audit and Security | Co:1 | Describe fundamental concepts of systems auditing and information security. |
| | | | | Co:2 | Analyze the latest trend of computer security threats and defense. |
| | | | | Co:3 | Identify security thefts in information systems and rectify them with appropriate security mechanisms. |
| | | | | Co:4 | Explain the security controls in the aspects of physical, logical and operational security control. |
| | | | | Co:5 | Analyze the security incident with a proven audit procedure. |
| 87. | III | MGS2113 | E-Business | Co:1 | Describe about the anatomy of e-commerce applications. |
| | | | | Co:2 | Demonstrate about the E-commerce consumer applications. |
| | | | | Co:3 | Describe about the digital token credit based electronic payment system. |
| | | | | Co:4 | Understand about the key multimedia concepts. |
| | | | | Co:5 | Analyze the potential impacts of different e-Business strategies. |
| 88. | III | MGS2133 | Cyber Laws and Cyber Security | Co:1 | Discuss an understanding of information security fundamentals. |
| | | | | Co:2 | Identify the applications of cryptography. |
| | | | | Co:3 | Illustrate the methods for data recovery. |
| | | | | Co:4 | Apply the methods for preservation of digital evidence. |
| | | | | Co:5 | Analyze the provisions in laws to deal with cybercrime. |
| 89. | III | MGS2153 | System Analysis & Design | Co:1 | Explain the roles and responsibilities of systems analysts and project managers in systems analysis and design. |
| | | | | Co:2 | Explain the stages of the system development life cycle model. |
| | | | | Co:3 | Analyze and recognize the causes of information related problems and design a new system to allay these problems. |
| | | | | Co:4 | Design appropriate information systems (ERD). |
| | | | | Co:5 | Manage the development of systems based on system specifications. |
| 90. | III | MGR2013 | Rural Banking and Microfinance | Co:1 | Identify and evaluate the complexities of Rural Credit Banking policies. Analyze the role of Credit Cooperatives. |
| | | | | Co:2 | Analyze the Functions of Commercial Banks. |
| | | | | Co:3 | Evaluate progress, performance & problems of RRBs, Small Finance Bank & Payment Bank. |

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| | | | | Co:4 | Assess the role of microfinance as a tool of socio economic development. |
| | | | | Co:5 | Conduct Social Assessments of MFIs, Loan Disbursement and Repayment. |
| 91. | III | MGR2033 | Rural Society and Polity | Co:1 | Analyze development of rural economy & rural society and Interdependence between Rural and Urban Sectors. |
| | | | | Co:2 | Develop relationship among Rural Communities, Rural Institutions and Rural Environment. |
| | | | | Co:3 | Analyze problems of Schedule Cast, Schedule Tribe and Women. |
| | | | | Co:4 | Assess the impact of Social Inclusion on development. |
| | | | | Co:5 | Analyze the Differences related to gender, Women in Development (WID) and Works and Gender Relation. |
| | | | | Co:6 | Evaluate Participatory approaches to rural development and social development. |
| 92. | III | MGR2053 | Society Up-liftment Policies | Co:1 | Identify and evaluate the complexities of Growth Vs Development, Rising Expectations & Development, Challenges & Opportunities in Rural Economy |
| | | | | Co:2 | Analyze the impact of Rural Child Development Programme. |
| | | | | Co:3 | Evaluate the National Rural Health Mission programme. |
| | | | | Co:4 | Analyze the role of Rural Housing Programme on socio economic development of rural areas. |
| | | | | Co:5 | Analyze the impact of Rural Women Empowerment programme. |
| | | | | Co:6 | Evaluate the National Rural Employment programme. |
| 93. | III | MGR2073 | ICT in Development | Co:1 | Understand and analyze importance of Information, Communication and Technology in development. |
| | | | | Co:2 | Assess role of ICT in Sustainable development goals. |
| | | | | Co:3 | Develop and design ICT as an infrastructure and its relationship in managing development issues. |
| | | | | Co:4 | Identify opportunities in E-inclusion and its importance in development. |
| | | | | Co:5 | Analyze National E Governance Policy. |
| | | | | Co:6 | Examine the impact of ICT in Rural Project Framework. |
| 94. | III | MGR2093 | Agribusiness | Co:1 | Analyze global Agribusiness Environment and scope of community-based industry. |
| | | | | Co:2 | Estimate demand and plan procurement method. |
| | | | | Co:3 | Identify opportunities in organized food retailing. |

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| | | | | Co:4 | Analyze problems in Agri Input Markets. |
| | | | | Co:5 | Analyze ICT application in Agriculture Trade. |
| | | | | Co:6 | Create linkage with apex agriculture and farming welfare institution for getting financial assistance and support from latest research. |
| 95. | III | MGR2113 | Managing Cooperatives | Co:1 | Differentiate the cooperatives with other business models. |
| | | | | Co:2 | Analyze the functions of short, medium and long-term credit cooperative structure and its role in financial inclusion. |
| | | | | Co:3 | Identify the challenges in management of cooperatives and suggest better solution for that. |
| | | | | Co:4 | Measure the legal aspects integrated with cooperative business. |
| | | | | Co:5 | Develop case study on cooperatives business models. |
| 96. | III | MGR2133 | Social Marketing and Social Entrepreneurship | Co:1 | Analyze Theories & Approaches in Behavioral Modification. |
| | | | | Co:2 | Identify social marketing projects. |
| | | | | Co:3 | Manage Social marketing programme. |
| | | | | Co:4 | Assess the models of social Entrepreneurship and Enterprise. |
| | | | | Co:5 | Analyze impact of social impact investors. |
| 97. | III | MGR2153 | Governance and Development | Co:1 | Analyze the relationship between Governance and Development. |
| | | | | Co:2 | Identify the role of environment in Governance. |
| | | | | Co:3 | Analyze Governance issues in Modern state and societies. |
| | | | | Co:4 | Evaluate Board of Director Roles and responsibilities for better corporate governance. |
| | | | | Co:5 | Assess Accountability and Transparency in Governance in CBOs. |
| 98. | III | MGT2013 | Engineering Management | Co:1 | Understand various functions of Engineer in the organization |
| | | | | Co:2 | Identify the problem and find the optimal solution for that problem. |
| | | | | Co:3 | Make Plan for and organize technical activities. |
| | | | | Co:4 | Manage production and service activities |
| | | | | Co:5 | Understand communication process and Management information system |
| 99. | III | MGT2033 | Enterprise Productivity | Co:1 | Understand and explain Enterprise level and micro level productivity |
| | | | | Co:2 | Apply different type technology to increase productivity |
| | | | | Co:3 | Understand and Explain different productivity models |
| | | | | Co:4 | Apply different productivity models in business. |

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| 100. | III | MGT2053 | Technology Management | Co:1 | Understand role of technology and core competence |
| | | | | Co:2 | Explain technology cycle and understand technology change |
| | | | | Co:3 | Identifying and evaluating the impact of relevant changing technology and managing those changes. |
| | | | | Co:4 | Analyze trend and understand role of TIFAC |
| | | | | Co:5 | Identify different patterns of technological changes |
| 101. | III | MGT2073 | R & D Management | Co:1 | Understand different Managerial aspects of Innovation function. |
| | | | | Co:2 | Develop innovative strategy in business. |
| | | | | Co:3 | Measure Performance of R&D management |
| | | | | Co:4 | Do R & D project. |
| | | | | Co:5 | Understand Intellectual Property Rights |
| 102. | III | MGT2093 | Value Engineering | Co:1 | Evaluate cost, worth and value. |
| | | | | Co:2 | Create value engineering job plan |
| | | | | Co:3 | Evaluate value engineering projects |
| | | | | Co:4 | Initiate value engineering programming |
| | | | | Co:5 | Use tools of value analysis |
| 103. | III | MGT2113 | Engineering Systems Simulation | Co:1 | Understand system stimulation |
| | | | | Co:2 | Apply random numbers in simulating systems. |
| | | | | Co:3 | Explain engineering systems modeling and simulation |
| | | | | Co:4 | Conduct simulation experiments |
| | | | | Co:5 | Analyze simulation output |
| 104. | III | MGT2133 | Big Data Analytics | Co:1 | Explain Challenges of Conventional Systems |
| | | | | Co:2 | Explain Stream Data Model and Architecture |
| | | | | Co:3 | Handle the Hadoop Distributed File System |
| | | | | Co:4 | Develop a Map Reduce Application |
| | | | | Co:5 | Set up a Hadoop Cluster |
| 105. | III | MGT2153 | Manufacturing Systems | Co:1 | Explain fundamentals of manufacturing and automation |
| | | | | Co:2 | Analyze flow lines without storage and with storage buffer |
| | | | | Co:3 | Develop and implement FMS |
| | | | | Co:4 | Understand functions and components of CIM system |
| | | | | Co:5 | Plan and Schedule Functions in CIM System |
| 106. | III | MGI2010 | India's Foreign Trade And Policy | Co:1 | Analyze the global business environment in terms of economic, social and legal aspects |
| | | | | Co:2 | Explain the concepts in trade documentation in international business with respect to foreign trade |
| | | | | Co:3 | Discuss Instruments of import policy and the concepts related to imports substitution and restrictions. |
| | | | | Co:4 | Evaluate various types of Tariffs in international trade. |

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| 107. | III | MGI2030 | Export Import Procedures, Documentation And Logistics | Co:1 | Comprehend export procedure and documentation. |
| | | | | Co:2 | Discuss importance of exports determinants and schemes in India. |
| | | | | Co:3 | Explain guidelines for international business negotiations. |
| | | | | Co:4 | Analyze nature and pattern of registration of exporters and importers and related concepts. |
| | | | | Co:5 | Explain Various Risks in export trade. |
| 108. | III | MGI2050 | International Economics | Co:1 | Explain the introductory international economics and the terminology adopted in international economics; |
| | | | | Co:2 | Describe various International Trade Theories |
| | | | | Co:3 | Illustrate the Factor Price and trade concepts |
| | | | | Co:4 | Differentiate between various BOP accounts |
| | | | | Co:5 | Analyze the factors influencing the exchange rates. |
| 109. | III | MGI2070 | Global Competitiveness Analysis | Co:1 | Discuss the complexity and the elusiveness of "competitiveness", for any country. |
| | | | | Co:2 | Examine the links between the concepts of competitiveness and development of a country. |
| | | | | Co:3 | Explain the economic, political and social determinants of competitiveness and their interdependencies. |
| | | | | Co:4 | Analyze different quantitative and qualitative approaches regarding the creation and measurement of competitiveness. |
| | | | | Co:5 | Summarize strategic and tactical decisions taken by firms to enter and compete in international markets |
| 110. | III | MGI2090 | Global Marketing Strategies | Co:1 | Differentiate between Domestic markets, International Markets and Global Markets with their key characteristics and differentiation |
| | | | | Co:2 | Identify the Global Trading Environment with focus on social, cultural environment and regulatory issues in foreign markets |
| | | | | Co:3 | Relate with Global demographic profiles of ever-changing Global markets and formulate requisite pricing strategies to sustain in Globalization |
| | | | | Co:4 | Categorize the factors impacting pricing and media communication in global environment |
| | | | | Co:5 | Identify the role of Mobile commerce and digital global marketing in the 21stcentury trading environment and its role in handling security aspects of global trade |
| 111. | III | MGI2110 | Management of International Logistics | Co:1 | Understand the issues in International Logistics. |
| | | | | Co:2 | Discuss Sales Contract in International Logistics. |
| | | | | Co:3 | Analyze models of Forecasting in Supply Chain Management. |
| | | | | Co:4 | Explain various methods for Demand Forecasting. |

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| | | | | Co:5 | Apply skills for inventory management |
| 112. | III | MGI2130 | Globalization and Indian Business Scenario | Co:1 | Describe the structural features of India's foreign trade |
| | | | | Co:2 | Explain the domestic response to globalization at a disaggregated sectorial level |
| | | | | Co:3 | Illustrate various threats and opportunities in doing business from an India-centric perspective in some emerging fields of global business |
| | | | | Co:4 | Classify the policy environment in India facilitating and/or inhibiting international business |
| | | | | Co:5 | Understand various policies which regulate Indian Business Environment |
| 113. | III | MGI2150 | Management of Trans-National Corporations | Co:1 | Implement the conceptual tools to navigate through the mass of information about how international competition takes place. |
| | | | | Co:2 | Classify the differences between multi-domestic, global, International and Transnational corporations. |
| | | | | Co:3 | Evaluate the global strategies that will help enhance the firm's long-term profitability and value. |
| | | | | Co:4 | Illustrate the management of a global workforce and the challenges in managing global business across different cultures. |
| | | | | Co:5 | Interpret the effects of economic, cultural, financial, political, and social factors on TNCs management decisions. |
| 114. | III | MGB2010 | Insurance Planning & Management | Co:1 | Comprehend the various forms of insurance and their suitability. |
| | | | | Co:2 | Analyze criteria for selection of various insurance products. |
| | | | | Co:3 | Explain the pricing mechanism of insurance products. |
| | | | | Co:4 | Discuss systems and procedures associated with various forms of insurance. |
| 115. | III | MGB2030 | Risk Management for Banks and Insurance Companies | Co:1 | Explain risks faced by banking and insurance companies. |
| | | | | Co:2 | Discuss the challenges in managing banks. |
| | | | | Co:3 | Analyze the risk management strategies for banks and insurance companies. |
| | | | | Co:4 | Discuss the best practices in India and other parts of the world, in respect of 'risk management'. |
| 116. | III | MGB2050 | Retail Banking | Co:1 | Impart basic banking operation skills and understanding banking types. |
| | | | | Co:2 | Analyze different delivery channels for banking services & products. |
| | | | | Co:3 | Perform activities related to Marketing/Selling of retails banking Products. |

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| | | | | Co:4 | Create Customer Relationship Management plan for retail banking organization. |
| | | | | Co:5 | Solve business problems related to retail banking organization. |
| 117. | III | MGB2070 | General Insurance | Co:1 | Implement the principles of General Insurance |
| | | | | Co:2 | Identify & Suggest the Insurance policies with risk management |
| | | | | Co:3 | Fix problem related to reinsurance & customer retention |
| | | | | Co:4 | Identify the risk management techniques in Insurance marketing & Servicing. |
| 118. | III | MGB2090 | Banking Services Operations | Co:1 | Evaluate the banking operations with products & services. |
| | | | | Co:2 | Impart electronic banking skills and technology |
| | | | | Co:3 | Identify the risk factors & need of security in e-banking |
| | | | | Co:4 | Develop the sense of record maintenance & risk management. |
| | | | | Co:5 | Impart the ability of risk management strategies in banking sector |
| 119. | III | MGB2110 | Treasury Management | Co:1 | Understand the concepts and functional framework treasury management |
| | | | | Co:2 | Apply the decisions and types of bill |
| | | | | Co:3 | Evaluate the operational functions of Bills financing and securities |
| | | | | Co:4 | Illustrate the treasury operations and manage customer investor relationships. |
| 120. | III | MGB2130 | Law's Governing Banking and Insurance | Co:1 | Explain the nature and development of banking and laws. |
| | | | | Co:2 | Discuss Regulatory Framework related to banking and insurance businesses. |
| | | | | Co:3 | Apply the rules and regulations in the establishment of banking and insurance companies. |
| | | | | Co:4 | Demonstrate the knowledge of understanding of important provisions of major acts related to banking and insurance businesses. |
| | | | | Co:5 | Apply due process in claim settlements and understand semi judiciary role of insurance Board in claim settlement |
| 121. | III | MGB2150 | Funds Management in Banking and Insurance | Co:1 | Get an insight into the liquidity management in commercial Banking business and discuss the necessity of adequate capital fund. |
| | | | | Co:2 | Explain different types of reserves & different factors affecting on its requirement. |
| | | | | Co:3 | Understand the different aspects related with Management of Bank loan. |

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| | | | | Co:4 | Evaluate the performance of Bank on the basis of deposit mobilization, credit deployment & profitability. |
| | | | | Co:5 | Discuss different functions & principles of life & non-life insurance. Also describe role of insurance & risk management policies related with non-life insurance. |
| 122. | III | MGC2053 | Capstone Project Phase II | Co:1 | Prepare the research design and preparation of tool of data collection |
| | | | | Co:2 | Use acquired theoretical knowledge into practical experience and reveal an understanding of the ideas, concepts and skills gained through their MBA program. |
| | | | | Co:3 | Formulate innovative approaches, models and supports actions that enhance innovation |
| 123. | III | MGC2073 | Summer Internship Project | Co:1 | Apply knowledge and skills learned in the classroom in a work setting. |
| | | | | Co:2 | Develop a greater understanding about career options while more clearly defining personal career goals. |
| | | | | Co:3 | Analyze the activities and functions of business professionals. |
| | | | | Co:4 | Develop and refine oral and written communication skills. |
| | | | | Co:5 | Identify areas for future knowledge and skill development |
| 124. | IV | IPMB2YYY | Online Course-I/Self learning course-I | Co:1 | Develop capability of self-education |
| | | | | Co:2 | Demonstrate lifelong learning skills |
| | | | | Co:3 | Assess self critically |
| | | | | Co:4 | Adopt corrective measures for self-improvement |
| 125. | IV | IP2043 | Project Management (Online Course) | Co:1 | Acquire an understanding of the fundamentals of project management. |
| | | | | Co:2 | Analyze the projects proposal by applying feasibility studies. |
| | | | | Co:3 | Take decisions relating to project cost management. |
| | | | | Co:4 | Identify and manage different issues relating to human aspect in projects. |
| | | | | Co:5 | Taking decisions based on risk management in the projects. |
| 126. | IV | IP2063 | Internship & Project | Co:1 | Develop industry required skill sets |
| | | | | Co:2 | Develop an attitude to adjust with the company culture, work norms, code of conduct |
| | | | | Co:3 | Demonstrate the ability to observe, analyse and document the details as per the industry practices |
| | | | | Co:4 | Improve the leadership abilities, communication |
| 127. | IV | ED2023 | | Co:1 | Acquire an understanding of the fundamentals of project management. |

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| | | | Project Management (Online Course) | Co:2 | Analyze the projects proposal by applying feasibility studies. |
| | | | | Co:3 | Take decisions relating to project cost management. |
| | | | | Co:4 | Identify and manage different issues relating to human aspect in projects. |
| | | | | Co:5 | Taking decisions based on risk management in the projects. |
| 128. | IV | ED2043 | New Venture Finance Startup Funding For Entrepreneurs | Co:1 | Apply the strategic aspects of entrepreneurial finance. |
| | | | | Co:2 | Identify various sources of finance from sources like venture capital, angel financer, private equity and hedge funds and their working procedures, |
| | | | | Co:3 | Conduct valuation of companies by venture capitalist |
| | | | | Co:4 | Compare different sources of finance and select the appropriate source for financing needs. |
| 129. | IV | ED2063 | Entrepreneurship Development Program (EDP) | Co:1 | Apply knowledge of management, economics, marketing and finance for formulation of business plan, starting & managing new business. |
| 130. | IV | ED2083 | Entrepreneurship Development Project | Co:1 | Apply knowledge of Management for preparation of project report. |
| | | | | Co:2 | Make commercial, technical and financial appraisal of project. |

K. E. Society's

# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

- **Department Name :- Department of Management Studies**
- **PG Program Name :- MBA-Innovation, Entrepreneurship and Venture Development [MBA-IEV]**
- **Vision and Mission :-**

**Vision:-**

Achieving excellence in academics and research to develop globally competent and socially responsible managers.

**Mission:-**

1. To leverage innovation and excellence in academic design, delivery and assessment to ensure holistic development of students for employability, entrepreneurship and higher education.
2. To design and keep the curricula updated, based on changing needs of industry and society worldwide.
3. To build and maintain world-class infrastructure, for sustained learning, development and research.
4. To provide an environment that encourages creativity, analysis and critical thinking.

| Sr. No. | Program Outcomes |
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| 103. | Apply knowledge of business theories and practices to solve business problems. |
| 104. | Foster Analytical and critical thinking abilities for data-based decision making. |
| 105. | Develop Value-based Leadership. |
| 106. | Analyze and communicate global, economic, legal, and ethical aspects of the business. |
| 107. | Lead themselves and others in the achievement of organizational goals |

| Sr. No. | Program Specific Outcomes |
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| 10. | NA |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| 131. | I | MIV 1011 | | Co:1 Analyze the DNA of an entrepreneur and assess their strengths and weaknesses from an entrepreneurial perspective |

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| | | | Introduction to Entrepreneurship | Co:2 | Apply leadership principles in various forms of business organizations. |
| | | | | Co:3 | Connect entrepreneurial principles to non-profit, government and larger corporate organizations. |
| | | | | Co:4 | Analyze common early stage pitfalls and design measures of control |
| | | | | Co:5 | Design value propositions for the products and services. |
| 132. | I | MIV 1031 | Entrepreneurial Economics | Co:1 | Evaluate the concepts and analytical tools from micro economic theory that are useful for entrepreneurs in making decisions at the firm level |
| | | | | Co:2 | Identify the competitive relationship between demand and supply |
| | | | | Co:3 | Evaluate the microeconomic variables of production function and role in decision making |
| | | | | Co:4 | Identify the issues related to markets and selection of best alternatives to maximize the profit |
| | | | | Co:5 | Analyze the role of International trade and sectoral development |
| 133. | I | MIV 1050 | Marketing Research | Co:1 | Apply the basics of marketing principles. |
| | | | | Co:2 | Formulate, organize and conduct a marketing research project |
| | | | | Co:3 | Apply and evaluate different sources of marketing information |
| | | | | Co:4 | Apply and evaluate various data collection and analysis techniques |
| | | | | Co:5 | Write a comprehensive market research report |
| 134. | I | MIV 1071 | Idea Generation & Validation | Co:1 | Identify problems and apply innovative solutions through the mode of ideation |
| | | | | Co:2 | Create ways and identify convergence tools to boost creative process |
| | | | | Co:3 | Apply various brainstorming techniques to break down ideas and visualize it create and assess business ideas |
| | | | | Co:4 | Apply core and basic concept of idea generation and creativity |
| 135. | I | MIV 1081 | People Management | Co:1 | Recruit, train, and appraise the performance of employees |
| | | | | Co:2 | Manage human resources through rewards and recognition. |
| | | | | Co:3 | Design compensation and salary administration |

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| | | | | Co:4 | Align talent management with organizational benefits. |
| 136. | I | MIV 1111 | Capstone project I-Idea Generation and Proof of concept | Co:1 | Identify a Social / Business problem. |
| | | | | Co:2 | Develop an idea for solution of the identified problem. |
| | | | | Co:3 | Design the visualization exercise to verify the potential real-life application of an idea. |
| | | | | Co:4 | Provide hands on approach to model building |
| 137. | I | MIV 1131 | Skill Development Lab I: Business Communication | Co:1 | Demonstrate applying themes and layouts to slides. |
| | | | | Co:2 | Demonstrate inserting pictures, graphics, shapes, and other things. |
| | | | | Co:3 | Demonstrate working with sound and videos, master slides, smart art. |
| | | | | Co:4 | Use existing PowerPoint presentations using advanced editing tools such as theme, layout, timing, and animation. |
| 138. | II | MIV 1020 | Organizational behavior | Co:1 | To apply the conceptual foundation and theories of organizational behaviour. |
| | | | | Co:2 | To develop a good working environment for an individual for the smooth running of the organisation. |
| | | | | Co:3 | To analyse inefficiency and weakness in individual and apply various measures to improve it in the organisation. |
| | | | | Co:4 | To analyze how to develop coordination and teamwork in the organisation. |
| | | | | Co:5 | To apply how to use organisation power and politics in an effective manner. |
| 139. | II | MIV 1041 | Pricing Management | Co:1 | Apply the key economic, analytical, and behavioral concepts associated with costs, customer behavior and competition. |
| | | | | Co:2 | Apply advanced pricing techniques. |
| | | | | Co:3 | Comprehend pricing strategies of different products, lifecycles, and companies. |
| | | | | Co:4 | Analyze price strategies of competitors in indifferent market situations through case study scenarios |
| 140. | II | MIV 1061 | New Venture Establishment and Management | Co:1 | Apply the knowledge to generate idea for starting new ventures |
| | | | | Co:2 | Assess the market potential and design strategies to reach out to potential customers, partners, suppliers and experts. |
| | | | | Co:3 | Analyze the legal challenges in setting up new business. |

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| | | | | Co:4 | Create a business plan using a business model canvas |
| | | | | Co:5 | Apply strategies for scaling the new ventures. |
| 141. | II | MIV 1091 | Entrepreneurial Finance | Co:1 | Discuss the fundamental aspects of accounting and finance. |
| | | | | Co:2 | Apply accounting theory and information as a tool for taking managerial decisions. |
| | | | | Co:3 | Prepare various financial statements of the firm. |
| | | | | Co:4 | Analyse and interpret the financial statements by associating the tools and techniques for effective decision making. |
| 142. | II | MIV 1101 | Skill Development Lab-II<br><br>NOC: Legal Compliance for Incorporating Startup - Video course | Co:1 | Develop capability of self-education |
| | | | | Co:2 | Demonstrate skills for incorporating legal aspects in their startups |
| | | | | Co:3 | Assess self critically |
| | | | | Co:4 | Adopt corrective measures for self-improvement |
| 143. | II | MIV 1121 | Skill Development Lab III: Business Communication | Co:1 | Write business letters in a proper, formal format |
| | | | | Co:2 | Demonstrate the methods of oral presentation both in a formal and informal environment |
| | | | | Co:3 | Review the importance of communication relative to securing employment, with emphasis on using both verbal and non-verbal communication and their impact |
| | | | | Co:4 | Prepare the student with the communication tools-verbal, non-verbal and written-and the practical applications inherent in each |
| 144. | II | MIV 1141 | Capstone Project-Formulation of Business Plan & Development of Business Model | Co:1 | Create a business plan |
| | | | | Co:2 | Develop a business model |
| | | | | Co:3 | Develop a feasibility analysis in to business plan |
| | | | | Co:4 | Analyze various business entry strategies |
| 145. | III | MIV 2011 | Venture Growth and Strategy | Co:1 | Identify and evaluate opportunities to scale an organization |
| | | | | Co:2 | Apply game theory to analyze, assess, and respond to competitors |

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| | | | | Co:3 | Assess the impact of a potential merger and acquisition and avoid common pitfalls of this type of growth |
| | | | | Co:4 | Build an innovative capability to add value from innovation to determining an innovation strategy |
| 146. | III | MIV 2031 | Incubation Internship | Co:1 | Apply knowledge and skills learned in the classroom in a work setting. |
| | | | | Co:2 | Develop a greater understanding about career options while more clearly defining personal career goals. |
| | | | | Co:3 | Analyze the activities and functions of business professionals. |
| | | | | Co:4 | Develop and refine oral and written communication skills. |
| | | | | Co:5 | Identify areas for future knowledge and skill development |
| 147. | III | MIM 2011 | Digital Marketing | Co:1 | Apply the digital marketing techniques in a real life situation |
| | | | | Co:2 | Assess the role of digitalization in the development of an entrepreneurship venture. |
| | | | | Co:3 | Evaluate how contemporary marketing techniques can be used for maximizing entrepreneurial success. |
| | | | | Co:4 | Design and evaluate the effectiveness of interactive web sites and analyze digital marketing strategies through SEO |
| 148. | III | MIM 2031 | Entrepreneurial Marketing & Sales Strategy | Co:1 | Apply Marketing mix of an enterprise |
| | | | | Co:2 | Design Growth and marketing strategies |
| | | | | Co:3 | Frame Market Development strategies |
| | | | | Co:4 | Analyze Contemporary issues in Entrepreneurial marketing. |
| 149. | III | MIM 2051 | Business to Business Marketing | Co:1 | Analyse firm specific issues in B2B markets. |
| | | | | Co:2 | Design strategies and structures to effectively serve the B2B market. |
| | | | | Co:3 | Apply a systematic approach to problem solving and decision making in business marketing organizations. |
| | | | | Co:4 | Develop a business-marketing plan for a real local company that mainly targets business customers. |
| 150. | III | MIM 2071 | Consumer Behavior | Co:1 | Assess the relevance of consumer behavior to the entire marketing process. |
| | | | | Co:2 | Analyze the causes giving rise to consumer behavior with the theories. |

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| | | | | Co:3 | Explain the impact of consumer behavior on the development of marketing strategies including marketing communication, segmentation and target marketing. |
| | | | | Co:4 | Apply the concepts and theories covered in the course to devise effective solutions in enhancing business performance.. |
| | | | | Co:5 | Collaborate with other classmates productively on the group work, communicate and present information effectively. |
| 151. | III | MIM 2090 | Export – Import Procedure & Documentation | Co:1 | Explain an overall perspective on import & export management. |
| | | | | Co:2 | Discuss an understanding towards export and import procedure and documentation. |
| | | | | Co:3 | Analyze processing of export order. |
| | | | | Co:4 | Apply knowledge of managing risk involves in the import & export transactions. |
| 152. | III | MIF 2011 | Venture Capital Financing | Co:1 | Identify the role that venture capital plays in financing innovation. |
| | | | | Co:2 | Explain how the structure of entrepreneurial financing arrangements alleviates some of the difficulties in funding new firms. |
| | | | | Co:3 | Illustrate valuation of companies by venture capitalist. |
| | | | | Co:4 | Analyse, compare different sources of finance, and select the appropriate source for financing needs. |
| 153. | III | MIF 2031 | Investment Analysis & Portfolio Management | Co:1 | Demonstrate a comprehensive understanding of the complex current issues relevant to the investment market. |
| | | | | Co:2 | Apply appropriate methods in portfolio management. |
| | | | | Co:3 | Develop a logical mathematical approach to solving complex problems. |
| | | | | Co:4 | Apply stock valuation models in portfolio management |
| 154. | III | MIF 2051 | Financial Analysis And Business Valuation | Co:1 | Apply the financial statements for analysis. |
| | | | | Co:2 | Apply appropriate measures for executing the financial analysis. |
| | | | | Co:3 | Demonstrate fundamental analysis for understanding the business valuation. |
| | | | | Co:4 | Interpret the statements for managerial decision making |
| | | | | Co:5 | Evaluate the results for setting business strategies |

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| 155. | III | MIF 2071 | Working Capital Management | Co:1 | Evaluate the importance of effective working capital Mgt. |
| | | | | Co:2 | Investigate funds flow cycles and their impact on working capital management objectives. |
| | | | | Co:3 | Formulate appropriate working capital management policies to achieve corporate objectives. |
| | | | | Co:4 | Apply corporate cash management, accounts receivable management, bank relations, and inventory management techniques to maximize the share holders' value. |
| | | | | Co:5 | Evaluate comparative working capital management policies and their impact on the firm's profitability, liquidity, risk and operating flexibility. |
| 156. | III | MIF 2090 | Tax Planning and Management | Co:1 | Identify the relevance of tax planning with reference to setting up a new business and various management decisionst. |
| | | | | Co:2 | Identify the areas for tax planning and different types of taxes levied |
| | | | | Co:3 | explain different types of incomes and their taxability and expenses and their deductibility. |
| | | | | Co:4 | Take financial decisions based on the taxes and their impact |
| | III | MIH 2010 | HR Analytics | Co:1 | Explain basic concepts of HR Analytics |
| | | | | Co:2 | Apply Data Analytic techniques using software packages |
| | | | | Co:3 | Identify and use key HR Metrics. |
| | | | | Co:4 | Forecast budget numbers for HR costs |
| | | | | Co:5 | Measure workforce productivity and performance |
| | | | | Co:6 | Explore and visualize data |
| 157. | III | MIH 2030 | Group Dynamics for Teams | Co:1 | Demonstrate familiarity with different types of groups, including their formation, structure and function. |
| | | | | Co:2 | Apply critical thinking skills to evaluate group dynamics and team processes. |
| | | | | Co:3 | Evaluate team skills within the context of the class project. |
| | | | | Co:4 | Analyze the issues facing teams including conflict, power and social influence. |
| | | | | Co:5 | Analyze the skills for understanding group dynamics and working effectively in groups. |

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| 158. | III | MIH 2050 | Human Resource Planning | Co:1 | Analyze the theory and concepts of human resource planning. |
| | | | | Co:2 | Identify the evolution of HRP throughout the organization. |
| | | | | Co:3 | Apply models and methods used in forecasting. |
| | | | | Co:4 | Describe the applications of a succession analysis & planning. |
| | | | | Co:5 | Evaluate the organization's planning program. |
| 159. | III | MIH 2070 | Industrial Psychology | Co:1 | Analyze how perceptions of difference contribute to disparate educational opportunities and work environments. |
| | | | | Co:2 | Conduct a conflict analysis. |
| | | | | Co:3 | Apply leadership lessons to class teams and team assignments. |
| | | | | Co:4 | Communicate effectively on business topics and concepts. |
| 160. | III | MIH 2090 | Leadership | Co:1 | Develop critical thinking skills |
| | | | | Co:2 | Explain different approaches to leadership. |
| | | | | Co:3 | Apply leadership theories in real world business problems. |
| | | | | Co:4 | Analyze leadership types and take appropriate decisions. |
| | | | | Co:5 | Demonstrate ethical leadership practices |
| 161. | IV | IPMI2YYY | Skill Certification-Online courses Relevant to the Chosen business | Co:1 | Develop capability of self-education |
| | | | | Co:2 | Demonstrate lifelong learning skills |
| | | | | Co:3 | Assess self critically |
| | | | | Co:4 | Adopt corrective measures for self-improvement |
| 162. | IV | MIV 2021 | Startup Establishment & Incubation Spaces Access | Co:1 | Establish their startup. |
| | | | | Co:2 | Avail incubation space access in or outside campus |
| | | | | Co:3 | To develop a robust implementable business plan |
| 163. | IV | MIV 2041 | Project Management (Online Course) | Co:1 | Acquire an understanding of the fundamentals of project management. |
| | | | | Co:2 | Analyze the projects proposal by applying feasibility studies. |
| | | | | Co:3 | Take decisions relating to project cost management. |
| | | | | Co:4 | Identify and manage different issues relating to human aspect in projects. |
| | | | | Co:5 | Taking decisions based on risk management in the projects. |

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# • Department of Computer Applications

## PG Program

- **Department Name:- Department of Computer Applications**
- **PG Program Name: - Master of Computer Application (MCA 2024-26)**
- **Vision and Mission: -**

| | |
|---|---|
| **Vision** | To become the center of excellence in computer education through innovation, cutting-edge research, and advanced knowledge dissemination to develop socially responsible and industry-ready IT professionals. |
| **Mission** | **M1:** To foster a dynamic learning environment in computer applications through industrial exposure, combining theoretical knowledge with practical skills.<br><br>**M2:** To enhance employability, engage students in workshops, seminars, and industry interactions to cultivate tech-driven skills essential for success in the IT sector.<br><br>**M3:** To equip students with advanced technical expertise, critical thinking, and ethical values, preparing them to tackle contemporary IT challenges with confidence and innovation. |

| Sr. No. | Program Outcomes |
|---|---|
| 14. | **PO1 (Foundation Knowledge):**<br>Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving. |
| 15. | **PO2 (Problem Analysis):**<br>Identify, review, formulate and analyse problems primarily focus on customer requirements using critical thinking frameworks. |
| 16. | **PO3 (Development of Solutions):**<br>Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals |
| 17. | **PO4 (Modern Tool Usage):**<br>Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases. |
| 18. | **PO5 (Individual and Teamwork):** |

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| | Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile. |
| 19. | **PO6 (Project Management and Finance):** Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management. |
| 20. | **PO7 (Ethics):** Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware. |
| 21. | **PO8 (Life-long learning):** Change management skills and the ability to learn, keep up with contemporary technologies and ways of working. |

| **Sr. No.** | **Program Specific Outcomes** |
|---|---|
| 1 | Apply advanced computing and domain-specific knowledge (AI, Cloud, Cybersecurity, Data Science, Full Stack) to design and implement effective IT solutions. |
| 2 | Apply computing knowledge and skills to address societal and environmental challenges, considering diverse cultural perspectives. |
| 3 | Develop innovative solutions and entrepreneurial skills to create value and address real-world problems in the computing field. |

| **Sr. No.** | **Semester** | **Course Code** | **Course Name** | **Course Outcome** |
|---|---|---|---|---|
| 1 | I | MCA101 | Mathematical Foundations | **1.** Apply principles of mathematical logic and set theory to solve computational problems. |
| | | | | **2.** Utilize combinatorial techniques and graph theory to model and analyze complex networks and structures. |
| | | | | **3.** Perform matrix operations and analyze vector spaces to support computational applications in linear algebra. |
| | | | | **4.** Apply probability and statistical methods to model and interpret data. |
| | | | | **5.** Formulate and solve optimization problems using linear and nonlinear programming |

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| | | | | techniques. |
| 2 | I | MCA103 | Data Structures using Python | **1.** Implement control structures and functions in the basics of python programming. |
| | | | | **2.** Utilize advanced Python features, including data structures such as lists, tuples, sets, and |
| | | | | dictionaries, as well as file handling. |
| | | | | **3.** Implement and manipulate arrays and lists effectively to solve computational problems. |
| | | | | **4.** Apply stack and queue operations, including their implementation and use cases. |
| | | | | **5.** Implement and use various types of linked lists, such as singly, doubly, and circular linked lists. |
| | | | | **6.** Analyse and implement trees and fundamental sorting algorithms, enhancing their problem-solving and computational thinking skills. |
| 3 | I | MCA105 | Database Management System | **1.** Normalize databases by drawing ER diagrams with required constraints and cardinality. |
| | | | | **2.** Design ER models to represent simple database application scenarios. |
| | | | | **3.** Write SQL queries to perform various operations on the database. |
| | | | | **4.** Apply concepts of integrity constraints, Hashing, and Indexing on databases. |
| | | | | **5.** Illustrate the transaction management, concurrency control, and crash recovery. |
| | | | | **6.** Analyse the NoSQL (MongoDB) Database System, its features and operations. |
| 4 | I | MCA107 | Computer Network | **1.** Analyze the various network components and topologies. |
| | | | | **2.** Illustrate the concepts, services, protocols, and algorithms used in Computer Networks. |
| | | | | **3.** Implement Client-server programs using Berkeley socket programming. |
| | | | | **4.** Solve problems related to routing, framing, error correction, detection, and IPv4 addressing. |
| | | | | **5.** Compare the different services, protocols, and algorithms used in Computer Networks. |
| 5 | I | MCA109 | Operating Systems | **1.** Describe the basic functions, structures, and operations of operating systems. |
| | | | | **2.** Utilize various system calls, interface with the operating system, and comprehend the |
| | | | | implementation of system programs. |

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| | | | | **3.** Implement process concepts, and scheduling algorithms, and develop multi-threaded applications. |
| | | | | **4.** Apply synchronization techniques, solve critical section problems, and manage deadlocks effectively. |
| | | | | **5.** Analyze memory management strategies, including paging, segmentation, and virtual memory management |
| | | | | **6.** Manage files, and directories, and understand disk scheduling and RAID structures. |
| | | | | **7.** Demonstrate hands-on experience with Linux operating system commands, file and directory management, shell scripting, and user management. |
| 6 | I | MCA111 | Research Methodology | **1**.Utilize concepts and processes of research methodology applicable to computer applications. |
| | | | | **2.** Formulate and refine research problems and hypotheses relevant to technical and experimental scenarios. |
| | | | | **3.** Design robust research studies utilizing appropriate technical research methods and tools. |
| | | | | **4.** Employ advanced data collection and analysis techniques, leveraging statistical and computational software. |
| | | | | **5.** Compose and present comprehensive research reports and technical papers. |
| | | | | **6.** Uphold ethical standards in conducting and reporting research in the field of computer applications. |
| 7. | I | MCA113 | Data Structures using Python lab | **1.**Implement control structures and functions in the basics of Python programming. |
| | | | | **2.** Utilize advanced Python features, including data structures such as lists, tuples, sets, and dictionaries, as well as file handling |
| | | | | **3.** Implement and manipulate arrays and lists effectively to solve computational problems. |
| | | | | 4. Apply stack and queue operations |
| | | | | **5.** Implement and use various types of linked lists, such as singly linked lists. |
| | | | | **6.** Analyse and implement trees and fundamental sorting algorithms. |

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| 8 | I | MCA115 | Database Management System Lab | **1.**Sketch E-R diagram for given Case Study/ Problem Statement. |
| | | | | **2.** Write SQL query for various operations like retrieval, insertion and manipulation of data etc. |
| | | | | **3.** Apply PL/SQL for implementing Cursor, Procedure/Function and Trigger. |
| | | | | **4.** Design databases for given applications. |
| | | | | **5.** Demonstrate basic commands of MongoDB with installation. |
| 9. | I | MCA117 | Basics of Computers and Computer Organization (BC) | **1.**Write simple C programs using input and output operations. |
| | | | | **2.** Use decision-making and loops to control the flow of C programs. |
| | | | | **3.** Use control structures, functions, arrays, and pointers in C programs. |
| | | | | **4.** Perform data handling using structures and file operations in C. |
| 10 | II | MCA102 | Object Oriented Programming using Java | **1.**Apply Java data types, operators, and control structures in programs. |
| | | | | **2.** Demonstrate /Implement Constructors, Function Overloading, Function Overriding, Wrapper Classes, and Garbage Collection in Java. |
| | | | | **3.** Utilize Array, String, and StringBuffer classes with packages and Exception handling. |
| | | | | **4.** Implement inheritance, abstract classes, interfaces, and access modifiers |
| | | | | **5**. Implement thread synchronization and inter-thread communication. |
| | | | | **6.** Apply File handling with serialization and deserialization using Object Streams. |
| 10 | II | MCA104 | Web Technology | **1.**Create structured web pages using HTML. |
| | | | | **2.** Apply styles to web pages using CSS, Bootstrap, and Tailwind CSS. |
| | | | | **3.** Develop interactive web pages using JavaScript and jQuery. |
| | | | | **4.** Implement server-side functionalities by applying PHP for CRUD operations. |
| 11 | II | MCA106 | Software Engineering and Project Management | **1.**Conduct software requirement analysis and specification. |
| | | | | **2.**Practice software process models for the undertaken software problems |
| | | | | **3.** Conduct software requirement analysis and specification. |

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| | | | | **4.**Compare different software testing techniques and strategies. |
| | | | | **5.** Plan and manage software projects effectively. |
| | | | | **6.**Manage software projects using modern project management tools. |
| 12 | II | MCA108 | Big Data Paradigm | **1.**Identify characteristics of Big Data and key terminologies. |
| | | | | **2.** Apply Hadoop architecture concepts with HDFS and MapReduce. |
| | | | | **3.** Analyze Hadoop ecosystem components, focusing on YARN and Hadoop 2.0 features. |
| | | | | **4.** Use Hive, HBase, and Pig for querying large datasets. |
| 13 | II | MCA110 | Principles of Information Security (PE-I) | **1.**Explain the principles and history of information security. |
| | | | | **2.** Assess security needs and threats in business environments. |
| | | | | **3.** Implement security technologies like firewalls, VPNs, and intrusion detection systems. |
| | | | | **4.** Apply cryptography and design physical security measures. |
| 14 | II | MCA112 | NoSQL (PE-I) | **1.**Analyze different types of NoSQL databases and their features. |
| | | | | **2.** Compare relational databases with NoSQL databases. |
| | | | | **3.** Demonstrate the architecture and performance tuning of Document-oriented NoSQL |
| | | | | databases. |
| | | | | **4.** Apply NoSQL development tools on various types of NoSQL databases. |
| 15 | II | MCA114 | Software Testing (PE-I) | **1.**Analyze fundamentals and types of software testing. |
| | | | | **2.** Design test cases using test case design techniques. |
| | | | | **3.** Use automation tools to test software systems. |
| | | | | **4.** Produce test reports from manual and automated testing. |
| 16 | II | MCA116 | Object-Oriented Programming Using Java Lab | Apply Object-Oriented Programming concepts in Java. |
| | | | | 2. Implement File Handling and Data Persistence. |
| | | | | 3. Utilize Multithreading for Concurrent Programming. |

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| | | | | 4. Design and Develop Interactive Applications |
| 17 | II | MCA118 | Web Technology Lab | **1.**Apply styles to web pages using CSS, Bootstrap, and Tailwind CSS. |
| | | | | **2.** Develop interactive web pages using JavaScript and jQuery. |
| | | | | **3.** Implement basic server-side functionalities using PHP. |
| | | | | **4.** Perform CRUD operations in PHP for database management. |
| 18 | II | MCA120 | Professional Communication and Employability Skills | **1.** Analyze the aspects of nature and process of technical Communication |
| | | | | **2.** Develop interpersonal skills beneficial in business meetings, teamwork, decision- making, and group discussion. |
| | | | | **3**. Apply presentation skills to prepare and deliver a presentation as per the audience and context requirements. |
| 19 | III | MCA201 | Machine Learning | **1.**Implement ML algorithms (Decision Trees, k-Means, PCA) using Python. |
| | | | | **2.** Analyze model performance using evaluation metrics. |
| | | | | **3.** Assess ML models and justify algorithm selection. |
| | | | | **4.** Develop an end-to-end ML application using cloud platforms. |
| 20 | III | MCA203 | Cloud Computing | **1.**Analyze basic cloud computing concepts, service, and deployment models. |
| | | | | **2.** Demonstrate virtualization and resource management in cloud environments. |
| | | | | **3.** Evaluate cloud security challenges, including access management and data |
| | | | | encryption. |
| | | | | **4.** Develop cloud applications using AWS, Azure, or Google Cloud. |
| 21 | III | MCA205 | Cyber Security and Forensics (PE-2) | **1.**Apply the basic terminology of cybercrimes. |
| | | | | **2.** Apply a number of different computer forensic tools to a given scenario. |
| | | | | **3.** Demonstrate the basics of computer forensics. |
| | | | | **4.** Analyze digital evidence, validate its integrity, evaluate acquisition methods used for system security investigations. |
| 22 | III | MCA207 | Data Mining | **1.**Apply real-world applications of data mining. |

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| | | | (PE – 2) | **2.** Utilize classification, clustering, and association rule mining to analyze large datasets and extract patterns. |
| | | | | **3.** Assess the performance of different data mining models and optimize them for better accuracy. |
| | | | | **4.** Implement data mining solutions using appropriate tools for real-world problem-solving. |
| 23 | III | MCA209 | Advanced Java and<br><br>J2EE (PE-2) | **1.**Implement database-driven applications using JDBC for efficient data management. |
| | | | | **2.** Create interactive GUI applications using Java GUI frameworks such as AWT, Swing, SWT, and SwingX. |
| | | | | **3.** Develop network-based applications using Java Socket programming and communication protocols. |
| | | | | **4.** Utilize Java-based reporting tools for generating structured enterprise reports. |
| 23 | III | MCA211 | Blockchain Technology (PE-3) | **1**.Interpret the fundamentals and basic concepts in Blockchain. |
| | | | | **2.** Compare the working of different blockchain platforms. |
| | | | | **3.** Use Crypto wallet for cryptocurrency-based transactions and analyze the importance of blockchain in finding the solution to the real-world problems. |
| | | | | **4.** Illustrate the Ethereum public block chain platform and identify relative application where |
| 24 | III | MCA213 | Deep Learning (PE-3) | **1.**Analyze the fundamental principles, architectures, and algorithms of deep learning, including neural networks, backpropagation, and optimization methods. |
| | | | | **2.** Implement deep learning models for various practical applications such as image recognition, natural language processing, and time-series forecasting. |
| | | | | **3.** Evaluate different deep learning architectures, assess their performance, and apply optimization techniques to improve efficiency and accuracy. |
| | | | | **4.** Develop deep learning solutions using state-of-the-art techniques and frameworks, exploring |
| 25 | III | MCA215 | Dot net framework | **1.**Analyze the .NET Framework architecture with its components for application development. |

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| | | | for Application Development (PE-3) | **2.** Design applications using console, Windows Forms, or web interfaces based on OOP principles. |
| | | | | **3.** Develop database-integrated applications using ADO.NET for seamless .NET integration. |
| | | | | **4.** Deploy applications by performing debugging, testing, or validation to ensure functionality. |
| 26 | III | MCA217 | Innovation, Business Models and Entrepreneurship | **1.** Implement innovation processes to support collaborative experimentation. |
| | | | | **2.** Design business models focused on innovation or technological advancement. |
| | | | | **3.** Manage technological innovation through commercialization, sustainability, or intellectual property strategies. |
| | | | | **4.** Explore emerging trends, challenges, or opportunities in innovation. |
| 27 | III | MCA219 | Machine Learning Lab | **1.** Analyze fundamental ML algorithms, including regression, classification, clustering, and dimensionality reduction, using Python and relevant libraries. |
| | | | | **2.** Analyze key performance metrics such as accuracy, precision, recall, F1-score, and confusion matrices to assess the effectiveness of classification models. |
| | | | | **3.**Build neural networks and reinforcement learning models using TensorFlow/Keras and deploy trained ML models using Flask and Docker. |
| | | | | **4.** Utilize Principal Component Analysis (PCA) and t-SNE for feature selection and dimensionality reduction while applying CNNs for image classification tasks. |
| 28 | III | MCA221 | Full Stack Development Lab | **1.**Develop structured, visually appealing, user-friendly web pages using modern web technologies. |
| | | | | **2.** Implement JavaScript to enhance user experience through DOM manipulation or event handling. |
| | | | | **3.** Integrate user authentication, file handling, or session management within Express.js applications. |
| | | | | **4.** Manage MongoDB connections for integration with Node.js applications in data storage. |

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# Rajarambapu Institute of Technology, Rajaramnagar

(An Empowered Autonomous Institute, affiliated to SUK)

## UG Program

- **Department Name :- Department of Computer Applications**
- **UG Program Name :- Bachelor of Computer Applications (BCA 2024-2027)**
- **Vision and Mission :-**

| | |
|---|---|
| **Vision** | To become the center of excellence in computer education through innovation, cutting-edge research, and advanced knowledge dissemination to develop socially responsible and industry- ready IT professionals. |
| **Mission** | **M1:** To foster a dynamic learning environment in computer applications through industrial exposure, combining theoretical knowledge with practical skills.<br><br>**M2:** To enhance employability, engage students in workshops, seminars, and industry interactions to cultivate tech-driven skills essential for success in the IT sector.<br><br>**M3:** To equip students with advanced technical expertise, critical thinking, and ethical values, preparing them to tackle contemporary IT challenges with confidence and innovation. |

| Sr. No. | Program Outcomes |
|---|---|
| 108. | **PO1 (Computing Knowledge):**<br><br>Apply foundational knowledge of mathematics, programming, databases, and information systems to design and implement effective computer applications. |
| 109. | **PO2 (Problem Analysis):**<br><br>Identify, analyze, and solve computational and real-world problems using appropriate algorithms, data structures, and software tools. |
| 110. | **PO3 (Design and Development of Solutions):**<br><br>Design, develop, and test computer-based systems and applications with attention to functionality, performance, and sustainability. |
| 111. | **PO4 (Modern Tool Usage):**<br><br>Use modern programming environments, databases, and software tools to develop solutions, while understanding their scope and limitations |

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| 112. | **PO5 (Professional and Ethical Responsibility):**<br><br>Demonstrate effective communication, teamwork, and ethical practices while applying IT knowledge in societal and organizational contexts. |
| 113. | **PO6 (Lifelong Learning and Employability):**<br><br>Recognize the need for continuous learning and acquire professional, entrepreneurial, and employability skills to adapt to emerging technologies and industry requirements. |

| Sr. No. | Program Specific Outcomes |
|---|---|
| 1 | PSO1: Design and develop computer applications using programming languages, databases, and web/mobile technologies to solve real-world problems. |
| 2 | PSO2: Apply emerging tools, frameworks, and platforms in cloud computing, AI, and data analytics to create innovative and sustainable IT solutions. |
| 3 | PSO3: Demonstrate teamwork, communication, and managerial skills to pursue careers in IT industries, higher education, or entrepreneurial ventures. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1 | I | BC101 | Programming in C | **1**. Implement algorithms and flowcharts; understand top-down design, debugging, and documentation. |
| | | | | **2.** Understand basic C programs using various data types, variables, and I/O statements. |
| | | | | 3. Implement control statements, including branching and looping constructs, in C programs |
| | | | | **4.**Apply arrays and pointers for effective data management in C programs. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | **5.** Describe functions and perform string manipulations. |
| | | | | **6.** Define and use structures and unions to manage complex data types in C programs. |
| 2 | I | BC103 | Fundamentals of Information Systems | **1.**Assess the impact of information systems on organizations and society, including ethical and privacy considerations. |
| | | | | **2.** Describe key computer hardware and software components and their functions. |
| | | | | **3.** Explain basic networking principles, including network components and the role of the Internet and wireless technologies. |
| | | | | **4.** Evaluate the impact of social computing on business functions such as marketing and customer management. |
| | | | | **5.** Identify threats to information systems and measures to protect data, including |
| | | | | **6.** Explain the benefits of business intelligence and cloud computing for decision-making and organizational efficiency. |
| 3. | I | BC105 | Professional Communication | **1.** Analyze aspects of nature and process of communication in a professional context. |
| | | | | **2.** Communicate effectively using various modes of communication. |
| | | | | **3.** Demonstrate reception skills of language to make communication effective. |
| | | | | **4.** To impart the correct practices of the strategies of Effective Business writing |
| | | | | **5.** Organize the content of technical documents in specific forms. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 4. | I | BC107 | Programming in C lab | **1**.Develop problem-solving skills through C programs for swapping variables, finding the largest number, and computing roots of equations. |
| | | | | **2.** Gain proficiency in control structures and loops to implement algorithms for summing digits, finding prime numbers, and computing Armstrong numbers. |
| | | | | **3.** Acquire skills in defining and using functions, including recursion, for computing Fibonacci numbers, factorials, and series calculations. |
| | | | | **4.** Learn to manipulate arrays and matrices, including searching, sorting, and performing operations, and use structures to manage and display complex data like student mark sheets. |
| 5. | I | BC109 | Professional Software Skills lab | **1.** Create and format professional documents and spreadsheets, utilizing features such as styles, formulas, and data visualization tools. |
| | | | | **2.** Design and deliver effective presentations using multimedia, animations, and slide transitions. |
| | | | | **3.** Implement basic version control with Git and develop styled web pages using HTML and CSS. |
| | | | | **4.** Identify key computer hardware components and manage email accounts, including composing and organizing emails |
| 6. | I | BC111 | Indian Knowledge System | **1.**Understand the fundamental concepts and historical significance of the Indian Knowledge System (IKS) and its unique features, including its classification framework and presentation style. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | **2.** Gain insights into the structure and content of the Vedic literature, its subdivisions, and<br>The distinctive features of Vedic life, including the concept of Yajña and its application in project management. |
| | | | | **3.** Analyze ancient Indian texts such as the Rāmāyaṇa and Arthashastra to understand the principles of governance, public administration, and their relevance to contemporary administrative practices. |
| 7. | I | BC113 | Japanese Language Lab Level-I | **1.** Acquire basic Japanese language skills (listening, speaking, writing, and reading). |
| | | | | **2.** Enable students to demonstrate an awareness of the relevance of the Japanese language to professions and careers. |
| | | | | **3.** Make students understand the cultures and civilizations of the country of Japan. |
| | | | | **4.** Enable the students to function in an environment where Japanese is used exclusively |
| 8. | I | BC115 | German Language Lab Level-I | **1.** Make use of familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. |
| | | | | **2.** Express him /herself and others and can ask and answer questions about personal details such as where he/she live, people he/she know, and things he/she has. |
| | | | | **3.** Interact simply, provided the other person talks slowly and clearly and is prepared to help. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | **4.** Make use of the basic grammar concepts correctly. |
| | | | | **5.** Demonstrate reading and writing skills. |
| 9. | I | BC119 | मराठी भाषिक कौशल्यषिकास | **१.** भाि ा आषण व्यक्तिमत्व षिकास यांमधील सिसंबंध स्पष्ट करू शके ल |
| | | | | **२.** भाषिक कौशल्यषिकास करू शके ल |
| | | | | **३.** कर्था या मराठी साषित्य प्रकाराचे षिश्लेि ण करू शके ल |
| | | | | **४.** एकांषकका या मराठी साषित्य प्रकाराच्या षिश्लेि णाची क्षमता प्राप्त करेल |
| 10. | I | BC117 | Hindi | **1.** षिद्यार्थायों मेंमानिीय सं ि ेदनाओं के षिकास के सार्थ निीन सामाषजक सांस्कृ षतक बोधऔर जीि न मूल्योंका षिकास ि ोगा। |
| | | | | **2.** षिद्यार्थायों मेंसाषित्य के माध्यम सेकलात्मक गुणों की अषभिृक्ति ि ोगी कला की साषिक्तत्यक |
| | | | | षिधाओंके प्रषत अषभरुषच जागृत ि ोगी तर्था रचनात्मक कौशल्य को बढ़ाि ा षमलेगा। |
| | | | | **3.**षिद्यार्थायोंमेंनए ि ैषश्वक मूल्योंके प्रषत सजगता को बढ़ाि ा षमलेगा एिं मूल्यिादी दृषष्ट के प्रषत दाषयत्व बोध उत्पन्न ि ोगा।छात्र व्यि ार मेंषिंदी भाि ा का उषचत प्रयोग कर सकें गे। |
| | | | | **4.** छात्र व्यि ार मेंषिंदी भाि ा का उषचत प्रयोग कर सकें गे। |
| 11. | I | BC121 | National Service Scheme / Physical Education / Yog | _ |
| 12. | II | BC102 | Mathematics for Computer Applications | **1.** Understand and apply the principles of propositional and predicate logic essential for formal reasoning and problem-solving in computer science. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | **2.** Apply fundamental set theory concepts to solve problems related to set operations and data organization. |
| | | | | **3.** Analyze and utilize different types of relations and functions, and understand their properties and applications in computer science. |
| | | | | **4.** Apply combinatorial methods and graph theory concepts to solve problems related to counting, arrangement, and network analysis. |
| | | | | **5.** Understand and apply fundamental probability concepts and methods to analyze and interpret uncertain data. |
| | | | | **6.** Utilize statistical methods to analyze data, perform hypothesis testing, and draw meaningful conclusions in computational contexts. |
| 13 | II | BC104 | Data Structures and Applications | **1.** Learn to perform file operations and understand basic data structures, including arrays, structures, and dynamic memory allocation. |
| | | | | **2.** Apply various sorting algorithms and searching techniques to efficiently manage and retrieve data. |
| | | | | **3.** Develop and manipulate stack and queue data structures using dynamic arrays, and apply them in expression evaluation and other applications. |
| | | | | **4.** Implement and manipulate different types of linked lists, performing operations like traversal, insertion, and deletion. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | **5.** Explore tree data structures, including binary trees and binary search trees, and implement tree traversal algorithms. |
| | | | | **6.** Understand and apply graph operations and hashing techniques for efficient data storage and retrieval. |
| 14 | II | BC106 | Database Management System | **1.** Understand the fundamental concepts of database systems, including database architecture, data models, and database languages. |
| | | | | **2.** Create and interpret entity-relationship (ER) diagrams to model and design database structures effectively. |
| | | | | **3.** Apply relational model concepts and perform relational algebra operations to query and manipulate data within a relational database. |
| | | | | **4.** Design normalized database schemas using functional and multivalued dependencies to ensure data integrity and reduce redundancy. |
| | | | | **5.** Write and execute SQL queries for data definition, manipulation, and retrieval, including schema modifications and constraints. |
| | | | | **6.** Develop complex SQL queries, utilize views, and manage constraints and triggers to enhance database functionality and integrity. |
| 15. | II | BC116 | Data Structures and Application Lab- | **1.** Implement and compare various sorting techniques (selection sort, bubble sort, insertion sort, quick sort, merge sort) to efficiently organize data. |
| | | | | **2.** Design and implement fundamental data structures such as stacks, queues, linked lists, |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | and binary trees, demonstrating their application through practical examples. |
| | | | | **3.** Utilize algorithms for searching and sorting, as well as implement recursive techniques, to solve computational problems and optimize performance. |
| 16. | II | BC118 | Database Management System lab | **1.** Create and interpret Entity-Relationship Diagrams (ERDs) to model database schemas and relationships between entities. |
| | | | | **2.** Write and execute SQL queries to retrieve, update, and manipulate data, including complex queries and views. |
| | | | | **3.** Apply relational algebra operations to perform queries and retrieve specific data from relational databases. |
| | | | | **4.** Implement normalization techniques, manage transactions, and apply constraints to maintain data integrity and optimize performance. |
| 17. | II | BC110 | Indian Politics and Economics | **1.** Explain the process and philosophy behind the formation of the Indian Constitution. |
| | | | | **2.** Differentiate between different political thoughts in India. |
| | | | | **3.** Compare different policy regimes in view of the economic growth of India. |
| | | | | **4.** Analyze Policies and Performance in agriculture and industry. |
| 18. | II | BC120 | National Service Scheme / Physical Education / Yog | _ |

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# Rajarambapu Institute of Technology, Rajaramnagar

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# • -BBA

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# Rajarambapu Institute of Technology, Rajaramnagar

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## UG Program

- **Department Name: -BBA**
- **UG Program Name: -Bachelor of Business Administration**
- **Vision and Mission: -**

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| **Vision** | To create excellence in corporate, businesses for nurturing value driven business leaders with analytical and entrepreneurial mindset to foster innovative ideas in ord transform the world and serve the society. |
| **Mission** | • To design a unique competency directed and industry relevant curriculum ba on changing needs of industry and society worldwide<br>• To facilitate student centric sound academic environment with co-curricular and extra-curricular activities to groom and develop future ready business professionals.<br>• To provide experiential learning through industry connect.<br>• To provide innovation and excellence in academic design with outcome-oriented teaching learning System<br>• To ensure holistic development of students for employability, entrepreneursl and higher education<br>• To enhance students' cognitive, research, analytical, ethical and behavioral competencies through programs that equip them to meet global business challenges in the professional world. |

| Sr. No. | Program Outcomes |
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| 114. | Identify the different functional aspects of business world and recognize different opportunities of business. |
| 115. | Articulate effectively business ideas with written and oral communication especially with the use of appropriate technology. |
| 116. | Analyze the importance of innovation and research, tackle the contemporary needs and accordingly grab the opportunities. |
| 117. | Demonstrate the ability to create business plans and acquire the different employability skills, entrepreneurial skills necessary for the professional attitudes. |

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| 118. | Demonstrate a global outlook with the ability to identify aspects of the global business and cross-cultural understanding through German or Japanese as a foreign language . |
| 119. | Develop skills on analyzing the business data application of relevant analysis and problem solving. |
| 120. | Develop innovative and entrepreneurial mindset. |

**Program Specific Outcomes-PSO**

| Sr. No. | Electives | PSO No. | Program Specific Outcomes |
|---|---|---|---|
| 1 | Marketing | PSO1 | To demonstrate an understanding of marketing principles, theories, and concepts, develop effective marketing strategies, branding and communication expertise, digital marketing competence, sales, and distribution management skills for different business environments. |
| | | PSO2 | To design and conduct market research, analyse consumer behaviour, and interpret market trends to identify opportunities and make informed marketing decisions. |
| 2 | Finance | PSO1 | To analyze the financial performance of an organization applying various tools that aid in decision making. |
| | | PSO2 | To identify the relevance of Financing, Investing & Dividend decisions that impact the growth of the firm |
| 3 | HR | PSO1 | To develop and implement strategic human resource plans aligned with organizational goals, able to handle talent acquisition and |

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| | | | management, design, implement, and evaluate training and development program, develop performance appraisal systems, understand compensation systems, salary structures, employee benefits, and incentives, able to design and manage competitive compensation packages. |
| | | PSO2 | To able to leverage HR data analytics to make data-driven decisions, measure HR effectiveness, identify trends, and predict future workforce needs. |
| 4 | Business Analytics | PSO1 | To possess a solid foundation in data analytics concepts, techniques, and tools, apply statistical analysis methods and data modeling techniques to extract meaningful insights, identify patterns, and make informed business decisions, develop interactive dashboards, reports, and visualizations to effectively communicate analytical findings and support business decision-making processes. |
| | | PSO2 | To able to apply predictive analytics and prescriptive modeling to forecast future trends, optimize business processes, and recommend actionable strategies, able to handle and analyze large volumes of structured and unstructured data using big data analytics tools and technologies. |
| 5 | Computer Application | PSO1 | To develop programming skills, networking skills, learn applications, packages, programming languages, and modern techniques of IT |

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| | | PSO2 | To identify, formulates, analyze and solve problems of programming using different languages. |
| 6 | International Business | PSO1 | To apply conceptual International Business foundations to solve practical decisionmaking problems, both individually and as part of teams using techniques such as case analysis, projects and assignments. |
| | | PSO2 | To develop a systematic understanding of globalization and its impact on People, Global businesses, Technology and the Economy and to demonstrate a critical awareness of current issues with respect to Cross Culture & diversity, social responsibility, sustainability, innovation, knowledge management, |
| 7 | Supply Chain Management | PSO1 | To develop fundamental knowledge of supply chain concepts in sync with other management functions comprising accounting, finance, marketing and human resources in a business enterprise. |
| | | PSO2 | To employ advanced techniques of supply chain management to offer solutions to business problems and aid decision making and to improve the efficiency and effectiveness of supply chain process using the advanced operations to ensure sustainable business practices. |
| 8 | Digital Marketing | PSO1 | To develop strategic digital marketing plans, executing and managing campaigns across various channels like SEO, social media |
| | | PSO2 | To create compelling content, analyzing campaign performance with tools like Google Analytics, and managing online reputation and e-commerce activities |

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| 9 | Data Science | PSO1 | To apply computational, statistical, and machine learning techniques to solve real-world problems, |
| | | PSO2 | To develop and evaluate data-based models, manage and analyze large datasets, design and implement data-driven systems ethically, and communicate findings effectively |
| 10 | Fintech | PSO1 | To demonstrate a comprehensive understanding of core financial principles, including financial management, investment analysis, risk management, and digital banking, and apply them in realworld scenarios |
| | | PSO2 | To develop proficiency in using advanced technological tools such as blockchain, artificial intelligence, machine learning, and data analytics to solve complex problems in the finance industry |
| 11 | Artificial Intelligence and Machine Learning | PSO1 | To able to analyze, design, and develop intelligent systems and solutions using AI/ML techniques, apply these to real-world problems, create computational models, and use modern tools and techniques in areas like deep learning, computer vision, and natural language processing for complex societal challenges. |
| | | PSO2 | To recognize with machine learning algorithms and their applications in business contexts, able to develop predictive models and implement AI-driven solutions. |

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| 12 | Innovation and Entrepreneurship | PSO1 | To able to develop entrepreneurial and entrepreneurial acumen for developing ideas and starting their own businesses |
| | | PSO2 | To develop entrepreneurial and intrapreneurial acumen for developing ideas and starting their own businesses |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1 | Sem.-I | BBA101 | Principles and Practices of Management Business Communication | 1.State fundamentals of management concept, principles. Explain different management functions and theories and their effectiveness in various organizational contexts . |
| | | | | 2.Illustrate SWOT analysis and strategic formulation in real organizational world |
| | | | | 3.Use management strategy for a hypothetical or real organization using a mix of management theories and practices |
| | | | | 4.Evaluate impact of globalization, diversity and Indian ethos in management |
| | | | | 5.Formulate innovative management solutions to enhance efficiency and effectiveness in given business scenarios |
| 2 | Sem.-I | BBA103 | Business Communication | 1.State the concept, process and importance of communication |
| | | | | 2.Explain basic principles and techniques of Communication |
| | | | | 3.Use the skills of effective letter writing and be able to create various kinds of Business letters. |
| | | | | 4.Illustrate various barriers to communication and apply pre-emptive |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| | | | | measures, including feedback, to minimize the same. |
| | | | | 5.Evaluate various kinds of business correspondence and e-correspondence. |
| | | | | 6.Design and produce presentations in front of audience with confidence and expertise |
| 3 | Sem.-I | BBA105 | Financial Accounting | 1.State applications of various principles and practices of Accounting in preparation of accounting statements. |
| | | | | 2.Demonstrate the knowledge on the process of accounting cycle. |
| | | | | 3.Illustrate the knowledge of systematic maintenance of books of accounts to real life business. |
| | | | | 4.Compare Annual Financial statements of Sole proprietorship and Company form of business. |
| | | | | 5.Assess Financial sustainability disclosure standards. |
| | | | | 6.Develop Sustainability reporting need and methods |
| 4 | Sem.-I | BBA107 | Business Statistics and Logic | 1.Recognize importance of logical reasoning in human inquiry. |
| | | | | 2.Explain data handling skills with clarity and logical reasoning. |
| | | | | 3.Illustrate the application of relevant concepts of Statistics to a given context/business scenario. |
| | | | | 4.Inspect business problems and make decisions using appropriate statistical models and explain trends. |
| | | | | 5.Evaluate and interpret data using appropriate statistical techniques |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| | | | | 6.Design a process of organizing a data and conduct statistical treatment |
| 5 | Sem.-I | BBA109 | English Proficiency & Soft Skills-I | 1.State basic grammar of English for writing . |
| | | | | 2.Describe different vocabulary used in English. |
| | | | | 3.Practice listening, speaking, reading and writing skills |
| | | | | 4.Experiment tasks and activities through guided instructions and materials. |
| | | | | 5.Assess English language learning with employability skills and training. |
| | | | | 6.Develop hands-on experience through case-studies, mini-projects, group and individual presentations. |
| 6 | Sem.-I | BBA111 | IKS-Vision for a Human Society | 1. State the concept of Vasudhaiv Kutumbakam and about its realization for the development of vision for a human society. |
| | | | | 2. Discuss the universality in humans and its co-existence in existence. |
| | | | | 3. Classify different stages of life and its development |
| | | | | 4. Illustrate a sense of responsibly, duties and participation of individual for establishment of fearless society. |
| | | | | 5. Investigate programs for ensuring human purpose at individual and societal level. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| | | | | 6.Revise states of consciousness |
| 6 | Sem.-I | BBA113 | Environmental Science and Sustainability | 1. Recognize the basic environmental concepts and issues relevant to the business and management field. |
| | | | | 2. Compare the interdependence between environmental processes and socio- economic dynamics. |
| | | | | 3. Present the role of business decisions, policies, and actions in minimizing environmental degradation. |
| | | | | 4. Examine possible solutions to curb environmental problems caused by managerial actions. |
| | | | | 5. Measure skills to address immediate environmental concerns through changes in business operations, policies, and decisions. |
| | | | | 6. Revise social issues, legislations and its practical applications |
| 7 | Sem.-I | BBA115 | Foreign Language-German -I | Recognize basic grammar used in German Language |
| | | | | Demonstrate familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type |
| | | | | Execute himself /herself and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. |
| | | | | Debate and interact in a simple way provided the other person talks slowly and clearly and is prepared to help. |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| | | | | Assess development in German language vocabulary by interacting with others |
| | | | | Construct presentation of how to use and scope of German Language. |
| 8 | Sem.-I | BBA117 | Foreign Language-Japanese-I | Recognize basic grammar used in Japanese Language |
| | | | | Relate and demonstrate regional languages into Japanese language. |
| | | | | Experiment Japanese vocabulary in day-today speaking. |
| | | | | Debate and interact in a simple way with other persons |
| | | | | Develop basic Japanese language skills (listening, speaking, writing, and reading). |
| | | | | Produce himself /herself with others and can ask and answer questions |
| 9 | Sem.-I | BBA119 | Computer Fundamentals | 1. Define various concept used in computer |
| | | | | 2. Demonstrate an advance knowledge of the MS Office and a knowledge of how to design different documents |
| | | | | 3. Illustrate effective and structured documents like technical reports, letters. and brochures. |
| | | | | 4. Experiment various features of MS Word for different documents. |
| | | | | 5. Test useful spread sheet application like tabulated statements, balanced sheet |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
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| | | | | statistical chart, business statements. |

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| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1 | Sem.-II | BBA102 | Human Behavior and Organization | 1. State individual and group behavior in organizational settings. |
| | | | | 2. Explain importance of OB in modern organizations |
| | | | | 3. Illustrate individual and group behavior in the workplace to improve effectiveness of an organization |
| | | | | 4. Examine theoretical knowledge of human behavior in human life setting in management. |
| | | | | 5. Investigate the lacunae in the system to be able to improve the organization health and other OB outcomes. |
| | | | | 6.Design a more productive system and high-performance work culture operating on the principles of OB. |
| 2 | Sem.-II | BBA104 | Principles of Marketing | 1.Recall fundamental marketing concepts, theories, and principles. |
| | | | | 2.Explain elements of marketing mix, the role of marketing in the organization context. |
| | | | | 3.Illustrate critically an organization's marketing strategies |
| | | | | 4.Compare tools and techniques of marketing with focus on Indian experiences, approaches, and cases |
| | | | | 5.Evaluate marketing implementation strategies from several perspectives |

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| | | | | 6.Formulate and assess strategic, operational, and tactical marketing decisions |
| **3** | Sem.-II | BBA106 | Business Economics | 1. State fundamental concepts of microeconomics. |
| | | | | 2. Discuss the Demand and Supply Schedule |
| | | | | 3. Illustrate problem of reallocation and distribution of the scarce resources. |
| | | | | 4. Compare forms of market and analyze their pricing strategies. |
| | | | | 5. Evaluate the calculation of national income and true measure for increasing economic welfare. |
| | | | | 6. Assess various challenges associated with the Indian economy and help to balance the economy |
| **4** | Sem.-II | BBA108 | Emerging Technologies and Applications | 1. outline foundational knowledge of emerging technologies such as block chain, IoT, cloud computing, AR/VR, etc., |
| | | | | 2. Explain comprehensive principles, components, and functionalities of emerging technologies. |
| | | | | 3. Illustrate the practical applications of these technologies in various business contexts, |
| | | | | 4. Experiment how they can optimize operations, enhance decision-making, and drive innovation. |
| | | | | 5. Evaluate the strategic implications of adopting emerging technologies, including potential challenges, risks, and opportunities, to formulate informed strategies for competitive advantage |

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| | | | | 6. Develop skills to plan and manage the integration of emerging technologies into business processes, ensuring alignment with organizational goals and effective change management. |
| 5 | Sem.-II | BBA112 | Aptitude Skills-I (Quantitative Skills) | 1. State core mathematical concepts, including number systems. |
| | | | | **2.** Demonstrate a thorough understanding of basic arithmetic operations, algebra, geometry, and data interpretation. |
| | | | | 3. Solve various problem-solving techniques and strategies to efficiently tackle quantitative problems, including algebraic equations, geometric calculations, and data analysis. |
| | | | | **4.** Examine and simplify data presented in different formats (e.g., tables, graphs, charts) and extract meaningful insights to solve problems. |
| | | | | **5.** Test quantitative skills to real-world problems and competitive exam scenarios, demonstrating the ability to approach and solve problems with confidence. |
| | | | | 6. Develop problem-solving skills for different real world problems. |
| 6 | Sem.-II | BBA114 | Media Literacy & Critical Thinking | 1. State proficiency in analyzing media texts and identifying implicit messages and ideologies. |
| | | | | 2. Describe media literacy principles to make informed decisions about media consumption and production. |

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| | | | | 3. Compare the complexities of media production, distribution, and audience behavior. |
| | | | | 4. Inspect media production dynamics and ownership structures in the Indian context. |
| | | | | 5. Evaluate ethical and regulatory considerations in media practices. |
| | | | | 6. Construct digital media literacy for responsible online engagement and combating misinformation. |
| 7 | Sem.-II | BBA116 | Mathematics-I | 1. Recall fundamental concepts in mathematics. |
| | | | | 2. Demonstrate different examples of profit or loss |
| | | | | 3. Solve problems of ratio, proportion |
| | | | | 4. Outline problems of Determinants and its application |
| | | | | 5. Use concepts of matrices that serve as essential basis for several computational techniques. |
| | | | | 6. Revise application of metrics |
| 8 | Sem.-II | BBA118 | Indian Constitution | 1. State an understanding of the Indian Constitution beyond legal and political lenses, emphasizing its significance for business students. |

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| | | | | 2. Explain the importance of comprehending constitutional basics and their impact on trade, economy, and business practices. |
| | | | | 3. Illustrate the inclusion of economic justice in the preamble and its implications for post-colonial economic policies. |
| | | | | 4. Connect the legal history of competing claims between economic development and principles of equity and justice in India. |
| | | | | 5. Investigate the transition from state-led industrialization to liberalization, highlighting the constitutional underpinnings of these economic shifts. |
| | | | | 6. Revise the constitutional provisions relevant to business, such as the fundamental right to practice any profession, occupation, trade, or business as enshrined in Article 19. |
| 9 | Sem.-II | BBA120 | English Proficiency and Soft Skills-II | 1. Recall Basics of English Grammer |
| | | | | 2. Describe verbal and non-verbal communication skills, including active listening, clear articulation of ideas, and effective presentation techniques. |
| | | | | 3. Develop critical thinking skills by analyzing situations, identifying problems, and evaluating alternative solutions |
| | | | | 4. Demonstrate heightened emotional intelligence, showing self-awareness, self-regulation, empathy and strong interpersonal skills |

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| | | | | 5. Examine the dynamics of teamwork, including roles and responsibilities, collaboration strategies, and effective delegation. |
| | | | | 6.Recall everyday familiar expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Make use of the basic grammar concepts correctly |
| 10 | Sem.-II | BBA122 | Foreign Language-German -II | |
| | | | | 1. Demonstrate familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. |
| | | | | 2. Execute himself /herself and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. |
| | | | | 3. Debate and interact in a simple way provided the other person talks slowly and clearly and is prepared to help. |
| | | | | 4. Assess development in German language vocabulary by interacting with others |
| | | | | 5. Construct presentation of how to use and scope of German Language. |
| 11 | Sem.-II | BBA124 | Foreign Language-Japanese -II | 1. Recognize basic grammar used in Japanese Language |
| | | | | 2. Demonstrate an awareness of the relevance of Japanese language to professions and careers. |

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| | | | | 3. Execute information about cultures and civilizations of the country of Japan.<br>4. Compare an environment where Japanese is used exclusively. |
| | | | | 5. Demonstrate reading and writing skills. |
| | | | | 6. Produce himself /herself with others and can ask and answer questions |
| 12 | Sem.-II | BBA126 | Advance Excel | 1. Recall Fundamentals of Computer and MS Excel |
| | | | | 2. Explain different MS Excel Tools |
| | | | | 3. Demonstrate advanced functions and productivity tools to assist in developing worksheets |
| | | | | 4. Execute and Manipulate data lists using Outline, Auto filter and Pivot Tables |
| | | | | 5. Illustrate Consolidation to summarize and report results from multiple worksheets |
| | | | | 6. Assess repetitive tasks by creating Macros |

| Sr. No. | Semester | Course Code | Course Name | Course Outcome |
|---|---|---|---|---|
| 1 | Sem-III | BBA201 | Cost and Management Accounting | 1.Describe basic concepts and processes used to determine product costs and ascertain Material, Labour and Overhead cost. |
| | | | | 2.Apply various tools like ratio analysis, cash flow statement, marginal costing for analyzing the financial statements for managerial information |
| | | | | 3.Explain the basic understanding of budgetary control. |
| | | | | 4.Develop management report. |
| 2 | Sem-III | BBA203 | Legal and Ethical Issues in business | 1.State key legal and ethical issues in the business context of India |
| | | | | 2.Analyze ethical dilemmas in business decisions |
| | | | | 3.Illustrate the legal and regulatory aspects of business ethics that concern the financial, competitive and charitable responsibilities of organizations. |
| | | | | 4.Categorize organizational and individual factors impact business ethics |
| 3 | Sem-III | BBA205 | Human Resource Management | 1.Explain the role and strategic importance of Human Resource Management in functional business settings and global organizations. |
| | | | | 2.Illustrate the employee life cycle by applying HR planning, recruitment, training, and career management techniques. |
| | | | | 3. Analyze employee engagement, performance management, compensation structures, and industrial relations within legal and ethical frameworks. |
| | | | | 4. Examine the role of technology, HR analytics, and Green HRM, DEI, and wellness initiatives in transforming modern HR practices. |

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| | | | | 5. Compare global HRM practices including cross-cultural issues, expatriate management, CSR, and ethical responsibilities in MNCs. |
| | | | | 6. Evaluate emerging HRM trends such as AI, automation, hybrid work models, re-skilling, and mental health strategies for workforce agility and future readiness. |
| 4 | Sem-III | BBA207 | Indian Systems of Health and Wellness | 1. Explain the importance of a healthy lifestyle |
| | | | | 2. Describe students about physical and mental health |
| | | | | 3. Demonstrate an awareness of various lifestyle related diseases |
| | | | | 4. Illustrate understanding of stress management |
| 5 | Sem-III | BBA217 | Financial Literacy-Fundamentals of Share Market-I & MOOC | 1. Explain a basic understanding of the products, players and functioning of financial markets, particularly the capital market (Stock Market) |
| | | | | 2. Evaluate the terms and jargons used in the financial newspapers and periodicals. |
| 6 | Sem-III | BBA219 | Computerized Accounting-Tally &MOOC | 1. Explain the basic concepts of accounting and the role of Tally ERP 9 |
| | | | | 2. Create and manage company accounts, ledgers, and groups. |
| | | | | 3.Record and process financial transactions using different vouchers. |
| | | | | 4. Use inventory management and stock transactions efficiently. |
| | | | | 5. Employ taxation & banking features, including GST and reconciliation |
| | | | | 6<br>Discuss and interpret financial reports for business analysis |
| 7 | Sem-III | BBA211 | Aptitude Skills-II(Logical Reasoning) | 1. Explain the basic examples of arrangement, blood relation, coding etc. |

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| | | | | 2. Solve problems of Clock and calendars, Tables, Charts and Other forms of Visualizations |
| | | | | 3. Compute examples of Cause and Effect, Ranking and Order, Cubes and Dice, Logical Venn Diagrams, Critical Reasoning |
| | | | | 4. Evaluate conclusion validity, Data Sufficiency, Inequalities, Mathematical & coded inequalities Decision Making |
| 8 | Sem-III | BBA213 | Management Information System (MIS) | 1. Explain the basic concepts, types, dimensions, and components of MIS, and evaluate the benefits and evolution of IT infrastructure in the digital firm era. |
| | | | | 2. Apply database management principles by setting up and managing DBMS packages, creating Entity-Relationship diagrams, and understanding data models, data warehouses, and administration techniques. |
| | | | | 3. Analyze various MIS applications, including DSS, GDSS, and knowledge management systems, and develop e-commerce solutions by leveraging enterprise models, business process reengineering, and digital communication strategies. |
| | | | | 4. Evaluate project management objectives and methodologies, including agile practices such as SCRUM, and manage projects effectively to control risk factors and understand ethical, social, and political issues in the information era. |
| 9 | Sem-III | BBA215 | Mathematics -II | 1. Explain the basic examples of relations and function |
| | | | | 2. Solve problems of dynamics and statics |

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| | | | | 3. Develop understanding of Vector Analysis |
| | | | | 4. Solve problems of Linear Algebra |
| 10 | Sem-III | BBA221 | Yoga | 1. Explain yoga and its modern applications for holistic well-being. |
| | | | | 2. Demonstrate proficiency in yogic anatomy and physiology, enhancing yoga practice and promoting physical and energetic balance. |
| | | | | 3. Illustrate the Eight Limbs of Yoga and comprehend their psychological impact, fostering personal growth and self-realization. |
| | | | | 4. Demonstrate yoga principles into sports and physical fitness activities to enhance performance and prevent injuries. |
| | | | | 5.Develop skills in wellness management and nutrition |
| 11 | Sem-III | BBA223 | Sports | 1. Explain the concept of sports and including its scope, organizational structure, and ethical considerations. |
| | | | | 2. Demonstrate the technique of Suryanamaskar. |
| | | | | 3. Evaluate Knowledge about Fitness, Wellness and Nutrition, Core Physical Education |
| 12 | Sem-III | BBA225 | | 1. Recall Basics of English Grammer |

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| | | | English Proficiency & Soft Skills-III | 2. Describe verbal and non-verbal communication skills, including active listening, clear articulation of ideas, and effective presentation techniques. |
| | | | | 3 Develop critical thinking skills by analyzing situations, identifying problems, and evaluating alternative solutions. |
| | | | | 4. Demonstrate heightened emotional intelligence, showing self-awareness, self-regulation, empathy and strong interpersonal skills |
| | | | | 5. Assess the dynamics of teamwork, including roles and responsibilities, collaboration strategies, and effective delegation. |
| 13 | Sem-III | BBA227 | German Language III | 1. Interpret the language if the next person is speaking slowly and clearly. |
| | | | | 2. Use language in routine life with the routing topics like family, shopping, work etc. |
| | | | | 3. Demonstrate the language by self-introduction in German with simple sentences. |
| 14 | Sem-III | BBA229 | Japanese Language-III | 1. Demonstrate use of basic conversations in various situations |
| | | | | 2. Identify the sentence patterns. |
| | | | | 3. Explain insights about the communication required for living in Japan. |
| | | | | 4. Interpret Japanese work ethics required in their professional career. |
| 15 | Sem-III | BBA231 | Computer Language-Python | 1. Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements. |
| | | | | 2.Apply operations on Looping and Control statement |
| | | | | 3. Develop proficiency in the programing of strings and functions. |

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| | | | | 4. Create Python programs by utilizing the data structures like lists, dictionaries, tuples and sets. |
| 16 | Sem-IV | BBA233 | Entrepreneurship | 1. Explain the entrepreneurial potential within them.<br>2. Demonstrate the role of entrepreneurship within society<br>3. Summarize the process & nature of entrepreneurship, and ways to manage the process;<br>4. Identify the many ways in which entrepreneurship manifests itself, including start-up contexts, corporate contexts, social contexts, public sector contexts, and others<br>5. Develop an appreciation for opportunity, recognize Same |
| 17 | Sem-IV | BBA235 | Data Visualization with Power BI & MOOC | 1 Explain Key Concepts in Data Modelling<br>2. Utilize visualization with Microsoft Power BI<br>3. Apply Advanced Data Analysis in Microsoft Power BI |
| 18 | Sem-IV | BBA202 | Entrepreneurship and Startup Ecosystem | 1. Explain Entrepreneurship and its types<br>2. Describe that not all ideas can be turned into viable business models and Guestimate business potential of an idea<br>3. Identify different type of finances available and financing methods<br>4. Design business plans on an identified idea<br>5. Recognize the nuances of operating a startup – low budget marketing, stabilizing operations, build a team from scratch and scaling the business<br>6. State what is a Family Business and how is it different from Entrepreneurship |
| 19 | Sem-IV | BBA204 | Operations Management | 1. Explain the core principles of operations management and their significance in enhancing efficiency, quality, and customer satisfaction. |

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| | | | | 2. Analyze different production systems and develop strategies aligned with business objectives. |
| | | | | 3. Optimize operational processes through effective process design, layout decisions, And capacity planning |
| | | | | 4. Implement quality management principles to enhance product/service quality and Reduce defects. |
| | | | | 5. Evaluate emerging trends in operations management, such as sustainable Operations and technological advancements. |
| 20 | Sem-IV | BBA206 | Financial Management | 1. Apply the knowledge in taking finance decisions |
| | | | | 2.develop analytical skills to identify financial management problems and solve them. |
| | | | | 3.analyse the relationship among capital structure, cost of capital, dividend decisions, and value of the business. |
| 21 | Sem-IV | BBA208 | Business Research Methodology | 1. Prepare a detailed research plan covering all essential aspects of a research project. |
| | | | | 2. Construct and administer effective research instruments like questionnaires |
| | | | | 3. Execute data collection strategically to gather relevant information. |
| | | | | 4. Apply advanced statistical techniques for data interpretation |
| | | | | 5. Draft comprehensive research reports tailored to specific audience needs. |
| 22 | Sem-IV | BBA210 | Geo-Politics and impact on Business | 1. Demonstrate a comprehensive understanding of global events and their implications on geopolitics |

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| | | | | 2. Identify the role and impact of geopolitics on the International political economic variables in international business |
| | | | | 3 analyse and evaluate the application of knowledge of Global trade and monetary systems to develop competitive strategies in regional, and global markets |
| | | | | 4. Assess and predict how emerging trends in geopolitics impact strategic decisions of international business |
| 23 | Sem-IV | BBA212 | International Business | 1. Demonstrate and interpret the fundamental theories of international business and trade |
| | | | | 2. Develop an understanding of the concept of Foreign Direct Investment and its impact on various world economy. |
| | | | | 3. Analyse the significance of economic Integration in International Business |
| | | | | 4. Appraise and develop a comprehensive understanding of global emerging trends and stakeholder engagement. |
| 24 | Sem-IV | BBA214 | Aptitude Skills-III (Verbal Reasoning) | 1. Explain the basic grammar level |
| | | | | 2. Develop logic behind Sentence completion, sentence arrangement |
| | | | | 3. Illustrate- Opposite meaning, Similar meaning, Word connections, Closest meaning, two odd ones out, Reading information |
| | | | | 4. Develop Insert a letter, Hidden word, missing word, move a letter Compound words, Make a word |

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| 25 | Sem-IV | BBA216 | Design Thinking & Innovation | 1. Identify real-time innovative product designs and Choose appropriate frameworks, strategies, techniques during prototype development. |
| | | | | 2. State wicked problems and how to frame them in a consensus manner that is agreeable to all stakeholders using appropriate frameworks, strategies, techniques during prototype development. |
| | | | | 3. Analyse emotional experience and Inspect emotional expressions to better understand users while designing innovative products |
| 26 | Sem-IV | BBA218 | English Proficiency & Soft Skills-IV | 1. Explain Importance of Team Building |
| | | | | 2. Compare styles of Leadership. |
| | | | | 3 analyze categories of thinking and Problem solving |
| | | | | 4. Judge works place etiquettes and practice for the same |
| 27 | Sem-IV | BBA220 | German Language IV | 1. Interpret the language if the next person is speaking slowly and clearly. |
| | | | | 2. Use language in routine life with the routing topics like family, shopping, work etc. |
| | | | | 3. Demonstrate the language by self-introduction in German with simple sentences. |
| 28 | Sem-IV | BBA222 | Japanese Language-IV | 1. Explain to make basic conversations in various situations |
| | | | | 2. Recognize the sentence patterns. |
| | | | | 3. Evaluate Japanese Language proficiency |

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| | | | | 4. Demonstrate insights about the communication required for living in Japan. |
| | | | | 5. Execute students to the Japanese work ethics required in their professional careers. |
| 29 | Sem-IV | BBA224 | Computer Language -R Programming | 1. Explain the fundamental syntax of R through practice exercises, readings, demonstrations and writing R code. |
| | | | | 2. Apply programming language concepts such as data types, iteration, control structures and functions by writing R programs. |
| | | | | 3. Illustrate the variety of data formats in R |
| | | | | 4. Summarize data using different R packages. |
| 30 | Sem-IV | BBA226 | Digital Marketing | 1. Explain the applications of Digital Marketing |
| | | | | 2. Analyse the different digital marketing avenues. |
| | | | | 3. Examine digital marketing tools. |
| | | | | 4. Illustrate real life problems in the domain of Digital Marketing |
| 31 | Sem-IV | BBA228 | Entrepreneurship Development & MOOC | 1. Explain and illustrate process of project identification. |
| | | | | 2. Examine institutional support and schemes for entrepreneurship development. |
| | | | | 3. Assess and utilize different methods of project appraisal. |
| | | | | 4. Design business plan with the help of incubation centers/ED centers |
| | | | | 5. Apply business plan practically to start business or startups |