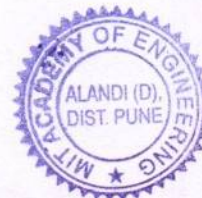## Criterion 1 - Curricular Aspects

*1.1.1 - Curricula developed and implemented have relevance to the local, national, regional and global developmental needs which are reflected in Programme Outcomes (POs), Programme Specific Outcomes (PSOs) and Course Outcomes (COs) of the various Programmes offered by the Institution:*

| Program code | Programe name | Website link |
|---|---|---|
| UG-CH | Chemical Engineering | https://drive.google.com/file/d/10NcIuLR-Rli-kb_YJYIld4XFfSjYwB0M/view |
| UG-CV | Civil Engineering | https://mitaoe.ac.in/school-of-civil-engineering-course.php |
| UG-CS | Computer Engineering | https://mitaoe.ac.in/school-of-computer-engineering-and-technology-comp-bachelor-course-structure.php |
| UG-EX | Electronics Engineering | https://mitaoe.ac.in/school-of-electrical-engineering-etx-course-structure.php |
| UG-ET | Electronics and Telecommunication Engineering | https://drive.google.com/file/d/1STug169WH7-DoYPNy46q68BPmFRGVVkI/view |
| UG-IT | Information Technology* | *From the acdemic year (2021-22) UG-Bachelor of Technology (B Tech ) Information Technology is merged to UG-Bachelor of Technology (B Tech ) Computer |
| UG-ME | Mechanical Engineering | https://drive.google.com/file/d/1a8Kfr_7EUG_b0tMNWdA4iWL64dSAqQUJ/view |
| UG-BD | Design ( B. Des) | https://www.mitsd.edu.in/institute.php#visionmission |
| PG-CS | Computer Engineering | https://mitaoe.ac.in/school-of-computer-engineering-and-technology-mtech-couse-structure.php |
| PG-ME | Mechanical Engineering | https://mitaoe.ac.in/school-of-mechanical-engineering-MTech-course.php |
| PG-EX | Electronics Engineering | https://mitaoe.ac.in/school-of-electrical-engineering-etx-course-structure.php |

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| UG-CS | Computer Engineering | https://mitaoe.ac.in/school-of-computer-engineering-and-technology-comp-bachelor-course-structure.php |
| UG-EX | Electronics Engineering | https://mitaoe.ac.in/school-of-electrical-engineering-etx-course-structure.php |
| UG-ET | Electronics and Telecommunication Engineering | https://drive.google.com/file/d/1STug169WH7-DoYPNy46q68BPmFRGVVkI/view |
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| UG-BD | Design ( B. Des) | https://www.mitsd.edu.in/institute.php#visionmission |
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| PG-ME | Mechanical Engineering | https://mitaoe.ac.in/school-of-mechanical-engineering-MTech-course.php |
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# MIT Academy of Engineering, Alandi(D.), Pune – 412 105

# *Course Outcomes (2019 – 2023 Pattern)*

# Contents

# MIT Academy of Engineering, Alandi(D.), Pune
## List of Program Outcomes Given By NBA

| PO No. | PO Statement |
|---|---|
| PO1 | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| PO2 | **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. |
| 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 the public health and safety, and the cultural, societal, and environmental considerations. |
| 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. |
| 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. |
| 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. |
| PO7 | **Environment and stainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| PO8 | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| PO9 | **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| 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. |
| PO11 | **Project management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| 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. |

# MIT Academy of Engineering, Alandi(D.), Pune
## List of Program Specific Outcomes

| PSO No. | PSO Statement |
|---|---|
| **Department :- Chemical Engineering** | |
| **PSO1** | Evaluate and identify separation process for the system. |
| **PSO2** | Apply the knowledge of unit operations and unit processes for design the chemical plant. |
| **PSO3** | Evaluate the energy scenario & environment related issues in Chemical Plants. |
| **Department :- Civil Engineering** | |
| **PSO1** | Analyze, Design, Construct, Maintain and Operate infrastructure projects. |
| **PSO2** | Assess the environmental impact of various projects and required measures to curb environmental deterioration. |
| **PSO3** | Able to use latest software pertaining to various streams of Civil Engineering. |
| **Department :- Computer Engineering** | |
| **PSO1** | Logic Building: Participate in Planning, Implementing and evaluating language – specific team programming solutions to specific application in system programming, networking, databases and machine intelligence. |
| **PSO2** | Application development skill: Complete individual practical experiences in a variety of programming languages and situations for solving real life problems. |
| **PSO3** | Competency Development: Develop the IT competencies using knowledge, skills and disposition to prepare or global workplace. |
| **Department :- Electronics Engineering** | |
| **PSO1** | Design building blocks of real time applications and automation by using modern engineering tools and multidisciplinary concepts |
| **PSO2** | Build confidence to participate and succeed in competitive examinations and technical competitions. |
| **PSO3** | Broaden the knowledge in various administrative skill sets, exposure to entrepreneurial setup and society outreach program as a whole |
| **Department :- Electronics and Telecommunication Engineering** | |
| **PSO1** | Analyze and simulate diverse problems in the field of communication. |
| **PSO2** | Design and analyze a system with applications in signal and image processing. |
| **PSO3** | Build, test and evaluate an embedded system with real time constraints. |
| **PSO4** | Design and implement a system towards automatic control in varied engineering problems. |
| **Department :- Information Technology** | |
| **PSO1** | Logic Building: Participate in Planning, Implementing and evaluating language – specific team programming solutions to specific application in system programming, networking, databases and machine intelligence. |
| **PSO2** | Application development skill: Complete individual practical experiences in a variety of programming languages and situations for solving real life problems. |
| **PSO3** | Competency Development: Develop the IT competencies using knowledge, skills and disposition to prepare or global workplace. |
| **Department :- Mechanical Engineering** | |
| **PSO1** | To apply design and development principles to provide solutions in Machine Design, Production Technology, Thermal Engineering and CAD-CAM domain to meet desired needs. |
| **PSO2** | To apply competency and proficiency in the field of allied engineering. |

# Course Outcomes

## First Year, B. Tech.

### (Common To All Programmes)

## (2019 – 2023)

| CO's | CO Statement | BT Level |
|---|---|---|
| | **First Year, BTech (Common To All Programmes)** | |
| **Course Name and Course Code** | **Calculus And Differential Equations (AS105)** | |
| AS105.CO.1 | Solve First order and First degree ordinary differential equations | L2 |
| AS105.CO.2 | Analyze and solve real world phenomenon governed by First order ordinary differential equations | L4 |
| AS105.CO.3 | Apply concepts of linear differential equations of second and higher order to solve systems in engineering world | L3 |
| AS105.CO.4 | Infer the problems based on properties of partial differentiation | L3 |
| AS105.CO.5 | Examine the applications of partial differentiation. | L4 |
| AS105.CO.6 | Solve and examine the solution of partial differential equations by theoretical methods | L3 |
| **Course Name and Course Code** | **Statistics and Integral Calculus (AS107)** | |
| AS107.CO.1 | Analze and evaluate statistical problems | L4 |
| AS107.CO.2 | Solve the probability distribution problems | L3 |
| AS107.CO.3 | Evaluate complex integrals | L3 |
| AS107.CO.4 | Sketch curves by analyzing the given equation of curves | L3 |
| AS107.CO.5 | Evaluate the multiple integrals | L4 |
| AS107.CO.6 | Apply the knowledge of multiple integrals to solve engineering problems | L3 |
| **Course Name and Course Code** | **Engineering Physics (AS106)** | |
| AS106.CO.1 | Evaluate the importance of order of all physical quantities and compare the order of size of different objects | L6, L4 |
| AS106.CO.2 | Apply the theoretical knowledge of optics to understand the physics behind engineering applications | L3 |
| AS106.CO.3 | Apply that light is transverse in nature | L3 |
| AS106.CO.4 | Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics | L3, L2 |
| AS106.CO.5 | Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell | L6 |
| AS106.CO.6 | Apply the concepts of Quantum Physics in different branches of engineering | L4 |
| **Course Name and Course Code** | **Science of Nature (CH101)** | |
| CH101.CO.1 | Explain natural biological processes and their technical aspects in view of optimizing Engineering solutions | L1 |
| CH101.CO.2 | Explain important inventions that changed the human life and their impact on engineering. | L3 |
| CH101.CO.3 | Apply the basic knowledge of chemistry to solve the engineering problems. | L3 |
| CH101.CO.4 | Categorize the different engineering materials and to solve engineering problems. | L3 |
| CH101.CO.5 | Apply basic concepts of analytical techniques for analysis of various chemical compounds | L3 |
| CH101.CO.6 | Identify different methodologies for water quality analysis for industrial applications. | L4 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Application Programming - Python (CS102)** | |
| CS102.CO.1 | Debug syntax and semantics in Python programs. | L2 |
| CS102.CO.2 | Demonstrate proficiency in handling strings and file system. | L3 |
| CS102.CO.3 | Implement the programs using core data structures like Lists and Dictionaries. | L3 |
| CS102.CO.4 | Interpret the concepts of Object Oriented Programming in Python. | L4 |
| CS102.CO.5 | Develop solution for real life problems using Python. | L4 |
| **Course Name and Course Code** | **LOGIC DEVELOPMENT - USING C PROG (CS101)** | |
| CS101.CO.1 | List the various data types, control structures and looping structures supported by C language | L1 |
| CS101.CO.2 | Diferentiate between various data types supported by C language. | L2 |
| CS101.CO.3 | Implement the solutions for various algorithms in C language. | L3 |
| CS101.CO.4 | Analyze various parameter passing methods to functions in C language. | L4 |
| **Course Name and Course Code** | **Applied Mechanics (CV102)** | |
| CV102.CO.1 | Determine the resultant and support reactions. | L3 |
| CV102.CO.2 | Equilibrium Analysis of bodies involving frictional forces. | L4 |
| CV102.CO.3 | Evaluate Centroid of bodies and moment of inertia of sections. | L3 |
| CV102.CO.4 | Identify the type of motion and its kinematic parameters. | L3 |
| CV102.CO.5 | Analyze the motion under action of constant and variable forces. | L4 |
| CV102.CO.6 | Apply energy and momentum methods for kinetics problems. | L4 |
| **Course Name and Course Code** | **Engineering Graphics (ME104)** | |
| ME104.CO.1 | Develop and/or comprehend a simple engineering drawing in both First and Third angle orthographic projections. | L1 |
| ME104.CO.2 | Interpret engineering drawings. | L2 |
| ME104.CO.3 | Apply visualization skills to development of surfaces. | L3 |
| ME104.CO.4 | Analyze engineering drawings. | L3 |
| ME104.CO.5 | Decide annotations for two dimensional drawings. | L2 |
| ME104.CO.6 | Create manual drawing & CAD data using SP46 standards. | L4 |
| **Course Name and Course Code** | **Experimental Tools and Techniques (ME105)** | |
| ME105.CO.1 | Recall the tools required for the measurements. | L2 |
| ME105.CO.2 | Summarize the application of various engineering tools used. | L2 |
| ME105.CO.3 | Identify the right tools for selected purpose. | L3 |
| ME105.CO.4 | Inspect various parts of the system. | L4 |
| ME105.CO.5 | Justify the most appropriate technique which can be compatible with the existing environment. | L5 |
| ME105.CO.6 | Develop the system which will give appropriate solution to the identified problem. | L6 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Electrical and Electroincs Engineering (EX102)** | |
| EX102.CO.1 | Develop Renewable energy system (PV) & power factor improvement circuits. | L3 |
| EX102.CO.2 | Distinguish behavior of three phase circuits & power measurement methods. | L2 |
| EX102.CO.3 | Analyze analog circuits. | L4 |
| EX102.CO.4 | Design Digital circuits. | L4 |
| EX102.CO.5 | Demonstrate the use of Instrumentation system in various fields. | L6 |
| EX102.CO.6 | Identify electrical machines used in typical domestic and industrial sector Application. | L4 |
| **Course Name and Course Code** | **English for Engineers (HP103)** | |
| HP103.CO.1 | Interpret texts written in English. | L2, L5 |
| HP103.CO.2 | Apply English grammar rules correctly. | L3 |
| HP103.CO.3 | Choose and employ appropriate words from AWL and NAWL in communication. | L3, L6 |
| HP103.CO.4 | Develop sentence and text in English coherently and formally. | L3, L6 |
| HP103.CO.5 | Demonstrate overall improvement in communication skills. | L2 |
| HP103.CO.6 | Analyze and infer from written, audio and video texts. | L2, L4 |
| **Course Name and Course Code** | **Design Thinking (ME106)** | |
| ME106.CO.1 | Recall fundamental principles of design thinking. | L1 |
| ME106.CO.2 | Explain all the dimensions of user and his needs using design thinking approach. | L2 |
| ME106.CO.3 | Outline user centric problem by using information gathering techniques. | L2 |
| ME106.CO.4 | Compare multiple solutions through ideation process. | L2 |
| ME106.CO.5 | Interpret most appropriate solution for defined user centric problem. | L2 |
| ME106.CO.6 | Develop the most optimum solution. | L3 |

# Course Outcomes

# B. Tech

# (Chemical Engineering)

# (2019 – 2023)

| COs | CO Statement | BT Level |
|---|---|---|
| **Second Year, BTech (Chemical Engineering)** | |
| **SEMESTER - III** | |
| **Course Name and Course Code :- Material Engineering (ME221)** | |
| ME221.CO1 | Relate the applications of various engineering materials and heat treatment processes in material processing industry. | L2 |
| ME221.CO2 | Interpret the specifications, composition, concepts and fundamental properties of engineering materials applied in industrial/research field | L3 |
| ME221.CO3 | Select the suitable materials, manufacturing process for speci ed application to meet theproduct performance requirements within its product service life. | L3 |
| ME221.CO4 | Analyze the suitable material testing and characterization technique to ensure service life for specific product without any failure or deterioration in its | L4 |
| **Course Name and Course Code :- Material and Energy Balance (CH221)** | |
| CH221.CO1 | Interpret the data presented in different unit systems | L3 |
| CH221.CO2 | Apply the various gas laws to calculate the unknowns in the given system | L3 |
| CH221.CO3 | Develop the material balance equation for the given system | L3 |
| CH221.CO4 | Analyze the heating value of the given fuel | L4 |
| CH221.CO5 | Calculate the heat of reaction for the given reaction at the specific conditions | L3 |
| CH221.CO6 | Calculate the energy requirement for the given system | L3 |
| **Course Name and Course Code :- Inorganic and Analytical Chemistry (CH222)** | |
| CH222.CO1 | Predict the geometry of various chemical compounds | L2 |
| CH222.CO2 | Appreciate the importance and applications of transition metals and coordination compounds in our day to day life. | L2 |
| CH222.CO3 | Describe Colligative properties of solutions and correlate these with molar masses of the solutes | L3 |
| CH222.CO4 | Describe the basic principle of different analytical techniques. | L3 |
| CH222.CO5 | Suggest possible analytical techniques for identification and quantification of organic compounds | L3 |
| CH222.CO6 | Apply the knowledge of various Biomolecules used in biochemical processes | L3 |
| **Course Name and Course Code :- Momentum transfer (CH223)** | |
| CH223.CO1 | Apply concepts of momentum transfer to different processes in chemical engineering. | L3 |
| CH223.CO2 | Find out the dimensions of unknown variable by using dimensional analysis. | L3 |
| CH223.CO3 | Calculate pressure drop by setting momentum balance. | L3 |
| CH223.CO4 | Perform design calculations related to flow measurements and pumping of fluids. | L3 |
| CH223.CO5 | Calculate different losses in piping. | L3 |
| CH223.CO6 | Apply the equation of motion. | L3 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Chemical Engineering Thermodynamics (CH224)** | | |
| CH224.CO1 | State the importance of thermodynamic laws and their applications in chemical engineering | L2 |
| CH224.CO2 | Evaluate the thermodynamic properties of pure substances as well as mixtures | 3 |
| CH224.CO3 | Apply the knowledge of thermodynamics in chemical engineering problems | L3 |
| CH224.CO4 | Use appropriate thermodynamic models to predict the equilibrium characteristics of a system | L3 |
| CH224.CO5 | Implement knowledge of heat cycles in day to day applications | L3 |
| CH224.CO6 | Evaluate the feasibility of a reaction using thermodynamic concepts | L5 |
| **Course Name and Course Code :- Rapid Prototyping (ET235)** | | |
| ET235.CO1 | Consolidate the techniques, skills & modern engineering tools. | L2 |
| ET235.CO2 | Apply acquired skills to the construction of a prototype project. | L3 |
| ET235.CO3 | Develop a prototype project by performing tasks in team. | L3 |
| ET235.CO4 | Demonstrate the work carried out in a team. | L3 |
| **Course Name and Course Code :- Minor Project - Design (CH230)** | | |
| CH230.CO1 | Delineate the problem to be solved | L2 |
| CH230.CO2 | Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession | L3 |
| CH230.CO3 | Embark project planning and design | L2 |
| CH230.CO4 | Inculcate problem solving skills and critically analyze the options available to solve the problem | L2 |
| CH230.CO5 | Cognize the importance of documentation and report writing | L2 |
| **Course Name and Course Code :- Environmental Science (CV203)** | | |
| CV203.CO1 | Summarize the importance of ecosystem and biodiversity for maintaining ecological balance. | L2 |
| CV203.CO2 | Identify environmental problems arising due to engineering and technological activities and the science behind those problems of engineering profession | L2 |
| CV203.CO3 | Categorize the major pollutants along with sources and abatement devices for the environmental management. | L2 |
| CV203.CO4 | Perceive the social and professional responsibility towards the environment | L2 |
| **SEMESTER  - IV** | | |
| **Course Name and Course Code :- Applied Mathematics (AS203)** | | |
| AS203.CO1 | Evaluate the Laplace and Inverse Laplace transform and will solve the differential equations | L3 |
| AS203.CO2 | Rewrite the periodic and non-periodic functions as a series of sines and cosines | L3 |
| AS203.CO3 | Differentiate a vector valued function in plane or space. | L3 |
| AS203.CO4 | Solve and compute the area and volume of the objects | L3 |
| AS203.CO5 | Apply the numerical methods to problems of calculus and differential equations. | L3 |
| AS203.CO6 | Execute the program codes using MATLAB. | L3 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Heat Transfer (CH231)** | | |
| CH231.CO1 | Identify the different modes of heat transfer and use the conduction calculations for various geometries | L3 |
| CH231.CO2 | Apply the principles of convection for thermal systems | L3 |
| CH231.CO3 | Implement the concepts of heat transfer with phase changes | L2 |
| CH231.CO4 | Analyze the systems involving radiation and to solve problems pertaining to them | L4 |
| CH231.CO5 | Analyze different types of heat exchangers based on fundamental concepts | L4 |
| CH231.CO6 | Develop the basic designs of heat transfer equipment | L5 |
| **Course Name and Course Code :- Advanced Chemistry (CH232)** | | |
| CH232.CO1 | Predict the rates of given chemical and photochemical processes | L3 |
| CH232.CO2 | Recognize how the MSDS improves your access to vital safety, health, and environmental information about chemicals used in the workplace | L2 |
| CH232.CO3 | Apply adsorption & catalysis technique for purification & unit processes. | L3 |
| CH232.CO4 | Predict the mechanism of given organic reaction | L3 |
| CH232.CO5 | Interpret spectral data and identify unknown compounds | L3 |
| CH232.CO6 | Interpret the thermograms, analyze and present the result of the measurements | L3 |
| **Course Name and Course Code :- Mass Transfer (CH233)** | | |
| CH233.CO1 | Calculate the molar flux for different systems | L3 |
| CH233.CO2 | Determine the individual and overall transfer coefficients | L3 |
| CH233.CO3 | Use the Psychrometric chart for humidification operations | L3 |
| CH233.CO4 | Analyze the drying rate of the given material | L4 |
| CH233.CO5 | Develop the equilibrium data for crystallization operation | L5 |
| CH233.CO6 | Design equipment for various mass transfer operations | L6 |
| **Course Name and Course Code :- Professional Communication (HP202)** | | |
| HP202.CO1 | Express themselves effectively in routine and real-world interactions through oral and written communication. | L2 |
| HP202.CO2 | Show Confident Public Speaking skills | L2 |
| HP202.CO3 | Showcase leadership qualities during tough tasks, make decisions and actions effectively within time | L2 |
| **Course Name and Course Code :- Digital Prototyping (ET224)** | | |
| ET224.CO1 | Consolidate the techniques, skills & modern engineering tools | L2 |
| ET224.CO2 | Apply acquired skills to the construction of a prototype project | L3 |
| ET224.CO3 | Develop a prototype project by performing tasks in team | L3 |
| ET224.CO4 | Demonstrate the work carried out in a team | L3 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Minor Project - Implementation (CH240)** | | |
| CH240.CO1 | Select appropriate method for making of solution | L2 |
| CH240.CO2 | Compare various engineering tools/technique to develop solution | L4 |
| CH240.CO3 | Justify the selected method/tools opted for making of solution | L4 |
| CH240.CO4 | Develop tangible solution to defined problem | L3 |
| CH240.CO5 | Test the developed solution | L3 |
| CH240.CO6 | Document solution in the form of Project report / IPR drafts | L2 |
| **Course Name and Course Code :- Liberal Learning (HP203)** | | |
| HP203.CO1 | Develop a skill in the domain of their interest | L3 |
| HP203.CO2 | Demonstrate the skills learnt in the course | L2 |
| HP203.CO3 | Apply the concepts learnt in real-life situations | L3 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Third Year, B.Tech (Chemical Engineering)** | | |
| **SEMESTER - V** | | |
| **Course Name and Course Code :- Chemical Engineering Operations (CH341)** | | |
| CH341.CO1 | Explain parts of equipments used in Solid-solid, solid-fluid separation | L2 |
| CH341.CO2 | Distinguish between various solid transportation equipments | L4 |
| CH341.CO3 | Calculate power requirement for various equipments with laws | L3 |
| CH341.CO4 | Classify size reduction, mixing and solid-fluid separation equipments | L4 |
| CH341.CO5 | Calculate pressure drop across solid- fluid systems | L3 |
| CH341.CO6 | Select appropriate equipments for solid-solid and solid-fluid separation | L3 |
| **Course Name and Course Code :- Separation Process (CH342)** | | |
| CH342.CO1 | Generate the vapor - liquid equilibrium data for the given system | L3 |
| CH342.CO2 | Perform material balance for batch and continuous distillation | L3 |
| CH342.CO3 | Calculate the mass transfer coefficient for the different system | L3 |
| CH342.CO4 | Analyze the effectiveness of the given separation column | L4 |
| CH342.CO5 | Perform material balance calculations for different types of extraction units | L3 |
| CH342.CO6 | Design equipment for various separation process | L6 |
| **Course Name and Course Code :- Chemical Reaction Engineering (CH343)** | | |
| CH343.CO1 | Identify different reaction types and mechanisms | L3 |
| CH343.CO2 | Classify the various reactor types and their applications | L4 |
| CH343.CO3 | Apply rate equations to determine the kinetic parameters of a reaction | L3 |
| CH343.CO4 | Compare the behavior of different reaction order systems | L4 |
| CH343.CO5 | Analyze the data obtained for different reactor systems | L4 |
| CH343.CO6 | Design a reactor based on the reaction kinetic data | L6 |
| **Course Name and Course Code :- Process Engineering (CH351)** | | |
| CH351.CO1 | Relate the role of process engineer | L2 |
| CH351.CO2 | Implement the appropriate symbol in process diagram | L3 |
| CH351.CO3 | Correlate the devices in process designing | L3 |
| CH351.CO4 | Calculate the process synthesis and equipmen | L3 |
| CH351.CO5 | Evaluate the data for process development | L5 |
| CH351.CO6 | Design the process equipment as per given requirement | L6 |
| **Course Name and Course Code :- Energy Engineering (CH352)** | | |
| CH352.CO1 | Describe the conventional and renewable energy sources | L3 |
| CH352.CO2 | Illustrate the various applications of each form of energy | L3 |
| CH352.CO3 | Utilize the energy conversion tools appropriately | L2 |
| CH352.CO4 | Discover a system based on non-conventional energy sources | L2 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Project Management (HP304)** | | |
| HP304.CO1 | Identify the Project Management Knowledge Areas and Processes | L2 |
| HP304.CO2 | Classify the responsibilities while designing the Project Master Plan | L3 |
| HP304.CO3 | Outline the Cost Estimating and Cost Escalation Process | L3 |
| HP304.CO4 | Demonstrate and highlight The Processes of Project Quality Management | L3 |
| HP304.CO5 | Analyze Project Management Maturity and Maturity Models | L4 |
| **Course Name and Course Code :- Skill Development Lab (CFD) (CH344)** | | |
| CH344.CO1 | Use a CAD tool for preparing CFD specific CAD models | L3 |
| CH344.CO2 | Create high quality CFD simulation meshes from imported CAD geometry | L3 |
| CH344.CO3 | Complete a basic CFD simulation including defining the problem, calculating the solution and post-processing the results | L3 |
| CH344.CO4 | Learn to interpret the results by qualitative and quantitative post-processing | L2 |
| CH344.CO5 | Perform all steps of a CFD simulation from CAD import to meshing to solution to results | L3 |
| CH344.CO6 | Perform a flow and heat transfer simulation | L3 |
| **Course Name and Course Code :- Project Design (CH345)** | | |
| CH345.CO1 | Delineate the problem to be solved | L2 |
| CH345.CO2 | Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges | L3 |
| CH345.CO3 | Carry out systematic literature review, planning and project design | L3 |
| CH345.CO4 | Cognize the importance of documentation and report writing | L3 |
| **SEMESTER - VI** | | |
| **Course Name and Course Code :- Process Dynamics and Control (CH361)** | | |
| CH361.CO1 | Experiment transfer functions of different systems and their response required for stability analysis. | L3 |
| CH361.CO2 | Categorize controller tuning for stable systems in chemical process plants | L3 |
| CH361.CO3 | Apply various software's used for control systems | L3 |
| CH361.CO4 | Identify multiple loops and use the computers in process control in chemical process industries. | L3 |
| CH361.CO5 | Compare stable & unstable systems by Bode Stability criterion | L4 |
| CH361.CO6 | Evaluate control system for various process operations | L3 |
| **Course Name and Course Code :- Chemical Equipment Design - I (CH362)** | | |
| CH362.CO1 | Describe the basics of process equipment design and important parameters of equipment design. | L3 |
| CH362.CO2 | Design different types of pressure vessels. | L6 |
| CH362.CO3 | Apply the complete knowledge of equipment fabrication and testing methods. | L3 |
| CH362.CO4 | Implement the various codes and standards used for equipment design. | L3 |
| CH362.CO5 | Find out the suitable material of construction, fabrication methods for various process equipment. | L3 |
| CH362.CO6 | Apply their knowledge for designing of process equipment | L3 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Chemical Process Technology (CH363)** | | |
| CH363.CO1 | Classify chemical industries | L2 |
| CH363.CO2 | Interpret manufacturing Flowsheet | L3 |
| CH363.CO3 | Recognize specification of different raw material and its importance | L3 |
| CH363.CO4 | Evaluate effect of operating parameter on quality | L5 |
| CH363.CO5 | Apply appropriate parameters for process selection | L3 |
| CH363.CO6 | Interpret major engineering problems associated with process | L4 |
| **Course Name and Course Code :- Process Modelling and Simulation (CH371)** | | |
| CH371.CO1 | Construct mathematical model and exercise model building procedure for steady and unsteady processes | L2 |
| CH371.CO2 | Formulate material, energy and momentum balance equations for chemical processes | L3 |
| CH371.CO3 | Develop mathematical model for heat and mass transfer operations | L3 |
| CH371.CO4 | Formulate model for chemical reactor systems | L3 |
| CH371.CO5 | Simulate the model using numerical techniques and software | L3 |
| CH371.CO6 | Optimize the various parameters to enhance the efficiency of the process | L4 |
| **Course Name and Course Code :- Energy Analysis and Modeling (CH372)** | | |
| CH372.CO1 | Understand energy analysis | L2 |
| CH372.CO2 | Design wind energy systems | L3 |
| CH372.CO3 | Understand concept of nuclear energy | L2 |
| CH372.CO4 | Apply various modeling techniques for energy systems | L3 |
| CH372.CO5 | Apply various simulation tools for energy systems | L3 |
| CH372.CO6 | Understand optimization tools for energy applications | L2 |
| **Course Name and Course Code :- Employability Skills (HP305)** | | |
| HP305.CO1 | Relate the importance of Employability Career Development | L2 |
| HP305.CO2 | Build necessary, specific professional skills | L3 |
| HP305.CO3 | Analyze the environment of employability | L4 |
| HP305.CO4 | Develop various techniques of effective team building in their professional life | L3 |
| **Course Name and Course Code :- Skill Development Lab (ASPEN ONE) (CH364)** | | |
| CH364.CO1 | Identify the operation/process required to solve an engineering problem | L2 |
| CH364.CO2 | Match calculation with computer simulation | L3 |
| CH364.CO3 | Apply the knowledge of chemical engineering basics to computational techniques | L3 |
| CH364.CO4 | Categorize different types of equipments based upon application | L3 |
| CH364.CO5 | Assess complex chemical engineering problems | L4 |
| CH364.CO6 | Evaluate a chemical engineering process/plant | L5 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Project Implementation (CH365)** | | |
| CH365.CO1 | Analyze techniques, algorithms and design process related to the project | L4 |
| CH365.CO2 | Infer conclusions by implementing/developing/experimenting/simulating/testing the different techniques/processes | L3 |
| CH365.CO3 | Cognize the importance of documentation and report writing | L3 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Final Year, B. Tech (Chemical Engineering)** | | |
| **SEMESTER - VII** | | |
| **Course Name and Course Code : Equipment Design and Costing (CH461)** | | |
| CH461.CO1 | Apply the concept for designing storage vessel. | L3 |
| CH461.CO2 | Analyze key criteria involved for the heating system used in reaction vessel. | L3 |
| CH461.CO3 | Apply knowledge about the designing tray column used in chemical processes. | L3 |
| CH461.CO4 | Design the Piping for Equipment. | L6 |
| CH461.CO5 | Design of packed column. | L6 |
| CH461.CO6 | Demonstrate the cost estimating process | L3 |
| **Course Name and Course Code :- Petroleum Refining Technology (CH483)** | | |
| CH483.CO1 | Apply characteristics of crude oil for classification and separation | L3 |
| CH483.CO2 | Analyze the importance of pre refining operation | L4 |
| CH483.CO3 | Interpret specification and test methods for fuel | L3 |
| CH483.CO4 | Identify processes used in refinery with its importance | L3 |
| CH483.CO5 | Build Hydrogen and sulphur production Flowsheet | L2 |
| CH483.CO6 | Interpret Lube oil and Bitumen production Flowsheet and specification | L3 |
| **Course Name and Course Code : Petroleum Refining Technology (CH484)** | | |
| CH484.CO1 | Identify basics of Biology and Overview of Biotechnology | L3 |
| CH484.CO2 | Model cell and enzyme kinetics | L2 |
| CH484.CO3 | Apply methods of immobilization | L3 |
| CH484.CO4 | Illustrate sterilization methods | L2 |
| CH484.CO5 | Inspect Bio-product Recovery & Bio-separations, Manufacture of Biochemical Products | L3 |
| CH484.CO6 | Design, Analysis and Stability of Bioreactors | L3 |
| **Course Name and Course Code :- Environmental Engineering (CH485)** | | |
| CH485.CO1 | Understand the importance of environment and environmental standards | L2 |
| CH485.CO2 | Identify the sources of Air pollution & suggest the steps to mitigate air pollution | L3 |
| CH485.CO3 | Specify control devices for air pollution | L3 |
| CH485.CO4 | Calculate BOD / COD for a given composition of effluent stream | L3 |
| CH485.CO5 | Identify tools and techniques for tertiary waste water treatment | L3 |
| CH485.CO6 | Predict the different strategies for solid waste management | L3 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code : Process Intensification and Integration (CH471)** | | |
| CH471.CO1 | Apply the concept of process integration and intensification | L3 |
| CH471.CO2 | Interpret the pinch analysis and methodology | L3 |
| CH471.CO3 | Apply process integration approach to given process | L3 |
| CH471.CO4 | Identify bottlenecks in process for minimization of energy requirements | L3 |
| CH471.CO5 | Design optimal process route | L6 |
| CH471.CO6 | Synthesize the reactor with given process requirements | L3 |
| **Course Name and Course Code :-  Skill Development Lab (Aspen EDR) (CH463)** | | |
| CH463.CO1 | Identify the operation/process required to solve an engineering problem. | L3 |
| CH463.CO2 | Match manual calculation with computer simulation. | L3 |
| CH463.CO3 | Apply the knowledge of chemical engineering basics to computational techniques. | L3 |
| CH463.CO4 | Categorize different types of equipment's based upon application. | L3 |
| CH463.CO5 | Assess complex chemical engineering problems. | L3 |
| CH463.CO6 | Design a chemical engineering process/plant. | L5 |
| **SEMESTER - VIII** | | |
| **Course Name and Course Code :-  Plant Design and Piping (CH461)** | | |
| CH461.CO1 | Identify the operation/process required to solve an engineering problem. | L3 |
| CH461.CO2 | Complete conceptual or preliminary plant design | L3 |
| CH461.CO3 | Match manual calculation with simulation outcomes. | L3 |
| CH461.CO4 | Design a piping layout and construction. | L6 |
| CH461.CO5 | Apply the knowledge of chemical engineering basics to computational techniques. | L3 |
| CH461.CO6 | Assess complex industrial refineries problems. | L4 |
| **Course Name and Course Code :- Petrochemical Technology (CH493)** | | |
| CH493.CO1 | Understand Indian and world scenario for production and demand for Petrochemical | L3 |
| CH493.CO2 | Understand specification of different raw material and its importance | L3 |
| CH493.CO3 | Select proper unit operation and processes in synthesis of various Petrochemicals | L3 |
| CH493.CO4 | Interpret the petrochemical Flowsheet and its major engineering problems | L6 |
| CH493.CO5 | Select proper process from available process | L3 |
| CH493.CO6 | Understand uses of petrochemicals product | L4 |

| COs | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Bio Process Technology (CH494)** | | |
| CH494.CO1 | Identify role of bioprocess engineering | L3 |
| CH494.CO2 | Select Appropriate Bioreactor Configurations and Operation | L3 |
| CH494.CO3 | Interpret preliminary design for a bioreactor | L3 |
| CH494.CO4 | Compare which unit operations are required before and after a bioreactor | L4 |
| CH494.CO5 | Develop block flow diagram and process flow diagram for bioprocesses | L3 |
| CH494.CO6 | Analyze kinetics of cell growth | L4 |
| **Course Name and Course Code :- Chemical Plant safety (CH495)** | | |
| CH495.CO1 | Apply the basic principles of safety | L3 |
| CH495.CO2 | Develop the roots for hazard analysis | L3 |
| CH495.CO3 | Identify the event tree and fault tree analysis | L3 |
| CH495.CO4 | Analyze the hazards in a given process and assess them to provide solutions for operating safely | L4 |
| CH495.CO5 | Knowledge to choose the safety requirements for storage and handling of a given chemical | L3 |
| CH495.CO6 | Formulate the important of risk factors | L2 |
| **Course Name and Course Code :-  Engineering Economics (HP405)** | | |
| HP405.CO1 | Understand the basic concepts of engineering economics | L2 |
| HP405.CO2 | Apply the economic approach in firm/organization under different market conditions | L3 |
| HP405.CO3 | Summarize the bank structures and schemes | L3 |
| HP405.CO4 | Use the effective way of financial budget and skills | L3 |

# Course Outcomes

# B. Tech

## (Civil Engineering)

# (2019 – 2023)

| CO's | CO Statement | BT Level |
|---|---|---|
| **Second Year, BTech (Civil Engineering)** | |
| **Course Name and Course Code** | **Material Engineering (ME221)** | |
| ME221.CO.1 | Relate the applications of various engineering materials and heat treatment processes in material processing industry. | L3 |
| ME221.CO.2: | Interpret the specifications, composition, concepts and fundamental properties of engineering materials applied in industrial/research field | L2 |
| ME221.CO.3: | Select the suitable materials, manufacturing process for speci ed application to meet theproduct performance requirements  within its product service life. | L4 |
| ME221.CO.4: | Analyze the suitable material testing and characterization technique to ensure service life for speci c product without any failure or deterioration in its performance. | L4 |
| **Course Name and Course Code** | **Geotechnical Engineering (CV204)** | |
| CV204.CO.1 | Grade engineering properties of soil based on index property by performing relevant experiments.(Evaluate) | L5 |
| CV204.CO.2 | Calculate seepage and flow net.  (Apply) | L3 |
| CV204.CO.3 | Choose suitable method for improvement in soil characteristics. (Evaluate) | L5 |
| CV204.CO.4 | Apply basic soil mechanics principle to calculate various stresses induced in soil. (Apply) | L3 |
| CV204.CO.5 | Calculate the stability of slope. (Apply) | L3 |
| CV204.CO.6 | Evaluate bearing capacity of different types of soils. (Evaluate) | L5 |
| **Course Name and Course Code** | **Building Design & Construction (CV205)** | |
| CV205.CO.1 | Design functionally a single/multi-storied building for various components of residen-tial/commercial units. | L4 |
| CV205.CO.2 | Implement relevant bye laws in functional design of buildings in a prescribed locality in India. | L2 |
| CV205.CO.3 | Select suitable types of basic building material and masonry used for construction of various types of buildings | L1 |
| CV205.CO.4 | Explain various components of buildings namely forms of oors, roofs, doors, windows, arches, lintels, staircases. | L2 |
| CV205.CO.5 | Select suitable type of formwork and scaffolding. | L1 |
| CV205.CO.6 | Describe green building concept and Rating Systems. | L2 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Mechanics of Solids (CV206)** | |
| CV206.CO.1 | Enlist and explain different types of actions on a structural component[Understand]. | L2 |
| CV206.CO.2 | Draw axial force diagrams for axially loaded members, shear force diagrams and bending moment diagrams for statically determinate beams and twisting moment diagram for statically determinate shafts[Apply]. | L3 |
| CV206.CO.3 | Draw bending stress distribution diagram for beams and shear stress distribution diagrams for beams and shafts. [Apply]. | L3 |
| CV206.CO.4 | Calculate load corresponding to elastic instability for columns with various end conditions[Apply]. | L3 |
| CV206.CO.5 | Calculate principal stresses and absolute maximum shear stresses at various locations of a structural component using analytical method and Mohrs circle whichever is suitable[Analyse]. | L4 |
| CV206.CO.6 | Select particular shape of cross section to economically carry calculated bending/shear stresses under flexure/shear[Evaluate] | L5 |
| **Course Name and Course Code** | **Minor Project- Design (CV230)** | |
| ME230.CO.1: | Delineate the problem to be solved. | L1 |
| ME230.CO.2: | Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession. | L2 |
| ME230.CO.3 | Embark project planning and design. | L1 |
| ME230.CO.4 | Inculcate problem solving skills and critically analyze the options available to solve the problem. | L3 |
| ME230.CO.5 | Cognize the importance of documentation and report writing. | L2 |
| **Course Name and Course Code** | **Skill Development Course 1 - REVIT (CV232)** | |
| CV232.CO.1 | Describe building information modeling methodology and its benefits | L2 |
| CV232.CO.2 | Draw all Architectural components. | L3 |
| CV232.CO.3 | Design detail views, add 3D and 2D elements and detail components. | L4 |
| CV232.CO.4 | Create construction documentation. | L4 |
| **Course Name and Course Code** | **Environmental Science (CV203)** | |
| CV203.CO.1: | Summarize the importance of ecosystem and biodiversity for maintaining ecological balance. | L2 |
| CV203.CO 2: | Identify environmental problems arising due to engineering and technological activities and the science behind those problems. | L2 |
| CV203.CO.3: | Categorize the major pollutants along with sources and abatement devices for the environmental management. | L3 |
| CV203.CO.4: | Perceive the social and professional responsibility towards the environment. | L1 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Applied Mathematics (AS203)** | |
| AS203.CO.1 | Evaluate the Laplace and Inverse Laplace transform and will solve the differential equations. | L2 |
| AS203.CO.2 | Rewrite the periodic and non-periodic functions as a series of sines and cosines. | L1 |
| AS203.CO.3 | Differentiate a vector valued function in plane or space. | L2 |
| AS203.CO.4 | Solve and compute the area and volume of the objects. | L3 |
| AS203.CO.5 | Apply the numerical methods to problems of calculus and differential equations. | L3 |
| AS203.CO.6 | Execute the program codes using MATLAB | L2 |
| **Course Name and Course Code** | **Mechanics of fluids (CV214)** | |
| CV214.CO.1 | Interpret the properties and behavior of the fluid at rest and in motion. | L2 |
| CV214.CO.2 | Utilize equations of motion for various flow conditions and compute discharge of the flows | L3 |
| CV214.CO.3 | Analyze laminar and turbulent flows through pipes considering the losses. | L4 |
| CV214.CO.4 | Evaluate various parameters related to the flow around immersed bodies. | L5 |
| CV214.CO.5 | Explain different terms related to open channel flow along with critical flow. | L3 |
| CV214.CO.6 | Analyze the different types of open channel flow using various governing equations. | L4 |
| **Course Name and Course Code** | **Surveying and Geospatial Engineering (CV215)** | |
| CV215.CO.1 | Apply the techniques of levelling to solve engineering problems. | L3 |
| CV215.CO.2 | Interpret and implement the principles of trigonometry for surveying using standardized methods. | L2 |
| CV215.CO.3 | Perform traversing and triangulation by implementing the basic principles of surveying. | L3 |
| CV215.CO.4 | Construct different types of curves for alignment of roads and railways and lay out civil engineering structure on field. | L3 |
| CV215.CO.5 | Record and interpret spatial data and perform analysis by using modern surveying tools | L3 |
| CV215.CO.6 | Analyze field data to minimize errors using mathematical models. | L4 |
| **Course Name and Course Code** | **Structural Analysis (CV216)** | |
| CV216.CO.1 | Determine internal forces in structure and sketch deflected shapes. | L3 |
| CV216.CO.2 | Determine displacements of determinate structures. | L3 |
| CV216.CO.3 | Analyse indeterminate structures by force methods. | L4 |
| CV216.CO.4 | Analyse indeterminate structures by displacements methods. | L4 |
| CV216.CO.5 | Analyse determinate structures for moving loads. | L4 |
| CV216.CO.6: | Estimate the collapse load for indeterminate structures. | L5 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Rapid Prototyping (ET235)** | |
| ET235.CO.1 | Consolidate the techniques, skills and modern engineering tools | L5 |
| ET235.CO.2 | Apply acquired skills to the construction of a prototype project | L3 |
| ET235.CO.3 | Develop a prototype project by performing tasks in team. | L6 |
| ET235.CO.4 | Demonstrate the work carried out in a team. | L3 |
| **Course Name and Course Code** | **Minor Project - Implementation (CV240)** | |
| ME240.CO.1 | Select appropriate method for making of solution. | L1 |
| ME240.CO.2 | Compare various engineering tools/technique to develop solution. | L2 |
| ME240.CO.3 | Justify the selected method/tools opted for making of solution. | L2 |
| ME240.CO.4 | Develop tangible solution to de☐fined problem. | L3 |
| ME240.CO.5 | Test the developed solution. | L2 |
| ME240.CO.6 | Document solution in the form of Project report / IPR drafts. | L2 |
| **Course Name and Course Code** | **Professional Skills (HP202)** | |
| HP202.CO.1 | Express themselves effectively in routine and real-world interactions through verbal and | L2 |
| HP202.CO.2 | Show confident Public Speaking skills. | L3 |
| HP202.CO.3 | To showcase leadership qualities during tough tasks, make decisions and actions effectively within time. | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Third Year, BTech (Civil Engineering)** | | |
| **Course Name and Course Code** | **Concrete Technology (CV305)** | |
| CV305.CO.1 | Describe different type's concrete ingredients with their properties. | L1 |
| CV305.CO.2 | Illustrate properties of concrete using various IS tests. | L3 |
| CV305.CO.3 | Produce a concrete with specific mix. | L4 |
| CV305.CO.4 | Explain special types of concrete techniques. | L2 |
| CV305.CO.5 | Describe different concrete related equipment. | L2 |
| CV305.CO.6 | Analyze Methods of Concrete Repair. | L3 |
| **Course Name and Course Code** | **Drinking Water & Sanitary Engineering (CV306)** | |
| CV306.CO.1 | Analyze the characteristics of water and wastewater. | B4 |
| CV306.CO.2 | Estimate the quantity of drinking water and domestic wastewater generated. | B3 |
| CV306.CO.3 | Design the various units of water treatment plant. | B4 |
| CV306.CO.4 | Summarize the advancement in water distribution system. | B2 |
| CV306.CO.5 | Design the various units of sewerage treatment plant. | B4 |
| **Course Name and Course Code** | **Design of steel structures (CV307)** | |
| CV307.CO.1 | Explain the various design philosophies | L2 |
| CV307.CO.2 | Design connections of structural elements for the actions they are subjected to, using limit state method. | L4 |
| CV307.CO.3 | Design axially loaded steel elements using Limit state method. | L4 |
| CV307.CO.4 | Design steel elements subjected to bending and shear using Limit state method. | L4 |
| **Course Name and Course Code** | **Construction Planning and Management (CV325)** | |
| CV325.CO.1 | Relate various project managerial and planning concepts with onsite work. | L2 |
| CV325.CO.2 | Analyze the technique of project scheduling & network analysis | L4 |
| CV325.CO.3 | Utilize the methods of project controlling & inventory management | L4 |
| CV325.CO.4 | Contrast on earned value management with administrative incentive schemes | L4 |
| CV325.CO.5 | Illustrate various concepts and methods for quality and safety management | L2 |
| CV325.CO.6 | Functionally design a schedule for a residential building | L4 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Solid waste management (CV326)** | |
| CV326.CO.1 | Describe the functional elements of a solid waste management system. | L1 |
| CV326.CO.2 | Identify the methods of collection, storage and transportation of solid waste. | L2 |
| CV326.CO.3 | Evaluate recovery, treatment and disposal alternatives according to properties of solid | L2 |
| CV326.CO.4 | Understand basic concepts in hazardous waste management and integrated waste man- | L2 |
| CV326.CO.5 | Recognize the relevant smart techniques for collection, transport disposal of waste. | L1 |
| CV326.CO.6 | Acquire knowledge on waste to energy productions in the perspective of sustainable development.. | L3 |
| **Course Name and Course Code** | **Project Management (CS361)** | |
| CS361.CO.1 | Identify the Project Management Knowledge Areas and Processes. | |
| CS361.CO.2 | Classify the responsibilities while designing the Project Master Plan. | |
| CS361.CO.3 | Outline the Cost Estimating and Cost Escalation Process. | |
| CS361.CO.4 | Demonstrate and highlight The Processes of Project Quality Management. | |
| CS361.CO.5 | Analyze Project Management Maturity and Maturity Models. | |
| **Course Name and Course Code** | **Skill Development Course 2-ETABS (CV342)** | |
| CV304.CO.1 | Prepare structural framing plan. [ Applying] | 3 |
| CV304.CO.2 | Assigning material properties, boundary conditions and loading to structural elements. [ Applying] | 3 |
| CV304.CO.3 | Analyze the R.C. and steel structures for various load combinations. [Analysis] | 4 |
| **Course Name and Course Code** | **Mini Project - Design (CV350)** | |
| CV350.CO.1 | Delineate the problem to be solved. | L1 |
| CV350.CO.2 | Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges. | L2 |
| CV350.CO.3 | Carry out systematic literature review, planning and project design. | L2 |
| CV350.CO.4 | Cognize the importance of documentation and report writing. | L3 |
| **Course Name and Course Code** | **Design of Reinforced Concrete Structures (CV312)** | |
| CV312.CO.1 | Describe the concept of elastic, ultimate, working stress and limit state method of design for reinforced concrete structures. | L1 |
| CV312.CO.2 | Design one way, two way, rectangular slab, singly and doubly reinforced Rectangular beam and flanged beam by Limit State Method. | L2 |
| CV312.CO.3 | Design RC members for combined bending shear and torsion using Limit State | L3 |
| CV312.CO.4 | Design short columns for various conditions. | L3 |
| CV312.CO.5 | Design axially and eccentrically loaded rectangular footing. | L4 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Transportation Engineering (CV313)** | |
| CV313.CO.1 | Explain basic transportation planning process. | L2 |
| CV313.CO.2 | Design systems for traffic operations. | L4 |
| CV313.CO.3 | Design highway geometry. | L4 |
| CV313.CO.4 | Design bituminous mixes. | L4 |
| CV313.CO.5 | Explain basics of bridge engineering. | L2 |
| CV313.CO.6 | Demonstrate use of BIS, IRC & MORTH codes. | L3 |
| **Course Name and Course Code** | **Water Resources Engineering (CV314)** | |
| CV314.CO.1 | Analyze hydro-meteorological data. | L2 |
| CV314.CO.2 | Estimate reservoir capacities, and yield. | L4 |
| CV314.CO.3 | Design irrigation canals and canal network. | L3 |
| CV314.CO.4 | Estimate aquifer parameters. | L4 |
| CV314.CO.5 | Apply system analysis techniques and solve complex problems in water resources Engineering | L3 |
| CV314.CO.6 | Develop rainfall-runoff relationship hydrological models. | L3 |
| **Course Name and Course Code** | **Operation Research (CV332)** | |
| CV332.CO.1 | Solve the optimization problems based on real scenario. | L3 |
| CV332.CO.2 | Apply Linear programming for minimizing the project cost and maximizing its profit. | L3 |
| CV332.CO.3 | Apply LPP to Transportations problems & solve assignment problems in an easy way. | L3 |
| CV332.CO.4 | Make decision of replacing for suitable outcome using assignment modeling & games theory. | L4 |
| CV332.CO.5 | Examine the real conditions of a project so that loss can be avoided. | L5 |
| CV332.CO.6 | Organize an appropriate order of operations to service facilities. | L3 |
| **Course Name and Course Code** | **Unit operations and Processes in Effluent Treatment (CV333)** | |
| CV333.CO.1 | Identify and solve complex engineering problems. | L2 |
| CV333.CO.2 | Suggest and apply the suitable treatment processes for Industrial Effluent same in the field application. | L2 |
| CV333.CO.3 | Design various unit processes for effluent treatment. | L3 |
| CV333.CO.4 | Identify and assess the characteristics of effluent water along with their environmental impacts. | L2 |
| **Course Name and Course Code** | **Skill Development Course - 3 OpenRoad Designer (CV343)** | |
| CV343.CO.1 | Demonstrate use of basic functions of OpenRoad Designer. | L2 |
| CV343.CO.2 | Model terrain using total station data in OpenRoad Designer Environment. | L4 |
| CV343.CO.3 | Create horizontal & vertical alignment. | L4 |
| CV343.CO.4 | Create 3D model of 2 / 4 lane rural corridor. | L4 |
| CV343.CO.5 | Create and annotate cross section sheets and plan and profile sheets. | L2 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Skill Development Course - 3 Water Gems (CV344)** | |
| CV344.CO. 1 | Summarize the basic principles of water distribution modeling. | L2 |
| CV344.CO. 2 | Apply Water GEMS models to solve common water distribution system problems.. | L3 |
| CV344.CO. 3 | Develop a deeper understanding of model creation and analysis using WaterGEMS. | L4 |
| **Course Name and Course Code** | **Employability Skills (HP305)** | |
| HP305.CO.1 | Relate the importance of Employability Career Development. | L2 |
| HP305.CO.2 | Build necessary, specific professional skills. | L3 |
| HP305.CO.3 | Analyze the environment of employability. | L4 |
| HP305.CO.4 | Develop various techniques of effective team building in their professional life. | L6 |

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Final Year, BTech (Civil Engineering)** | |
| **Course Name and Course Code** | **Estimation and Costing (CV405)** | |
| CV405.CO.1 | Describe the importance of estimation and able to use approximate estimate for rough estimation. | L2 |
| CV405.CO.2 | Write specification for construction materials and activities | L6 |
| CV405.CO.3 | Prepare detailed estimate for building, road and industrial structure | L6 |
| CV405.CO.4 | Calculate rates for various items of construction | L4 |
| CV405.CO.5 | Prepare valuation report for residential building | L6 |
| CV405.CO.6 | Describe types of contracts and to draft tender notices | L2 |
| **Course Name and Course Code** | **Building Services (CV471)** | |
| CV471.CO.1 | Analyze plumbing and drainage plan. | L3 |
| CV471.CO.2 | Explain the concepts and techniques of water proofing and rain water harvesting | L2 |
| CV471.CO.3 | Prepare reflected ceiling plan | L3 |
| CV471.CO.4 | Define principles of air conditioning and thermal insulation. | L2 |
| CV471.CO.5 | Illustrate firefighting system | L2 |
| CV471.CO.6 | Identify materials of acoustics and sound insulation. | L2 |
| **Course Name and Course Code** | **Structural Dynamics & Earthquake Engineering (CV472)** | |
| CV472.CO.1 | Apply fundamentals of structural dynamics and earthquake engineering to different structures. | L3 |
| CV472.CO.2 | Analyse and design of structural components from seismic considerations. | L4 |
| CV472.CO.3 | Analyse and implement protective measures and strengthening techniques. | L4 |
| **Course Name and Course Code** | **Railway Engineering (CV473)** | |
| CV473.CO.1 | Explain Components of Railway Track, different Railway Gauges. | L2 |
| CV473.CO.2 | Design track Gradients as per given requirements. | L4 |
| CV473.CO.3 | Discuss various Types of Track Turnouts. | L2 |
| CV473.CO.4 | Describe purposes and facilities at Railway Stations. | L2 |
| CV473.CO.5 | Explain Interlocking and modern signal system. | L2 |
| CV473.CO.6 | Describe Surface Defects on Railway Track and Their Remedial Measures. | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Numerical Methods in Civil Engineering (CV474)** | |
| CV474.CO.1 | Describe various concepts of Numerical Methods and Mathematical Modelling. | L2 |
| CV474.CO.2 | Select appropriate Numerical Methods to Find the Roots of the Equations. | L2 |
| CV474.CO.3 | Analyse simultaneous Equation to solve the problems. | L4 |
| CV474.CO.4 | Discover relationship between experimental values in the form of Mathematical Equation. | L3 |
| CV474.CO.5 | Illustrate Solutions for real life problem using Numerical Integration. | L4 |
| CV474.CO.6 | Evaluate a solution of Differential Equation in given area for various boundary conditions. | L5 |
| **Course Name and Course Code** | **Financial Management (CV422)** | |
| CV422.CO.1 | Understand the role of financial management in business operation. | L2 |
| CV422.CO.2 | Analyze the finances of individual corporation in term of capital requirements. | L3 |
| CV422.CO.3 | Have a understanding of risk within the context of financial decision making. | L2 |
| CV422.CO.4 | Have a understanding of supply chain management. | L2 |
| **Course Name and Course Code** | **Environmental Impact assessment & Climate Change (CV423)** | |
| CV423. CO.1 | To identify the need to appraise and estimate the impact on environment. | L2 |
| CV423. CO.2 | To understand the basic principles of environmental impact assessment. | L2 |
| CV423.CO.3 | To learn its different components and methods of documentation and monitoring. | L2 |
| CV423. CO.4 | To illustrate about climate system its changes and causes. | L3 |
| CV423. CO.5 | To impart knowledge about impacts, adaptation and mitigation of climate change. | L3 |
| **Course Name and Course Code** | **Skill Development Course - 4 CFD (CV433)** | |
| CV343.CO.1 | Prepare CFD-specific CAD models. | L3 |
| CV343.CO 2 | Prepare quality CFD simulation meshes from imported CAD geometry. | L3 |
| CV343.CO.3 | Select the appropriate boundary conditions for CFD simulation. | L4 |
| CV343.CO.4 | Analyze the solution of a CFD simulation. | L4 |
| CV343.CO.5 | Interpret the results by qualitative and quantitative post-processing. | L4 |
| **Course Name and Course Code** | **Skill Development Course - 4 QGIS (CV434)** | |
| CV434.CO.1 | Use GIS to identify, explore, understand, and solve spatial problems. | L3 |
| CV434.CO 2 | Demonstrate GIS modeling skills. | L3 |
| CV434.CO.3 | Design and implement a GIS project. | L4 |
| CV434.CO.4 | Formulate applications of GIS technology. | L5 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Project Evaluation (CV464)** | |
| CV464.CO.1 | Show the evidence of independent evaluation. | L1 |
| CV464.CO.2 | Critically analyzed the result and their implementation methodology. | L2 |
| CV464.CO.3 | Validate the results with standard tools and techniques. | L3 |
| CV464.CO.4 | Recognize the importance of documentation and report writing. | L4 |
| **Course Name and Course Code** | **Design of Hydraulics Structures (CV406)** | |
| CV406.CO.1 | Perform the stability analysis of gravity dams. | L4 |
| CV406.CO 2 | Explain the causes of failure of different types of dams and their design criteria. | L2 |
| CV406.CO.3 | Design components of dam outlet works. | L3 |
| CV406.CO.4 | Design minor irrigation structures. | L3 |
| CV406.CO.5 | Integrate relevant concept and methodologies in the area of hydraulics, water resources and geotechnical engineering. | L3 |
| **Course Name and Course Code** | **Foundation Engineering (CV475)** | |
| CV475.CO.1 | Adopt suitable soil exploration technique & interpretation of related data | L3 |
| CV475.CO.2 | Design both shallow and deep foundation | L5 |
| CV475.CO.3 | Solve the engineering behaviour of expansive soils & selection of suitable foundation. | L3 |
| CV475.CO.4 | Selection of geosynthetic materials and its application in foundation problems. | L4 |
| **Course Name and Course Code** | **Geospatial Tools and Techniques (CV476)** | |
| CV476.CO.1 | Explain the concept of Geodetic Surveying for fixing the ground control points | L2 |
| CV476.CO.2 | Apply knowledge of Hydrographic Surveying to identify points & solve problems | L3 |
| CV476.CO.3 | Utilize the concepts of astronomical surveying | L3 |
| CV476.CO.4 | Apply the relevent concepts of hydrographic surveying | L3 |
| CV476.CO.5 | Analyse the various characteristics of remote sensing system | L4 |
| CV476.CO.6 | Distinguish working of various spaces-based positioning systems | L4 |
| **Course Name and Course Code** | **Air and Noise Pollution (CV477)** | |
| CV437.CO.1 | Explain the Details About Source, Types and Impacts of Air Pollution. | L1 |
| CV437.CO.2 | Understand Meteorological Aspects of Air Pollution. | L2 |
| CV437.CO.3 | Identify Sampling and Analysis Techniques for Air Quality Assessment. | L2 |
| CV437.CO.4 | Illustrate The Various Air Pollution Control Measures. | L4 |
| CV437.CO.5 | Summarize Various Polices Related to Air Pollution Prevention and Control | L2 |
| CV437.CO.6 | Understand Noise Pollution Control Methods. | L2 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Capstone project (CV466)** | |
| CV466.CO.1 | Portray individual skill for solving the problem. | L4 |
| CV466.CO.2 | Showcase and exhibit the best techniques and suitable methodology. | L5 |
| CV466.CO.3 | Cognize the significance of report and comprehend its reflections. | L4 |
| CV466.CO.4 | Assimilate digital and visual literacies. | L5 |
| **Course Name and Course Code** | **Engineering Economics (HP405)** | |
| HP405.CO.1 | The students would have understood the basic concepts of Economics. | L2 |
| HP405.CO.2 | The students would have acquired knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a rm/organization under different market conditions | L3 |
| HP405.CO.3 | The course is designed to improve critical thinking, problem solving skills by using economic models and theories and predict economic relationships | L3 |
| HP405.CO.4 | Students entering any profession in the workforce today must be able to utilize these basic economic principles. The course expected to develop critical understanding of current topics in economics and able to formulate their own opinions on economic issues | L4 |
| **Course Name and Course Code** | **Sociology (HP402)** | |
| HP402.CO.1 | Get acquainted to sociology as a social science. | L1 |
| HP402.CO.2 | Explain the significance of sociology in solving problems. | L2 |
| HP402.CO.3 | Derive solutions to critical social issues. | L2 |
| HP402.CO.4 | Change their attitude towards social issues. | L3 |

# Course Outcomes

# B. Tech

# (Computer Engineering)

# (2019 – 2023)

| CO's | CO Statement | BT Level |
|------|--------------|----------|
| **Second Year, BTech (Computer Engineering)** | | |
| **Course Name and Course Code :- Data Structures (CS221)** | | |
| CS221.CO.1 | Explain the concept of data structure. | **L2** |
| CS221.CO.2 | Develop elcient algorithm for a given problem. | **L3** |
| CS221.CO.3 | Analyze appropriate algorithm for solving the real world problem | **L4** |
| CS221.CO.4 | Demonstrate advantages and disadvantages of data structures for variety of problems. | **L3** |
| CS221.CO.5 | Choose effective data structures in approaching a problem solution | **L2** |
| CS221.CO.6 | Make use of appropriate sorting and searching algorithm for a given application. | **L3** |
| **Course Name and Course Code :- Computer Graphics (CS223)** | | |
| CS223.CO1 | To explain different graphics primitives | **L2** |
| CS223.CO2 | To apply related mathematical concepts to develop Computer graphics operations | **L3** |
| CS223.CO3 | To demonstrate 2D and 3D transformation | **L3** |
| CS223.CO4 | To apply various methods for projection | **L3** |
| CS223.CO5 | To illustrate programs on clipping algorithms | **L2** |
| CS223.CO6 | To develop animation and gaming application | **L3** |
| **Course Name and Course Code :- DIG PROTO (ET224)** | | |
| ET206.CO1 | Consolidate the techniques, skills and modern engineering tools. | **L2** |
| ET206.CO2 | Apply acquired skills to the construction of a prototype project. | **L3** |
| ET206.CO3 | Develop a prototype project by performing tasks in team. | **L4** |
| ET206.CO3 | Demonstrate the work carried out in a team. | **L3** |
| **Course Name and Course Code :- # JAVA Skill (CS227L)** | | |
| CS227.CO1 | Implement Object Oriented Programming Concepts in java | **L3** |
| CS227.CO2 | Use and create packages and interfaces in Java. | **L3** |
| CS227.CO3 | Use graphical user interface in Java programs. | **L3** |
| CS227.CO4 | Perform fille handling operations. | **L2** |
| CS227.CO5 | Implement exception handling in Java. | **L3** |
| CS227.CO6 | Implement applications using JDBC . | **L3** |
| **Course Name and Course Code :- #CPP Skill (CS226L)** | | |
| CS226.CO.1 | Make use of class and objects using C++. | **L3** |
| CS226.CO.2 | Demonstrate control structures using C++. | **L2** |
| CS226.CO.3 | Implement the programs using data structures in C++. | **L3** |
| CS226.CO.4 | Develop solution for real world problems using inheritance and polymorphism. | **L3** |
| CS226.CO.5 | Apply standard template library to solve real world instances. | **L3** |
| CS226.CO.6 | Make use of various file handling and exception handling operations in C++. | **L3** |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Engineering Informatics (IT221)** | | |
| IT221.CO.1 | Interpret Data, Information and Knowledge. | L2 |
| IT221.CO.2 | Make use of data acquisition techniques for an information system. | L3 |
| IT221.CO.3 | Categories different storage techniques. | L4 |
| IT221.CO.4 | Develop dashboard for effective communication of information. | L3 |
| IT221.CO.5 | Determine components of Human computer interaction. | L5 |
| IT221.CO.6 | Model IoT based information system. | L4 |
| **Course Name and Course Code :- Discrete Struture and Graph Theory (CS211)** | | |
| CS211.CO1 | To learn logic and proof techniques to explore mathematical reasoning | L2 |
| CS211.CO2 | To formulate the problems precisely and solve the problems. | L3 |
| CS211.CO3 | To use appropriate set, function, or relation models to analyze practical examples. | L3 |
| CS211.CO4 | Model and analyze computational processes using combinatorial methods. | L3 |
| CS211.CO5 | To explore number of logical possibilities and algebraic structures. | L2 |
| CS211.CO6 | To use graph theory and associated terminology in practical example. | L3 |
| **Course Name and Course Code :- Appiled Mathematics (AS201)** | | |
| AS201.CO1 | Evaluate the rank of a matrix and solve the system of equations. | L3 |
| AS201.CO2 | Determine the eigenvalues and eigenvectors of a matrix. | L2 |
| AS201.CO3 | Differentiate a vector valued function in plane or space. | L2 |
| AS201.CO4 | Compute the area and volume of the objects. | L2 |
| AS201.CO5 | Apply the Cauchy's Integral Theorem and evaluate the integrations. | L3 |
| AS201.CO6 | Execute the program codes using MATLAB. | L4 |
| **Course Name and Course Code :- Minor Project- Design (CS230)** | | |
| CS230.CO1 | Delineate the problem to be solved. | L2 |
| CS230.CO2 | Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession. | L3 |
| CS230.CO3 | Embark project planning and design. | L4 |
| CS230.CO4 | Inculcate problem solving skills and critically analyze the options available to solve the problem | L4 |
| CS230.CO5 | Cognize the importance of documentation and report writing. | L3 |
| **Course Name and Course Code :- Database Managment System (CS231)** | | |
| CS231.CO1 | Perform basic operation with DBMS. | L2 |
| CS231.CO2 | Design and develop database application using ER diagram and normalization. | L3 |
| CS231.CO3 | Implement validation framework like integrity constraints and trigger. | L4 |
| CS231.CO4 | Apply ACID properties for transaction management. | L3 |
| CS231.CO5 | Explain concurrency control mechanism using lock based and timestamp based protocol | L2 |
| CS231.CO6 | Execute the basic operation on NoSQL database | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Advanced Data Structures (CS228)** | | |
| CS228.CO.1 | Explain the working of basic and advanced data structures like trees, graphs, heaps, disjoint sets, hash tables, bloom filters. | L2 |
| CS228.CO.2 | Demonstrate the advantages and disadvantages of various data structures. | L3 |
| CS228.CO.3 | Choose appropriate data structures while building the applications. | L3 |
| CS228.CO.4 | Implement various applications using data structures like trees, graphs, hash tables, heaps. | L3 |
| CS228.CO.5 | Evaluate the performance of various data structures in terms of time and memory complexity . | L5 |
| CS228.CO.6 | Design own data structures using the build in data structures. | L6 |
| **Course Name and Course Code :- Computer Organization & Architecture (CS229)** | | |
| CS228.CO.1 | Explain the architecture of the microprocessor 80386. | L2 |
| CS228.CO.2 | Develop assembly language programs using 32/64 bit registers | L3 |
| CS228.CO.3 | Illustrate Control unit and IO organizations | L2 |
| CS228.CO.4 | Explain the memory organization in the computer system | L2 |
| CS228.CO.5 | Illustrate arithmetic operations. | L2 |
| CS228.CO.6 | Explain Pipelining processing environment. | L2 |
| **Course Name and Course Code :- Professional Skill (HP202)** | | |
| HP202.CO1 | Express themselves effectively in routine and real-world interactions through oral and written communication. | L3 |
| HP202.CO2 | Show Confident Public Speaking skills | L5 |
| HP202.CO3 | To showcase leadership qualities during tough tasks, make decisions and actions effectively within time. | L5 |
| **Course Name and Course Code :- Programming Lab (CS224)** | | |
| CS224.CO1 | Explain the concept of data structure. | L2 |
| CS224.CO2 | Develop efficient algorithm for a given problem. | L3 |
| CS224.CO3 | Analyze appropriate algorithm for solving the real world problem. | L4 |
| CS224.CO4 | Demonstrate advantages and disadvantages of data structures for variety of problems. | L3 |
| CS224.CO5 | Choose effective data structures in approaching a problem solution. | L2 |
| CS224.CO6 | Make use of appropriate sorting and searching algorithm for a given application. | L3 |
| **Course Name and Course Code :- Minor Project - Implementation (CS240)** | | |
| CS240.CO1 | Select appropriate method for making of solution. | L1 |
| CS240.CO2 | Compare various engineering tools/technique to develop solution. | L2 |
| CS240.CO3 | Justify the selected method/tools opted for making of solution. | L2 |
| CS240.CO4 | Develop tangible solution to dened problem. | L5 |
| CS240.CO5 | Test the developed solution. | L4 |
| CS240.CO6 | Document solution in the form of Project report / IPR drafts. | L3 |

| CO's | CO Statement | BT Level |
|------|--------------|----------|
| **Third Year, BTech (Computer Engineering)** | | |
| **Course Code and Course Name :- Operating System (CS341)** | | |
| CS341.CO1 | Illustrate the role of OS in the management of system resources. | **L2** |
| CS341.CO2 | Organize process and threads execution in operating system effectively | **L3** |
| CS341.CO3 | Identify deadlock to resolve the related issues. | **L3** |
| CS341.CO4 | Analyze the memory management and its allocation policies | **L4** |
| CS341.CO5 | Make use of the file system, protection and security aspects of OS effectively | **L3** |
| **Course Code and Course Name :- Theory of Computation (CS342)** | | |
| CS342.CO1 | Differentiate between types of languages and respective recognition automata. | **L2** |
| CS342.CO2 | Construct various types of automata and grammar from language and vice versa. | **L3** |
| CS342.CO3 | Make use of the properties of languages and automata to design complex automata prove equivalence of automata | **L3** |
| CS342.CO4 | Decide the type of automata to be used to recognize the particular language. | **L5** |
| CS342.CO5 | Identify decidability of languages. | **L3** |
| **Course Code and Course Name :- Minor Project - Implementation (CS343)** | | |
| CS343.CO1 | Comprehend signals and communications types. | **L2** |
| CS343.CO2 | Build different types of network topologies and protocols. | **L2** |
| CS343.CO3 | Evaluate routing protocols for different real time systems. | **L4** |
| CS343.CO4 | Analyze connection oriented and connectionless services. | **L3** |
| CS343.CO5 | Demonstrate different application/systems related to networking. | **L5** |
| **Course Code and Course Name :- Descriptive Analytics (CS351)** | | |
| CS351.CO1 | Outline the data warehouse architecture. (Understanding-L2) | **L2** |
| CS351.CO2 | Build data marts using different modeling techniques for given application( Apply-L3) | **L3** |
| CS351.CO3 | Create OLAP cubes and Visualize data using visualizing tools.( Apply-L3) | **L3** |
| CS351.CO4 | Recognize trends, detect outliers, and summarize data sets( Apply-L3) | **L3** |
| CS351.CO5 | Validate hypothesis using various testing methods for a real-life problem statement( Evaluate-L4) | **L4** |
| CS351.CO6 | Predict output by applying correct regression model.( Apply-L3) | **L3** |
| **Course Code and Course Name :- Artificial Intelligence (CS352)** | | |
| CS352.CO1 | Apply basic principles of knowledge representation, inference and reasoning in Artificial Intelligence[L3]. | **L3** |
| CS352.CO2 | Apply problem solving and searching techniques of Artificial Intelligence to reach desired goals [L3]. | **L3** |
| CS352.CO3 | Analyze appropriate methods of Machine Learning based on the particular characteristicsof the domains and applications under consideration[L4]. | **L4** |
| CS352.CO4 | Accurately formulate, test and evaluate hypothesis and performance of machine learningalgorithms[L4]. | **L4** |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Code and Course Name :- Cloud Computing Foundations (CS353)** | | |
| CS353.CO1 | To classify various cloud computing services and models | **L2** |
| CS353.CO2 | To build various compute services in cloud | **L3** |
| CS353.CO3 | To distinguish between various storage related services used during application development | **L4** |
| CS353.CO4 | To select appropriate database service during application development | **L3** |
| CS353.CO5 | To choose various networking and security options during application development | **L3** |
| CS353.CO6 | To estimate the resource requirements for the application with high availability and reliability features | **L5** |
| **Course Code and Course Name :- Cryptography & System Security (IT351)** | | |
| IT351.CO1 | Identify the security threats, and the security services and mechanisms to counter them [L3]. | **L3** |
| IT351.CO2 | Apply security principles to protect the data.[L3] | **L3** |
| IT351.CO3 | Analyze symmetric key and asymmetric key algorithm. [L4] | **L4** |
| IT351.CO4 | Identify the different Authentication method in digital signature [L3] | **L3** |
| IT351.CO5 | Analyze network security protocols [L4]. | **L4** |
| IT351.CO6 | Identify and investigate network security threat and provide solution to protect the network [L3]. | **L3** |
| **Course Code and Course Name :- Project Management (CS361)** | | |
| CS361.CO1 | Identify the Project Management Knowledge Areas and Processes | **L1** |
| CS361.CO2 | Classify the responsibilities while designing the Project Master Plan | **L2** |
| CS361.CO3 | Outline the Cost Estimating and Cost Escalation Process | **L2** |
| CS361.CO4 | Demonstrate and highlight The Processes of Project Quality Management | **L3** |
| CS361.CO5 | Analyze Project Management Maturity and Maturity Models | **L4** |
| **Course Code and Course Name :- Skill Development :WebTechnology (CS346)** | | |
| CS346.CO1 | To understand the concepts and principles of web applications and development. | **L2** |
| CS346.CO2 | To apply current web technologies and web business models. | **L3** |
| CS346.CO3 | To understand and apply Web development processes. | **L3** |
| CS346.CO4 | To understand the world wide web client-server request and response. | **L2** |
| **Course Code and Course Name :- Skill Development Red Hat Linux (CS344)** | | |
| CS344.CO1 | Illustrate essential Linux administration tasks. | **L2** |
| CS344.CO2 | Experiment with installation, networking and user profiles. | **L3** |
| CS344.CO3 | Examine physical storage,file systems and log files. | **L3** |
| CS344.CO4 | Inspect the Linux processes, control services, daemons and basic security administration. | **L3** |
| CS344.CO5 | Analyze Redhat Linux System with a comprehensive and systematic approach. | **L4** |

| CO's | CO Statement | BT Level |
|------|-------------|----------|
| Course Code and Course Name :- Project Design (CS350) | | |
| CS350.CO1 | Delineate the problem to be solved. | L3 |
| CS350.CO2 | Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges. | L4 |
| CS350.CO3 | Carry out systematic literature review, planning and project design. | L4 |
| CS350.CO4 | Cognize the importance of documentation and report writing. | L3 |
| Course Code and Course Name :- Design and Analysis of Algorithms (CS347) | | |
| CS347.CO1 | Make use of the Five problem solving strategy to design an algorithm. | L3 |
| CS347.CO2 | Analyze the given algorithm in terms of its computational complexity. | L4 |
| CS347.CO3 | Apply prior knowledge of standard algorithm to solve new problem. | L3 |
| CS347.CO4 | Evaluate the intractable problems using approximation algorithms. | L5 |
| CS347.CO5 | Compare various string matching Algorithms. | L2 |
| Course Code and Course Name :- Software Engineering (CS349) | | |
| CS349.CO1 | Classify process models. | L2 |
| CS349.CO2 | Analyze conformance of the requirement related to project development. | L4 |
| CS349.CO3 | Develop design models using UML diagram. | L3 |
| CS349.CO4 | Mitigate the risk associated with project development. | L4 |
| CS349.CO5 | Evaluate the schedule, cost and staff associated with project. | L5 |
| CS349.CO6 | Review quality assurance through test driven development. | L4 |
| Course Code and Course Name :- Compiler Design (CS348) | | |
| CS348.CO1 | Use different compiler construction tools to show the working of every compiler phase(L3) | L3 |
| CS348.CO2 | Demonstrate working of lexical analyser and parser by using FLEX & BISON(L3) | L3 |
| CS348.CO3 | Choose efficient parsing techniques for given grammar(L4) | L4 |
| CS348.CO4 | Develop Syntax Directed Translation Schemes for the given grammar(L6) | L6 |
| CS348.CO5 | Apply code generation and optimization techniques(L3) | L3 |
| Course Code and Course Name :- Employability & Career Development (HP305) | | |
| HP305.CO1 | Relate the importance of Employability Career Development (L2) | L2 |
| HP305.CO2 | Build necessary, specific professional skills (L3) | L3 |
| HP305.CO3 | Analyze the environment of employability (L4) | L4 |
| HP305.CO4 | Develop various techniques of effective team building in their professional life (L6) | L6 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Code and Course Name :- Machine Learning (CS355)** | | |
| CS355.CO1 | Design and implement various machine learning algorithms in a range of real-world ap plications | L3 |
| CS355.CO2 | Analysis of the fundamental issues and challenges of model selection and its complexity | L4 |
| CS355.CO3 | Make use of various algorithms for Natural Language Processing and Information Retrieval | L3 |
| CS355.CO4 | Decide appropriate methods for applications of machine learning in Computer Vision and Pattern Recognition. | L4 |
| **Course Code and Course Name :- Predictive Analytics (CS354)** | | |
| CS354.CO1 | Analyze various Association Algorithms. | L3 |
| CS354.CO2 | Apply the classification and prediction techniques to solve real world problems. | L3 |
| CS354.CO3 | Use advanced classification techniques. | L3 |
| CS354.CO4 | Apply artificial neural network on a real application. | L3 |
| CS354.CO5 | Analyze the unsupervised learning methods. | L4 |
| CS354.CO6 | Apply the conceptual clustering and ensemble learning methods on a real-life | L3 |
| **Course Code and Course Name :- Cloud Native Application Development (CS356)** | | |
| CS356.CO1 | To configure the software development kit for various AWS services | L3 |
| CS356.CO2 | To develop various compute services in cloud | L3 |
| CS356.CO3 | To access various database services through a web application | L3 |
| CS356.CO4 | To distuinguish between protocols for developing own API | L4 |
| CS356.CO5 | To select an appropriate configuration for provisioning infrastructure as a code | L3 |
| CS356.CO6 | To develop a web application using various cloud services | L3 |
| **Course Code and Course Name :- Cyber Security & Forensic (CS352)** | | |
| CS352.CO1 | Identify different cybercrimes and offences that can attack a network. | L1 |
| CS352.CO2 | Complete Implementing a secure wireless network in the organization. | L2 |
| CS352.CO3 | Articulate a secure network environment with the help of various network components. | L2 |
| CS352.CO4 | Illustrate the fundamental risk management principles related to Cyber intelligence. | L4 |
| CS352.CO5 | Analyze the Digital evidences and Digital Forensics Life Cycle. | L3 |
| CS352.CO6 | Evaluate the security vulnerabilities in the system with the help of forensics tools. | L4 |
| **Course Code and Course Name :- SDL : Advanced Java (CS357)** | | |
| CS357.CO1 | Construct java applications using multithreading and networking concepts | L3 |
| CS357.CO2 | Build web applications using Servlet, JSP. | L3 |
| CS357.CO3 | Explore JSF framework for the better user interfaces. | L2 |
| CS357.CO4 | Integrate Hibernate and spring framework with applications | L4 |
| CS357.CO5 | Develop advanced enterprise web applications | L4 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Code and Course Name :- SDL: .DOT NET (CS358)** | | |
| CS358.CO1 | Implement object-oriented programming and C# multitasking concepts(L3) | **L3** |
| CS358.CO2 | Explore application development with C# 8.0 and .NET (L3) | **L2** |
| CS358.CO3 | Design windows forms for different applications(L6) | **L3** |
| CS358.CO4 | Use Entity Framework and work with relational databases(L3) | **L3** |
| CS358.CO5 | Develop web applications using a combination of client-side and server-side technologies (L3) | **L3** |
| **Course Code and Course Name :- SDL : RED HAT LINUX (CS359)** | | |
| CS349.CO1 | Illustrate essential Linux administration tasks. | **L2** |
| CS349.CO2 | Experiment with installation, networking and user profiles. | **L3** |
| CS349.CO3 | Examine physical storage, file systems and log files. | **L3** |
| CS349.CO4 | Inspect the Linux processes, control services, daemons and basic security administration. | **L2** |
| CS349.CO5 | Analyze Redhat Linux System with a comprehensive and systematic approach. | **L4** |
| **Course Code and Course Name :- Minor Project - Implementation (CS360)** | | |
| CS360.CO1 | Analyze techniques, algorithms and design process related to the project. | **L4** |
| CS360.CO2 | Infer conclusions by implementing/developing/experimenting/simulating/testing the dif-ferent techniques/processes. | **L4** |
| CS360.CO3 | Cognize the importance of documentation and report writing. | **L3** |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Final Year, BTech (Computer Engineering)** | | |
| **Course Code and Course Name :- Distributed Systems (CS481)** | | |
| CS481.CO1 | Identify the goals of Distributed System for a particular Architecture type. | **L2** |
| CS481.CO2 | Implement the MPI programs for distributed system applications. | **L3** |
| CS481.CO3 | Differentiate between different clock synchronization algorithms. | **L3** |
| CS481.CO4 | Choose appropriate algorithms for incorporating replication and consistency in the given distributed system application. | **L5** |
| CS481.CO5 | Decide fault tolerance mechanism to be used for particular distributed system application | **L5** |
| CS481.CO6 | Explain distributed File System with reference to scalability, concurrency, transparency, replication and Fault Tolerance. | **L2** |
| **Course Code and Course Name :- Wireless and Mobile Networks (CS472)** | | |
| CS472.C01 | Determine issues and challenges in Wireless Networks. | **L3** |
| CS472.C02 | Categories different types of wireless networks. | **L4** |
| CS472.C03 | Determine issues and challenges of Mobile Ad-Hoc Networks. | **L3** |
| CS472.C04 | Assessing the features of Mobile Ad-Hoc Networks. | **L3** |
| CS472.C05 | Assessing the features of Wireless Sensor Networks. | **L3** |
| CS472.C06 | Apply different security algorithms in wireless Network. | **L3** |
| **Course Code and Course Name :- Information Retrieval (CS473)** | | |
| CS473.CO1 | Understand the process of representing, retrieving and analyzing IR models and advanced IR models. | **L2** |
| CS473.CO2 | Understand structure of web and working of crawlers | **L2** |
| CS473.CO3 | Develop IR models form standard IR models | **L6** |
| CS473.CO4 | Demonstrate the standard methods for web indexing and evaluation | **L3** |
| CS473.CO5 | To analyze optimization techniques & various algorithms used in web search | **L4** |
| **Course Code and Course Name :- Computer Vision (CS477)** | | |
| CS477.CO1 | Explain image formation and operations. | **L2** |
| CS477.CO2 | Implement Binary Image Processing operations. | **L3** |
| CS477.CO3 | Compare different image enhancement and feature extraction techniques. | **L3** |
| CS477.CO4 | Apply methods of computer vision for image segmentation and recognition. | **L3** |
| CS477.CO5 | Identify the design requirement of video processing. | **L2** |
| CS477.CO6 | Suggest a design of a computer vision system for a specific problem. | **L5** |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Code and Course Name :- Skill Development Course - Android Application Development  (CS456)** | | |
| CS456.CO1 | Learn Android application development tools and environment. | L2 |
| CS456.CO2 | Prepare User Interfaces for the Android platform. | L3 |
| CS456.CO3 | Apply SQLite light weight database and store information in persistence storage | L3 |
| CS456.CO4 | Create various Layouts and Widgets in Android Applications | L4 |
| CS456.CO5 | Build Android application | L5 |
| **Course Code and Course Name :- Skill Development Course - AWS Cloud Services (CS485)** | | |
| CS485.CO1 | Define different types of cloud computing models and review the AWS Cloud Adoption Framework (AWS CAF) | L2 |
| CS485.CO2 | Create VPC and add additional components to produce customized network | L5 |
| CS485.CO3 | Demonstrate when to use AWS Elastic Beanstalk, AWS Lambda. | L2 |
| CS485.CO4 | Implement Amazon RDS database such as launching, configuring and interacting. | L3 |
| CS485.CO5 | Design and configure different types of security credentials in IAM | L5 |
| **Course Code and Course Name :- Ethical Hacking (IT461)** | | |
| IT461.CO1 | Describe hacking concepts, and scopes. | L2 |
| IT461.CO2 | Apply different approaches to perform Footprinting through search engine, web and network sites. | L3 |
| IT461.CO3 | Analyze vulnerability assessment reports. | L3 |
| IT461.CO4 | Apply different techniques to privilege escalation and gain the access to a system. | L4 |
| IT461.CO5 | Perform various web server attacks its countermeasures. | L2 |
| IT461.CO6 | Demonstrateddifferent techniques to perform various web application attack. | L5 |
| **Course Code and Course Name :- Big Data Analytics (CS461)** | | |
| CS461.CO1 | Prepare for data summarization, query, and analysis. | L2 |
| CS461.CO2 | Apply data modeling techniques to large data sets. | L3 |
| CS461.CO3 | Inspect applications for Big Data analytics. | L4 |
| CS461.CO4 | Build a complete business data analytic solution. | L5 |
| **Course Code and Course Name :- Deep Learning (CS462)** | | |
| CS462.CO1 | Understand the fundamentals of deep learning. | L2 |
| CS462.CO2 | Recognize significances of deep learning algorithms to handle high dimensional data. | L2 |
| CS462.CO3 | Interpret the application requirements in field of Computer vision and Natural language processing. | L3 |
| CS462.CO4 | Analyze experimental results of different algorithms in deep learning. | L4 |
| CS462.CO5 | Optimize algorithms using various approaches to improve performance of model. | L5 |
| CS462.CO6 | Assemble variety of deep learning algorithm to develop the model. | L5 |

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Course Code and Course Name :- Cloud Native Apps (CS463)** | |
| CS463.CO1 | To develop the automated the SDLC Process | **L5** |
| CS463.CO2 | To summerize the various advanced facilities available to launch infrastructure using cloudformation. | **L2** |
| CS463.CO3 | To differenciate between AWS Elastic Container Service, AWS Fargate and AWS Elastic Kubernetes Service. | **L2** |
| CS463.CO4 | To implement the various policies and standards required for automation. | **L3** |
| CS463.CO5 | To design the systems with detailed plan for High Availability and Disaster Recovery. | **L4** |
| CS463.CO6 | To develop a infrastructure using Jenkins. | **L5** |

# Course Outcomes

## B. Tech

## (Electronics Engineering)

## (2019 – 2023)

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Second Year, BTech (Electronics Engineering)** | |
| **Course Name and Course Code** | **Electronic Devices and Circuits  (ET221)** | |
| ET221.CO.1 | Identify and correctly utilize the external lead structure and basic electrical characteristics of common semiconductor devices (PN junctions, MOSFETs, and BJTs) | L3 |
| ET221.CO.2 | Illustrate the feedback mechanism in the design of electronic circuits | L3 |
| ET221.CO.3 | Scrutinize and project electronic circuits for various signals at low and high frequencies | L4 |
| ET221.CO.4 | Analyze performance parameters of various electronics circuits | L4 |
| ET221.CO.5 | Compile component ideas into electronic circuits | L6 |
| **Course Name and Course Code** | **Digital Systems & Applications (ET222)** | |
| ET222.CO.1 | Design combinational circuits and its applications | L3 |
| ET222.CO.2 | Design various sequential circuits | L4 |
| ET222.CO.3 | Construct state diagrams for various sequential circuits | L4 |
| ET222.CO.4 | Identify various logic families and semiconductor memories | L3 |
| ET222.CO.5 | Develop VHDL code for various combinational and sequential digital circuits | L3 |
| **Course Name and Course Code** | **Signals and Systems (ET223)** | |
| ET223.CO.1 | Classify various types of signals and systems. | L2 |
| ET223.CO.2 | Classify systems based on their properties and determine the response of LTI system using convolution. | L4 |
| ET223.CO.3 | Analyze the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis. | L4 |
| ET223.CO.4 | Describe sampling theorem and reconstruction of signal. | L2 |
| ET223.CO.5 | Apply the Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems. | L3 |
| **Course Name and Course Code** | **Digital Prototyping (ET224)** | |
| ET224.CO.1 | Consolidate the techniques, skills and modern engineering tools. | L5 |
| ET224.CO.2 | Apply acquired skills to the construction of a prototype project. | L3 |
| ET224.CO.3 | Develop a prototype project by performing tasks in team. | L6 |
| ET224.CO.4 | Demonstrate the work carried out in a team. | L3 |
| **Course Name and Course Code** | **Minor Project Design (ET230)** | |
| ET230.CO.1 | Delineate the problem to be solved. | L2 |
| ET230.CO.2 | Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession. | L1 |
| ET230.CO.3 | Embark project planning and design. | L5 |
| ET230.CO.4 | Inculcate problem solving skills and critically analyze the options available to solve the problem. | L2 |
| ET230.CO.5 | Cognize the importance of documentation and report writing. | L1 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Object Oriented Programming using JAVA (ET227)** | |
| ET227.CO.1 | Describe the principles of object oriented programming | L2 |
| ET227.CO.2 | Apply the concepts of classes, methods & inheritance to write Java program | L3 |
| ET227.CO.3 | Describe and use the concepts in Java to develop simple user friendly applications | L2 |
| **Course Name and Course Code** | **Electromagnetic Theory (ET231)** | |
| ET231.CO.1 | Apply appropriate coordinate system and transformations to describe spatial variation of EM quantities. | L3 |
| ET231.CO.2 | Explain laws governing electrostatics and magnetostatics for wireless communication and antenna systems. | L2 |
| ET231.CO.3 | Analyze basic electromagnetic problems using Maxwell's equation to demonstrate propagation of fluctuating electric and magnetic fields. | L3 |
| ET231.CO.4 | Appreciate the working of transmission line, waveguides and impedance calculations using Smith chart. | L3 |
| ET231.CO.5 | Explain different modes of wave propagations for terrestrial, satellite and 5G communication. | L2 |
| **Course Name and Course Code** | **Network Analysis Techniques (ET232)** | |
| ET232.CO.1 | Analyze complex linear circuits analytically and graphically. | L4 |
| ET232.CO.2 | Examine the performance of first and second order circuits in time and frequency domain. | L4 |
| ET232.CO.3 | Design and analyze the response of resonance circuits. | L4 |
| ET232.CO.4 | Analyze different filter configurations and applications there-of. | L4 |
| ET232.CO.5 | Inspect two port network of a given electronic circuit. | L4 |
| ET232.CO.6 | Derive general solution of a transmission line and extend the concept to distortion-less line. | L3 |
| **Course Name and Course Code** | **Microcontroller and Interfacing (ET233)** | |
| ET233.CO.1 | Compare the features of different families of the microcontrollers. | L2 |
| ET233.CO.2 | Explain the architecture and features of the 8 bit microcontroller. | L2 |
| ET233.CO.3 | Categorize the software and hardware tools for embedded system development. | L2 |
| ET233.CO.4 | Apply the interfacing techniques for various peripherals with the microcontroller. | L3 |
| **Course Name and Course Code** | **Minor Project Implementation (ET240)** | |
| ET240.CO.1 | Select appropriate method for making of solution. | L1 |
| ET240.CO.2 | Compare various engineering tools/technique to develop solution. | L4 |
| ET240.CO.3 | Justify the selected method/tools opted for making of solution. | L5 |
| ET240.CO.4 | Develop tangible solution to defined problem. | L6 |
| ET240.CO.5 | Test the developed solution. | L4 |
| ET240.CO.6 | Document solution in the form of Project report / IPR drafts. | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Third Year, BTech (Electronics Engineering)** | |
| **Course Name and Course Code** | **Control Systems (ET341)** | |
| ET341.CO.1 | Develop the mathematical model of the physical systems. | L3 |
| ET341.CO.2 | Develop and analyze state space models. | L3 |
| ET341.CO.3 | Analyze the response of the closed and open loop systems. | L4 |
| ET341.CO.4 | Analyze the stability of the closed and open loop systems. | L4 |
| ET341.CO.5 | Explain a closed loop motion control system with an application. | L2 |
| **Course Name and Course Code** | **Digital Signal Processing (ET342)** | |
| ET342.CO.1 | Analyze LTI systems using DFT | L2 |
| ET342.CO.2 | Model & Synthesize IIR and FIR filters | L2 |
| ET342.CO.3 | Develop single stage and multi-stage sampling rate converters | L4 |
| ET342.CO.4 | Build practical applications using DSP processor in the context of architecture and programming | L4 |
| **Course Name and Course Code** | **Embedded System Design (ET343)** | |
| ET343.CO.1 | Interpret H/W & S/W co-design. | L3 |
| ET343.CO.2 | Explain architecture of ARM processor | L2 |
| ET343.CO.3 | Analyze ARM cortex microcontroller with its applications in embedded system. | L4 |
| ET343.CO.4 | Develop applications using ARM Cortex based microcontroller. | L4 |
| **Course Name and Course Code** | **IoT Architecture & Sensors (ET352)** | |
| ET352.CO.1 | Apply the basic fundamental to build an IoT application | L3 |
| ET352.CO.2 | Analyze various M2M and IoT architectures | L4 |
| ET352.CO.3 | Create IoT solutions using sensors, actuators and Devices | L5 |
| ET352.CO.4 | Analyze the IoT data with the help of Cloud Computing | L3 |
| ET352.CO.5 | Analyze IoT platform design methodology and its constraints | L3 |
| **Course Name and Course Code** | **Skill Development Course: Data Science (ET345)** | |
| ET345.CO.1 | Apply python programming concepts | L3 |
| ET345.CO.2 | Relate basic concepts of algebra, calculus and statistics | L2 |
| ET345.CO.3 | Apply different data visualization libraries and feature engineering techniques | L3 |
| **Course Name and Course Code** | **Power Electronics (ET361)** | |
| ET361.CO.1 | Design and implement a triggering / gate drive circuit for power converters. | L4 |
| ET361.CO.2 | Design and analyze different power electronic converters. | L4 |
| ET361.CO.3 | Analyze various power quality issues and their remedies. | L3 |
| ET361.CO.4 | Analyze applications of power electronics. | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Principles of Communication Systems (ET362)** | |
| ET362.CO.1 | Illustrate the fundamental concepts and terminologies of communication systems | L2 |
| ET362.CO.2 | Inspect different analog modulation, demodulation schemes along with transmitter and receiver circuitry | L4 |
| ET362.CO.3 | Explain the concept of random variables and processes with statistical parameters | L3 |
| ET362.CO.4 | Analyze various source and channel coding methods | L4 |
| ET362.CO.5 | Examine optimum receiving techniques and error performances of digital modulation schemes | L4 |
| **Course Name and Course Code** | **Soft Computing (ET363)** | |
| ET363.CO.1 | Explain fundamentals of machine learning. | L2 |
| ET363.CO.2 | Describe supervised and unsupervised learning. | L2 |
| ET363.CO.3 | Analyze mathematically various machine learning approaches and paradigms. | L3 |
| ET363.CO.4 | Implement machine learning solutions for classification, regression, and clustering problems. | L4 |
| ET363.CO.5 | Compare various machine learning techniques and to get an insight of when to apply a particular machine learning approach. | L4 |
| **Course Name and Course Code** | **IoT Network and Protocols (ET372)** | |
| ET372.CO.1 | Interpret fundamentals underlying principles of networking | L2 |
| ET372.CO.2 | Prioritize networking protocol as per the real time applications | L3 |
| ET372.CO.3 | Articulate the cryptography techniques used in network security | L3 |
| ET372.CO.4 | Defend various security parameters related to network | L4 |
| **Course Name and Course Code** | **Skill Development Course - Networking (ET364)** | |
| ET364.CO.1 | Assign various IP address in network | L2 |
| ET364.CO.2 | Install and configure the web server | L3 |
| ET364.CO.3 | Configure network for routing and switching | L4 |
| **Course Name and Course Code** | **Robot Dynamics and Control (EX371)** | |
| EX371.CO.1 | Explain block schematic of robotic control system | L2 |
| EX371.CO.2 | Design of controller using state space. | L4 |
| EX371.CO.3 | Develop control law for a given application | L4 |
| EX371.CO.4 | Compute the manipulator motion and statics | L4 |
| EX371.CO.5 | Apply knowledge of mathematics to obtain the dynamic model of robotic arm | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Final Year, BTech (Electronics Engineering)** | |
| **Course Name and Course Code** | **HDL-Digital Circuit Design  (ET461)** | |
| ET461.CO.1 | Analyse different architectures of PLDs (L2) | L4 |
| ET461.CO.2 | Comprehend the basic concepts of Verilog (L2) | L2 |
| ET461.CO.3 | Model digital circuits with Verilog, simulate, synthesis and prototype in PLDs. (L4) | L4 |
| ET461.CO.4 | Examine verification types and associated parameters (L3) | L3 |
| **Course Name and Course Code** | **Deep Learning (ET481)** | |
| ET481.CO.1 | Explain fundamentals of Neural Network and Deep Learning | L2 |
| ET481.CO.2 | Describe Convolution Neural Network | L2 |
| ET481.CO.3 | Explain Sequence Model and Encoder Decoder Model | L2 |
| ET481.CO.4 | Develop Deep Learning model for classification and object detection | L3 |
| ET481.CO.5 | Evaluate the performance of Deep Learning models | L5 |
| **Course Name and Course Code** | **Digital Image Processing (ET482)** | |
| ET482.CO.1 | Illustrate the fundamental concepts and process of image processing | L2 |
| ET482.CO.2 | Construct an algorithm for spatial and frequency domain filtering | L2 |
| ET482.CO.3 | Determine various image compression and segmentation techniques | L4 |
| ET482.CO.4 | Examine digital image processing techniques to real world applications | L3 |
| ET482.CO.5 | Analyze the problems in the field of robotics and other applications | L3 |
| **Course Name and Course Code** | **Electric Vehicle (ET483)** | |
| ET483.CO.1 | Model vehicle parameters | L3 |
| ET483.CO.2 | Explore the EV motors and their controllers | L2 |
| ET483.CO.3 | Develop the battery modelling and its parameters | L3 |
| ET483.CO.4 | Illustrate the Model Based Development using MATLAB and SIMULINK | L2 |
| ET483.CO.5 | Analyse different Electric vehicle case studies | L4 |
| **Course Name and Course Code** | **RTOS  (ET484)** | |
| ET484.CO.1 | Explain the characteristics of real-time embedded applications | L2 |
| ET484.CO.2 | Interpret the RTX Kernel Structure | L2 |
| ET484.CO.3 | Apply Scheduling and synchronization in RTX | L3 |
| ET484.CO.4 | Utilize the inter task communication in RTX for an application | L3 |
| ET484.CO.5 | Summarize popular RTOS available for different applications | L2 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Data Management & Analytics  (ET472)** | |
| ET472.CO.1 | Demonstrate the data lifecycle | L2 |
| ET472.CO.2 | Apply basic concepts of database management system | L3 |
| ET472.CO.3 | Apply basic operations with DBMS | L3 |
| ET472.CO.4 | Infer the importance of the domain context for data analytics | L2 |
| ET472.CO.5 | Illustrate basic concepts of big data analytics and their components | L2 |
| ET472.CO.6 | Analyze the database system design, implementation, and maintenance | L4 |
| **Course Name and Course Code** | **Skill DevelopmentCourse: EmbeddedLinux Systems  (ET463)** | |
| ET463.CO.1 | Explore the features of Linux through command line and shell programming | L2 |
| ET463.CO.2 | Demonstrate the usage of file system in Linux | L3 |
| ET463.CO.3 | Apply toolchain in the embedded Linux environment | L3 |
| ET463.CO.4 | Design the various device drivers for embedded application | L4 |
| **Course Name and Course Code** | **Skill DevelopmentCourse: System Modelling (ET465)** | |
| ET465.CO.1 | Implement methodology to improve efficiency of MATLAB programming code | L4 |
| ET465.CO.2 | Exploit the concept of OOP in MATLAB | L3 |
| ET465.CO.3 | Create an application using App Designer | L6 |
| ET465.CO.4 | Build a system model in electrical, mechanical and power domain | L6 |
| ET465.CO.5 | Design a user friendly application | L6 |
| **Course Name and Course Code** | **AI in Robotics  (EX471)** | |
| EX471.CO.1 | Apply suitable algorithm for Search and Planning for AI robotics system. | L3 |
| EX471.CO.2 | Apply Robotic vision algorithms for vision guided robotics. | L3 |
| EX471.CO.3 | Apply suitable algorithm for machine learning algorithms for AI robotics systems. | L4 |
| EX471.CO.4 | Analyze various applications in the field of AI Robotics & Vision guided Robotics. | L3 |
| **Course Name and Course Code** | **Biomedical Engineering (EX441)** | |
| EX441.CO.1 | Elaborate the origin of various bio-signals and the electrodes used to measure them. | L2 |
| EX441.CO.2 | Illustrate the various biomedical and radiological instruments | L3 |
| EX441.CO.3 | Apply the knowledge of electrical safety while designing. | L3 |
| EX441.CO.4 | Apply the knowledge of biotelemetry and telemedicine in the fields of biomedical. | L4 |
| EX441.CO.5 | Apply the concept of biomechanics and biomaterial in biomedical Engineering. | L4 |

# Course Outcomes

# B. Tech

# (Electronics and Telecommunication Engineering)

# (2019 – 2023)

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Second Year, BTech (Electronics and Telecommunication Engineering)** | |
| **Course Name and Course Code** | **Electronic Devices and Circuits  (ET221)** | |
| ET221.CO.1 | Identify and correctly utilize the external lead structure and basic electrical characteristics of common semiconductor devices (PN junctions, MOSFETs, and BJTs) | L3 |
| ET221.CO.2 | Illustrate the feedback mechanism in the design of electronic circuits | L3 |
| ET221.CO.3 | Scrutinize and project electronic circuits for various signals at low and high frequencies | L4 |
| ET221.CO.4 | Analyze performance parameters of various electronics circuits | L4 |
| ET221.CO.5 | Compile component ideas into electronic circuits | L6 |
| **Course Name and Course Code** | **Digital Systems & Applications (ET222)** | |
| ET222.CO.1 | Design combinational circuits and its applications | L3 |
| ET222.CO.2 | Design various sequential circuits | L4 |
| ET222.CO.3 | Construct state diagrams for various sequential circuits | L4 |
| ET222.CO.4 | Identify various logic families and semiconductor memories | L3 |
| ET222.CO.5 | Develop VHDL code for various combinational and sequential digital circuits | L3 |
| **Course Name and Course Code** | **Signals and Systems (ET223)** | |
| ET223.CO.1 | Classify various types of signals and systems. | L2 |
| ET223.CO.2 | Classify systems based on their properties and determine the response of LTI system using convolution. | L4 |
| ET223.CO.3 | Analyze the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis. | L4 |
| ET223.CO.4 | Describe sampling theorem and reconstruction of signal. | L2 |
| ET223.CO.5 | Apply the Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems. | L3 |
| **Course Name and Course Code** | **Digital Prototyping (ET224)** | |
| ET224.CO.1 | Consolidate the techniques, skills and modern engineering tools. | L5 |
| ET224.CO.2 | Apply acquired skills to the construction of a prototype project. | L3 |
| ET224.CO.3 | Develop a prototype project by performing tasks in team. | L6 |
| ET224.CO.4 | Demonstrate the work carried out in a team. | L3 |
| **Course Name and Course Code** | **Minor Project Design (ET230)** | |
| ET230.CO.1 | Delineate the problem to be solved. | L2 |
| ET230.CO.2 | Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession. | L1 |
| ET230.CO.3 | Embark project planning and design. | L5 |
| ET230.CO.4 | Inculcate problem solving skills and critically analyze the options available to solve the problem. | L2 |
| ET230.CO.5 | Cognize the importance of documentation and report writing. | L1 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Object Oriented Programming using JAVA (ET227)** | |
| ET227.CO.1 | Describe the principles of object oriented programming | L2 |
| ET227.CO.2 | Apply the concepts of classes, methods & inheritance to write Java program | L3 |
| ET227.CO.3 | Describe and use the concepts in Java to develop simple user friendly applications | L2 |
| **Course Name and Course Code** | **Electromagnetic Theory (ET231)** | |
| ET231.CO.1 | Apply appropriate coordinate system and transformations to describe spatial variation of EM quantities. | L3 |
| ET231.CO.2 | Explain laws governing electrostatics and magnetostatics for wireless communication and antenna systems. | L2 |
| ET231.CO.3 | Analyze basic electromagnetic problems using Maxwell's equation to demonstrate propagation of fluctuating electric and magnetic fields. | L3 |
| ET231.CO.4 | Appreciate the working of transmission line, waveguides and impedance calculations using Smith chart. | L3 |
| ET231.CO.5 | Explain different modes of wave propagations for terrestrial, satellite and 5G communication. | L2 |
| **Course Name and Course Code** | **Network Analysis Techniques (ET232)** | |
| ET232.CO.1 | Analyze complex linear circuits analytically and graphically. | L4 |
| ET232.CO.2 | Examine the performance of first and second order circuits in time and frequency domain. | L4 |
| ET232.CO.3 | Design and analyze the response of resonance circuits. | L4 |
| ET232.CO.4 | Analyze different filter configurations and applications there-of. | L4 |
| ET232.CO.5 | Inspect two port network of a given electronic circuit. | L4 |
| ET232.CO.6 | Derive general solution of a transmission line and extend the concept to distortion-less line. | L3 |
| **Course Name and Course Code** | **Microcontroller and Interfacing (ET233)** | |
| ET233.CO.1 | Compare the features of different families of the microcontrollers. | L2 |
| ET233.CO.2 | Explain the architecture and features of the 8 bit microcontroller. | L2 |
| ET233.CO.3 | Categorize the software and hardware tools for embedded system development. | L2 |
| ET233.CO.4 | Apply the interfacing techniques for various peripherals with the microcontroller. | L3 |
| **Course Name and Course Code** | **Minor Project Implementation (ET240)** | |
| ET240.CO.1 | Select appropriate method for making of solution. | L1 |
| ET240.CO.2 | Compare various engineering tools/technique to develop solution. | L4 |
| ET240.CO.3 | Justify the selected method/tools opted for making of solution. | L5 |
| ET240.CO.4 | Develop tangible solution to defined problem. | L6 |
| ET240.CO.5 | Test the developed solution. | L4 |
| ET240.CO.6 | Document solution in the form of Project report / IPR drafts. | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| Third Year, BTech (Electronics and Telecommunication Engineering) | | |
| Course Name and Course Code | Control Systems (ET341) | |
| ET341.CO.1 | Develop the mathematical model of the physical systems. | L3 |
| ET341.CO.2 | Develop and analyze state space models. | L3 |
| ET341.CO.3 | Analyze the response of the closed and open loop systems. | L4 |
| ET341.CO.4 | Analyze the stability of the closed and open loop systems. | L4 |
| ET341.CO.5 | Explain a closed loop motion control system with an application. | L2 |
| Course Name and Course Code | Digital Signal Processing (ET342) | |
| ET342.CO.1 | Analyze LTI systems using DFT | L2 |
| ET342.CO.2 | Model & Synthesize IIR and FIR filters | L2 |
| ET342.CO.3 | Develop single stage and multi-stage sampling rate converters | L4 |
| ET342.CO.4 | Build practical applications using DSP processor in the context of architecture and programming | L4 |
| Course Name and Course Code | Embedded System Design (ET343) | |
| ET343.CO.1 | Interpret H/W & S/W co-design. | L3 |
| ET343.CO.2 | Explain architecture of ARM processor | L2 |
| ET343.CO.3 | Analyze ARM cortex microcontroller with its applications in embedded system. | L4 |
| ET343.CO.4 | Develop applications using ARM Cortex based microcontroller. | L4 |
| Course Name and Course Code | IoT Architecture & Sensors (ET352) | |
| ET352.CO.1 | Apply the basic fundamental to build an IoT application | L3 |
| ET352.CO.2 | Analyze various M2M and IoT architectures | L4 |
| ET352.CO.3 | Create IoT solutions using sensors, actuators and Devices | L5 |
| ET352.CO.4 | Analyze the IoT data with the help of Cloud Computing | L3 |
| ET352.CO.5 | Analyze IoT platform design methodology and its constraints | L3 |
| Course Name and Course Code | Skill Development Course: Data Science (ET345) | |
| ET345.CO.1 | Apply python programming concepts | L3 |
| ET345.CO.2 | Relate basic concepts of algebra, calculus and statistics | L2 |
| ET345.CO.3 | Apply different data visualization libraries and feature engineering techniques | L3 |
| Course Name and Course Code | Power Electronics (ET361) | |
| ET361.CO.1 | Design and implement a triggering / gate drive circuit for power converters. | L4 |
| ET361.CO.2 | Design and analyze different power electronic converters. | L4 |
| ET361.CO.3 | Analyze various power quality issues and their remedies. | L3 |
| ET361.CO.4 | Analyze applications of power electronics. | L3 |

| CO's | CO Statement | BT Level |
|------|--------------|----------|
| **Course Name and Course Code** | **Principles of Communication Systems (ET362)** | |
| ET362.CO.1 | Illustrate the fundamental concepts and terminologies of communication systems | L2 |
| ET362.CO.2 | Inspect different analog modulation, demodulation schemes along with transmitter and receiver circuitry | L4 |
| ET362.CO.3 | Explain the concept of random variables and processes with statistical parameters | L3 |
| ET362.CO.4 | Analyze various source and channel coding methods | L4 |
| ET362.CO.5 | Examine optimum receiving techniques and error performances of digital modulation schemes | L4 |
| **Course Name and Course Code** | **Soft Computing (ET363)** | |
| ET363.CO.1 | Explain fundamentals of machine learning. | L2 |
| ET363.CO.2 | Describe supervised and unsupervised learning. | L2 |
| ET363.CO.3 | Analyze mathematically various machine learning approaches and paradigms. | L3 |
| ET363.CO.4 | Implement machine learning solutions for classification, regression, and clustering problems. | L4 |
| ET363.CO.5 | Compare various machine learning techniques and to get an insight of when to apply a particular machine learning approach. | L4 |
| **Course Name and Course Code** | **IoT Network and Protocols (ET372)** | |
| ET372.CO.1 | Interpret fundamentals underlying principles of networking | L2 |
| ET372.CO.2 | Prioritize networking protocol as per the real time applications | L3 |
| ET372.CO.3 | Articulate the cryptography techniques used in network security | L3 |
| ET372.CO.4 | Defend various security parameters related to network | L4 |
| **Course Name and Course Code** | **Skill Development Course - Networking (ET364)** | |
| ET364.CO.1 | Assign various IP address in network | L3 |
| ET364.CO.2 | Install and configure the web server | L4 |
| ET364.CO.3 | Configure network for routing and switching | L4 |
| **Course Name and Course Code** | **Robot Fundamentals and Kinematics  (ME352)** | |
| ME352.CO.1 | List the key components of Industrial robot | L1 |
| ME352.CO.2 | Classify , sensors and actuators of industrial robots. | L2 |
| ME352.CO.3 | Select transmission system for robots. | L4 |
| ME352.CO.4 | Apply the kinematics and Inverse kinematics principles to robot | L3 |
| ME352.CO.5 | Determine Trajectory for given robot. | L5 |
| ME352.CO.6 | Build the task based robot by applying knowledge of sensors, actuators | L6 |

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Final Year, BTech (Electronics and Telecommunication Engineering)** | |
| **Course Name and Course Code** | **HDL-Digital Circuit Design  (ET461)** | |
| ET461.CO.1 | Analyse different architectures of PLDs | L4 |
| ET461.CO.2 | Comprehend the basic concepts of Verilog | L2 |
| ET461.CO.3 | Model digital circuits with Verilog, simulate, synthesis and prototype in PLDs. | L4 |
| ET461.CO.4 | Examine verification types and associated parameters | L3 |
| **Course Name and Course Code** | **Deep Learning (ET481)** | |
| ET481.CO.1 | Explain fundamentals of Neural Network and Deep Learning | L2 |
| ET481.CO.2 | Describe Convolution Neural Network | L2 |
| ET481.CO.3 | Explain Sequence Model and Encoder Decoder Model | L2 |
| ET481.CO.4 | Develop Deep Learning model for classification and object detection | L3 |
| ET481.CO.5 | Evaluate the performance of Deep Learning models | L5 |
| **Course Name and Course Code** | **Digital Image Processing (ET482)** | |
| ET482.CO.1 | Illustrate the fundamental concepts and process of image processing | L2 |
| ET482.CO.2 | Construct an algorithm for spatial and frequency domain filtering | L2 |
| ET482.CO.3 | Determine various image compression and segmentation techniques | L4 |
| ET482.CO.4 | Examine digital image processing techniques to real world applications | L3 |
| ET482.CO.5 | Analyze the problems in the field of robotics and other applications | L3 |
| **Course Name and Course Code** | **Electric Vehicle (ET483)** | |
| ET483.CO.1 | Model vehicle parameters | L3 |
| ET483.CO.2 | Explore the EV motors and their controllers | L2 |
| ET483.CO.3 | Develop the battery modelling and its parameters | L3 |
| ET483.CO.4 | Illustrate the Model Based Development using MATLAB and SIMULINK | L2 |
| ET483.CO.5 | Analyse different Electric vehicle case studies | L4 |
| **Course Name and Course Code** | **RTOS  (ET484)** | |
| ET484.CO.1 | Explain the characteristics of real-time embedded applications | L2 |
| ET484.CO.2 | Interpret the RTX Kernel Structure | L2 |
| ET484.CO.3 | Apply Scheduling and synchronization in RTX | L3 |
| ET484.CO.4 | Utilize the inter task communication in RTX for an application | L3 |
| ET484.CO.5 | Summarize popular RTOS available for different applications | L2 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Data Management & Analytics  (ET472)** | |
| ET472.CO.1 | Demonstrate the data lifecycle | L2 |
| ET472.CO.2 | Apply basic concepts of database management system | L3 |
| ET472.CO.3 | Apply basic operations with DBMS | L3 |
| ET472.CO.4 | Infer the importance of the domain context for data analytics | L2 |
| ET472.CO.5 | Illustrate basic concepts of big data analytics and their components | L2 |
| ET472.CO.6 | Analyze the database system design, implementation, and maintenance | L4 |
| **Course Name and Course Code** | **Skill DevelopmentCourse: EmbeddedLinux Systems  (ET463)** | |
| ET463.CO.1 | Explore the features of Linux through command line and shell programming | L2 |
| ET463.CO.2 | Demonstrate the usage of file system in Linux | L3 |
| ET463.CO.3 | Apply toolchain in the embedded Linux environment | L3 |
| ET463.CO.4 | Design the various device drivers for embedded application | L4 |
| **Course Name and Course Code** | **Skill DevelopmentCourse: System Modelling (ET465)** | |
| ET465.CO.1 | Implement methodology to improve efficiency of MATLAB programming code | L4 |
| ET465.CO.2 | Exploit the concept of OOP in MATLAB | L3 |
| ET465.CO.3 | Create an application using App Designer | L6 |
| ET465.CO.4 | Build a system model in electrical, mechanical and power domain | L6 |
| ET465.CO.5 | Design a user friendly application | L6 |
| **Course Name and Course Code** | **Biomedical Engineering (EX441)** | |
| EX441.CO.1 | Elaborate the origin of various bio-signals and the electrodes used to measure them. | L2 |
| EX441.CO.2 | Illustrate the various biomedical and radiological instruments | L3 |
| EX441.CO.3 | Apply the knowledge of electrical safety while designing. | L3 |
| EX441.CO.4 | Apply the knowledge of biotelemetry and telemedicine in the fields of biomedical. | L4 |
| EX441.CO.5 | Apply the concept of biomechanics and biomaterial in biomedical Engineering. | L4 |

# Course Outcomes

## B. Tech

## (Information Technology)

## (2019 – 2023)

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Second Year, BTech (Information Technology)** | |
| | **Course Name and Course Code :- Data Structures (CS221)** | |
| CS221.CO.1 | Explain the concept of data structure. | L2 |
| CS221.CO.2 | Develop elcient algorithm for a given problem. | L3 |
| CS221.CO.3 | Analyze appropriate algorithm for solving the real world problem | L4 |
| CS221.CO.4 | Demonstrate advantages and disadvantages of data structures for variety of problems. | L3 |
| CS221.CO.5 | Choose effective data structures in approaching a problem solution | L2 |
| CS221.CO.6 | Make use of appropriate sorting and searching algorithm for a given application. | L3 |
| | **Course Name and Course Code :- Computer Graphics (CS223)** | |
| CS223.CO1 | To explain different graphics primitives | L2 |
| CS223.CO2 | To apply related mathematical concepts to develop Computer graphics operations | L3 |
| CS223.CO3 | To demonstrate 2D and 3D transformation | L3 |
| CS223.CO4 | To apply various methods for projection | L3 |
| CS223.CO5 | To illustrate programs on clipping algorithms | L2 |
| CS223.CO6 | To develop animation and gaming application | L3 |
| | **Course Name and Course Code :- DIG PROTO (ET224)** | |
| ET206.CO1 | Consolidate the techniques, skills and modern engineering tools. | L2 |
| ET206.CO2 | Apply acquired skills to the construction of a prototype project. | L3 |
| ET206.CO3 | Develop a prototype project by performing tasks in team. | L4 |
| ET206.CO3 | Demonstrate the work carried out in a team. | L3 |
| | **Course Name and Course Code :- # JAVA Skill (CS227L)** | |
| CS227.CO1 | Implement Object Oriented Programming Concepts in java | L3 |
| CS227.CO2 | Use and create packages and interfaces in Java. | L3 |
| CS227.CO3 | Use graphical user interface in Java programs. | L3 |
| CS227.CO4 | Perform fille handling operations. | L2 |
| CS227.CO5 | Implement exception handling in Java. | L3 |
| CS227.CO6 | Implement applications using JDBC . | L3 |
| | **Course Name and Course Code :- #CPP Skill (CS226L)** | |
| CS226.CO.1 | Make use of class and objects using C++. | L3 |
| CS226.CO.2 | Demonstrate control structures using C++. | L2 |
| CS226.CO.3 | Implement the programs using data structures in C++. | L3 |
| CS226.CO.4 | Develop solution for real world problems using inheritance and polymorphism. | L3 |
| CS226.CO.5 | Apply standard template library to solve real world instances. | L3 |
| CS226.CO.6 | Make use of various file handling and exception handling operations in C++. | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Engineering Informatics (IT221)** | | |
| IT221.CO.1 | Interpret Data, Information and Knowledge. | L2 |
| IT221.CO.2 | Make use of data acquisition techniques for an information system. | L3 |
| IT221.CO.3 | Categories different storage techniques. | L4 |
| IT221.CO.4 | Develop dashboard for effective communication of information. | L3 |
| IT221.CO.5 | Determine components of Human computer interaction. | L5 |
| IT221.CO.6 | Model IoT based information system. | L4 |
| **Course Name and Course Code :- Discrete Struture and Graph Theory (CS211)** | | |
| CS211.CO1 | To learn logic and proof techniques to explore mathematical reasoning | L2 |
| CS211.CO2 | To formulate the problems precisely and solve the problems. | L3 |
| CS211.CO3 | To use appropriate set, function, or relation models to analyze practical examples. | L3 |
| CS211.CO4 | Model and analyze computational processes using combinatorial methods. | L3 |
| CS211.CO5 | To explore number of logical possibilities and algebraic structures. | L2 |
| CS211.CO6 | To use graph theory and associated terminology in practical example. | L3 |
| **Course Name and Course Code :- Appiled Mathematics (AS201)** | | |
| AS201.CO1 | Evaluate the rank of a matrix and solve the system of equations. | L3 |
| AS201.CO2 | Determine the eigenvalues and eigenvectors of a matrix. | L2 |
| AS201.CO3 | Differentiate a vector valued function in plane or space. | L2 |
| AS201.CO4 | Compute the area and volume of the objects. | L2 |
| AS201.CO5 | Apply the Cauchy's Integral Theorem and evaluate the integrations. | L3 |
| AS201.CO6 | Execute the program codes using MATLAB. | L4 |
| **Course Name and Course Code :- Minor Project- Design (CS230)** | | |
| CS230.CO1 | Delineate the problem to be solved. | L2 |
| CS230.CO2 | Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession. | L3 |
| CS230.CO3 | Embark project planning and design. | L4 |
| CS230.CO4 | Inculcate problem solving skills and critically analyze the options available to solve the problem | L4 |
| CS230.CO5 | Cognize the importance of documentation and report writing. | L3 |
| **Course Name and Course Code :- Database Managment System (CS231)** | | |
| CS231.CO1 | Perform basic operation with DBMS. | L2 |
| CS231.CO2 | Design and develop database application using ER diagram and normalization. | L3 |
| CS231.CO3 | Implement validation framework like integrity constraints and trigger. | L4 |
| CS231.CO4 | Apply ACID properties for transaction management. | L3 |
| CS231.CO5 | Explain concurrency control mechanism using lock based and timestamp based protocol | L2 |
| CS231.CO6 | Execute the basic operation on NoSQL database | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code :- Advanced Data Structures (CS228)** | | |
| CS228.CO.1 | Explain the working of basic and advanced data structures like trees, graphs, heaps, disjoint sets, hash tables, bloom filters. | **L2** |
| CS228.CO.2 | Demonstrate the advantages and disadvantages of various data structures. | **L3** |
| CS228.CO.3 | Choose appropriate data structures while building the applications. | **L3** |
| CS228.CO.4 | Implement various applications using data structures like trees, graphs, hash tables, heaps. | **L3** |
| CS228.CO.5 | Evaluate the performance of various data structures in terms of time and memory complexity . | **L5** |
| CS228.CO.6 | Design own data structures using the build in data structures. | **L6** |
| **Course Name and Course Code :- Computer Organization & Architecture (CS229)** | | |
| CS228.CO.1 | Explain the architecture of the microprocessor 80386. | **L2** |
| CS228.CO.2 | Develop assembly language programs using 32/64 bit registers | **L3** |
| CS228.CO.3 | Illustrate Control unit and IO organizations | **L2** |
| CS228.CO.4 | Explain the memory organization in the computer system | **L2** |
| CS228.CO.5 | Illustrate arithmetic operations. | **L2** |
| CS228.CO.6 | Explain Pipelining processing environment. | **L2** |
| **Course Name and Course Code :- Professional Skill (HP202)** | | |
| HP202.CO1 | Express themselves effectively in routine and real-world interactions through oral and written communication. | **L3** |
| HP202.CO2 | Show Confident Public Speaking skills | **L5** |
| HP202.CO3 | To showcase leadership qualities during tough tasks, make decisions and actions effectively within time. | **L5** |
| **Course Name and Course Code :- Programming Lab (CS224)** | | |
| CS224.CO1 | Explain the concept of data structure. | **L2** |
| CS224.CO2 | Develop efficient algorithm for a given problem. | **L3** |
| CS224.CO3 | Analyze appropriate algorithm for solving the real world problem. | **L4** |
| CS224.CO4 | Demonstrate advantages and disadvantages of data structures for variety of problems. | **L3** |
| CS224.CO5 | Choose effective data structures in approaching a problem solution. | **L2** |
| CS224.CO6 | Make use of appropriate sorting and searching algorithm for a given application. | **L3** |
| **Course Name and Course Code :- Minor Project - Implementation (CS240)** | | |
| CS240.CO1 | Select appropriate method for making of solution. | **L1** |
| CS240.CO2 | Compare various engineering tools/technique to develop solution. | **L2** |
| CS240.CO3 | Justify the selected method/tools opted for making of solution. | **L2** |
| CS240.CO4 | Develop tangible solution to dened problem. | **L5** |
| CS240.CO5 | Test the developed solution. | **L4** |
| CS240.CO6 | Document solution in the form of Project report / IPR drafts. | **L3** |

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Third Year, BTech (Information Technology)** | |
| | **Course Code and Course Name :- Operating System (CS341)** | |
| CS341.CO1 | Illustrate the role of OS in the management of system | L2 |
| CS341.CO2 | Organize process and threads execution in operating system effectively | L3 |
| CS341.CO3 | Identify deadlock to resolve the related issues. | L3 |
| CS341.CO4 | Analyze the memory management and its allocation policies | L4 |
| CS341.CO5 | Make use of the file system, protection and security aspects of OS effectively | L3 |
| | **Course Code and Course Name :- Theory of Computation (CS342)** | |
| CS342.CO1 | Differentiate between types of languages and respective recognition automata. | L2 |
| CS342.CO2 | Construct various types of automata and grammar from language and vice versa. | L3 |
| CS342.CO3 | Make use of the properties of languages and automata to design complex automata prove equivalence of automata | L3 |
| CS342.CO4 | Decide the type of automata to be used to recognize the particular language. | L5 |
| CS342.CO5 | Identify decidability of languages. | L3 |
| | **Course Code and Course Name :- Minor Project - Implementation (CS343)** | |
| CS343.CO1 | Comprehend signals and communications types. | L2 |
| CS343.CO2 | Build different types of network topologies and protocols. | L2 |
| CS343.CO3 | Evaluate routing protocols for different real time systems. | L4 |
| CS343.CO4 | Analyze connection oriented and connectionless services. | L3 |
| CS343.CO5 | Demonstrate different application/systems related to networking. | L5 |
| | **Course Code and Course Name :- Descriptive Analytics (CS351)** | |
| CS351.CO1 | Outline the data warehouse architecture. (Understanding-L2) | L2 |
| CS351.CO2 | Build data marts using different modeling techniques for given application( Apply-L3) | L3 |
| CS351.CO3 | Create OLAP cubes and Visualize data using visualizing tools.( Apply-L3) | L3 |
| CS351.CO4 | Recognize trends, detect outliers, and summarize data sets( Apply-L3) | L3 |
| CS351.CO5 | Validate hypothesis using various testing methods for a real-life problem statement( Evaluate-L4) | L4 |
| CS351.CO6 | Predict output by applying correct regression model.( Apply-L3) | L3 |
| | **Course Code and Course Name :- Artificial Intelligence (CS352)** | |
| CS352.CO1 | Apply basic principles of knowledge representation, inference and reasoning in Artificial Intelligence[L3]. | L3 |
| CS352.CO2 | Apply problem solving and searching techniques of Artificial Intelligence to reach desired goals [L3]. | L3 |
| CS352.CO3 | Analyze appropriate methods of Machine Learning based on the particular characteristicsof the domains and applications under consideration[L4]. | L4 |
| CS352.CO4 | Accurately formulate, test and evaluate hypothesis and performance of machine learningalgorithms[L4]. | L4 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Code and Course Name :- Cloud Computing Foundations (CS353)** | |
| CS353.CO1 | To classify various cloud computing services and models | L2 |
| CS353.CO2 | To build various compute services in cloud | L3 |
| CS353.CO3 | To distinguish between various storage related services used during application development | L4 |
| CS353.CO4 | To select appropriate database service during application development | L3 |
| CS353.CO5 | To choose various networking and security options during application development | L3 |
| CS353.CO6 | To estimate the resource requirements for the application with high availability and reliability features | L5 |
| | **Course Code and Course Name :- Cryptography & System Security (IT351)** | |
| IT351.CO1 | Identify the security threats, and the security services and mechanisms to counter them [L3]. | L3 |
| IT351.CO2 | Apply security principles to protect the data.[L3] | L3 |
| IT351.CO3 | Analyze symmetric key and asymmetric key algorithm. [L4] | L4 |
| IT351.CO4 | Identify the different Authentication method in digital signature [L3] | L3 |
| IT351.CO5 | Analyze network security protocols [L4]. | L4 |
| IT351.CO6 | Identify and investigate network security threat and provide solution to protect the network [L3]. | L3 |
| | **Course Code and Course Name :- Project Management (CS361)** | |
| CS361.CO1 | Identify the Project Management Knowledge Areas and Processes | L1 |
| CS361.CO2 | Classify the responsibilities while designing the Project Master Plan | L2 |
| CS361.CO3 | Outline the Cost Estimating and Cost Escalation Process | L2 |
| CS361.CO4 | Demonstrate and highlight The Processes of Project Quality Management | L3 |
| CS361.CO5 | Analyze Project Management Maturity and Maturity Models | L4 |
| | **Course Code and Course Name :- Skill Development :WebTechnology (CS346)** | |
| CS346.CO1 | To understand the concepts and principles of web applications and development. | L2 |
| CS346.CO2 | To apply current web technologies and web business models. | L3 |
| CS346.CO3 | To understand and apply Web development processes. | L3 |
| CS346.CO4 | To understand the world wide web client-server request and response. | L2 |
| | **Course Code and Course Name :- Skill Development Red Hat Linux (CS344)** | |
| CS344.CO1 | Illustrate essential Linux administration tasks. | L2 |
| CS344.CO2 | Experiment with installation, networking and user profiles. | L3 |
| CS344.CO3 | Examine physical storage,file systems and log files. | L3 |
| CS344.CO4 | Inspect the Linux processes, control services, daemons and basic security administration. | L3 |
| CS344.CO5 | Analyze Redhat Linux System with a comprehensive and systematic approach. | L4 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Code and Course Name :- Project Design (CS350)** | | |
| CS350.CO1 | Delineate the problem to be solved. | L3 |
| CS350.CO2 | Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges. | L4 |
| CS350.CO3 | Carry out systematic literature review, planning and project design. | L4 |
| CS350.CO4 | Cognize the importance of documentation and report writing. | L3 |
| **Course Code and Course Name :- Design and Analysis of Algorithms (CS347)** | | |
| CS347.CO1 | Make use of the Five problem solving strategy to design an algorithm. | L3 |
| CS347.CO2 | Analyze the given algorithm in terms of its computational complexity. | L4 |
| CS347.CO3 | Apply prior knowledge of standard algorithm to solve new problem. | L3 |
| CS347.CO4 | Evaluate the intractable problems using approximation algorithms. | L5 |
| CS347.CO5 | Compare various string matching Algorithms. | L2 |
| **Course Code and Course Name :- Software Engineering (CS349)** | | |
| CS349.CO1 | Classify process models. | L2 |
| CS349.CO2 | Analyze conformance of the requirement related to project development. | L4 |
| CS349.CO3 | Develop design models using UML diagram. | L3 |
| CS349.CO4 | Mitigate the risk associated with project development. | L4 |
| CS349.CO5 | Evaluate the schedule, cost and staff associated with project. | L5 |
| CS349.CO6 | Review quality assurance through test driven development. | L4 |
| **Course Code and Course Name :- Compiler Design (CS348)** | | |
| CS348.CO1 | Use different compiler construction tools to show the working of every compiler phase(L3) | L3 |
| CS348.CO2 | Demonstrate working of lexical analyser and parser by using FLEX & BISON(L3) | L3 |
| CS348.CO3 | Choose efficient parsing techniques for given grammar(L4) | L4 |
| CS348.CO4 | Develop Syntax Directed Translation Schemes for the given grammar(L6) | L6 |
| CS348.CO5 | Apply code generation and optimization techniques(L3) | L3 |
| **Course Code and Course Name :- Employability & Career Development (HP305)** | | |
| HP305.CO1 | Relate the importance of Employability Career Development (L2) | L2 |
| HP305.CO2 | Build necessary, specific professional skills (L3) | L3 |
| HP305.CO3 | Analyze the environment of employability (L4) | L4 |
| HP305.CO4 | Develop various techniques of effective team building in their professional life (L6) | L6 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Code and Course Name :- Machine Learning (CS355)** | | |
| CS355.CO1 | Design and implement various machine learning algorithms in a range of real-world ap plications | **L3** |
| CS355.CO2 | Analysis of the fundamental issues and challenges of model selection and its complexity | **L4** |
| CS355.CO3 | Make use of various algorithms for Natural Language Processing and Information Retrieval | **L3** |
| CS355.CO4 | Decide appropriate methods for applications of machine learning in Computer Vision and Pattern Recognition. | **L4** |
| **Course Code and Course Name :- Predictive Analytics (CS354)** | | |
| CS354.CO1 | Analyze various Association Algorithms. | **L3** |
| CS354.CO2 | Apply the classification and prediction techniques to solve real world problems. | **L3** |
| CS354.CO3 | Use advanced classification techniques. | **L3** |
| CS354.CO4 | Apply artificial neural network on a real application. | **L3** |
| CS354.CO5 | Analyze the unsupervised learning methods. | **L4** |
| CS354.CO6 | Apply the conceptual clustering and ensemble learning methods on a real-life | **L3** |
| **Course Code and Course Name :- Cloud Native Application Development (CS356)** | | |
| CS356.CO1 | To configure the software development kit for various AWS services | **L3** |
| CS356.CO2 | To develop various compute services in cloud | **L3** |
| CS356.CO3 | To access various database services through a web application | **L3** |
| CS356.CO4 | To distuinguish between protocols for developing own API | **L4** |
| CS356.CO5 | To select an appropriate configuration for provisioning infrastructure as a code | **L3** |
| CS356.CO6 | To develop a web application using various cloud services | **L3** |
| **Course Code and Course Name :- Cyber Security & Forensic (CS352)** | | |
| CS352.CO1 | Identify different cybercrimes and offences that can attack a network. | **L1** |
| CS352.CO2 | Complete Implementing a secure wireless network in the organization. | **L2** |
| CS352.CO3 | Articulate a secure network environment with the help of various network components. | **L2** |
| CS352.CO4 | Illustrate the fundamental risk management principles related to Cyber intelligence. | **L4** |
| CS352.CO5 | Analyze the Digital evidences and Digital Forensics Life Cycle. | **L3** |
| CS352.CO6 | Evaluate the security vulnerabilities in the system with the help of forensics tools. | **L4** |

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Course Code and Course Name :- SDL : Advanced Java (CS357)** | |
| CS357.CO1 | Construct java applications using multithreading and networking concepts | L3 |
| CS357.CO2 | Build web applications using Servlet, JSP. | L3 |
| CS357.CO3 | Explore JSF framework for the better user interfaces. | L2 |
| CS357.CO4 | Integrate Hibernate and spring framework with applications | L4 |
| CS357.CO5 | Develop advanced enterprise web applications | L4 |
| | **Course Code and Course Name :- SDL: .DOT NET (CS358)** | |
| CS358.CO1 | Implement object-oriented programming and C# multitasking concepts(L3) | L3 |
| CS358.CO2 | Explore application development with C# 8.0 and .NET (L3) | L2 |
| CS358.CO3 | Design windows forms for different applications(L6) | L3 |
| CS358.CO4 | Use Entity Framework and work with relational databases(L3) | L3 |
| CS358.CO5 | Develop web applications using a combination of client-side and server-side technologies (L3) | L3 |
| | **Course Code and Course Name :- SDL : RED HAT LINUX (CS359)** | |
| CS349.CO1 | Illustrate essential Linux administration tasks. | L2 |
| CS349.CO2 | Experiment with installation, networking and user profiles. | L3 |
| CS349.CO3 | Examine physical storage, file systems and log files. | L3 |
| CS349.CO4 | Inspect the Linux processes, control services, daemons and basic security administration. | L2 |
| CS349.CO5 | Analyze Redhat Linux System with a comprehensive and systematic approach. | L4 |
| | **Course Code and Course Name :- Minor Project - Implementation (CS360)** | |
| CS360.CO1 | Analyze techniques, algorithms and design process related to the project. | L4 |
| CS360.CO2 | Infer conclusions by implementing/developing/experimenting/simulating/testing the dif-ferent techniques/processes. | L4 |
| CS360.CO3 | Cognize the importance of documentation and report writing. | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Final Year, BTech (Information Technology)** | | |
| **Course Code and Course Name :- Distributed Systems (CS481)** | | |
| CS481.CO1 | Identify the goals of Distributed System for a particular Architecture type. | **L2** |
| CS481.CO2 | Implement the MPI programs for distributed system applications. | **L3** |
| CS481.CO3 | Differentiate between different clock synchronization algorithms. | **L3** |
| CS481.CO4 | Choose appropriate algorithms for incorporating replication and consistency in the given distributed system application. | **L5** |
| CS481.CO5 | Decide fault tolerance mechanism to be used for particular distributed system application | **L5** |
| CS481.CO6 | Explain distributed File System with reference to scalability, concurrency, transparency, replication and Fault Tolerance. | **L2** |
| **Course Code and Course Name :- Wireless and Mobile Networks (CS472)** | | |
| CS472.C01 | Determine issues and challenges in Wireless Networks. | **L3** |
| CS472.C02 | Categories different types of wireless networks. | **L4** |
| CS472.C03 | Determine issues and challenges of Mobile Ad-Hoc Networks. | **L3** |
| CS472.C04 | Assessing the features of Mobile Ad-Hoc Networks. | **L3** |
| CS472.C05 | Assessing the features of Wireless Sensor Networks. | **L3** |
| CS472.C06 | Apply different security algorithms in wireless Network. | **L3** |
| **Course Code and Course Name :- Information Retrieval (CS473)** | | |
| CS473.CO1 | Understand the process of representing, retrieving and analyzing IR models and advanced IR models. | **L2** |
| CS473.CO2 | Understand structure of web and working of crawlers | **L2** |
| CS473.CO3 | Develop IR models form standard IR models | **L6** |
| CS473.CO4 | Demonstrate the standard methods for web indexing and evaluation | **L3** |
| CS473.CO5 | To analyze optimization techniques & various algorithms used in web search | **L4** |
| **Course Code and Course Name :- Computer Vision (CS477)** | | |
| CS477.CO1 | Explain image formation and operations. | **L2** |
| CS477.CO2 | Implement Binary Image Processing operations. | **L3** |
| CS477.CO3 | Compare different image enhancement and feature extraction techniques. | **L3** |
| CS477.CO4 | Apply methods of computer vision for image segmentation and recognition. | **L3** |
| CS477.CO5 | Identify the design requirement of video processing. | **L2** |
| CS477.CO6 | Suggest a design of a computer vision system for a specific problem. | **L5** |
| **Course Code and Course Name :- Skill Development Course - Android Application Development  (CS456)** | | |

| CO's | CO Statement | BT Level |
|------|-------------|----------|
| CS456.CO1 | Learn Android application development tools and environment. | L2 |
| CS456.CO2 | Prepare User Interfaces for the Android platform. | L3 |
| CS456.CO3 | Apply SQLite light weight database and store information in persistence storage | L3 |
| CS456.CO4 | Create various Layouts and Widgets in Android Applications | L4 |
| CS456.CO5 | Build Android application | L5 |
| **Course Code and Course Name :- Skill Development Course - AWS Cloud Services (CS485)** | | |
| CS485.CO1 | Define different types of cloud computing models and review the AWS Cloud Adoption Framework (AWS CAF) | L2 |
| CS485.CO2 | Create VPC and add additional components to produce customized network | L5 |
| CS485.CO3 | Demonstrate when to use AWS Elastic Beanstalk, AWS Lambda. | L2 |
| CS485.CO4 | Implement Amazon RDS database such as launching, configuring and interacting. | L3 |
| CS485.CO5 | Design and configure different types of security credentials in IAM | L5 |
| **Course Code and Course Name :- Ethical Hacking (IT461)** | | |
| IT461.CO1 | Describe hacking concepts, and scopes. | L2 |
| IT461.CO2 | Apply different approaches to perform Footprinting through search engine, web and network sites. | L3 |
| IT461.CO3 | Analyze vulnerability assessment reports. | L3 |
| IT461.CO4 | Apply different techniques to privilege escalation and gain the access to a system. | L4 |
| IT461.CO5 | Perform various web server attacks its countermeasures. | L2 |
| IT461.CO6 | Demonstrateddifferent techniques to perform various web application attack. | L5 |
| **Course Code and Course Name :- Big Data Analytics (CS461)** | | |
| CS461.CO1 | Prepare for data summarization, query, and analysis. | L2 |
| CS461.CO2 | Apply data modeling techniques to large data sets. | L3 |
| CS461.CO3 | Inspect applications for Big Data analytics. | L4 |
| CS461.CO4 | Build a complete business data analytic solution. | L5 |
| **Course Code and Course Name :- Deep Learning (CS462)** | | |
| CS462.CO1 | Understand the fundamentals of deep learning. | L2 |
| CS462.CO2 | Recognize significances of deep learning algorithms to handle high dimensional data. | L2 |
| CS462.CO3 | Interpret the application requirements in field of Computer vision and Natural language processing. | L3 |
| CS462.CO4 | Analyze experimental results of different algorithms in deep learning. | L4 |
| CS462.CO5 | Optimize algorithms using various approaches to improve performance of model. | L5 |
| CS462.CO6 | Assemble variety of deep learning algorithm to develop the model. | L5 |
| **Course Code and Course Name :- Cloud Native Apps (CS463)** | | |

| CO's | CO Statement | BT Level |
|------|-------------|----------|
| CS463.CO1 | To develop the automated the SDLC Process | L5 |
| CS463.CO2 | To summerize the various advanced facilities available to launch infrastructure using cloudformation. | L2 |
| CS463.CO3 | To differenciate between AWS Elastic Container Service, AWS Fargate and AWS Elastic Kubernetes Service. | L2 |
| CS463.CO4 | To implement the various policies and standards required for automation. | L3 |
| CS463.CO5 | To design the systems with detailed plan for High Availability and Disaster Recovery. | L4 |
| CS463.CO6 | To develop a infrastructure using Jenkins. | L5 |

# Course Outcomes

## B. Tech

## (Mechanical Engineering)

## (2019 – 2023)

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Second Year, BTech (Mechanical Engineering)** | |

| Course Name and Course Code | Strength of Materials (ME231) | |
|---|---|---|
| ME231.CO.1 | Memorize the fundamental concepts including static equilibrium, geometry of deforma- tion, and material constitutive behavior. | L1 |
| ME231.CO.2 | Understand the concept of resistance, deformation and thermal stresses and  Principal Stresses. | L2 |
| ME231.CO.3 | Construct shear forces and bending moment diagrams for different beams under various loads. | L6 |
| ME231.CO.4 | Analyze concept of Slope and Deflections, Bending and Shear stresses in beams  for solving numerical. | L4 |
| ME231.CO.5 | Judge suitable dimensions for Column, solid and hollow circular shafts for mechanical systems. | L5 |
| **Course Name and Course Code** | **Thermal Engineering (ME232)** | |
| ME232.CO.1 | Apply the basic concepts and laws of thermodynamics to various thermal processes and real systems. | L3 |
| ME232.CO.2 | Formulate performance of various thermodynamic gas power cycles. | L6 |
| ME232.CO.3 | Evaluate performance characteristics of IC engine and recent IC engine technologies. | L5 |
| ME232.CO.4 | Examine the quality of steam and performance of steam generators | L4 |
| **Course Name and Course Code** | **Manufacturing Technology(ME233)** | |
| ME233.CO.1 | Illustrate the working of various conventional manufacturing machines. | L3 |
| ME233.CO.2 | Choose proper tools and various machining parameters for manufacturing. | L3 |
| ME233.CO.3 | Demonstrate the working of various Machines like CNC, VMC, HMC. | L3 |
| ME233.CO.4: | Outline the concept of digital manufacturing. | L2 |
| **Course Name and Course Code** | **Digital Prototyping (ET224)** | |
| ET224.CO.1 | Consolidate the techniques, skills and modern engineering tools. | L3 |
| ET224.CO.2 | Apply acquired skills to the construction of a prototype project. | L3 |
| ET224.CO.3 | Develop a prototype project by performing tasks in team | L6 |
| ET224.CO.4 | Demonstrate the work carried out in a team. | L3 |
| **Course Name and Course Code** | **Industrial Measurements & Instrumentation (ME241)** | |
| ME241.CO.1 | Identify the correct measuring instruments for different measurements. | L2 |
| ME241.CO.2 | Summarize different types of Limits, Fits and tolerances. | L1 |
| ME241.CO.3 | Demonstrate industrial measurements using suitable instruments. | L3 |
| ME241.CO.4 | Estimate dimensions of complex geometries like groove, pitch diameter using electronic height gauge. | L5 |
| ME241.CO.5 | Verify the accuracy of measuring instruments. | L5 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Minor Project- Design (ME230)** | |
| ME230.CO.1 | Delineate the problem to be solved | L2 |
| ME230.CO.2 | Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession. | L2 |
| ME230.CO.3 | Embark project planning and design. | L1 |
| ME230.CO.4 | Inculcate problem solving skills and critically analyze the options available to solve the problem. | L3 |
| ME230.CO.5 | Cognize the importance of documentation and report writing. | L2 |
| **Course Name and Course Code** | **Environmental Science (CV203)** | |
| CV203.CO.1 | summarize the importance of ecosystem and biodiversity for maintaining ecological bal- ance | L2 |
| CV203.CO.2 | identify environmental problems arising due to engineering and technological activities and the science behind those problems | L2 |
| CV203.CO.3 | categorize the major pollutants along with sources and abatement devices for the envi- ronmental management | L4 |
| CV203.CO.4 | analyze material balance for different environmental systems | L4 |
| CV203.CO.5 | perceive the social and professional responsibility towards the environment | L1 |
| CV203.CO.6 | appraise the environmental factors so as to ensure sustainable development | L5 |
| **Course Name and Course Code** | **Materials Engineering (ME221)** | |
| ME221.CO.1 | Relate the applications of various engineering materials and heat treatment processes in material processing industry. | L2 |
| ME221.CO.2 | Interpret the specifications, composition, concepts and fundamental properties of engi- neering materials applied in industrial/research field | L3 |
| ME221.CO.3 | Select the suitable materials, manufacturing process for specified application to meet the product performance requirements within its product service life. | L2 |
| ME221.CO.4 | Analyze the suitable material testing and characterization technique to ensure service life for specific product without any failure or deterioration in its performance | L4 |
| **Course Name and Course Code** | **Machines & Mechanisms (ME234)** | |
| ME234.CO.1 | State the concept of degrees of freedom and select suitable mechanisms for the engineer- ing applications | L1 |
| ME234.CO.2 | Determine kinematic analysis (Velocity, acceleration, Inertia forces) for a given mecha- nism using graphical methods | L3 |
| ME234.CO.3 | Calculate the velocity ratios of belt and rope drives with analytical methods and suggest suitable applications | L3 |
| ME234.CO.4 | Sketch different types of cam profiles for a given follower motions using drawing tools | L3 |
| ME234.CO.5 | Solve the numericals based on simple and epicyclic gear trains using formula methods | L3 |
| ME234.CO.6 | Analyze the effect of gyroscopic couple and turning moment diagrams for flywheel. | L4 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Fluid Mechanics (ME235)** | |
| ME235.CO.1 | Interpret the properties and behavior of the fluid at rest and in motion | L3 |
| ME235.CO.2 | Explain different parameters related to fluid kinematics to visualize the fluid flow. | L2 |
| ME235.CO.3 | Utilize different equations of fluid flow to compute the velocity and discharge. | L3 |
| ME235.CO.4 | Analyze the laminar and turbulent internal flows considering the losses | L4 |
| ME235.CO.5 | Evaluate various parameters related to the flow around immersed bodies and present the governing equation in non dimensional form. | L5 |
| **Course Name and Course Code** | **Engineering Informatics (ME222)** | |
| ME222.CO.1 | Understand data and its types, information and knowledge of information life cycle (ILC). | L2 |
| ME222.CO.2 | Make use of sensors, data acquisition systems (DAS) and design of experiment (DoE). | L6 |
| ME222.CO.3 | Identify various data storage, data transmission, data analysis, data prediction and optimization techniques. | L2 |
| ME222.CO.4 | Learn in depth knowledge of data/information visualisation and hands on experience on various data management and visualisation techniques. | L2 |
| ME222.CO.5 | Understand the human computer interaction (HCI) system and computation techniques | L2 |
| ME222.CO.6 | Design of IoT based information system | L6 |
| **Course Name and Course Code** | **Rapid Prototyping (ET235)** | |
| ET235.CO.1 | Consolidate the techniques, skills and modern engineering tools. | L3 |
| ET235.CO.2 | Apply acquired skills to the construction of a prototype project | L3 |
| ET235.CO.3 | Develop a prototype project by performing tasks in team. | L6 |
| ET235.CO.4 | Demonstrate the work carried out in a team. | L3 |
| **Course Name and Course Code** | **Professional Skills  (HP 202)** | |
| HP202.CO.1 | Express themselves effectively in routine and real-world interactions through verbal and written communication. | L3 |
| HP202.CO.2 | Show Confident Public Speaking skills. | L3 |
| HP202.CO.3 | To showcase leadership qualities during tough tasks, make decisions and actions effec- tively within time. | L3 |
| **Course Name and Course Code** | **Minor Project- Implementation (ME 240)** | |
| ME240.CO.1 | Select appropriate method for making of solution. | L4 |
| ME240.CO.2 | Compare various engineering tools/technique to develop solution. | L4 |
| ME240.CO.3 | Justify the selected method/tools opted for making of solution. | L2 |
| ME240.CO.4 | Develop tangible solution to defined problem. | L6 |
| ME240.CO.5 | Test the developed solution. | L4 |
| ME240.CO.6 | Document solution in the form of Project report / IPR drafts. | L2 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Liberal Learning (HP203)** | |
| HP203.CO.1 | Develop a skill in the domain of their interest. | L6 |
| HP203.CO.2 | Demonstrate the skills learnt in the course. | L2 |
| HP203.CO.3 | Apply the concepts learnt in real-life situations. | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| | **Third Year, BTech (Mechanical Engineering)** | |

| Course Name and Course Code | Machine Design (ME341) | |
|---|---|---|
| ME341.CO.1 | Recall fundamental Design procedure and Design parameters for machine Elements. | L1 |
| ME341.CO.2 | Illustrate Design Procedure of the Machine Elements considering failure criterias. | L3 |
| ME341.CO.3 | Identify the various stresses induced in a machine elements for safer dimensions. | L2 |
| ME341.CO.4 | Examine the stresses induced in machine elements for various failure modes. | L4 |
| ME341.CO.5 | Determine the optimum and reliable solutions for the Mechanical Engineering problems based on required criterias. | L3 |
| **Course Name and Course Code** | **Turbomachines (ME342)** | |
| ME342.CO.1 | Classify the different turbo machines. [L1] | L2 |
| ME342.CO.2 | Illustrate energy transfer in turbo machines using thermo-fluid dynamics equation. [L2] | L3 |
| ME342.CO.3 | Model rotating element of turbo machines. [L3] | L3 |
| ME342.CO.4 | Analyse the overall performance of turbo machines. [L4] | L4 |
| ME342.CO.5 | Recommend the suitable turbo machines for required application. [L5] | L5 |
| **Course Name and Course Code** | **Hydraulics & Pneumatics (ME343)** | |
| ME343.CO.1 | Recognize principle of various components used for hydraulic & pneumatic systems.[L1] | L1 |
| ME343.CO.2 | Draw control circuits for hydraulic and pneumatic systems.[L3] | L3 |
| ME343.CO.3 | Evaluate different industrial applications of hydraulic and pneumatic system.[L5] | L5 |
| ME343.CO.4 | Design hydraulic circuits for industrial applications.[L4] | L4 |
| ME343.CO.5 | Troubleshooting of hydraulic & pneumatic circuits through Automation studio software.[L5] | L5 |
| **Course Name and Course Code** | **Finite Element Analysis (ME351)** | |
| ME351.CO.1 | Explain the fundamentals of finite element method. [L2] | L2 |
| ME351.CO.2 | Formulate simple problems into finite elements. [L3] | L3 |
| ME351.CO.3 | Solve for modeling and meshing of structural problems. [L3] | L3 |
| ME351.CO.4 | Derive element matrix equation by different methods by applying basic laws in mechanics and integration by parts. [L4] | L4 |
| ME351.CO.5 | Use professional-level finite element software to solve engineering problems in Solid me- chanics. [L5] | L5 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Automobile System Design (ME354)** | |
| ME354.CO.1 | To identify and visualize automotive parts [L1] | L2 |
| ME354.CO.2 | To select and design the different automobile system for given situation [L2] | L2 |
| ME354.CO.3 | To standardize the different parts according to norms [L3] | L3 |
| ME354.CO.4 | To optimize the parts for given condition [L4] | L4 |
| **Course Name and Course Code** | **Robot Fundamentals and Kinematics (ME352)** | |
| ME352.CO.1 | List the key components of Industrial robot. [L1] | L1 |
| ME352.CO.2 | Classify, sensors and actuators of industrial robots. [L2] | L2 |
| ME352.CO.3 | Select transmission system for robots. [L4] | L2 |
| ME352.CO.4 | Apply the kinematics and Inverse kinematics principles to robot. [L3] | L3 |
| ME352.CO.5 | Determine the Trajectory of the given robot. [L5] | L5 |
| ME352.CO.6 | Build the task based robot by applying knowledge of sensors, actuators.[L6] | L3 |
| **Course Name and Course Code** | **Project Management (CS361)** | |
| CS361.CO.1 | Identify the Project Management Knowledge Areas and Processes. | L2 |
| CS361.CO.2 | Classify the responsibilities while designing the Project Master Plan. | L2 |
| CS361.CO.3 | Outline the Cost Estimating and Cost Escalation Process. | L2 |
| CS361.CO.4 | Demonstrate and highlight The Processes of Project Quality Management. | L3 |
| CS361.CO.5 | Analyze Management of a Project and Maturity Models. | L4 |
| **Course Name and Course Code** | **Computer Aided Product Design (ME371)** | |
| ME372.CO.1 | Design solid parts. [L2] | L6 |
| ME372.CO.2 | Build assemblies. [L3] | L3 |
| ME372.CO.3 | Design intent applied to solid parts and assemblies. [L4] | L6 |
| ME372.CO.4 | Create sheet metal components. [L5] | L6 |
| ME372.CO.5 | Generate the NC program using software package. [L4] | L6 |
| **Course Name and Course Code** | **Project Design (ME350)** | |
| ME350.CO.1 | Delineate the problem to be solved. | L2 |
| ME350.CO.2 | Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges. | L3 |
| ME350.CO.3 | Carry out systematic literature review, planning and project design. | L2 |
| ME350.CO.4 | Cognize the importance of documentation and report writing. | L2 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Design of Transmission Systems (ME344)** | |
| ME344.CO.1 | Recall fundamental Design procedure and Design parameters for Transmission System elements. | L1 |
| ME344.CO.2 | Illustrate Design Procedure of the Machine Elements considering failure criteria. | L3 |
| ME344.CO.3 | Identify the various stresses induced in a Transmission element for safer dimensions. | L2 |
| ME344.CO.4 | Examine the stresses induced in transmission elements for various failure modes. | L4 |
| ME344.CO.5 | Determine the optimum and reliable solutions for the Mechanical Engineering problems based on required criterias. | L3 |
| **Course Name and Course Code** | **Heat Transfer (ME346)** | |
| ME346.CO.1 | Define the important modes of heat transfer and state their applications. | L1 |
| ME346.CO.2 | Compare the heat transfer rate of different thermal system. | L4 |
| ME346.CO.3 | Calculate heat transfer by conduction, convection and thermal radiation for real life applications. | L3 |
| ME346.CO.4 | Analyze heat transfer in thermal systems involving several heat transfer mechanisms. | L4 |
| ME346.CO.5 | Recommend suitable Heat Exchanger for any practical application. | L6 |
| **Course Name and Course Code** | **Quality Management (ME347)** | |
| ME347.CO.1 | Identify different quality management principles. | L2 |
| ME347.CO.2 | Explain the different types tools used in quality management. | L2 |
| ME347.CO.3 | Describe different quality management systems. | L2 |
| ME347.CO.4 | Apply QC tools in solving industrial problems. | L3 |
| ME347.CO.5 | Prepare corrective action plan for given problems using value engineering techniques. | L3 |
| **Course Name and Course Code** | **Computational Fluid Dynamics (ME361)** | |
| ME361.CO.1 | Summarize basic physical laws for numerical modeling in fluid flow and heat transfer. [L2] | L2 |
| ME361.CO.2 | Solve the governing equations in fluid flow and heat transfer by appropriate Discretiza tion Method. [L3] | L3 |
| ME361.CO.3 | Apply appropriate numerical scheme for basic fluid flow and heat transfer problems. [L3] | L3 |
| ME361.CO.4 | Develop a CFD code for basic fluid flow and heat transfer problems. [L4] | L6 |
| **Course Name and Course Code** | **Vehicle Dynamics (M364)** | |
| ME364.CO.1: | Understand the dynamics of vehicle ride. | L2 |
| ME364.CO.2: | Apply aerodynamics to find airflow and pressure distribution on automobile. | L3 |
| ME364.CO.3: | Calculate and refer the loads and forces associated to the vehicles. | L3 |
| ME364.CO.4: | Analyze the behavior of the vehicles under acceleration, ride and braking. | L4 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Mechanical Simulations (ME381)** | |
| ME381.CO.1 | Illustrate the fundamental ideas and concepts of the FEM and CFD. | L3 |
| ME381.CO.2 | Apply machine design, mechanics of materials, fluid mechanics, and heat transfer topics to provide preliminary results used for testing the CAE results. | L3 |
| ME381.CO.3 | Understand the modeling and meshing of structural, heat transfer and fluid problems. | L2 |
| ME381.CO.4 | Analyze complex geometries and loading states to validate with analytical solution. | L4 |
| ME381.CO.5 | Solve complex problems in solid mechanics and heat transfer using commercial CAE software. | L3 |
| **Course Name and Course Code** | **Employability and Career Development (HP305)** | |
| HP305.CO.1 | Relate the importance of Employability Career Development (L2) | L2 |
| HP305.CO.2 | Build necessary, specific professional skills (L3) | L3 |
| HP305.CO.3 | Analyze the environment of employability (L4) | L4 |
| HP305.CO.4 | Develop various techniques of effective team building in their professional life (L6) | L6 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Final Year, BTech (Mechanical Engineering)** | | |

| Course Name and Course Code | Operation Research (ME471) | |
|---|---|---|
| ME471.CO.1 | Develop linear programming models and their solutions. | L6 |
| ME471.CO.2 | Apply Transportation and Assignment Models for real systems. | L3 |
| ME471.CO.3 | Investigate decision and game theory problems. | L4 |
| ME471.CO.4 | Analyses the network and scheduling problems. | L4 |
| Course Name and Course Code | Mechanical Control System (ME472) | |
| ME472.CO.1 | Relate the principle of feedback control systems. | L1 |
| ME472.CO.2 | Develop the control circuits using a block & Signal flow diagram. | L3 |
| ME472.CO.3 | Evaluate and identify the PID controlled systems. | L5 |
| ME472.CO.4 | Construct basic PLC circuits for industrial applications using WinProladder software. | L4 |
| ME472.CO.5 | Classify DCS operation in Industrial control equipment. | L2 |
| Course Name and Course Code | Mechanical System Design (ME473) | |
| ME473.CO.1 | Explore the difference between component level design and system level design. | L2 |
| ME473.CO.2 | Design various mechanical systems like pressure vessels, I. C. engine, material handling systems, etc. for the specifications stated/formulated. | L6 |
| ME473.CO.3 | Identify optimum design principles and apply it to mechanical components. | L2 |
| ME473.CO.4 | Optimize design for efficient performance | L6 |
| ME473.CO.5 | Apply the concept of system design. | L3 |
| Course Name and Course Code | Sustainable Energy Development (ME 474) | |
| ME474.CO.1 | Evaluate Sustainability of renewable energy systems. | L5 |
| ME474.CO.2 | Elaborate energy Sustainability issues in India. | L2 |
| ME474.CO.3 | Estimate energy footprint. | L5 |
| ME474.CO.4 | Evaluate the role of green buildings in achieving sustainability. | L5 |
| ME474.CO.5 | Summarize circular economy concept. | L2 |
| ME474.CO.6 | Demonstrate sustainability using open LCA | L3 |
| Course Name and Course Code | Artificial Intelligence (ME475) | |
| ME475.CO.1 | Apply basic principles of knowledge representation, inference and reasoning in Artificial Intelligence.[L3] | L3 |
| ME475.CO.2 | Apply the data analytics tools for data processing, regression and hypothesis testing, performance analysis. [L3] | L3 |
| ME475.CO.3 | Apply problem solving and searching techniques of Artificial Intelligence to reach desired goals. [L3] | L3 |
| ME475.CO.4 | Apply the AI algorithms to provide better solutions for the projects / problems under- taken. [L3] | L3 |

| CO's | CO Statement | BT Level |
|---|---|---|
| **Course Name and Course Code** | **Advanced Computational Fluid Dynamics (ME491)** | |
| ME491.CO.1 | To formulate a CFD code for Nonlinear and Multi-Solid Conduction | L6 |
| ME491.CO.2 | To develop a CFD code for curvilinear grid generation and 2D unsteady heat conduction on a complex geometry | L6 |
| ME491.CO.3 | Apply appropriate computational Scheme to multiphase problems | L3 |
| ME491.CO.4 | Analyze Turbulence models to engineering fluid flow problems | L4 |
| **Course Name and Course Code** | **Autotronics and e-vehicles (ME494)** | |
| ME494.CO.1 | Describe electronic control system components | L2 |
| ME494.CO.2 | Maintain automotive sensors and actuators | L1 |
| ME494.CO.3 | Diagnosis of fault codes in vehicle system | L4 |
| ME494.CO.4 | Selection and Application of BMS system in E-Vehicles | L2 |
| **Course Name and Course Code** | **Object Oriented Programming with Python (ME407)** | |
| ME407.CO.1 | Apply conditional statement, loops condition and functions in python program. | L3 |
| ME407.CO.2 | Solve mathematical and mechanical problems using python program. | L3 |
| ME407.CO.3 | Plot various type of chart using python program. | L3 |
| ME407.CO.4 | Analyze the mechanical problem using python program. | L4 |
| **Course Name and Course Code** | **Refrigeration & Air Conditioning (ME461)** | |
| ME461.CO.1: | Explore fundamental principles of refrigeration cycles used in air conditioning and refrigeration systems. [L2] | L2 |
| ME461.CO.2: | Apply concepts of non-conventional refrigeration principle and air-conditioning cycles in developing energy efficient cooling systems. [L3] | L3 |
| ME461.CO.3: | Estimate different psychometric properties using psychometric chart to solve commercial cooling and heating problems. [L4] | L5 |
| ME461.CO.4: | Analyze air-conditioning processes using the principles of Psychrometry. [L4] | L4 |
| ME461.CO.5: | Calculate the load on the cooling coil and fix the supply conditions for various airconditioning systems. [L5] | L3 |
| **Course Name and Course Code** | **Capstone Portfolio (ME480)** | |
| ME480.CO.1: | Portray individual skill for solving the problem. (L4) | L4 |
| ME480.CO.2: | Showcase and exhibit the best techniques and suitable methodology. (L5) | L5 |
| ME480.CO.3: | Cognize the significance of report and comprehend its reflections. (L4) | L4 |
| ME480.CO.4: | Assimilate digital and visual literacies. (L5) | L5 |