B.Tech : I[st] year (I[st] and II[nd] Semester)	
Subject Name	**Engineering Chemistry**
Subject Code	**BT – 101**
Students will be able to:	
CO 1	Determine hardness and alkalinity of water.
CO 2	Illustrate properties of lubricants and polymers with respect to their applications.
CO 3	Interpret graphical representation of phase equilibrium diagram and mechanism of corrosion.
CO 4	Analyze electronic, vibrational and rotational Spectroscopy.
CO 5	Determine periodic properties of various elements in s, p, d and f orbital's.

Subject Name	**Engineering Mathematics-I**
Subject Code	**BT – 102**
Students will be able to:	
CO 1	Apply Fundamental theorems of calculus in solving Engineering problems.
CO 2	Determine surface areas and volumes of revolution by method of integration.
CO 3	Use sequential series in generation of waves.
CO 4	Analyze the transformation of function from one stage to another by vectors and their combination.
CO 5	Solve complex problems of engineering through matrices.

Subject Name	**Communication Skills**
Subject Code	**BT – 103**
Students will be able to:	
CO 1	Develop grammatical competence.
CO 2	Demonstrate lexical ability.
CO 3	Demonstrate effective oral and written communication.
CO 4	Create reports, resumes, and other technical documents effectively and coherently.
CO 5	Show competency in business communication skills in real world.

Subject Name	**Basic Electrical and Electronics Engineering**
Subject Code	**BT – 104**
Students will be able to:	
CO 1	Analyze electrical and electronics circuits using network theorems and laws.
CO 2	Analyze the performance of AC circuits.
CO 3	Apply electromagnetic induction principle for the performance analysis of magnetic circuits like transformer etc.
CO 4	Classify the electrical machines for different applications.
CO 5	Utilize basic concepts of semiconductor devices and digital circuits for problem solving.

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Subject Name		Engineering Graphics
Subject Code		BT – 105
Students will be able to:		
CO 1	Apply BIS standards and conventions while drawing Lines, printing letters and showing dimensions.	
CO 2	Construct engineering scales, conic sections and engineering curves.	
CO 3	Apply the principle of orthographic projection to draw orthographic views of point, line, planes, solids and section of solids.	
CO 4	Convert pictorial and isometric view of simple objects to orthographic views and vice-versa	
CO 5	Create 2D and 3D models using Auto-CAD.	

Subject Name		Engineering Physics
Subject Code		BT – 201
Students will be able to:		
CO 1	Apply Schrodinger wave equation to one dimensional box.	
CO 2	Analyze interference and diffraction phenomena in wave optics.	
CO 3	Determine the conductivity in different type of semiconductor diodes.	
CO 4	Classify different types of lasers on the basis of their properties.	
CO 5	Estimate the charge distribution within a close surface.	

Subject Name		Engineering Mathematics-II
Subject Code		BT – 202
Students will be able to:		
CO 1	Solve ordinary differential equation of first order and higher degree.	
CO 2	Illustrate the concept of higher order differential equation and its application.	
CO 3	Solve linear and non-linear partial differential equation.	
CO 4	Apply function of complex variable to solve contour integration.	
CO 5	Apply the concept of vector calculus and its application in engineering problems.	

Subject Name		Basic Mechanical Engineering
Subject Code		BT – 203
Students will be able to:		
CO 1	Assess the engineering properties of ferrous materials.	
CO 2	Identify concepts of measurement, important manufacturing processes and machine tools.	
CO 3	Apply elementary principles of fluid statics and dynamics.	
CO 4	Apply laws of thermodynamics in steam engineering.	
CO 5	Estimate the efficiency of reciprocating machines.	

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Name of the Program	Bachelor of Technology
Subject Name	Basic Civil Engineering and Engineering Mechanics
Subject Code	BT – 204
Students will be able to:	
CO 1	Discuss critically different building materials and building components.
CO 2	Determine distance, direction and elevation of survey lines.
CO 3	Interpret contours, remote sensing techniques and cross section elements of given profile.
CO 4	Analyze system of forces and trusses.
CO 5	Determine cross sectional properties and draw bending moment diagram of statically determinate beams.

Name of the Program	Bachelor of Technology
Subject Name	Basic Computer Engineering
Subject Code	BT – 205
Students will be able to:	
CO 1	Illustrate the basic understanding of computer hardware and software.
CO 2	Develop the problem solving skills using programming language.
CO 3	Develop deeper understanding of object oriented programming by using C++.
CO 4	Create comprehensive understanding of computer networking, security basics.
CO 5	Develop the basic concepts and state of the art of database and cloud technology.

Name of the Program	Bachelor of Technology
Subject Name	Engineering Chemistry Laboratory
Subject Code	BT – 101
COURSE OUTCOMES	
Students will be able to:	
CO 1	Examine alkalinity of water through neutralization titration method.
CO 2	Examine the hardness of water through titration method.
CO 3	Analyze the quality of lubricating oil.
CO 4	Evaluate percentage of metal in metal alloy.
CO 5	Analyze quality of coal through proximate analysis.

Name of the Program	Bachelor of Technology
Subject Name	Basic Electrical and Electronics Engineering Laboratory
Subject Code	BT – 104
Students will be able to:	
CO 1	Verify KVL and KCL for DC electrical circuits.
CO 2	Determine the performance of AC electrical circuits.
CO 3	Test for performance parameters of transformer.
CO 4	Demonstrate working of DC and AC machine.
CO 5	Analyze different semiconductor devices and digital circuits.

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(Run by ChandravadaniMahilaShikshaSamiti, Bhopal)
Approved By AICTE New Delhi & Govt. of Madhya Pradesh
Affiliated To Rajeev Gandhi Proudyogiki Vishwavidyalaya, Bhopal
Anand Nagar Post Piplani, BHEL, Bhopal-21, Ph. No.- 0755-2751801 Fax- 0755-2751679 website:www.titexcellence.net

Name of the Program	Bachelor of Technology
Subject Name	Communication Skills Laboratory
Subject Code	BT – 103
COURSE OUTCOMES	
Students will be able to:	
CO 1	Develop listening skills in English.
CO 2	Develop pronunciation skills, intonation and rhythm.
CO 3	Acquire basic proficiency in English conversation.
CO 4	Develop effectiveness in interview skills by the knowledge of all spheres of communication skills.
CO 5	Inculcate presentation skills in formal environment.

Name of the Program	Bachelor of Technology
Subject Name	Engineering Graphics Laboratory
Subject Code	BT – 105
After completion of this course, the student will be able to:	
CO 1	Prepare engineering drawings of objects as per BIS conventions mentioned in the relevant codes.
CO 2	Develop imaginative skills required to understand projection of solids, section of solids and developments of surfaces.
CO 3	Develop simple solids and their frustum/truncated part to interpret actual shape and size of raw materials needed.
CO 4	Develop isometric drawings of simple objects.
CO 5	Construct orthographic and isometric views in CAD environment.

Name of the Program	Bachelor of Technology
Subject Name	Manufacturing Practices
Subject Code	BT – 106
Students will be able to:	
CO 1	Develop mould cavity in green sand of given pattern.
CO 2	Prepare a fitting job of prescribed geometry.
CO 3	Create lap joint of wooden material in carpentry shop.
CO 4	Demonstrate different welding operations in the welding shop.
CO 5	Demonstrate turning operation using lathe machine.

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Name of the Program	Bachelor of Technology
Subject Name	Rural Outreach
Subject Code	BT – 108
Students will be able to:	
CO 1	Relate the importance of Swatch Bharat Abhiyan in Health and hygiene.
CO 2	Motivate communities of rural areas for personal hygiene.
CO 3	Create awareness towards sanitation and cleanliness.
CO 4	Apply modern and scientific techniques for managing society waste.
CO 5	Apply the technological innovation in the field of sanitation and cleanliness.

Name of the Program	Bachelor of Technology
Subject Name	Engineering Physics
Subject Code	BT – 201
After completion of this course, the student will be able to:	
CO 1	Determine the wavelength of laser beam by diffraction grating.
CO 2	Determine the radius of curvature of Plano convex lens and wavelength of light source by Newton's ring experiment.
CO 3	Deduct wavelength of different colors of white light using diffraction grating.
CO 4	Inspect the internal resistance of different types of semiconductor diodes by plotting V-I characteristics.
CO 5	Determine charge carriers density and mobility of a given semiconductor crystals by hall effect.

Name of the Program	Bachelor of Technology
Subject Name	Basic Mechanical Engineering Laboratory
Subject Code	BT – 203
Students will be able to:	
CO 1	Determine tensile and compressive strength of a material.
CO 2	Verify Bernoulli's equation using Bernoulli's Apparatus.
CO 3	Evaluate hardness of a given specimen.
CO 4	Perform turning operation using lathe machine.
CO 5	Demonstrate two stroke & four stroke petrol and diesel engines.

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Name of the Program	Bachelor of Technology
Subject Name	Basic Civil Engineering and Engineering Mechanics Laboratory
Subject Code	BT – 204
Students will be able to:	
CO 1	Determine properties of various building materials.
CO 2	Measure distance, direction and elevation of survey lines.
CO 3	Verify law of forces.
CO 4	Determine moment of inertia of fly wheel.
CO 5	Determine support reactions for given beam and truss experimentally.

Name of the Program	Bachelor of Technology
Subject Name	Basic Computer Engineering Laboratory
Subject Code	BT – 205
Students will be able to:	
CO 1	Interpret the fundamentals of word processing software skills.
CO 2	Implement the concept of control and condition statement in program.
CO 3	Write programs using concept of object oriented paradigm.
CO 4	Outline the concepts of linear data structures.
CO 5	Create database structure using SQL command.

Name of the Program	Bachelor of Technology
Subject Name	Language Laboratory and Seminar
Subject Code	BT – 206
Students will be able to:	
CO 1	Develop conversational skills in English.
CO 2	Build spontaneous and public speaking skills.
CO 3	Interpret text enhancing for reading proficiency.
CO 4	Evaluate critically and provide recommendations based on comprehension of a text.
CO 5	Construct and communicate thoughts in real world scenario and different roles.

Branch: Department of Computer Science Engineering	
Name of Subject:	Energy & Environmental
Subject Code:	ES 301
Student will be able to	
CO1	Classify various energy systems and resources.
CO2	Identify the elements of an Ecosystem.
CO3	Illustrate the Biodiversity and its conservation.
CO4	Examine various causes of Environmental Pollution
CO5	Discuss the issues involved in environmental social issues.

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Name of Subject: Discrete Structure	
Subject Code: CS 302	
Student will be able to	
CO1	Apply the concepts of the Set theory, Relation and Functions.
CO2	Illustrate the concepts of Algebraic Structures.
CO3	Analyze the relation between Propositional Logic and Finite state machines
CO4	Apply various types of graph structures to computational problem solving.
CO5	Apply the concept of phase diagram, posets, lattice and combinatorics to solve problems in multiple domains.

Name of Subject: Data Structure	
Subject Code: CS 303	
Student will be able to	
CO1	Summarize the concept of data structure and explore arrays and linked lists.
CO2	Classify various linear data structures with their representation and perform different operations on them.
CO3	Analyze algorithms for operations on Tree.
CO4	Analyze algorithms for operations on Graph.
CO5	Apply data structures to implement algorithms for searching and sorting.

Name of Subject: Data Structure Lab	
Subject Code: CS 303	
Student will be able to	
CO1	Develop program for different operations using array and linked list.
CO2	Develop programs for linear data structures
CO3	Build program for non linear data structures to solve various computing problems.
CO4	Apply various sorting, searching and hashing techniques
CO5	Develop code for real life problems like shortest path and MST using graph theory.

Name of Subject: Digital System	
Subject Code: CS 304	
Student will be able to	
CO1	Simplify Boolean expression using minimization techniques.
CO2	Design various combinational circuits.
CO3	Design various sequential circuits.
CO4	Contrast between logic families, Converters and programmable logic devices.
CO5	Illustrate the working principle of digital communication systems.

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Name of Subject: Digital System Lab	
Subject Code: CS 304	
Student will be able to	
CO1	Examine the truth table of digital circuits.
CO2	Design various combinational circuits.
CO3	Design sequential circuits using flip flop
CO4	Make use of digital ICs to implement digital circuits.
CO5	Test different digital circuits.

Name of Subject: Object Oriented Programming & Methodology	
Subject Code: CS-305	
Student will be able to	
CO1	Outline the basics of Object Oriented Programmings and its elements.
CO2	Apply the concepts of encapsulation and abstraction in Object Oriented Programmings.
CO3	Apply concept of inheritance in program development.
CO4	Discuss different polymorphisms methods with real world examples.
CO5	Apply concept of exception handling and multithreading.

Name of Subject: Object Oriented Programming & Methodology Lab	
Subject Code: CS-305	
Student will be able to	
CO1	Apply object oriented programming concept in program design.
CO2	Create programs using friend function and function overloading.
CO3	Implement concept of operator overloading, Inheritance and polymorphism in program design.
CO4	Construct programs to handle exceptions in programming in C++.
CO5	Build program using constructor and destructor.

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Name of Subject: Computer Workshop	
Subject Code: CS-306	
Student will be able to	
CO1	Make use of basics of Java Features using programming environment.
CO2	Apply Java collective framework to design data structures, generics and collections algorithms.
CO3	Develop programs using advance Java Features-Multithreading, Networking and JDBC.
CO4	Development of web based applications with the help of servlets, JSP and Multimedia.
CO5	Experiment with advanced web/internet programming technologies like J2ME, J2EE, EJB and XML.

Name of Subject: Evaluation of Internship-I completed at I year level	
Subject Code: BT107	
Student will be able to	
CO1	Demonstrate the ability to resolve the problems.
CO2	Demonstrate critical thinking skills, such as related to social issues.
CO3	Adapt professional software development environment.
CO4	Identify the different resources for the software development
CO5	Summarize new practices observed during internship

Name of Subject: Mathematics III	
Subject Code: BT 401	
Student will be able to	
CO1	Solve polynomial and transcendental equations using interpolation and extrapolation techniques.
CO2	Implement numerical differentiation and integration techniques by nm
CO3	Evaluate ordinary differential equations and partial differential equations.
CO4	Apply Laplace and Fourier transforms in complex engineering problems.
CO5	Analyze and represent complicated data in an easy way with various probability distributions.

Name of Subject: Analysis Design of Algorithm	
Subject Code: CS-402	
Student will be able to	
CO1	Analyze different divide and conquer algorithms with respect to time and space complexity.
CO2	Apply greedy strategies and Dynamic programming technique for algorithm development
CO3	Apply branch and bound and backtracking technique for the solution of computing problems
CO4	Apply the concepts of trees and graphs for solving of real world problems
CO5	Choose the problem solving strategies for given problem

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Name of Subject: Analysis Design of Algorithm Lab	
Subject Code: CS-402	
Student will be able to	
CO1	Create programs using Greedy method to find optimal solution for problems like single source shortest path algorithm
CO2	Create program using Dynamic programming concept for Floyd-Warshal algorithm.
CO3	Create program for Hamiltonian cycle problem using backtracking
CO4	Develop AVL and B-trees based simple search programs
CO5	Create programs using.Greedy method to find optimal solution for problems like single source shortest path algorithm

Name of Subject: Software Engineering	
Subject Code: CS-403	
Student will be able to	
CO1	Classify different software process models.
CO2	Determine software functional and non-functional requirements.
CO3	Design software process, architecture, user Interface.
CO4	Categorize various types of software testing techniques.
CO5	Discuss project management and software maintenance.

Name of Subject: Software Engineering Lab	
Subject Code: CS-403	
Student will be able to	
CO1	Apply the software engineering methodologies involved in the phases for project development.
CO2	Create function oriented and object oriented software design using tools like rational rose.
CO3	Develop software requirements specifications for a given problem.
CO4	Create structure and behavior of UML diagrams.
CO5	Create the test cases and test strategies for conventional software.

Name of Subject: Computer Organisation and Architecture	
Subject Code: CS-404	
Student will be able to	
CO1	Summarize the basic organization of computer with emphasis on working of each component.
CO2	Interpret the steps of execution of instruction cycle, micro instructions along with the control signals generated by control unit.
CO3	Evaluate the computer based different arithmetic operations.
CO4	Discuss input-output Organization of Computer System.
CO5	Classify various Memory devices, Multiprocessors with its working.

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Name of Subject: Computer Organisation and Architecture Lab	
Subject Code: CS-404	
Student will be able to	
CO1	Elaborate basic principles of computer architecture.
CO2	Interpret multiplication operation on memory.
CO3	Develop programs to perform addition operation on memory.
CO4	Construct programs to perform subtraction operation on memory.
CO5	Build the steps of execution of instructions and micro instructions along with the control signals generated by control unit.

Name of Subject: Operating Systems	
Subject Code: CS-405	
Student will be able to	
CO1	Develop the concept of operating systems and its services.
CO2	Contrast file system along with disk scheduling algorithms.
CO3	Analyze different process scheduling algorithms and memory management techniques to achieve better performance of a computer system.
CO4	Determine techniques to deal with different Concurrent processes.
CO5	Examine case studies of Unix/Linux and Windows operating system.

Name of Subject: Operating Systems Lab	
Subject Code: CS-405	
Student will be able to	
CO1	Construct a program for different CPU scheduling algorithm.
CO2	Build a program for different classical problem of synchronization.
CO3	Construct a program for different page replacement algorithm.
CO4	Create a program for disk scheduling algorithms.
CO5	Construct a program for Deadlock free condition.

Name of Subject: Programming Practices Python Lab	
Subject Code: CS406	
Student will be able to:	
CO1	Interpret the basic Python syntax.
CO2	Construct programs in python using conditional statements.
CO3	Demonstrate the concepts of object oriented programming like encapsulation, inheritance and polymorphism in python.
CO4	Identify the different types of exceptions occurring in python programs and handle them.
CO5	Utilize different Standard Libraries in python programs.

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Name of Subject: Theory of Computation	
Subject Code: CS –501	
Student will be able to	
CO1	Summarize the fundamentals of various Languages, Grammars & Automata.
CO2	Construct Automata to recognize the languages.
CO3	Select appropriate automata as per the requirements.
CO4	Prove properties of languages, grammars and automata using formal mathematical methods.
CO5	Discuss the complexity and limitation of computation in problem solving.

Name of Subject: Theory of Computation Lab	
Subject Code: CS –501	
Student will be able to	
CO1	Write a Program to implement DFA to accept a given language.
CO2	Write a program for modelling a system using PDA to accept appropriate language.
CO3	Write a program to implement turing machine to accept a given language.
CO4	Select appropriate automata to implement a given dynamic system of moderate complexity.
CO5	Measure Complexity of various Computation problems.

Name of Subject: Database Management Systems	
Subject Code: CS-502	
Student will be able to	
CO1	Discuss the concepts of Database and make use of ER diagram.
CO2	Write the database queries in the form of relational algebra and calculus expression.
CO3	Demonstrate the Normalization with example.
CO4	Utilize the concept of concurrency control & recovery mechanism for database.
CO5	Design RDBMS through Oracle / Postgresql / mySql.

Name of Subject: Database Management Systems Lab	
Subject Code: CS-502	
Student will be able to	
CO1	Create database structure using DDL commands.
CO2	Build user defined constraints on the database.
CO3	Create queries for interacting with database.
CO4	Construct procedures, cursor and trigger.
CO5	Develop a simple data base application in RDBMS.

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Name of Subject: Departmental Elective- Cyber Security	
Subject Code: CS-503(C)	
Student will be able to	
CO1	Classify the cyber crimes along with its challenges
CO2	Discuss perception of cyber criminals.
CO3	Identify and tackle the Cyber Crime
CO4	Discuss Criminal justice according latest Act for Digital Media Ethics Code
CO5	Select tools to avoid cyber crime

Name of Subject: Open Elective Internet and Web Technology	
Subject Code: CS-504(A)	
Student will be able to	
CO1	Outline the concept and state of the art of world wide web and effective web design
CO2	Apply HTML tags for user friendly web pages.
CO3	Design dynamic web pages using CSS and Javascript as per need of applications.
CO4	Develop server side scripting with PHP to generate the web pages dynamically using the database connectivity.
CO5	Create the modern Web applications using the client and server side technologies.

Name of Subject: Lab (Linux)	
Subject Code: CS-505	
Student will be able to	
CO1	Develop the Linux environment and shell scripts.
CO2	Analyze system and network based file system.
CO3	Build, control and monitor the system level process to optimize the Linux kernel.
CO4	Develop physical, user and system level security in Linux environment.
CO5	Carryout implementation of Apache web, Domain Name System, Dynamic Host Configuration Protocols and security server in Linux.

Name of Subject: Lab (Python)	
Subject Code: CS-506	
Student will be able to:	
CO1	Formulate Conditional statements and Loops for Python Programs
CO2	Construct programs to Read and write data to and from files in Python.
CO3	Design Graphical user Interfaces in Python
CO4	Create database applications in Python.
CO5	Develop real world Application in python using Pygam

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Name of Subject: Evaluation of Internship-II	
Subject Code: CS-507	
Student will be able to:	
CO1	Apply the real working environment principles in his/her professional development.
CO2	Correlate theoretical concepts learned in class rooms to the industrial work scenario.
CO3	Adapt professional software development environment.
CO4	Learn various key practices for working in team and optimizing processes.
CO5	Develop work competencies for a specific profession or occupation.

Name of Subject: Minor Project- I	
Subject Code: CS-508	
Student will be able to:	
CO1	Choose the technology to implement the project from the available technologies.
CO2	Identify the project based on the review of the selected technology.
CO3	Develop the project in legal and ethical ways using project management principals such as planning, scheduling, budgeting and risk management.
CO4	Work effectively with team members, communicate and resolve conflicts if any within the team.
CO5	To present their project outcomes effectively in verbal and written form.

Name of Subject: Machine Learning	
Subject Code: CS-601	
Student will be able to:	
CO1	Utilize the knowledge of probability, statistics and linear algebra to machine learning problems.
CO2	Determine terminologies involved in machine learning and deep learning models.
CO3	Build the concept of CNN, SVM and RNN to solve specific machine learning problem.
CO4	Build the concept of Reinforcement Learning framework to solve specific machine learning problem.
CO5	Apply the knowledge of machine learning algorithms in computer vision, speech processing and Natural language processing.

Name of Subject: Machine Learning Lab	
Subject Code: CS-601	
Student will be able to:	
CO1	Identify the hardware requirements for implementation of machine learning and install Anaconda and Tensor Flow in the laboratory.
CO2	Create the program using LSTM (Long Short Term Memory) for real world classification problem of moderate complexity.
CO3	Carry out implementation of SVM for three dimensional numerical data Classification
CO4	Examine which model is performing well for a specific problem.
CO5	Carry out implementation of CNN in tensor flow environment for Image Classification

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Name of Subject: Computer Networks	
Subject Code: CS-602	
Student will be able to:	
CO1	Outline basics of computer networks and design issues related to various layers of TCP/IP
CO2	Apply different protocols of data link layer
CO3	Apply multiple approaches for medium access control in a computer network
CO4	Analyze different routing algorithms to optimize the use of channel
CO5	Discuss transport and application issues (related to protocols such as HTTP, FTP, SMTP, SNMP, DNS, SSH etc.)

Name of Subject: Computer Networks Lab	
Subject Code: CS-602	
Student will be able to:	
CO1	Demonstrate computer network component and devices.
CO2	Analyze how communication works at different layers of TCP/IP model
CO3	Apply mathematical foundations to solve computational problems.
CO4	Apply the various Routing Protocols/Algorithms and Internetworking
CO5	Design network with client/server programming

Name of Subject: Departmental Elective Compiler Design	
Subject Code: CS-603(C)	
Student will be able to:	
CO1	Summarize the fundamentals & different phases of compiler with examples.
CO2	Construct Parsing Table & Show the parsing of string for various parsers.
CO3	Analyze data structures used for symbol table and runtime organization and errors in various phases
CO4	Apply code generation techniques to create target code.
CO5	Summarize the fundamentals & different phases of compiler with examples.

Name of Subject: Open Elective Project Management	
Subject Code: CS-604(B)	
Student will be able to:	
CO1	Contrast between conventional and modern software management techniques.
CO2	Apply the evaluation criteria to the various phases of the software management process.
CO3	Identify software development process workflow and put required checkpoints
CO4	To develop ability to monitor and control projects life cycle and risk involved.
CO5	Discuss the quality of the software products using software metrics.

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Name of Subject: Data Analytics Lab	
Subject Code: CS 605	
Student will be able to:	
CO1	Interpret the concepts of data analytics using statistics and probability
CO2	Demonstrate the data pre-processing techniques used in data analytics.
CO3	Identify the relation between Correlation and Covariance.
CO4	Develop programs in the field of data analytics based on R programming language.
CO5	Build programs using MATLAB and Python as data analytics tools.

Name of Subject: Skill Development Lab	
Subject Code: CS-606	
Student will be able to:	
CO1	Select appropriate software life cycle model, Process & methods for developing software product according user requirements & expectations.
CO2	Translate user requirements & expectations in the form of software requirement specification.
CO3	Make use of various design pattern & design methods for implementing the design of software product.
CO4	Develop skills in software development through analysis of case study.
CO5	Organize all activities like requirement analysis, design, and coding, testing, maintenance in the form of documentation for systematic execution of project.

Name of Subject: Minor Project II	
Subject Code: CS-608	
Student will be able to:	
CO1	Choose the technology to implement the project from the available technologies.
CO2	Identify the project title based on the review of the selected technology.
CO3	Develop the project in legal and ethical ways using project management principals such as planning, scheduling, budgeting and risk management.
CO4	Work effectively with team members, communicate and resolve conflicts if any within the team.
CO5	To present their project outcomes effectively in verbal and written form.

Name of Subject: Software Architectures	
Subject Code: CS-701	
Student will be able to:	
CO1	Outline the software architecture frame work and business cycle.
CO2	Choose a software architectural models, styles and patterns.
CO3	Select appropriate software architectural implementation technology.
CO4	Examine software architectures and review its design
CO5	Propose a documentation using standard principles of sound documentation

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Name of Subject: Software Architectures Lab	
Subject Code: CS-701	
Student will be able to:	
CO1	Build Use Case diagram using UML
CO2	Install Open EJB and AngularJs
CO3	Create software architecture design patterns in java
CO4	Develop server side programming module with database handling servlets
CO5	Prepare documentation of the developed software design.

Name of Subject: Departmental Elective Big Data	
Subject Code: CS-702(D)	
Student will be able to:	
CO1	Analyze the big data characteristics and challenges.
CO2	Interpret the big data infrastructure through hadoop.
CO3	Develop Big Data Solutions using Hadoop Eco System.
CO4	Determine data architectural patterns and its variations of NoSQL and MangoDB.
CO5	Analyze the mining of social network graphs and its applications.

Name of Subject: Data Mining and Warehousing	
Subject Code: CS-703(B)	
Student will be able to:	
CO1	Build the concept of multidimensional data and perform OLAP operations
CO2	Identify data preprocessing steps required to build Data warehouse
CO3	Identify the properties of data required to Build the concept of data mining
CO4	Build the concept of Fuzzy logic, neural network , Classification and clustering algorithms
CO5	Choose the appropriate classification and clustering algorithm for data mining task

Name of Subject: Departmental Elective Lab	
Subject Code: CS 704	
Student will be able to:	
CO1	Perceive hands-on experience on large-scale analytics tools.
CO2	Design Algorithms to solve Data Intensive Problems using Map Reduce Paradigm.
CO3	Analyze and perform different operations on data using Hive and Pig Latin scripts.
CO4	Create NoSQL data for Unstructured data and perform operations with API.
CO5	Apply the concept of social network graphs and clustering in real world applications.

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Name of Subject: Open Elective Lab	
Subject Code: CS 705	
Student will be able to:	
CO1	Build a tool for creation of a Data warehouse.
CO2	Measure the statistical characteristics of data using statistical tool.
CO3	Experiment with the handling of data quality issues present in data
CO4	Demonstrate the application of machine learning algorithms for data mining task.
CO5	Discover interesting patterns from large amounts of data to analyze for predictions and classification

Name of Subject: Major Project -I	
Subject Code: CS 706	
Student will be able to:	
CO1	Identify the project title based on the review of the current state of the field of project.
CO2	Choose the technology to implement the problem from the available technologies.
CO3	Develop creative and innovative solutions to the problems in legal and ethical ways using project management principals such as planning, scheduling , budgeting and risk management.
CO4	Work effectively with team members, communicate and resolve conflicts if any within the team.
CO5	To present their project outcomes effectively in verbal and written form.

Name of Subject: Evaluation of Internship -III	
Subject Code: CS 607	
Student will be able to:	
CO1	Apply the real working environment principles in his/her professional development.
CO2	Correlate theoretical concepts learned in class rooms to the industrial work scenario.
CO3	Adapt professional software development environment.
CO4	Learn various key practices for working in team and optimizing processes.
CO5	Develop work competencies for a specific profession or occupation.

Name of Subject: Internet of Things	
Subject Code: CS-801	
Student will be able to:	
CO1	Summarize the design, components and state of the art of IoT.
CO2	Outline the components, classes and types of sensors.
CO3	Discuss different wired and wireless IoT networking technologies.
CO4	Interpret the working of message passing protocol of IoT.
CO5	Build the IoT on Arduino and Raspberry Pi platform.

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Name of Subject: Internet of Things Lab	
Subject Code: CS-801	
Student will be able to:	
CO1	Interpret concepts of IoT, including sensors, actuators and IoT plate forms.
CO2	Implement interfacing of various sensors with Arduino/Raspberry Pi.
CO3	Design service oriented architecture and network for RFID, NFC, Bluetooth, ZigBee, NFC.
CO4	Apply IoT protocols, such as MQTT, CoAP on IoT applications.
CO5	Develop IoT applications using various platforms and technologies such as Arduino, Raspberry Pi.

Name of Subject: Departmental Elective-Cloud Computing	
Subject Code: CS 802(B)	
Student will be able to:	
CO1	Summarize various service oriented architectures in cloud computing.
CO2	Classify cloud computing architecture including virtualization technology and multitenant architecture.
CO3	Outline the cloud file system and apply map reduce model
CO4	Discuss secured cloud environment
CO5	Elaborate quality of service issues in real time cloud application.

Name of Subject: Open Elective Image Processing and Computer Vision	
Subject Code: CS 803(A)	
Student will be able to:	
CO1	Build the concept of representation, preprocessing and operational algorithms required for CVIP.
CO2	Demonstrate use of mathematical tools for digital image processing and computer vision.
CO3	Identify, formulate and solve problems in image processing and computer vision.
CO4	Use & apply appropriate image processing methods for image filtering, image restoration, image reconstruction, segmentation, classification and representation & Region analysis.
CO5	Apply Facet model recognition & Knowledge based Vision for Image processing.

Name of Subject: Elective Lab	
Subject Code: CS 804 D/O	
Student will be able to:	
CO1	Examine virtualization tools with the help of VMare workstation
CO2	Develop a web application in a PaaS environment.
CO3	Analyze different cloud programming models to solve problem on the cloud.
CO4	Create generic cloud environment.
CO5	Compile different services of cloud service provider.

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Name of Subject: Major Project-II	
Subject Code: CS – 805	
Student will be able to:	
CO1	Identify the project title based on the review of the current state of the field of project.
CO2	Choose the technology to implement the problem from the available technologies.
CO3	Develop creative and innovative solutions to the problems in legal and ethical ways using project management principals such as planning, scheduling, budgeting and risk management.
CO4	Work effectively with team members, communicate and resolve conflicts if any within the team.
CO5	To present their project outcomes effectively in verbal and written form.

Branch: Department of Mechanical Engineering	
Subject Name: Mathematics-III	
Subject Code:BT301	
Student will be able to:	
CO1	Solve polynomial and transcendental equations using interpolation and extrapolation techniques.
CO2	Implement numerical differentiation and integration techniques by numerical methods.
CO3	Evaluate ordinary differential equations and partial differential equations.
CO4	Apply Laplace and Fourier transforms in complex engineering problems.
CO5	Analyze complicated data in an easy way with various probability distributions.

Subject Name: Thermodynamics	
Student will be able to:	
CO1	Determine performance parameters of work producing and work absorbing devices.
CO2	Apply second law of thermodynamics to find performance parameters of heat engines and refrigerators.
CO3	Assess properties of steam using steam tables and Mollier charts.
CO4	Determine air standard efficiency of power cycles.
CO5	Analyze actual & theoretical combustion processes.

Subject Name: Materials Technology	
Subject Code:ME303	
Student will be able to	
CO1	Interpret crystal lattice structure of materials.
CO2	Elaborate different phase diagrams for solid solutions
CO3	Choose heat treatment processes for phase transformation in cast iron and steel.
CO4	Identify various properties and defects using destructive and non destructive testing methods.
CO5	Select appropriate material for commercial applications.

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Subject Name: Materials Technology (LAB)	
Subject Code:BT303	
Student will be able to	
CO1	Analyze microstructure using optical microscope.
CO2	Analyze properties of materials using non destructive method.
CO3	Determine the lattice structure of engineering materials.
CO4	Identify heat treatment methods for various metals.
CO5	Analyze phase transformation reactions in iron carbon and TTT diagram.

Subject Name: Strength of Material	
Subject Code:ME304	
Student will be able to	
CO1	Analyze the simple and compound stresses and strains induced in structural members
CO2	Determine the slope and defection of beams.
CO3	Analyze stresses due to torsional loading in solid and hollow shafts.
CO4	Apply suitable failure theory to predict and prevent the failures.
CO5	Determine the stability of column and strut.

Subject Name: Strength of Material (LAB)	
Subject Code:ME304	
Student will be able to	
CO1	Evaluate hardness of a given specimen.
CO2	Determine tensile and compressive strength of a material.
CO3	Perform transverse bending test to obtain deflection.
CO4	Evaluate behavior of a given specimen in Torsion.
CO5	Determine impact strength of a material.

Subject Name: Manufacturing Process	
Subject Code:ME305	
Student will be able to	
CO1	Identify suitable casting methods for different applications.
CO2	Apply appropriate welding method for a specific application.
CO3	Identify the suitable forging operation for a given application.
CO4	Interpret theories of cold and hot rolling techniques.
CO5	Examine the role of various machining operations to make jobs consisting of salient operations.

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Subject Name: Manufacturing Process (LAB)	
Subject Code:ME305	
Student will be able to	
CO1	Prepare basic patterns for Metal Casting process.
CO2	Develop Metal Casting of Simple component using moulding equipments.
CO3	Prepare permanent joints using Arc welding and Gas welding.
CO4	Determine salient characteristics of rolling and forging through studies
CO5	Perform various machining operations on different machine tools.

Subject Name: Thermal Engg. Lab	
Subject Code: ME306	
Student will be able to:	
CO1	Categorize high pressure boilers with the help of their respective components
CO2	Determine quality of steam using different calorimeters.
CO3	Determine the performance of Boilers through Heat balance sheet.
CO4	Determine volumetric and isothermal efficiencies of a single and multi stage compressor.
CO5	Elaborate working principles of thermocouples, temperature sensors through study of engine testing facility.

Subject Name: Internship -I	
Subject Code: BT107 -Internship -I	
Student will be able to	
CO1	Identify their areas of interest as per their training requirement.
CO2	Formulate problems and try to find their solution through gained knowledge.
CO3	Adapt actual engineering environment.
CO4	Develop the habit of utilization of technical resources.
CO5	Develop training report and give oral presentations related to the training completed.

Subject Name: Energy & Environmental Engineering	
Subject Code:ES401	
Student will be able to:	
CO1	Discuss the potential of various energy resources.
CO2	Summarize ecosystem and its components.
CO3	Discuss biodiversity and its conservation at global, national and local levels.
CO4	Describe causes, effects and preventive measures of various environmental pollutions and natural disasters.
CO5	Propose appropriate solutions on social issues related to environment.

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Subject Name: Instrumentation & Control	
Subject Code: ME402	
Student will be able to	
CO1	Estimate static and dynamic characteristics of measurement.
CO2	Choose suitable temperature measurement method for a domestic and industrial application.
CO3	Apply pressure, velocity and flow measurement methods in diversified applications.
CO4	Demonstrate working principle of torque/force sensors and transducers.
CO5	Formulate mathematical model for dynamic systems.

Subject Name: Instrumentation & Control (LAB)	
Subject Code:ME402	
Student will be able to	
CO1	Analze static and dynamic characteristics of measuring instruments.
CO2	Perform the flow and velocity measurement using venturimeter, orificemeter and rotameter.
CO3	Measure force and torque using load cell and dynamometers.
CO4	Measure pressure and its gradient using manometers.
CO5	Perform first and second order systems using simulators.

Subject Name: Theory of Machines	
Subject Code:ME403	
Student will be able to	
CO1	Evaluate displacement, velocity & acceleration of linkages in mechanism.
CO2	Analyze dynamic motion of mechanisms using analytical and graphical approaches.
CO3	Design cam & follower mechanisms for specified motions.
CO4	Perform parametric analysis of different power transmission system.
CO5	Develop the concepts of compound gear trains and balancing of masses.

Subject Name: Theory of Machines (LAB)	
Subject Code:ME403	
Student will be able to:	
CO1	Categorize various kinematic links, pairs, chains, & mechanisms.
CO2	Construct velocity and acceleration diagram of different mechanism.
CO3	Construct cam profiles for different applications.
CO4	Perform balancing of rotating unbalanced masses.
CO5	Categorize various power transmission systems.

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Subject Name: Fluid Mechanics	
Subject Code:ME404	
Student will be able to	
CO1	Perceive properties of fluids and condition for stability of floating bodies.
CO2	Determine various aspects of fluid motion in fluid kinematics.
CO3	Determine of forces on immersed bodies using fundamental laws.
CO4	Interpret the different principles of flow through pipes and losses in fluid flow.
CO5	Apply the boundary layer theory for problems related to fluid flow.

Subject Name: Fluid Mechanics (LAB)	
Subject Code:ME404	
Student will be able to:	
CO1	Determine coefficient of discharge through venturimeter, orificemeter and notch.
CO2	Verify Bernoullis Theorem for streamline flow.
CO3	Illustrate flow patterns and determine Reynold's number.
CO4	Measure force due to impact of water jet on differently shaped vane.
CO5	Determine losses in a pipe during fluid flow.

Subject Name: Manufacturing Technology	
Subject Code: ME405	
Student will be able to:	
CO1	Analyze theory of metal cutting, tool geometry, cutting forces and super finishing processes.
CO2	Identify different gear production techniques.
CO3	Perceive basic concepts of plastic moulding & plastic welding techniques.
CO4	Categorize unconventional machining processes and their applications.
CO5	Interpret elements of NC machine tools and basic principle of extrusion.

Subject Name: Manufacturing Technology (LAB)	
Subject Code:ME405	
Student will be able to:	
CO1	Analyze the significance of cutting tool geometry in machining.
CO2	Perform gear machining using milling machine.
CO3	Perform finishing operations on Grinding Machine.
CO4	Examine the suitability of non-conventional with conventional machining for different applications.
CO5	Formulate NC part program for a given Job.

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Subject Name: Software Lab	
Subject Code:ME406	
Student will be able to	
CO1	Identify the merits and demerits of Computer Aided Design process.
CO2	Make use of sketching tools to generate geometric models.
CO3	Generate a detailed model of a machine component.
CO4	Generate a component assembling different parts.
CO5	Outline IGES system for import and export of designs.

Subject Name: I C Engines	
Subject Code:ME501	
Student will be able to:	
CO1	Analyze performance characteristics of IC engines.
CO2	Interpret the effect of variables affecting combustion phenomenon in IC engines.
CO3	Select the appropriate fuel injection system in IC engines.
CO4	Analyze characteristics of traditional and alternate fuels.
CO5	Analyze the influence of turbo charging and supercharging on engine performance.

Subject Name: I C Engines (LAB)	
Subject Code:ME501	
Student will be able to	
CO1	Determine performance characteristics of single cylinder petrol engine through load test.
CO2	Determine the performance characteristics a multi-cylinder petrol engine by Morse Test.
CO3	Estimate the losses occurred in IC engines by preparing the heat balance sheet.
CO4	Measure performance and combustion characteristics of a diesel engine using alternative fuels
CO5	Perform assembling and disassembling of an IC engine.

Subject Name: Mechanical Vibration	
Subject Code:ME502	
Student will be able to	
CO1	Derive the mathematical model of undamped natural vibration system.
CO2	Analyze under damped free vibration system.
CO3	Determine response to forced vibrations due to harmonic excitation.
CO4	Analyze vibration system with two degrees of freedom.
CO5	Elaborate attributes of noise and its impact.

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Subject Name: Mechanical Vibration (LAB)	
Subject Code:ME502	
Student will be able to	
CO1	Determine the natural frequency of spring mass and pendulum system.
CO2	Determine the natural frequency of the damped vibration.
CO3	Evaluate the natural frequency of a forced vibration.
CO4	Estimate natural frequency of a rotor system.
CO5	Determine the critical speed of the shaft.

Subject Name: Dynamics of Machine	
Subject Code: ME503	
Student will be able to:	
CO1	Determine the dynamic parameters of the reciprocating engine mechanism.
CO2	Analyze the characteristics of centrifugal governers.
CO3	Determine balanced masses in unbalanced rotatry and reciprocating systems.
CO4	Evaluate frictional torque in pivots, collars and clutches.
CO5	Interpret the working of brakes, dynamometers and cams.

Subject Name: TQM and SQC	
Subject Code:ME504	
Student will be able to:	
CO1	Apply TQM and BPR principles in manufacturing and service industries.
CO2	Estimate quality of product using Kaizen concept and Taguchi method.
CO3	Select suitable quality control chart for acceptance or rejection of samples.
CO4	Estimate the features of process diagnostics using appropriate method.
CO5	Apply acceptance sampling plan for process improvement.

Subject Name: FEM/CFD Lab	
Subject Code:ME505	
Student will be able to:	
CO1	Identify the applicability of Finite element and finite volume methods in engineering analysis.
CO2	Apply linear static FE analysis on one dimensional model.
CO3	Build a simple model to conduct steady state and transient thermal FE analysis.
CO4	Analyze computational fluid dynamics of flow over a flat plate
CO5	Analyze computational fluid dynamics of flow over conduits.

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Subject Name: Python	
Subject Code:ME506	
Student will be able to:	
CO1	Formulate Conditional statements and Loops for Python Programs
CO2	Construct programs to Read and write data to and from files in Python.
CO3	Design Graphical user Interfaces in Python
CO4	Create database applications in Python.
CO5	Develop real world Application in python using Pygam

Subject Name: Internship -II	
Subject Code:BT407	
Student will be able to:	
CO1	Identify their areas of interest as per their training requirement.
CO2	Formulate problems and try to find their solution through gained knowledge.
CO3	Adapt actual engineering environment.
CO4	Develop the habit of utilization of technical resources.
CO5	Develop training report and give oral presentations related to the training completed.

Subject Name: Minor Project-I	
Subject Code:ME508	
Student will be able to:	
CO1	Identify a potential problem based on literature survey/impending industrial/real time needs.
CO2	Categorize various solution methodologies to solve problem taken for study.
CO3	Carry out design and or experimental procedure relevant to the problem.
CO4	Analyze results and findings obtained.
CO5	Draw conclusion based on analysis and recommend solution to potential engineering problems.

Subject Name: Thermal Engineering and Gas Dynamics	
Subject Code: ME601	
Student will be able to:	
CO1	Determine boiler performance parameters and heat balance sheet.
CO2	Calculate the work done and efficiency of an ideal and modified vapor cycles.
CO3	Analyze one dimensional isentropic flow of ideal gases through ducts.
CO4	Determine volumetric, isentropic, isothermal and mechanical efficiency of reciprocating single and multi stage air compressors.
CO5	Estimate performance of steam nozzles and condensers.

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Subject Name: Thermal Engineering and Gas Dynamics (LAB)	
Subject Code:ME601	
Student will be able to	
CO1	Identify various high pressure boilers through their construction and operating parameters.
CO2	Determine heat transfer rate of a parallel and counter flow heat exchanger.
CO3	Evaluate the performance of multi stage air compressor.
CO4	Evaluate the Performance of steam condenser.
CO5	Determine the thermal efficiency of a cooling tower.

Subject Name: Machine Component Design	
Subject Code:ME602	
Student will be able to	
CO1	Identify causes of stress concentration & fatigue failure of machine components
CO2	Design the shaft for combined bending, twisting & axial loading
CO3	Design various types of springs such as helical, leaf, torsion springs
CO4	Design various types of brakes & clutches.
CO5	Evaluate load carrying capacity of ball and rolling contact bearings.

Subject Name: Machine Component Design (LAB)	
Subject Code:ME602	
Student will be able to	
CO1	Design of compression helical spring.
CO2	Design of keys and couplings
CO3	Design of leaf spring.
CO4	Design of clutches and brakes.
CO5	Design of screw jack for a given load.

Subject Name: Turbo Machinery	
Subject Code:ME603	
Student will be able to:	
CO1	Apply moment of momentum equation to develop power equation.
CO2	Evaluate performance characteristics of a steam turbine.
CO3	Analyze performance parameters of hydro turbines and centrifugal pumps.
CO4	Calculate the efficiency of a centrifugal blower, centrifugal and axial flow compressors.
CO5	Analyze elementary performance parameters of power transmitting turbo machines.

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Subject Name: Renewable Energy Technology	
Subject Code:ME604	
Student will be able to	
CO1	Elaborate radiation measuring methods and photovoltaic conversion of solar energy.
CO2	Estimate wind energy conversion and its characteristics.
CO3	Interpret the phenomenon of biomass gasification process and associated cost analysis.
CO4	Analyze the designing criteria of a hydro turbine and principles of ocean energy and tidal energy.
CO5	Evaluate principles of geothermal energy, generation of hydrogen power and fuel cell technology.

Subject Name: CAD Lab	
Subject Code:ME605	
Student will be able to	
CO1	Identify basic tools and commands available in CAD software package.
CO2	Apply the drawing commands for drafting planes, curves etc.
CO3	Apply the drawing commands to draft solid elements like prism, pyramid, cylinder and cone.
CO4	Apply the drawing tools for drafting sectional views of solids and isometric projection of objects
CO5	Create 3D models of simple objects and obtain 2D multi view drawings from 3D object

Subject Name: RDBMS	
Subject Code: ME606	
Student will be able to	
CO1	Outline database language commands to create the database.
CO2	Analyze the database using queries to retrieve records.
CO3	Explain the concept of query processing.
CO4	Analyze front end tools to design forms, reports and menus.
CO5	Develop the concept of create web database.

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Subject Name: Minor Project-II	
Subject Code:ME608	
Student will be able to	
CO1	Identify a potential problem based on literature survey/impending industrial/real time needs.
CO2	Categorize various solution methodologies to solve problem taken for study.
CO3	Carry out design and or experimental procedure relevant to the problem.
CO4	Analyze results and findings obtained.
CO5	Draw conclusion based on analysis and recommend solution to potential engineering problems.

Subject Name: Heat and Mass Transfer	
Subject Code:ME701	
Student will be able to:	
CO1	Apply the governing equation of conduct on to find rate of heat transfer in different geometries.
CO2	Assess heat transfer rate for fins and conceptualize lumped body analysis for transient conduction.
CO3	Estimate heat transfer rate in forced and free convection using dimensional analysis.
CO4	Design heat exchangers using LMTD and NTU approaches.
CO5	Analyze radiation heat transfer, and theories of boiling and condensation.

Subject Name: Heat and Mass Transfer (LAB)	
Subject Code:ME701	
Student will be able to:	
CO1	Determine the thermal conductivity of a metal rod using Fourier's law.
CO2	Determine Heat flow rate and effectiveness of pin fin in natural and forced convection
CO3	Determine Heat exchanger effectiveness for parallel and counter flow
CO4	Determine emissivity of a given grey specimen
CO5	Evaluate heat transfer rate in Film wise and Drop wise condensation.

Subject Name: Advance Machine Design	
Subject Code:ME702	
Student will be able to	
CO1	Design the flexible elements used in power transmission system.
CO2	Evaluate major design parameters in spur, helical and bevel gears.
CO3	Design basic components of an I.C. Engine.
CO4	Design joints, coupling and keys.
CO5	Design pressure vessels subjected to internal pressure and power screw.

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Affiliated To Rajeev Gandhi Proudyogiki Vishwavidyalaya, Bhopal
Anand Nagar Post Piplani, BHEL, Bhopal-21, Ph. No.- 0755-2751801 Fax- 0755-2751679 website:www.titexcellence.net

Subject Name: Operation Research and Supply Chain	
Subject Code:ME703	
Student will be able to:	
CO1	Apply Linear Programming for solving transportation and assignment problems.
CO2	Elaborate strategies of Supply Chain Management system.
CO3	Perceive the importance of inventory control techniques for assessing the economically viable inventory order size.
CO4	Evaluate different parameters of service industry using waiting line models for building elementary competitive strategies.
CO5	Apply network analysis and meta-heuristic algorithm in project management and decision making.

Subject Name: CAD/CAM/CIM	
Subject Code:ME704	
Student will be able to	
CO1	Identify the use of CNC machines on the basis of various criteria for manufacturing.
CO2	Apply M&G codes to fulfill different machining requirements.
CO3	Build a part involving basic turning operations.
CO4	Create a part using single and multi point cutting tools.
CO5	Elaborate the importance of integration of CAD/CAM and CIM.

Subject Name: MATLAB and R Programming	
Subject Code:ME705	
Student will be able to:	
CO1	Create a plot using Plot function in MATLAB.
CO2	Write programs of matrices in MATLAB.
CO3	Apply MATLAB programs for image processing.
CO4	Apply R Programming Language for effective data analysis
CO5	Identify the steps involved to download and install R, R Studio, Anaconda on Mac or Windows

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Subject Name: Internship -III	
Subject Code:ME607	
Student will be able to:	
CO1	Identify their areas of interest as per their training requirement.
CO2	Formulate problems and try to find their solution through gained knowledge.
CO3	Adapt actual engineering environment.
CO4	Develop the habit of utilization of technical resources.
CO5	Develop training report and give oral presentations related to the training completed.

Subject Name: Major Project-I	
Subject Code:ME706	
Student will be able to:	
CO1	Identify a potential problem based on literature survey/impending industrial/real time needs.
CO2	Categorize various solution methodologies to solve problem taken for study.
CO3	Carry out design and or experimental procedure relevant to the problem.
CO4	Analyze results and findings obtained.
CO5	Draw conclusion based on analysis and recommend solution to potential engineering problems.

Subject Name: Refrigeration& Air Conditioning	
Subject Code:ME801	
Student will be able to:	
CO1	Analyze air refrigeration cycles.
CO2	Evaluate performance of vapour compression refrigeration system.
CO3	Analyze performance of theoretical and practical vapour absorption refrigeration.
CO4	Select appropriate refrigerant on the basis of their performance and environmental aspect.
CO5	Design a Heating, Ventilation and Air-conditioning system.

Subject Name: Refrigeration& Air Conditioning (LAB)	
Subject Code:ME801	
Student will be able to	
CO1	Evaluate performance index of Vapour Compression Refrigeration System.
CO2	Determine performance characteristics of Vapour Absorption Refrigeration System.
CO3	Determine COP of a windows air conditioner using eco-friendly refrigerant.
CO4	Determine the refrigeration capacity of an Ice plant.
CO5	Design an air conditioning system for a commercial application.

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Subject Name: Automobile Engineering	
Subject Code:ME802	
Student will be able to:	
CO1	Optimize the types of frames of an automobile.
CO2	Analyze steering system and stability of vehicle.
CO3	Evaluate the performance of transmission system.
CO4	Elaborate functioning and applications of suspension and braking systems.
CO5	Analyze effect and curtail of emission hazards on environment.

Subject Name: Entrepreneurship& Management Concepts	
Subject Code:ME803	
Student will be able to	
CO1	Select between management work system and input-processing-output system for manufacturing industry.
CO2	Apply SWOT analysis in managerial decision making.
CO3	Apply marketing and financial strategies in competitive world.
CO4	Utilize quality control and productivity enhancement techniques.
CO5	Develop entrepreneurship skills to meet the socio-economic needs.

Subject Name: Simulation and Modeling	
Subject Code:ME804	
Student will be able to	
CO1	Develop geometric models using modeling software's.
CO2	Assemble CAD models to create joints and I.C. Engine components.
CO3	Apply meshing techniques to CAD models.
CO4	Evaluate critical parameters in thermo-structural analysis.
CO5	Simulate flow over different geometries through CFD.

Subject Name: Major Project-II	
Subject Code:ME805	
Student will be able to:	
CO1	Identify a potential problem based on literature survey/impending industrial/real time needs.
CO2	Categorize various solution methodologies to solve problem taken for study.
CO3	Carry out design and or experimental procedure relevant to the problem.
CO4	Analyze results and findings obtained.
CO5	Draw conclusion based on analysis and recommend solution to potential engineering problems.

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Branch: Department of Electronics & Communication	
Name of Subject: Mathematics-III	
Subject Code: BT 301	
Student will be able to:	
CO1	Solve polynomial and transcendental equations using interpolation and extrapolation techniques.
CO2	Analyze numerical differentiation and integration techniques by numerical method.
CO3	Evaluate ordinary differential equations and partial differential equations.
CO4	Apply Laplace and Fourier transforms in complex engineering problems.
CO5	Analyze complicated data in an easy way with various probability distributions.

Name of Subject: Electronic Measurements and Instrumentation	
Subject Code: EC 302	
Student will be able to:	
CO1	Analyze the characteristics of measuring instruments.
CO2	Calculate the unknown electrical parameters using AC bridges.
CO3	Analyze the working of different types of transducers as LVDT, RVDT, Thermocouple, thermister etc.
CO4	Analyze the working of CROs, function generators and display devices.
CO5	Analyze the performance of ADCs and DACs.

Name of Subject: Digital System Design	
Subject Code: EC 303	
Student will be able to:	
CO1	Apply the concept of number system, codes and minimization techniques to simplify digital circuits.
CO2	Design various combinational circuits using basic logic gates and universal gates
CO3	Design various sequential circuits using flip flops.
CO4	Solve digital functions using PLDs to give cost effective solution.
CO5	Analyze performance of logic/ universal gates provided by different logic families

Name of Subject: Electronic Devices	
Subject Code:EC304	
Student will be able to:	
CO1	Determine the characteristics of semiconductor diodes
CO2	Analyze the output of rectifier, filter and regulator circuits.
CO3	Apply the fundamentals of transistors in solving electronics circuits.
CO4	Analyze small and large signal amplifier circuits.
CO5	Evaluate the input/output parameters and characteristic of FET in electronic circuits.

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Name of Subject: Network Analysis	
Subject Code: EC - 305	
Student will be able to:	
CO1	Simplify different electrical networks using basic circuit laws.
CO2	Analyze electrical circuits using network and graph theory.
CO3	Solve electrical/electronic circuits using network theorems.
CO4	Analyze transient and steady state response of electrical networks.
CO5	Evaluate input/output parameters of two port networks.

Name of Subject: Digital System Design Lab	
Subject Code: EC - 303	
Student will be able to:	
CO1	Examine Demorgan's theorem and truth table of logic gates.
CO2	Examine the output of various combinational circuits.
CO3	Determine the output of sequential circuits such as flip flop, registers, counters.
CO4	Test the pin functions of digital ICs
CO5	Design digital circuits using digital ICs for given engineering problem.

Name of Subject: Electronic Devices Lab	
Subject Code:EC304	
Student will be able to:	
CO1	Analyze the characteristics of different semiconductor devices.
CO2	Determine characteristics of various semiconductor diodes.
CO3	Examine the output of amplifiers and oscillators
CO4	Determine input/output parameters and working of MOSFET
CO5	Design electronic circuits using diodes and transistors for specific application

Name of Subject: Network Analysis Lab	
Subject Code: EC - 305	
Student will be able to:	
CO1	Apply fundamentals of basic circuit laws in electrical/electronic network.
CO2	Examine the different network theorems.
CO3	Measure parameters in two port network.
CO4	Determine the characteristics of RLC circuits.
CO5	Test passive components in a given network.

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Name of Subject: Electronic Measurement and Instrumentation Lab	
Subject Code: EC 306	
Student will be able to:	
CO1	Work with different electrical and electronic instruments.
CO2	Demonstrate the operation of display devices.
CO3	Measure different parameters related to electrical bridges.
CO4	Examine the output waveform of function generators using CRO.
CO5	Examine the working of ADCs and DACs

Name of Subject: Internship -I	
Subject Code: BT 107	
Student will be able to:	
CO1	Adapt tools/technologies used in industries.
CO2	Develop computer programs for the given problem.
CO3	Develop positive attitude, effective communication and time management skill.
CO4	Adopt professional and ethical values.
CO5	Write internship report in prescribed format.

Name of Subject: Energy & Environmental Engineering	
Subject Code:ES 401	
Student will be able to:	
CO1	Interpret the potential of various energy resources.
CO2	Interpret the concept of ecosystem to control environmental issues.
CO3	Analyze the biodiversity and its conservation process.
CO4	Analyze the sustainable development for environmental issues
CO5	Propose appropriate solutions on social issues related to environment.

Name of Subject: Signals and Systems	
Subject Code:EC 402	
Student will be able to:	
CO1	Analyze various types of signals and their properties.
CO2	Analyze Continuous and Discrete Time systems.
CO3	Apply the properties of Z-transform in Discrete Linear Time Invariant System.
CO4	Solve the problems of discrete time signals using Fourier transform and Fourier Series.
CO5	Analyze the sampling theorem and state space matrix for communication system.

Name of Subject: Analog Communication	
Subject Code: EC 403	
Student will be able to:	
CO1	Apply concept of Fourier transform and its properties.
CO2	Analyze amplitude modulation and demodulation techniques.
CO3	Analyze FM and PM modulation techniques.
CO4	Evaluate the parameters of AM /FM transmitter & receiver.
CO5	Estimate the noise levels for a variety of conditions in AM and FM systems

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Name of Subject: Control System Subject Code: EC 404	
Student will be able to:	
CO1	Solve open loop and closed loop control systems.
CO2	Analyze Time response of closed loop control system.
CO3	Analyze Frequency response of closed loop control system.
CO4	Design Lead-Lag compensator in time and frequency domain.
CO5	Draw the state space diagram of control system

'Name of Subject: Analog Circuits Subject Code: EC - 405	
Student will be able to:	
CO1	Analyze feedback amplifiers and oscillator circuits.
CO2	Evaluate the parameters of various Integrated circuits.
CO3	Analyze the characteristics of operational amplifier.
CO4	Design of analog circuits using Op Amp.
CO5	Design multivibrators and voltage regulators.

Name of Subject: Signal and Systems Lab Subject Code: EC - 402	
Student will be able to:	
CO1	Analyze the features MATLAB simulation software.
CO2	Write MATLAB code for given problem.
CO3	Examine plots of Continuous Time and Discrete Time signals.
CO4	Determine the response of the CT LTI system
CO5	Determine the response of the DT LTI system

Name of Subject: Analog Communication Lab Subject Code: EC 403	
Student will be able to:	
CO1	Demonstrate working of analog transmitter and receiver system.
CO2	Measure modulation index for different modulation techniques.
CO3	Compare output of AM, FM modulators and demodulators.
CO4	Evaluate the parameters of AGC circuit.
CO5	Determine the characteristic of radio receiver.

Name of Subject: Control System Lab Subject Code: EC - 404	
Student will be able to:	
CO1	Analyze features of MATLAB simulink tool.
CO2	Evaluate the parameters of first order control system using MATLAB.
CO3	Evaluate the parameters of second order control system using MATLAB.
CO4	Examine stability of the closed loop control system.
CO5	Determine the performance of control system using PI and PD controllers.

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Name of Subject: Analog Circuits Lab	
Subject Code: EC 405	
Student will be able to:	
CO1	Measure input/output parameters of operational amplifier.
CO2	Design amplifiers and oscillators using IC741.
CO3	Examine characteristic of analog filters.
CO4	Design multivibrators using IC555.
CO5	Measure output voltage of AVC/AGC circuit.

Name of Subject: Subject & Code: Simulation Lab	
Subject Code: EC 406	
Student will be able to:	
CO1	Work with circuit simulation software TINAPRO
CO2	Design PCB layout using TINAPRO.
CO3	Examine the output of rectifier circuits.
CO4	Design electronics circuits using TINAPRO.
CO5	Interpret the simulation results of electronic circuit.

Name of Subject: Microprocessor & its Application	
Subject Code:: EC- 501	
Student will be able to:	
CO1	Analyze the features of microprocessors and their applications.
CO2	Utilize the instruction set and addressing modes of 8086 Microprocessor in assembly language programming
CO3	Analyze different peripherals and their interfacing with 8086 microprocessor.
CO4	Apply the concept of programmable peripheral devices to interface with microcontroller.
CO5	Illustrate the working of microcontroller & its applications.

Name of Subject: Digital Communication	
Subject Code: EC- 502	
Student will be able to:	
CO1	Analyze Sampling theorem for LPF & Band-pass Signals
CO2	Assess digital modulation techniques and various encoding techniques
CO3	Analyze different digital transmission techniques.
CO4	Estimate probability of error for digital transmission techniques.
CO5	Solve the problems of channel capacity and entropy

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Name of Subject:(Departmental Elective) CNTL	
Subject Code: EC– 503	
Student will be able to:	
CO1	Analyze the symmetrical and asymmetrical networks.
CO2	Design of passive and active filters for given specifications.
CO3	Solve RL, RC, LC and RLC network synthesis problems.
CO4	Evaluate parameters of transmission lines.
CO5	Analyze various transmission lines using smith chart.

Name of Subject:(A) Open Elective-Electro Magnetic Theory	
Subject Code:EC-504	
Student will be able to:	
CO1	Apply concept of vector calculus in steady electric field theory.
CO2	Analyze magnetic field due to steady current.
CO3	Solve time varying field equations using Faraday's law
CO4	Analyze wave equation in free space, dielectric and conducting medium.
CO5	Utilize the concept of field theory and plane wave propagation in lossy and lossless dielectrics.

Name of Subject: Microprocessor & its Application LAB	
Subject Code: EC- 501	
Student will be able to:	
CO1	Examine the working of 8086 microprocessor and its pin functions.
CO2	Write assembly language programs using instruction set of 8086.
CO3	Compile assembly language programs using 8086 instructions set.
CO4	Write code to interface peripherals with microprocessor.
CO5	Select the suitable microcontroller for real time applications

Name of Subject: Digital Communication LAB	
Subject Code: EC- 502	
Student will be able to:	
CO1	Examine ASK, FSK PSK modulation/demodulation techniques
CO2	Show the application of sampling theorem in digital communication.
CO3	Evaluate the performance of PAM, PWM and PPM modulation/demodulation techniques.
CO4	Examine various Line coding techniques
CO5	Examine the principle of multiplexing in digital communication.

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Name of Subject: Communication Networks and Transmission Lines LAB	
Subject Code: EC– 505	
Student will be able to:	
CO1	Work with communication networks and transmission lines.
CO2	Examine frequency response of passive filters.
CO3	Measure characteristic impedance of transmission line.
CO4	Measure reflection coefficient and VSWR
CO5	Determine the attenuation in transmission line.

Name of Subject: MATLAB Programming	
Subject Code: EC– 506	
Student will be able to:	
CO1	Demonstrate features and toolboxes of MATLAB software.
CO2	Write MATLAB code for different application.
CO3	Examine different modulation techniques using MATLAB
CO4	Test the stability of control system using MATLAB tool.
CO5	Interpret the plots and graphs of simulation results.

Name of Subject: Minor Project I	
Subject Code:EC-508	
Student will be able to:	
CO1	Select minor project topic based on acquired technical knowledge.
CO2	Identify problem through literature review.
CO3	List the tools and technology required in project work.
CO4	Propose the engineering solution to identified problem.
CO5	Compile the report in prescribe format to communicate their project ideas.

Name of Subject: Internship -II	
Subject Code: BT 407	
Student will be able to:	
CO1	Adapt tools and technologies used in industries.
CO2	Inference the in-depth knowledge of specific area.
CO3	Apply skills such as time management, positive attitude and effective communication.
CO4	Apply the safety measures and ethics during engineering practice.
CO5	Compile the internship report in prescribed format.

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Name of Subject: Digital Signal Processing	
Subject Code: EC- 601	
Student will be able to:	
CO1	Apply the properties of discrete time signals in systems.
CO2	Analyze the linear time-invariant systems using Z-transform.
CO3	Apply the concept of DFS and DFT in discrete time signals.
CO4	Analyze FFT algorithms used in signal processing.
CO5	Design digital filters using windowing techniques.

Name of Subject: Antenna & Wave Propagation	
Subject Code: EC- 602	
Student will be able to:	
CO1	Calculate radiated field and power by oscillating electric dipole, monopole and half wave dipole antenna.
CO2	Design antenna arrays for desired radiation characteristic.
CO3	Analyze working and radiation characteristic of various antenna along with their applications.
CO4	Evaluate the performance parameters of various antennas.
CO5	Illustrate wave propagation modes used in communication system.

Name of Subject:(Departmental Elective) Data Communication	
Subject Code: EC– 603	
Student will be able to:	
CO1	Apply the concept of data transmission in communication system.
CO2	Analyze OSI model and switching techniques in data communication.
CO3	Illustrate error detection & correction and data link layer protocols.
CO4	Apply the concept of LAN, MAN and WAN networks in data communication.
CO5	Analyze the function of networking devices, routing algorithm & TCP / IP Protocol.

Name of Subject: (Open Elective) Microcontroller and Embedded system	
Subject Code:EC-604	
Student will be able to:	
CO1	Perceive interfacing of microcontroller 8051 to other peripherals.
CO2	Write ALP code using instruction set of 16-bit microcontroller IC 8096/DSPIC.
CO3	Analyze characteristics of embedded system and their applications.
CO4	Interpret RISC, CISC, DSP and other processors for embedded system.
CO5	Design embedded system using input/output and other peripheral devices for specific application.

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Name of Subject: Digital Signal Processing LAB	
Subject Code: EC- 601	
Student will be able to:	
CO1	Examine DFS and DFT in signal processing.
CO2	Examine plots of discrete time signals using MATLAB.
CO3	Assess linear and circular convolution of two discrete signals.
CO4	Determine Auto co-relation & Cross co-relation of discrete signals.
CO5	Design FIR and IIR digital filters using windowing techniques.

Name of Subject: Antenna & Wave Propagation Lab	
Subject Code: EC- 602	
Student will be able to:	
CO1	Examine the performance of different antenna elements like monepole, halfwave dipole, full wave dipole.
CO2	Determine radiation characteristic and performance parameters of different antenna arrays.
CO3	Plot the radiation pattern of different type of antennas.
CO4	Examine the performance parameters like directivity, gain, FBR, beamwidth of various antennas.
CO5	Analyze the radiation characteristics of microstrip antenna.

Name of Subject: Data Communication LAB (DE)	
Subject Code: EC- 605	
Student will be able to:	
CO1	Work with data communication trainer kit.
CO2	Examine digital multiplexing techniques in data communication.
CO3	Examine error detection method for error checking.
CO4	Test for RS-232 and Network Interface Card (NIC) used in networking.
CO5	Design LAN for the given problem.

Name of Subject:(Open Elective) Microcontroller and Embedded system Lab	
Subject Code:EC-606	
Student will be able to:	
CO1	Examine working & pin functions of microcontroller 8051.
CO2	Write ALP for microcontroller 8051.
CO3	Test assembly language programming for microcontroller in embedded system.
CO4	Write code for interfacing different peripherals with Microcontroller.
CO5	Examine external devices and I/O with 8051 micro controller.

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Name of Subject: Minor Project II Lab	
Subject Code:EC-608	
Student will be able to:	
CO1	Design electronic circuits for their selected project.
CO2	Create PCB layout using appropriate software tool.
CO3	Estimate the circuit designing parameters and other technical aspects.
CO4	Test the project model and present its utility for the societal needs.
CO5	Compile the required documents and communicate effectively through presentations.

Name of Subject: VLSI Design	
Subject Code: EC-701	
Student will be able to:	
CO1	Inspect fabrication process for VLSI designing.
CO2	Assess various VLSI device models.
CO3	Design different Models in VLSI.
CO4	Analyze various structured digital circuits & system.
CO5	Elaborate CMOS Processing technology, Layout rules & Latch Up.

Name of Subject:(Department Elective)Microwave Engineering	
Subject Code:EC-702	
Student will be able to:	
CO1	Demonstrate the working principle of vaccum tube and Microwave tube.
CO2	Analyze the working of solid state microwave diodes & transistors.
CO3	Apply scattering matrix and its application in microwave network.
CO4	Analyze various microwave components.
CO5	Design of microwave and millimeter wave integrated circuits.

Name of Subject:(Open Elective) Cellular Mobile Communications	
Subject Code:EC-703	
Student will be able to:	
CO1	Apply the concepts of cellular radio in mobile communication system.
CO2	Analyze cell coverage for signal and traffic.
CO3	Estimate co-channel/non co-channel interference and its reduction methods.
CO4	Inspect frequency management, channel assignment and handoff mechanisms.
CO5	Illustrate technology of digital cellular systems.

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Name of Subject: VLSI Design Lab	
Subject Code:EC-701	
Student will be able to:	
CO1	Analyze the features of Microwind tool.
CO2	Apply CMOS layout rules and process parameters.
CO3	Design structured digital logic circuits using CMOS.
CO4	Compile the CMOS layout and its timing simulation.
CO5	Interpret the simulation results of CMOS models.

Name of Subject: Microwave Engineering Lab	
Subject Code:EC-704	
Student will be able to:	
CO1	Demonstrate microwave bench and components.
CO2	Measure microwave frequency and wavelength in waveguides.
CO3	Determine characteristics and tuning range of reflex klystron tube.
CO4	Examine the VI characteristics of Gunn Diode oscillator.
CO5	Measure VSWR and losses in microwave components and networks.

Name of Subject: IOT Lab	
Subject Code:EC-705	
Student will be able to:	
CO1	Demonstrate Arduino microcontroller board.
CO2	Work with Arduino board for different IOT based applications
CO3	Create programs for sensor based applications.
CO4	Work with Raspberry Pi controller for practical application
CO5	Create programs for MQTT protocol and interfacing using Arduino/Raspberry Pi.

Name of Subject: Major Project I	
Subject Code:EC-706	
Student will be able to:	
CO1	Select major project topic based on acquired technical knowledge for solving realistic problems.
CO2	Identify block representation, electronic circuit and tools required for project module design.
CO3	Propose the engineering solution to identified problem.
CO4	Test the project module on bread board.
CO5	Compile the report in prescribe format to communicate their project ideas.

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Name of Subject: Internship III	
Subject Code:EC-607	
Student will be able to:	
CO1	Interpret technological aspects and basic principles of an industry.
CO2	Examine a given engineering problem with its optimum solution
CO3	Apply prior acquired knowledge in problem solving.
CO4	Apply time management skills, positive attitude and confidence in carrier growth.
CO5	Compile the internship report in prescribed format.

Name of Subject: Optical Fibre Communication	
Subject Code:EC-801	
Student will be able to:	
CO1	Analyze different type of optical fiber using basic optical laws.
CO2	Elaborate fiber fabrication techniques and signal degradation in optical fiber.
CO3	Inspect optical sources and detectors.
CO4	Evaluate the performance of optical transceiver.
CO5	Assess optical networks and amplifiers used in optical fiber communication.

Name of Subject:(Department Elective) Wireless Communication	
Subject Code:EC-802	
Student will be able to:	
CO1	Analyze propagation mechanism in wireless communication system.
CO2	Assess wireless channels and their characteristics.
CO3	Inspect channel models and antennas in wireless communication.
CO4	Analyze the structure and error probability of wireless communication link.
CO5	Apply the concept of diversity and equalizers in wireless communication system.

Name of Subject: Name of Subject:(Open Elective) Wireless Network	
Subject Code: EC-803	
Student will be able to:	
CO1	Apply the concept of cellular network in wireless communication.
CO2	Evaluate the performance of LTE systems for mobile telephony
CO3	Inspect wireless sensor networks and their technologies.
CO4	Elaborate routing protocols for wireless network.
CO5	Adapt the IoT and GPS technology for real time application.

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Name of Subject: Optical Fibre Communication LAB	
Subject Code: EC-801	
Student will be able to:	
CO1	Examine analog and digital optical fibre link.
CO2	Measure losses in different type of optical fiber.
CO3	Evaluate numerical aperture in optical fiber.
CO4	Estimate power budget in optical fiber link.
CO5	Examine voice communication using optical fiber.

Name of Subject: Advanced Communication Engineering Lab	
Subject Code:EC-804	
Student will be able to:	
CO1	Work with equipments and tools of communication systems.
CO2	Examine BPSK, DPSK, QPSK generation and detection.
CO3	Evaluate the performance of TDM and FDM.
CO4	Test for gain and directivity of different antennas.
CO5	Determine coupling and isolation characteristics of a stripline directional coupler.

Name of Subject: Major Project II Lab	
Subject Code:EC-805	
Student will be able to:	
CO1	Construct PCB circuit layout using appropriate software tool.
CO2	Select appropriate electronic components, tools and technology for the implementation of project model.
CO3	Develop project model to solve society and environmental issues by utilizing system approach.
CO4	Test the project model and present its utility for the societal needs.
CO5	Compile document in prescribed format with proper language usage and ethical standard

Branch: Civil Engineering	
Name of Subject: Mathematics-III	
Subject Code: BT 301	
Student will be able to:	
CO1	Solve polynomial and transcendental equations using interpolation and extrapolation techniques.
CO2	Implement numerical differentiation and integration techniques by nm.
CO3	Evaluate ordinary differential equations and partial differential equations.
CO4	Apply Laplace and Fourier transforms in complex engineering problems.
CO5	Analyze and represent complicated data in an easy way with various probability distributions.

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Name of Subject: Construction Materials	
Subject Code: CE -302	
Student will be able to:	
CO1	Examine functioning of various masonry materials.
CO2	Select appropriate fabricating building material as per requirement.
CO3	Illustrate various types of flooring, roofing, plumbing and sanitary material.
CO4	Summarize applications of paints, varnishes and emulsions.
CO5	Identify the requirement of miscellaneous materials like bitumen, tar and insulating materials.

Name of Subject: Surveying	
Subject Code: CE-303	
Student will be able to:	
CO1	Determine distance, direction and elevation of survey lines.
CO2	Estimate missing data in a traverse.
CO3	Illustrate principle and procedure of tacheometric survey.
CO4	Design elements of various curves.
CO5	Illustrate the basic principles of photographic and hydrographic surveying.

Name of Subject: Surveying Lab	
Subject Code: CE-303	
Student will be able to:	
CO1	Measure distance with the help of linear distance measuring instrument.
CO2	Perform traversing by using theodolite or compass.
CO3	Determine reduced level of various points.
CO4	Use tacheometer for traverse survey.
CO5	Prepare plan or map of surveyed area.

Name of Subject: Building Planning and Architecture	
Subject Code: CE-304	
Student will be able to:	
CO1	Categorize various substructural and super structural components of a building.
CO2	Apply provisions of National Building code, and Building bye-laws for building planning.
CO3	Choose various building services.
CO4	Apply principles of architecture design in planning.
CO5	Illustrate various aspects of perspective drawing and town planning.

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Name of Subject: Building Planning and Architecture Lab	
Subject Code: CE-304	
Student will be able to:	
CO1	Produce drawing of various substructural and superstructural building components.
CO2	Illustrate various building services.
CO3	Propose building plan for one/two bed room residential building.
CO4	Develop perspective view of elements.
CO5	Create building drawing by using Auto-CAD.

Name of Subject: Strength of Materials	
Subject Code: CE-305	
Student will be able to:	
CO1	Solve complex problems related to stress, strain and elastic constants.
CO2	Determine bending and shearing stresses.
CO3	Determine slope and deflection in beams by various methods.
CO4	Analyse column by various methods.
CO5	Analyse members subjected to torsion and unsymmetrical bending.

Name of Subject: Strength of Materials Lab	
Subject Code: CE-305	
Student will be able to:	
CO1	Evaluate young modulus, torsional strength, and tensile strength of given specimens.
CO2	Assess hardness of given specimens.
CO3	Measure the deflection of beams.
CO4	Determine toughness of given specimens.
CO5	Determine compressive strength of concrete cubes and bricks.

Name of Subject: Study of hist. and anc. CE practice (LAB)	
Subject Code: CE-306	
Student will be able to:	
CO1	Illustrate civil engineering practices in ancient and historical structures.
CO2	Summarize environmental practices in construction of structures during ancient/medieval period.
CO3	Describe construction techniques and materials used in historical structures.
CO4	Explain planning aspects adopted in historical structures.
CO5	Summarize history of civil engineering practices.

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Name of Subject: Evaluation of Internship-I completed at I year level	
Subject Code: BT107	
Student will be able to:	
CO1	Demonstrate the ability to resolve the problems.
CO2	Demonstrate critical thinking skills related to social issues.
CO3	Develop more confidence in experimental knowledge.
CO4	Identify the different resources in interdisciplinary projects.
CO5	Summarize new practices in projects.

Name of Subject: Energy & Environmental Engineering	
Subject Code: ES-401	
Student will be able to:	
CO1	Interpret the potential of various energy resources.
CO2	Summarize ecosystem and its components.
CO3	Illustrate biodiversity and its conservation at global, national and local levels.
CO4	Summarize causes, effects and preventive measures of various environmental pollutions and natural disasters.
CO5	Propose appropriate solutions on social issues related to environment.

Name of Subject: Construction Technology	
Subject Code: CE-402	
Student will be able to:	
CO1	Illustrate design features and behaviour of foundations under eccentric load.
CO2	Design construction features of temporary structures and formworks.
CO3	Describe casting, repairing and protection of various masonry works.
CO4	Choose various flooring and roofing materials and their repairing techniques.
CO5	Interpret planning and construction of an earthquake resistant building.

Name of Subject: Construction Technology Lab	
Subject Code: CE-402	
Student will be able to:	
CO1	Demonstrate the functioning of different material testing equipment's.
CO2	Examine material properties through field and laboratory tests.
CO3	Determine the workability of concrete by different methods
CO4	Interpret the effect of admixtures on the concrete compressive strength.
CO5	Compile test results in the form of report.

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Name of Subject: Structural Analysis-I	
Subject Code: CE-403	
Student will be able to:	
CO1	Analyse the indeterminate structures by principle of virtual work and strain energy.
CO2	Analyse the indeterminate structures by clayperon's theorem and hardy cross method.
CO3	Analyse beams and frames by slope deflection method and column analogy method.
CO4	Interpret the behaviour of arches & cables and their methods of analysis.
CO5	Apply the concepts of ILD and moving loads on determinate beams.

Name of Subject: Structural Analysis-I Lab	
Subject Code: CE-403	
Student will be able to:	
CO1	Verify the maxwell's law.
CO2	Determine the deflection of truss practically.
CO3	Determine the flexural rigidity of a given beam experimentally.
CO4	Verify Muller Breslau principle.
CO5	Analyse the behaviour of column and portal frame practically under different end conditions.

Name of Subject: Transportation Engineering-I	
Subject Code: CE-404	
Student will be able to:	
CO1	Illustrate different ways of transportations and component of permanent way.
CO2	Determine various parameters of railway geometric design and signalling.
CO3	Identify different design parameters required for road and railway bridges.
CO4	Illustrate construction, testing and strengthening techniques of bridge foundation.
CO5	Summarize construction of tunnels.

Name of Subject: Transportation Engineering-I Lab	
Subject Code: CE-404	
Student will be able to:	
CO1	Interpret different modes of transportation.
CO2	Identify requirement of hydraulic design of bridges.
CO3	Summarize launching process of large span pre-stress bridges.
CO4	Detect components of permanent way and signalling system.
CO5	Present effective reports and documents.

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Name of Subject: Engineering Geology & Remote Sensing	
Subject Code: CE-405	
Student will be able to:	
CO1	Illustrate static and dynamic geological features of earth.
CO2	Identify importance of various minerals and crystals in the field of civil engineering.
CO3	Select various rock types of civil engineering importance.
CO4	Infer geological structures and their importance in civil engineering.
CO5	Apply remote sensing and geographical information system in civil engineering and resource mapping.

Name of Subject: Engineering Geology & Remote Sensing Lab	
Subject Code: CE-405	
Student will be able to:	
CO1	Identify different types of rocks.
CO2	Identify different types of ores and minerals.
CO3	Identify geological structures i.e., Folds, Faults, Joints.
CO4	Survey various geological formations through site visit.
CO5	Mark various geological formations on geological map of India

Name of Subject: Software Lab	
Subject Code: CE-406	
Student will be able to:	
CO1	Choose different Auto-CAD commands.
CO2	Apply various commands in Auto-CAD.
CO3	Plan a structure using Auto-CAD.
CO4	Organize a project using Auto-CAD.
CO5	Develop 3D modelling in Auto-CAD.

Name of Subject: Fluid Mechanics-I	
Subject Code: CE –501	
Student will be able to:	
CO1	Conclude various fluid properties at rest and in transit.
CO2	Interpret the pattern of fluid flow and its parameters.
CO3	Illustrate Bernoulli's equation and its applications.
CO4	Examine laminar and turbulent flow under different boundary conditions.
CO5	Apply basic fundamentals of dimensional analysis in fluid flow problems.

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Name of Subject: Fluid Mechanics I Lab	
Subject Code: CE – 501	
Student will be able to:	
CO1	Measure fluid pressure using various pressure measuring equipment's.
CO2	Determine met centric height, terminal velocity, friction factor and parameters like Cc, Cv, Cd of orifices.
CO3	Demonstrate the calibration of equipment's such as venturi meter, orifice meter and mouth piece.
CO4	Demonstrate type of fluid flow using Reynold's experiment.
CO5	Verify the Impulse momentum principle.

Name of Subject: Transportation Engineering-II	
Subject Code: CE-502	
Student will be able to:	
CO1	Design various geometric elements of highway as per IRC recommendations.
CO2	Illustrate various techniques for construction of flexible and rigid pavement.
CO3	Identify the requirements of various elements of road construction, traffic and safety.
CO4	Assess various geometric elements of airport runway and taxiway.
CO5	Summarise the requirements of different services and facilities at airport terminal.

Name of Subject: Transportation Engineering-II Lab	
Subject Code: CE-502	
Student will be able to:	
CO1	Demonstrate working of various highway material testing equipment's.
CO2	Determine the properties of highway materials.
CO3	Assess the quality of highway materials.
CO4	Compile test results in the form of report.
CO5	Justify the use of highway construction materials in field as per IS recommendations.

Name of Subject: Departmental Elective Structural Analysis -II	
Subject Code:CE-503(A)	
Student will be able to:	
CO1	Analyze the structural members for different loading conditions by various methods.
CO2	Assess collapse load for structural members by plastic hinge concept.
CO3	Analyze tall structures subjected to horizontal and vertical loads.
CO4	Develop force and displacement matrix to analyze structures.
CO5	Analyze given structures by using concepts of influence line diagram.

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Name of Subject: Open Elective Renewable energy sources	
Subject Code:CE-504(C)	
Student will be able to:	
CO1	Interpret the potential of various energy resources.
CO2	Demonstrate wind energy, wind mills and grid connected systems.
CO3	Illustrate the components of solar energy and biomass energy system.
CO4	Illustrate geothermal energy, energy from oceans and possibilities of other modern nonconventional energy sources.
CO5	Recommend energy efficient devices and measures of energy conservation.

Name of Subject: Quantity Surveying & Costing Lab	
Subject Code: CE-505	
Student will be able to:	
CO1	Determine quantity of various construction items in measurement sheet.
CO2	Determine cost of various construction items in abstract sheet.
CO3	Estimate the cost of building services like plumbing, water supply and electrification.
CO4	Analyze the rate for any construction work as per current SOR.
CO5	Create DPR for civil engineering projects.

Name of Subject: Material & Testing Lab	
Subject Code: CE-506	
Student will be able to:	
CO1	Demonstrate working of various construction material testing equipment's.
CO2	Determine the properties of the construction materials.
CO3	Assess the quality of construction materials.
CO4	Compile test results in the form of report.
CO5	Justify the use of construction materials in field as per IS recommendations.

Name of Subject: Evaluation of Internship-II	
Subject Code: CE-507	
Student will be able to:	
CO1	Understand the nature of work in preferred domain.
CO2	Apply experimental skills.
CO3	Perceive latest techniques and practices in the field.
CO4	Adapt requisite competence in domain area.
CO5	Formulate effective reports and documents.

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Name of Subject: Field Visit, Case Study and Seminar	
Subject Code: CE-508	
Student will be able to:	
CO1	Asses the technical aspects of work.
CO2	Notice experimental skills and professional practices in field.
CO3	Discuss the impact of civil engineering projects on socio-economic development.
CO4	Apply the skills required to facilitate a group discussion, review and focus on communication skills.
CO5	Identify, compile and prioritize ideas.

Name of Subject: RCC-I	
Subject Code: CE-601	
Student will be able to:	
CO1	Utilize the knowledge of various properties of concrete and compare working stress & limit state methods of design.
CO2	Design singly and doubly reinforced beams.
CO3	Design one-way and two-way slabs.
CO4	Design column and footings.
CO5	Design various staircases.

Name of Subject: RCC-I Lab	
Subject Code: CE-601	
Student will be able to:	
CO1	Prepare the detailed drawing of beams as per IS recommendations.
CO2	Prepare the detailed drawing of slabs as per IS recommendations.
CO3	Prepare the detailed drawing of columns as per IS recommendations.
CO4	Prepare the detailed drawing of footings as per IS recommendations.
CO5	Prepare the detailed drawing of staircases as per IS recommendations.

Name of Subject: Environmental Engineering – I	
Subject Code: CE-602	
Student will be able to:	
CO1	Examine quantity and quality of water for municipal use.
CO2	Identify various impurities of water and components of water conveyance system.
CO3	Design water treatment unit of a treatment plant using suitable method.
CO4	Illustrate design and construction of sewers.
CO5	Identify suitable methods of physical, chemical and biological characteristics of sewage.

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Name of Subject: Environmental Engg. – I Lab	
Subject Code: CE-602	
Student will be able to:	
CO1	Test for various standards of a given water sample.
CO2	Decide sampling techniques for given water sample.
CO3	Determine physical characteristics of the given water sample.
CO4	Determine chemical characteristics of the given water sample.
CO5	Determine bacteriological characteristics of the given water sample.

Name of Subject: Departmental Elective Water Resources Engineering	
Subject Code:CE-603(A)	
Student will be able to:	
CO1	Discuss various irrigation methods and soil-water-crop relationship.
CO2	Choose methods of improving ground water storage.
CO3	Determine quantity of runoff using hydrograph.
CO4	Classify the hydraulic structures.
CO5	Identify methods of flood estimation.

Name of Subject: Open Elective EIA	
Subject Code:CE-604(C)	
Student will be able to:	
CO1	Illustrate the concept of environmental impact assessment.
CO2	Identify environmental indices and indicators for describing the affected environment.
CO3	Explain the assess of Impacts on environment.
CO4	Formulate effective report on EIA.
CO5	Illustrate the necessity of public participation in EIA studies.

Name of Subject: Advanced Surveying La	
Subject Code: CE605	
Student will be able to:	
CO1	Measure distance with the help of linear distance measuring instrument.
CO2	Perform traversing by using theodolite or compass.
CO3	Determine reduced level of various points.
CO4	Determine area of irregular surfaces by digital planimeter.
CO5	Demonstrate Total Station

Name of Subject: NDT Lab	
Subject Code: CE-606	
Student will be able to:	
CO1	Describe destructive and non-destructive testing methods.
CO2	Classify various non-destructive testing methods.
CO3	Select an appropriate NDT technique as per requirement.
CO4	Identify the internal flaws in the material by NDT and take measures to eliminate them.
CO5	Describe destructive and non-destructive testing methods.

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Name of Subject: Evaluation of Internship-III	
Subject Code: CE-607	
Student will be able to:	
CO1	Inspect the preferred field of specialization.
CO2	Apply and observe experimental skills.
CO3	Perceive latest techniques and practices in field.
CO4	Develop requisite competence in domain area.
CO5	Formulate and write effective reports and design documentation.

Name of Subject: Geotechnical Engineering	
Subject Code: CE-701	
Student will be able to:	
CO1	Identify various types of soil and their index properties.
CO2	Analyse flow of water through soils.
CO3	Discuss critically about stress distribution and compaction methods in soil.
CO4	Interpret consolidation characteristics of different soils.
CO5	Evaluate shear strength parameters of soil.

Name of Subject: Geotechnical Engineering Lab	
Subject Code: CE-701	
Student will be able to:	
CO1	Perform various test for determination of index properties of given soil specimen.
CO2	Perform particle size distribution for fine- and coarse-grained soils.
CO3	Measure permeability of soil sample.
CO4	Assess optimum moisture content and maximum dry density by various compaction tests.
CO5	Determine shear strength of soil through various tests.

Name of Subject: Environmental Engineering- II	
Subject Code: CE-702(B)	
Student will be able to:	
CO1	Design primary treatment units of municipal wastewater.
CO2	Design various biological treatment units.
CO3	Apply knowledge of various advanced wastewater treatment processes.
CO4	Discuss knowledge of air pollution and its effect on ecosystem.
CO5	Explain dispersion of air pollutants.

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Name of Subject: Integrated Waste Management	
Subject Code: CE-703(C)	
Student will be able to:	
CO1	Explain characteristics of solid waste and its sources.
CO2	Identify concepts of integrated solid waste management beginning from source generation to waste disposal.
CO3	Explain various methods of solid waste segregation.
CO4	Elaborate methods of solid waste transformation.
CO5	Compare among different solid waste disposal techniques.

Name of Subject: Prestressed Concrete Structures Lab	
Subject Code: CE 704	
Student will be able to:	
CO1	Describe use of fabrication, casting and testing of simply supported prestressed concrete beam/slab (pre-tensioned or post-tensioned) for strength and deflection behaviour.
CO2	Describe use of fabrication, casting and testing of beam/slab (pre-tensioned or post-tensioned) with different layout of cables for strength and deflection behaviour.
CO3	Describe use of fabrication, casting and testing of various prestressed structures.
CO4	Analyze one real-life structure using open-source/ professional software.
CO5	Assess one real-life structure using open-source/ professional software.

Name of Subject: IOT Lab	
Subject Code: CE-705	
Student will be able to:	
CO1	Build the concept of Internet of Things.
CO2	Create the ability to transmit data wirelessly between different devices.
CO3	Discuss an ability to upload/download sensor data on cloud and server.
CO4	Analyse Cloud security fundamentals and its challenges.
CO5	Design an IoT device to work with a Cloud Computing infrastructure.

Name of Subject: Major Project -I	
Subject Code: CE706	
Student will be able to:	
CO1	Identify the scope and objectives of problem.
CO2	Make use of plan and requirement of any public building.
CO3	Apply learned technical concepts of civil engineering on an approved project.
CO4	Organize design and set of drawings in the form of a report.
CO5	Discuss and submit a report of experimental work.

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Name of Subject: Design of Steel Structures	
Subject Code: CE-801	
Student will be able to:	
CO1	Design bolted, riveted and welded connections.
CO2	Discuss IS provisions for tension and compression members.
CO3	Design flexural members.
CO4	Design columns and column base.
CO5	Design various elements of industrial building.

Name of Subject: Design of Steel Structures Lab	
Subject Code: CE-801	
Student will be able to:	
CO1	Make use of steel table and relevant IS code of practice.
CO2	Prepare detailed drawing of various connections in steel structures as per IS recommendations.
CO3	Prepare detailed drawing of beams under different loading conditions as per IS recommendations.
CO4	Prepare detailed drawing of columns and column bases as per codal provisions.
CO5	Prepare detailed drawing of purlin and elements of truss in multi-storied framed structures.

Name of Subject: Foundation Engineering	
Subject Code: CE 802(B)	
Student will be able to:	
CO1	Identify foundation type and methods of sub- soil exploration.
CO2	Apply different theories for estimating bearing capacity of soil.
CO3	Design pile foundation.
CO4	Interpret the behaviour of foundation on expansive and collapsible soil.
CO5	Describe various earth pressure theories and earth retaining structures.

Name of Subject: Integrated Water Management	
Subject Code: CE 803(D)	
Student will be able to:	
CO1	Discuss the paradigm shift in water management with global and national perspectives of water crisis.
CO2	Develop framework for sustainable water resources management.
CO3	Interpret the modern principles of water management and planning.
CO4	Develop surface and subsurface water systems along with water balance equation.
CO5	Identify the conventional and non-conventional techniques for water security.

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Name of Subject: Earthquake Resistant Structures Lab	
Subject Code: CE 804	
Student will be able to:	
CO1	Analyse the failure pattern of structures due to earthquake.
CO2	Plan structural configuration for seismic resistance in STAAD- PRO.
CO3	Compute seismic forces in multi-story buildings as per prevailing standard codes of practice.
CO4	Prepare working model of earthquake resistance structures.
CO5	Apply various seismic control measures in real world problems.

Name of Subject: Major Project-II	
Subject Code: CE – 805	
Student will be able to:	
CO1	Adapt the application aspects of civil engineering fundamentals to address the problem.
CO2	Identify scope and objectives of problem to manage the activities associated with the work.
CO3	Survey the literature related to problem and prepare the report of outcomes.
CO4	Plan experimentation and design with the team to fulfil the objectives.
CO5	Compile data and results in the form of project report.

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Branch: Electrical Engineering	
Name of Subject: Energy & Environmental Engineering	
Subject Code: ES-301	
Student will be able to	
CO1	Interpret the potential of various energy resources.
CO2	Interpret ecosystem for environmental issues.
CO3	Illustrate the Biodiversity and its conservation.
CO4	Examine various causes of Environmental Pollution
CO5	Propose appropriate solutions on social issues related to environment.

Name of Subject: Subject: Electromagnetic Field & Materials	
Subject Code: EE302	
Student will be able to:	
CO1	Interpret the theory of coordinate system, scalar quantities, vector quantities, different type of distribution of charges in electrostatics.
CO2	Evaluate behaviour of conductor and semiconductor materials.
CO3	Assess the value of magnetic field using boundary conditions and various laws.
CO4	Illustrate use of Maxwell's equations for static and time varying electric field and magnetic field.
CO5	Interpret the nature of electromagnetic waves and its performance.

Name of Subject: Electrical Measurement &Measuring Instruments	
Subject Code: EE303	
Student will be able to:	
CO1	Compare various types of measurements, calibrations, errors in measurements.
CO2	Examine performance of MC, MI and Dynamometer type of measuring instruments.
CO3	Examine the errors in CTs and PTs and subdivide the measurement of power.
CO4	Evaluate different powers and energy using different instruments
CO5	Analyse behaviour of different measuring instruments.

Name of Subject: Analog Electronics	
Subject Code: EE304	
Student will be able to:	
CO1	Illustrate the concepts of semiconductor diodes.
CO2	Apply the fundamentals of transistor in solving electronic circuit.
CO3	Elaborate Feedback amplifier and Oscillators
CO4	Build electronic circuit using diode and transistor for specific application.
CO5	Build analog circuit using OP-AMP.

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Name of Subject: Network Analysis	
Subject Code: EE305	
Student will be able to:	
CO1	Solve complex AC and DC circuits.
CO2	Examine AC electrical circuits using Laplace transform for solution of Integro-differential equations.
CO3	Compile the structure of signals, hypothesize the forms of Fourier series.
CO4	Formulate parameters of two port networks.
CO5	Demonstrate complex networks through generalized and simplified mathematical analysis.

Name of Subject: Electrical Measurement & Measuring Instruments Lab	
Subject Code: EE303	
Student will be able to:	
CO1	Judge. the value of resistance using DC Bridges.
CO2	Justify use of various measuring instruments and their calibration
CO3	Develop a circuit using instrument transformer.
CO4	Verify the values of different electrical quantities such as earth resistance
CO5	Utilize megger for measurement of insulation resistance.

Name of Subject: Analog Electronics Lab	
Subject Code: EE304	
Student will be able to:	
CO1	Appraise the basic concept of carrier transport in metals/ semiconductors and real device structure.
CO2	Execute the fundamentals of operation of the semiconductor electronic devices.
CO3	Indicate the basic parameter of electronic devices by their performance and limiting factors.
CO4	Illustrate operation of bipolar transistor and unipolar microwave devices.
CO5	Solve electronics circuit problems using basic concepts.

Name of Subject:Network Analysis Lab	
Subject Code: EE305	
Student will be able to:	
CO1	CO 1: -Justify different network theorems
CO2	CO 2: -Evaluate of parameters of two port network
CO3	CO 3: -Examine frequency response of RLC series and parallel circuits
CO4	CO 4: -Apply network theorems and circuit laws to various real-life problems
CO5	CO 5: -Analyze resonant circuits both in time and frequency domains.

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Name of Subject: Electrical Workshop Lab	
Subject Code: EE306	
Student will be able to:	
CO1	Categorize various types of switches, different tools & other components used in residential, commercial and industrial applications.
CO2	Develop skills for project work.
CO3	Identify and troubleshoot various practical difficulties encountered in industries.
CO4	Demonstrates capability to develop solutions for complex technical problems in Electrical Engineering by applying scientific methods.
CO5	Demonstrate different types of wiring.

Name of Subject: Evaluation of Intership-I,	
Subject Code: BT 107	
Student will be able to:	
CO1	Identify technologies used in software industries.
CO2	Develop small project for the given problem.
CO3	Develop positive attitude, effective communication and time management skills.
CO4	Adapt professional and ethical values.
CO5	Write internship report in prescribed format.

Name of Subject: Mathematics – III	
Subject Code: BT-401	
Student will be able to:	
CO1	Solve polynomial and transcendental equations using interpolation and extrapolation techniques.
CO2	Implement numerical differentiation and integration techniques by nm
CO3	Evaluate ordinary differential equations and partial differential equations.
CO4	Apply Laplace and Fourier transforms in complex engineering problems.
CO5	Analyze and represent complicated data in an easy way with various probability

Name of Subject: Electrical Machine-I	
Subject Code: EE402	
Student will be able to:	
CO1	Demonstrate the working principle of single-phase transformer and its equivalent circuit
CO2	Assess features of three phase transformer including construction and operation.
CO3	Illustrate application of three phase induction motor by relating the performance measures of induction motor.
CO4	Estimate behaviour of different three phase induction motor under different load conditions and types of different power supply
CO5	Infer the construction, working and application of single-phase induction motor.

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Name of Subject: Digital Electronics & Logic Design	
Subject Code: EE403	
Student will be able to:	
CO1	Illustrate the concepts and techniques associated with the number systems and codes to minimize the logical expressions using Boolean postulates.
CO2	Analyze different logic families and their comparative study.
CO3	Compare different types of memories and programmable logic devices.
CO4	Design different types of digital electronic circuit using various mapping and logical tools
CO5	Apply the memory devices in different types of digital circuits for real world application.

Name of Subject: Power System I	
Subject Code: EE404	
Student will be able to:	
CO1	Utilize the concepts and economic aspects of power system in social and environmental applications.
CO2	Illustrate the issues of electrical parameters R, L and C for transmission line and underground cables.
CO3	Evaluate the performance of transmission line and mechanical parameter
CO4	Examine A.C and D.C distribution networks for necessary variable calculations.
CO5	Estimate performance of electrical power generation, transmission and usage.

Name of Subject: Control Systems	
Subject Code: EE405	
Student will be able to:	
CO1	Simplify mathematical modelling of dynamic systems.
CO2	Dissect time domain performance of closed loop system feedback control systems.
CO3	Interpret stability of closed loop system using root locus method.
CO4	Evaluate frequency domain analysis and stability using Bode and Nyquist methods
CO5	Design different types of compensators networks (lag-lead) and Controller.

Name of Subject: Electrical Machine -I lab	
Subject Code: EE402	
Student will be able to:	
CO1	Illustrate the working of transformer and 3 phase induction motor. .
CO2	Perform various test on 1 phase and 3 phase transformers.
CO3	Develop setup for No Load and Block rotor test on Induction motor.
CO4	Distinguish various starter for 3 phase induction motors.
CO5	Make up a circuit utilising transformer for determination of efficiency at different loading.

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Name of Subject: Digital Electronic & Logic Design Lab	
Subject Code: EE403	
Student will be able to:	
CO1	Illustrate the concepts and techniques associated with the number systems and codes.to minimize the logical expressions using Boolean postulates.
CO2	Design basic digital circuits and their operations.
CO3	Apply the concept of memories and programmable logic devices.
CO4	Evaluate different logic families and their comparative study.
CO5	Develop combinational circuits and sequential circuits for given problem.

Name of Subject: Power System – I lab	
Subject Code: EE404	
Student will be able to:	
CO1	Illustrate the structure of substation, towers and poles, insulators and transmission lines
CO2	Examine performance of power system
CO3	Judge simulation results of operation of transmission lines.
CO4	Develop a prototype power system, its components, and transmission process
CO5	Create written documents according to a prescribed schedule, records.

Name of Subject: Control System – lab	
Subject Code: EE405	
Student will be able to:	
CO1	Solve control engineering problems using the acquired analog and digital control.
CO2	Examine effect of feedback on the system using transfer function
CO3	Formulate PI, PD and PID controllers
CO4	Use MATLAB for state space model, root-loci and bode plot of type-1, type-2 systems.
CO5	Apply Laplace transform, transfer functions, modelling RLC circuit, block diagrams for simulation and control.

Name of Subject: Electrical Machine II	
Subject Code: EE 501	
Student will be able to:	
CO1	Evaluate performance of DC generator.
CO2	Analyze the operating characteristics & starting methods of DC motors.
CO3	Appraise the construction, working principle and voltage regulation of poly phase synchronous machine.
CO4	Predict the parallel operation and load sharing by using performance parameters of synchronous machine.
CO5	Infer single-phase synchronous motor's applications on the basis of performance.

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Name of Subject: Power Electronics	
Subject Code: EE 502	
Student will be able to:	
CO1	Choose a power electronic device for a particular application.
CO2	Make use of various single phase and three phase power converter circuits.
CO3	Modify power quality of power output of inverters.
CO4	Identify requirements for power electronics-based DC-DC converter
CO5	Design power electronics circuits in commercial and industrial applications.

Name of Subject: Departmental Elective -I (Electrical Power Generation & Economy)	
Subject Code: EE 503(A)	
Student will be able to:	
CO1	Correlate the concepts of electrical power generation from conventional and nonconventional sources of energy.
CO2	Conclude various types of power plants i.e., hydro, thermal, gas and nuclear
CO3	Appraise harnessing of power from renewable sources
CO4	Evaluate the optimum economy for the power plant
CO5	Design layout of various generating power plants

Name of Subject: Open Elective -I (Industrial Electronics) Subject Code : EE 504(A)	
Subject Code:	
Student will be able to:	
CO1	Analyze performance of regulated power supplies, SMPS etc.
CO2	Infer characteristics of SCR and related circuits.
CO3	Compare characteristics of power MOSFET, power transistor and power IGBT.
CO4	Demonstrate Applications of OP-AMP and related circuits.
CO5	Develop program through Programmable Logic Controller (PLC).

Name of Subject: Electrical Machines-II lab	
Subject Code : EE 501	
Student will be able to:	
CO1	Inspect the working of DC and AC electrical machines .
CO2	Develop practical scheme for synchronisation of alternator with bus bar.
CO3	Troubleshoot the operation of an electrical machines under loaded and unloaded conditions.
CO4	Implement testing and experimental procedures for DC machines.
CO5	Determination of Xd and Xq of synchronous machine.

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Name of Subject: Subject: Power Electronic lab	
Subject Code: EE 502	
Student will be able to:	
CO1	Inspect VI characteristics of various Power Electronics devices
CO2	Implement transfer characteristics of MOSFET.
CO3	Compile Simulink model of various power electronics devices
CO4	Demonstrate working of controlled rectifier.
CO5	Evaluate different commutation techniques.

Name of Subject: Departmental Lab (Simulation MATLAB)	
Subject Code: EE 505	
Student will be able to:	
CO1	Depicts and conduct simulation and experiments.
CO2	Determine the circuit parameters for economic operation
CO3	Utilize techniques, skills and modern engineering tools necessary for engineering practice.
CO4	Solve engineering problems with simulation.
CO5	Examine the waveforms of various circuits

Name of Subject: Open Elective Lab (PLC & HMI)	
Subject Code: EE 506	
Student will be able to:	
CO1	Illustrated industrial automation and various hardware components
CO2	Apply ladder logic concepts of PLC programming
CO3	Examine PLC programming software though various application
CO4	Able to create project using PLC programming.
CO5	Develop HMI programming for graphics display and screen generation

Name of Subject: Evaluation of Intership-II	
Subject Code: BT 407	
Student will be able to:	
CO1	Build the company profile by compiling the brief history, management structure, products / services offered, key achievements and market performance for his / her organization of internship.
CO2	Assess its Strengths, Weaknesses, Opportunities and Threats (SWOT).
CO3	Determine the challenges and future potential for his / her internship organization in particular and the sector in general. .
CO4	Test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period.
CO5	Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization

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Name of Subject: Minor Project I/ Seminar	
Subject Code: EE 508	
Student will be able to:	
CO1	Develop specialist knowledge in the area of their course to make a physical model.
CO2	Illustrate the ability to select and organise research-based and scholarly literature.
CO3	Illustrate the ability to initiate research and formulate viable questions.
CO4	Illustrate the capacity to design, conduct and report his/her original work.
CO5	Justify his/her work based on empirical evidence and the scientific approach to knowledge development

Name of Subject: Electrical Machine Design	
Subject Code: EE 601	
Student will be able to:	
CO1	Apply solution techniques to different optimization problems.
CO2	Design DC machine with formulation of design equations, objective function constraint functions etc.
CO3	Design power transformer optimally.
CO4	Design 3 phase alternator optimally .
CO5	Design 3 phase induction motor optimally.

Name of Subject: Power System-II	
Subject Code: EE602	
Student will be able to:	
CO1	Analyze power system in steady state condition.
CO2	Demonstrate stability constraints in synchronous grid.
CO3	Evaluate methods for control of voltage, frequency and power flow.
CO4	Analyze monitoring and control of power system.
CO5	Outline basics of power system economics.

Name of Subject: Power System Protection	
Subject Code: Subject Code :EE603 (A)	
Student will be able to:	
CO1	Infer various types of faults in Power system
CO2	Implement suitable relays and circuit breaker in commercial and domestic applications.
CO3	Analyze protection arrangements for transformer, alternator and busbar
CO4	Analyze digital protection system.
CO5	Develop system protection schemes through U/F, U/V and df/dt relays.

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Name of Subject: Energy Conservation & Management	
Subject Code: EE604(B)	
Student will be able to:	
CO1	Formulate tasks & duties of an energy manager.
CO2	Demonstrate proper utilisation of energy efficient electric motors and drives.
CO3	Interpret energy saving measures for residential, commercial and industrial areas.
CO4	Appraise the need and methods of energy conservation to industrial, commercial and residential sector.
CO5	Formulate principles relating to energy economy.

Name of Subject: Electrical Drives	
Subject Code: EE 701	
Student will be able to:	
CO1	Examine various applications in industrial and domestic areas where use of electric drives is essential.
CO2	Compare different types of electric drive systems based on nature of loads, control objectives, performance and reliability.
CO3	Combine concepts of previously learnt courses such as, electrical machines, control and power electronics to cater to the need of automations in industries.
CO4	Select most suitable type and specification of motor drive combination for efficient conversion and control of electric power.
CO5	Design new control and power conversion schemes for implementing alternative solutions.

Name of Subject: High Voltage Engineering (HVE)	
Subject Code: EE-702 A	
Student will be able to:	
CO1	Infer various theories of ionization process.
CO2	Illustrate various breakdown phenomena of insulating materials.
CO3	Examine the generation of HV AC DC and impulse voltage and current.
CO4	Illustrate the high voltage transmission and measurements.
CO5	Conduct high voltage test on materials and apparatus.

Name of Subject:EE-703(A) Utilization of Electrical Energy	
Subject Code: EE703(A)	
Student will be able to:	
CO1	Estimate Illumination of different kinds of lamp.
CO2	Elaborate the process of heating, welding & electrolysis.
CO3	Classify drives used in traction.
CO4	Examine the techniques for braking system realization in traction.
CO5	Select motors for various industrial drives.

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Name of Subject: Electrical Drives – lab	
Subject Code: EE-701	
Student will be able to:	
CO1	Propose ways to control the speed of DC machines, AC machine and 3 phase fully controlled converter as speed controller.
CO2	Evaluate the impact of control methods on the measurement results
CO3	Select the control method of induction motor.
CO4	Verify universal AC/DC motor controller.
CO5	Drive system simulation with MATLAB/Simulink

Name of Subject: Electrical Cad Lab	
Subject Code: EE704	
Student will be able to:	
CO1	Demonstrate drafting techniques and shortcuts used by professionals.
CO2	Evaluate design of induction machine.
CO3	Develop electrical drawing of synchronous machine.
CO4	Develop electrical drawing of design of transformer, DC m/c.
CO5	Enhance visualization ability of machine components.

Name of Subject: Energy Audit – Lab	
Subject Code: EE705	
Student will be able to:	
CO1	State the technology, economics and regulation related issues associated with energy auditing
CO2	Classify the instruments for energy auditing
CO3	Examine the energy audit and other related jobs with the help of available software.
CO4	Inspect strategic and policy recommendations on energy auditing
CO5	Develop concept of real time problem solving for energy audit issue

Name of Subject: Major Project-I	
Subject Code: EE706	
Student will be able to:	
CO1	Choose potential problem based on literature survey/impending industrial/real time needs.
CO2	Classify various solution methodologies to solve problem taken for study.
CO3	Judge the design steps or experimental procedure relevant to the problem.
CO4	Examine results and findings obtained.
CO5	Recommend solutions to potential engineering problems.

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Name of Subject: Evaluation of Intership-III,	
Subject Code: EE-607	
Student will be able to:	
CO1	Identify their areas of interest as per their training requirement.
CO2	Formulate problems and try to find their solution through gained knowledge.
CO3	Adapt actual engineering environment.
CO4	Develop the habit of utilization of technical resources.
CO5	Develop training report and give oral presentations related to the training completed.

Name of Subject: Power Quality Improvement & Mitigation Technique	
Subject Code: EE-801	
Student will be able to:	
CO1	Compare the methods involved in power system calculations, applications and regulation of power system network parameters.
CO2	Examine the causes of voltage sag and swell.
CO3	Interpret various methods to improve power quality.
CO4	Evaluate the Effects of harmonics on various equipments.
CO5	Classify compensating techniques for a given power quality problem

Name of Subject: EHV AC and DC Transmission	
Subject Code: EE-802 (C)	
Student will be able to:	
CO1	Evaluate existing status EHV AC and DC transmission.
CO2	Recommend various types of series and shunt FACTS devices.
CO3	Analyze the control characteristics of EHV d.c. system.
CO4	Analyze travelling waves & over voltages on transmission systems.
CO5	Design a system, component, or process with constraints such as economic, environmental and safety.

Name of Subject: Power Electronics Converter for Renewable Energy	
Subject Code: EE-803 (B)	
Student will be able to:	
CO1	Discuss the Importance of power electronics converter in harnessing energy from renewable sources
CO2	Discuss different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems.
CO3	Examine the stand alone and grid connected renewable energy systems.
CO4	Develop maximum power point tracking algorithms
CO5	Evaluate the dynamic analysis of power converters for renewable energy Sources

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Name of Subject: Power Quality Improvement & Mitigation Technique	
Subject Code: EE-801	
Student will be able to:	
CO1	Examine dynamic load with respect to power quality.
CO2	Build electrical system for reactive power compensation of linear load.
CO3	Analyse harmonics of balanced and un-balanced non-linear loads.
CO4	Implement suitable model for compensating device for power factor correction and voltage regulation.
CO5	Develop model of hybrid filters for harmonics compensation.

Name of Subject: Simulation Lab	
Subject Code: EE-804	
Student will be able to:	
CO1	Build an electrical system in terms of its differential equation, transfer function, magnitude response which are mutually convertible.
CO2	Evaluate mathematical expressions that can be used to estimate parameters from different types of data, for different models of electrical system.
CO3	Examine simulation of a continuous-time system by means of numerical integration.
CO4	Synthesise MATLAB code to simulate a given system or model.
CO5	Implement a suitable model for a given problem, making informed choices about the model type.

Name of Subject:Major Project-II	
Subject Code: EE-805	
Student will be able to:	
CO1	Choose potential problem based on literature survey/impending industrial/real time needs.
CO2	Classify various solution methodologies to solve problem taken for study.
CO3	Judge the design steps or experimental procedure relevant to the problem.
CO4	Examine results and findings obtained.
CO5	Recommend solutions to potential engineering problems.

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Course Outcomes for B. Tech (Grading) Session 2022-23	
Branch: Department of Computer Science Engineering-Artificial Intelligence & Machine Learning	
Name of Subject: Technical Communication	
Subject Code: AL301	
Student will be able to	
CO1	Summarize the importance of Communication in a Globalized world.
CO2	Classify Writing Skills and Speaking Skills.
CO3	Analyseinterpersonal communication skills.
CO4	Analyse Professional Presentations techniques.
CO5	Apply Basics of grammar and common error in writing and speaking.

Name of Subject: Introduction to Probability and Statistics	
Subject Code: AL 302	
Student will be able to:	
CO1	Develop statistical techniques and methodologies.
CO2	Develop and equip the students with standard concepts and tools at an intermediate to advanced level.
CO3	Build a discipline that will serve them well towards tackling various problems in the real world.
CO4	Apply curve fitting methods to calculate mean and mean differences.
CO5	Develop goodness of fit and independence of attributes.

Name of Subject: Data Structures	
Subject Code: AL 303	
Student will be able to :	
CO1	Summarize the concept of data structure and explore arrays and linked lists.
CO2	Classify various linear data structures with their representation and perform different operations on them.
CO3	Analyze algorithms for operations on Tree.
CO4	Analyse algorithms for operations on Graph.
CO5	Apply data structures to implement algorithms for searching and sorting.

Name of Subject: Data Structure Lab	
Subject Code: AL 303	
Student will be able to:	
CO1	Develop program for different operations using array and linked list.
CO2	Develop programs for linear data structures
CO3	Build program for non linear data structures to solve various computing problems.
CO4	Apply various sorting, searching and hashing techniques
CO5	Develop code for real life problems like shortest path and MST using graph theory.

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Name of Subject: Object Oriented Programming & Methodology	
Subject Code: AL 305	
Student will be able to	
CO1	Outline the basics of Object Oriented Programming and its elements.
CO2	Apply the concepts of encapsulation and abstraction in Object Oriented Programming.
CO3	Apply concept of inheritance in program development.
CO4	Discuss different polymorphisms methods with real world examples.
CO5	Apply concept of exception handling and multithreading.

Name of Subject: Object Oriented Programming & Methodology Lab	
Subject Code: AL 305	
Student will be able to	
CO1	Apply object oriented programming concept in program design.
CO2	Create programs using friend function and function overloading.
CO3	Implement concept of operator overloading, Inheritance and polymorphism in program design.
CO4	Construct programs to handle exceptions in programming in C++.
CO5	Build program using constructor and destructor.

Name of Subject: Computer Workshop	
Subject Code: AL 306	
Student will be able to	
CO1	Make use of basics of Java Features using programming environment.
CO2	Apply Java collective framework to design data structures and collections algorithms.
CO3	Develop programs using advance Java Features-Multithreading, Networking and JDBC.
CO4	Development of web based applications with the help of servlets, JSP and Multimedia.
CO5	Experiment with advanced web/internet programming technologies like J2ME, J2EE, EJB and XML.

Name of Subject: Evaluation of Internship-I completed at I year level	
Subject Code: BT107	
Student will be able to	
CO1	Demonstrate the ability to resolve the problems.
CO2	Demonstrate critical thinking skills, such as related to social issues.
CO3	Adapt professional software development environment.
CO4	Identify the different resources for the software development
CO5	Summarize new practices observed during internship

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Name of Subject: Discrete Structure	
Subject Code: AL 401	
Student will be able to	
CO1	Apply the concepts of the Set theory, Relation and Functions.
CO2	Illustrate the concepts of Algebraic Structures.
CO3	Analyze the relation between Propositional Logic and Finite state machines
CO4	Apply various types of graph structures to computional problem solving.
CO5	Apply the concept of hasse diagram, posets, lattice and combinatorics to solve problems in multiple domains.

Name of Subject: Analysis Design of Algorithm	
Subject Code: AL 402	
Student will be able to :	
CO1	Analyse different divide and conquer algorithms with respect to time and space complexity.
CO2	Apply greedy strategies and Dynamic programming technique for algorithm development
CO3	Apply branch and bound and backtracking technique for the solution of computing problems
CO4	Apply the concepts of trees and graphs for solving of real world problems
CO5	Choose the problem solving strategies for given problem

Name of Subject: Analysis Design of AlgorithmLab	
Subject Code: Al 402	
Student will be able to :	
CO1	Create programs using Greedy method to find optimal solution for problems like single source shortest path algorithm
CO2	Create program using Dynamic programming concept for Floyd-Warshal algorithm.
CO3	Create program for Hamiltonian cycle problem using backtracking
CO4	Develop AVL and B-trees based simple search programs
CO5	Create programs using Greedy method to find optimal solution for problems like single source shortest path algorithm

Name of Subject: Software Engineering	
Subject Code: AL 403	
Student will be able to :	
CO1	Classify different software process models.
CO2	Determine software functional and non-functional requirements.
CO3	Design software process, architecture, user Interface.
CO4	Categorize various types of software testing's techniques.
CO5	Discuss project management and software maintenance.

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Name of Subject: Software Engineering Lab	
Subject Code: AL 403	
Student will be able to :	
CO1	Apply the software engineering methodologies involved in the phases for project development.
CO2	Create function oriented and object oriented software design using tools like rational rose.
CO3	Develop software requirements specifications for a given problem.
CO4	Create structure and behavior of UML diagrams.
CO5	Create the test cases and test strategies for conventional software.

Name of Subject: Computer Organisation and Architecture	
Subject Code: AL 404	
Student will be able to :	
CO1	Summarize the basic organization of computer with emphasis on working of each component.
CO2	Interpret the steps of execution of instruction cycle, micro instructions along with the control signals generated by control unit.
CO3	Evaluate the computer based different arithmetic operations.
CO4	Discuss input-output Organization of Computer System.
CO5	Classify various Memory devices, Multiprocessors with its working.

Name of Subject: Computer Organisation and Architecture Lab	
Subject Code: AL 404	
Student will be able to :	
CO1	Elaborate basic principles of computer architecture.
CO2	Interpret multiplication operation on memory.
CO3	Develop programs to perform addition operation on memory.
CO4	Contruct programs to perform subtraction operation on memory.
CO5	Build the steps of execution of instructions and micro instructions along with the control signals generated by control unit.

Name of Subject: Machine Learning	
Subject Code: AL 405	
Student will be able to :	
CO1	Elaborate most cost-effective approaches of machine learning.
CO2	Develop automated knowledge acquisition in emerging data-rich disciplines theoretical understanding of these methods.
CO3	Develop computational implications of machine learning algorithms.
CO4	Understanding of the theoretical concepts of machine learning.
CO5	Apply research or industry application of machine learning techniques.

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Name of Subject: Operating Systems	
Subject Code: AL 501	
Student will be able to :	
CO1	Develop the concept of operating systems and its services.
CO2	Contrast file system along with disk scheduling algorithms.
CO3	Analyze different process scheduling algorithms and memory management techniques to achieve better performance of a computer system.
CO4	Determine techniques to deal with different Concurrent processes.
CO5	Examine case studies of Unix/Linux and Windows operating system.

Name of Subject: Operating Systems Lab	
Subject Code: AL 501	
Student will be able to :	
CO1	Construct a program for different CPU scheduling algorithm.
CO2	Build a program for different classical problem of synchronization.
CO3	Construct a program for different page replacement algorithm.
CO4	Create a program for disk scheduling algorithms.
CO5	Construct a program for Deadlock free condition.

Name of Subject: Database Management Systems	
Subject Code: AL 502	
Student will be able to :	
CO1	Discuss the concepts of Database and make use of ER diagram.
CO2	Write the database queries in the form of relational algebra and calculus expression.
CO3	Demonstrate the Normalization with example.
CO4	Utilize the concept of concurrency control & recovery mechanism for database.
CO5	Design RDBMS through Oracle / Postgresql / mySql.

Name of Subject: Database Management Systems Lab	
Subject Code: AL 502	
Student will be able to :	
CO1	Create database structure using DDL commands.
CO2	Build user defined constraints on the database.
CO3	Create queries for interacting with database.
CO4	Construct procedures, cursor and trigger.
CO5	Develop a simple data base application in RDBMS.

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Name of Subject: Open Elective- Deep Learning	
Subject Code: AL-503 (B)	
Student will be able to :	
CO1	Define understanding deep learning fundamentals.
CO2	Demonstrate structure, functionality, and applications of neural network architectures.
CO3	Apply and training deep learning models using appropriate techniques.
CO4	Solve and implement deep learning libraries and frameworks such as Tensor Flow, Keras, PyTorch.
CO5	Describe reinforcement learning and deep reinforcement learning algorithms for sequential decision-making tasks.

Name of Subject: Open Elective- Natural Language Processing	
Subject Code: AL-504 (B)	
Student will be able to :	
CO1	Define different data models used in Information Retrieval using NLP
CO2	Demonstrate current methods for statistical approaches to machine translation.
CO3	Apply syntactic parsing and semantic analysis on text.
CO4	Solve and implement real world problems using NLP.
CO5	Describe man machine interfaces.

Name of Subject: Departmental Elective Lab (Deep Learning)	
Subject Code: AL-505	
Student will be able to :	
CO1	Identify in-depth about theories, fundamentals, and techniques in Deep learning.
CO2	Describe the on-going research in computer vision and multimedia field.
CO3	Illustrate various deep networks using performance parameters.
CO4	Prepare design and validate deep neural network as per requirements.
CO5	Select tools to analyse gradient problems.

Name of Subject: Open Elective Lab (Natural Language Processing)	
Subject Code: AL 506	
Student will be able to :	
CO1	Formulate define different data models used in Information Retrieval using NLP.
CO2	Construct programs to demonstrate current methods for statistical approaches to machine translation
CO3	Design Apply syntactic parsing and semantic analysis on text.
CO4	Create Solve and implement real world problems using NLP.
CO5	Develop programs for intelligent work processors.

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Anand Nagar, Bhopal

Technocrats Institute of Technology (Excellence) TIT(E) BHOPAL Bhopal (M.P.)

Name of Subject: Evaluation of Internship-II	
Subject Code: AL 507	
Student will be able to :	
CO1	Apply the real working environment principles in his/her professional development.
CO2	Correlate theoretical concepts learned in class rooms to the industrial work scenario.
CO3	Adapt professional software development environment.
CO4	Learn various key practices for working in team and optimizing processes.
CO5	Develop work competencies for a specific profession or occupation.

Name of Subject: Minor Project- I	
Subject Code: AL 508	
Student will be able to :	
CO1	Choose the technology to implement the project from the available technologies.
CO2	Identify the project based on the review of the selected technology.
CO3	Develop the project in legal and ethical ways using project management principals such as planning, scheduling, budgeting and risk management.
CO4	Work effectively with team members, communicate and resolve conflicts if any within the team.
CO5	To present their project outcomes effectively in verbal and written form.

Name of Subject: Theory of Computation	
Subject Code: AL-601	
Student will be able to :	
CO1	Summarize the fundamentals of various Languages, Grammars & Automata.
CO2	Construct Automata to recognize the languages.
CO3	Select appropriate automata as per the requirements.
CO4	Prove properties of languages, grammars and automata using formal mathematical methods.
CO5	Discuss the complexity and limitation of computation in problem solving.

Name of Subject: Theory of Computation Lab	
Subject Code: AL–601	
Student will be able to :	
CO1	Write a Program to implement DFA to accept a given language.
CO2	Write a program for modelling a system using PDA to accept appropriate language.
CO3	Write a program to implement turing machine to accept a given language.
CO4	Select appropriate automata to implement a given dynamic system of moderate complexity.
CO5	Measure Complexity of various Computation problems.

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Name of Subject: Computer Networks	
Subject Code: AL-602	
Student will be able to :	
CO1	Outline basics of computer networks and design issues related to various layers of TCP/IP
CO2	Apply different protocols of data link layer
CO3	Apply multiple approaches for medium access control in a computer network
CO4	Analyze different routing algorithms to optimize the use of channel
CO5	Discuss transport and application issues (related to protocols such as HTTP, FTP, SMTP, SNMP, DNS, SSH etc.)

Name of Subject: Computer Networks Lab	
Subject Code: AL-602	
Student will be able to :	
CO1	Demonstrate computer network component and devices.
CO2	Analyze how communication works at different layers of TCP/IP model
CO3	Apply mathematical foundations to solve computational problems .
CO4	Apply the various Routing Protocols/Algorithms and Internetworking
CO5	Design network with client/server programming

Name of Subject: Departmental Elective Data and Visual Analytics	
Subject Code:AL-603(B)	
Student will be able to :	
CO1	Summarize theLevels of Measurement Data management and indexing techniques.
CO2	Construct analysis and variance methods using regression.
CO3	Analyze data gathering, accessing and cleaning techniques.
CO4	Apply Big Data processing tools using Hadoop.
CO5	ImplementPython visualization libraries (matplotlib, pandas, seaborn, ggplot,plotly), Introduction to PowerBI tools.

Name of Subject: Open Elective-Cloud Computing	
Subject Code: AL-604(A)	
Student will be able to :	
CO1	Summarize various service oriented architectures in cloud computing.
CO2	Classify cloud computing architecture including virtualization technology and multitenant architecture.
CO3	Outline the cloud file system and apply map reduce model
CO4	Discuss secured cloud environment
CO5	Elaborate quality of service issues in real time cloud application.

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Name of Subject: Departmental Elective Lab (Data and Visual Analytics)	
Subject Code: AL-605	
Student will be able to :	
CO1	Interpret the concepts of data analytics using statistics and probability
CO2	Demonstrate the data pre-processing techniques used in data analytics.
CO3	Identify the relation between Correlation and Covariance.
CO4	Develop programs in the field of data analytics based on R programming language.
CO5	Build programs using MATLAB and Python as data analytics tools.

Name of Subject: Minor Project II	
Subject Code: AL-608	
Student will be able to :	
CO1	Choose the technology to implement the project from the available technologies.
CO2	Identify the project title based on the review of the selected technology.
CO3	Develop the project in legal and ethical ways using project management principals such as planning, scheduling , budgeting and risk management.
CO4	Work effectively with team members, communicate and resolve conflicts if any within the team.
CO5	To present their project outcomes effectively in verbal and written form.

Name of Subject: Computer Vision	
Subject Code: AL-701	
Student will be able to :	
CO1	Understand practice and theory of computer vision.
CO2	Elaborate computer vision algorithms, methods and concepts.
CO3	Implement computer vision systems with emphasis on applications and problem solving
CO4	Apply skills for automatic analysis of digital images to construct representations of physical objects and scenes.
CO5	Design and implement real-life problems using Image processing and computer vision.

Name of Subject: Departmental Elective Advanced Machine Learning	
Subject Code: AL702 (B) Advanced Machine Learning	
Student will be able to :	
CO1	Introduce advanced concepts and methods of machine learning
CO2	Develop an understanding of the role of machine learning in massive scale automation.
CO3	Develop various machine learning algorithms in a range of real-world applications.
CO4	Determine and design dynamic programming algorithms.
CO5	Analyze and implement reinforcement learning techniques.

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Name of Subject: Open ElectiveCompiler Design	
Subject Code:AL-703(A)	
Student will be able to :	
CO1	Summarize the fundamentals & different phases of compiler with examples.
CO2	Construct Parsing Table & Show the parsing of string for various parsers.
CO3	Analyze data structures used for symbol table and runtime organization and errors in various phases
CO4	Apply code generation techniques to create target code.
CO5	Summarize the fundamentals & different phases of compiler with examples.

Name of Subject: Departmental Elective Lab	
Subject Code: AL704 Advanced Machine Learning	
Student will be able to :	
CO1	Introduce methods of machine learning used forreal time data science project.
CO2	Develop an understanding of advanced data visualization techniques with Seaborn and Matplotlib.
CO3	Develop various machine learning algorithms like random forest classifier.
CO4	Determine and design programming logics App behaviour analysis algorithms.
CO5	Analyzeand implement machine learning environment using Anaconda, Jupyter Notebook, Spyder.

Name of Subject: Skill Development Lab	
Subject Code: AL-705	
Student will be able to :	
CO1	Select appropriate software life cycle model, Process & methods for developing software product according user requirements & expectations.
CO2	Translate user requirements & expectations in the form of software requirement specification.
CO3	Make use of various design pattern & design methods for implementing the design of software product.
CO4	Develop skills in software development through analysis of case study.
CO5	Organize all activities like requirement analysis, design, and coding, testing, maintenance in the form of documentation for systematic execution of project.

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Name of Subject: Major Project -I	
Subject Code: AL-706	
Student will be able to :	
CO1	Identify the project title based on the review of the current state of the field of project.
CO2	Choose the technology to implement the problem from the available technologies.
CO3	Develop creative and innovative solutions to the problems in legal and ethical ways using project management principals such as planning, scheduling , budgeting and risk management.
CO4	Work effectively with team members, communicate and resolve conflicts if any within the team.
CO5	To present their project outcomes effectively in verbal and written form.

Name of Subject: Evaluation of Internship -III	
Subject Code: AL- 607	
Student will be able to :	
CO1	Apply the real working environment principles in his/her professional development.
CO2	Correlate theoretical concepts learned in class rooms to the industrial work scenario.
CO3	Adapt professional software development environment.
CO4	Learn various key practices for working in team and optimizing processes.
CO5	Develop work competencies for a specific profession or occupation.

Name of Subject: Business Intelligence	
Subject Code: AL801	
Student will be able to :	
CO1	Analyseexposed with the basic rudiments of business intelligence system.
CO2	Interpret and understand the modelling aspects behind Business Intelligence.
CO3	Develop the understanding of the business intelligence life cycle and the techniques used in it.
CO4	Determine data analysis tools and techniques for marketing models.
CO5	Implementadvanced visualization using Rich Report tool.

Name of Subject: Departmental Elective Big Data	
Subject Code: AL802 (C)	
Student will be able to :	
CO1	Analyze the big data characteristics and challenges.
CO2	Interpret the big data infrastructure through hadoop.
CO3	Develop Big Data Solutions using Hadoop Eco System.
CO4	Determine data architectural patterns and its variations of NoSQL and MangoDB.
CO5	Analyze the mining of social network graphs and its applications.

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Name of Subject: Internet of Things	
Subject Code: AL-803(A)	
Student will be able to :	
CO1	Summarize the design, components and state of the art of IoT.
CO2	Outline the components, classes and types of sensors.
CO3	Discuss different wired and wireless IoT networking technologies
CO4	Interpret the working of message passing protocol of IoT
CO5	Build the IoT on Arduino and Raspberry Pi platform

Name of Subject: D/O elective lab	
Subject Code: AL804	
Student will be able to :	
CO1	Perceive hands-on experience on large-scale analytics tools.
CO2	Design Algorithms to solve Data Intensive Problems using Map Reduce Paradigm.
CO3	Analyze and perform different operations on data using Hive and Pig Latin scripts.
CO4	Create NoSQL data for Unstructured data and perform operations with API.
CO5	Apply the concept of social network graphs and clustering in real world applications.

Name of Subject: Major Project-II	
Subject Code: AL-805	
Student will be able to :	
CO1	Identify the project title based on the review of the current state of the field of project.
CO2	Choose the technology to implement the problem from the available technologies.
CO3	Develop creative and innovative solutions to the problems in legal and ethical ways using project management principals such as planning, scheduling, budgeting and risk management.
CO4	Work effectively with team members, communicate and resolve conflicts if any within the team.
CO5	To present their project outcomes effectively in verbal and written form.

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