Course Outcomes [CO]

Semester III

Subject: Engineering Mathematics - III
Course code: BTCOC301

CO1: Apply the Laplace Transform technique to evaluate integrals , differential equations and their applications to engineering problems.

CO2: Demonstrate the concept of Partial Differential Equation and their applications to engineering problems.

CO3: Apply the Fourier Transform technique to evaluate improper integral and their applications to engineering problems

CO4: Identify the analytic function and their applications to solve complex integrals

CO5: Discuss the complex transformations and their applications to rotate, translate and magnify the images.

Subject: Discrete Mathematics
Course code: BTCOC302

CO1: Solve problems based on Sets theory, Basics of Number theory and apply Propositional Logic and First order logic.

CO2: Identify Properties/types of Relations, Functions and Partial Order Sets.

CO3: Analyze computational process using analytic and combinatorics methods.

CO4: Design a discrete model for a given Graph problems and solve. Understand the basic Graph theory and its applications in computer science.

CO5: Apply concept of Rooted Tree, Minimum Cost Spanning Tree to solve various problems on MST.

CO6: Demonstrate Groups, Rings and Fields. Express and solve number theoretic problems using Algebraic properties of Groups, Rings and Fields.

Subject: Data Structures
Course Code: BTCOC303

CO1: Classify different data structures such as stack, queues, linked list, trees and graphs

CO2: Analyze and implement various searching and sorting techniques

CO3: Implement linear and non-linear data structures

CO4: Apply appropriate data structures to solve specific problems

CO5: Evaluate algorithms and data structures in terms of time and space complexity of basic operations.

Subject: Computer Architecture & Organization
Subject Code: BTCOC304

CO1: Identify the basic structure and functional units of a computer to analyze the merits and pitfalls in architecture and performance.
CO2: Demonstrate the impact of instruction set architecture, central processing unit on cost-performance of computer design and apply it in assembly language programming.
CO3: Select and classify various interrupts used to implement I/O control and data transfers.
CO4: Describe the design process of a computer with arithmetic and logical operation and critical elements in each step.
CO5: Identify the pros and cons of different types of memory hierarchy, cache design and data transfer techniques in computer.
CO6: Analyze the interconnection networks, multiprocessors designs and use research based various design techniques to be employed.

Subject: Digital Electronics & Microprocessors
Course Code: BTCOC305

CO1: Identify numbers in various number systems and perform basic arithmetic operations and code conversions.
CO2: Compute different errors in codes using error detection and correction methods.
CO3: Analyze, Design simple and complex combinational and sequential logic circuits.
CO4: Compare accepted standards and guidelines to select appropriate Microprocessor from 8085, 8086, 80386 to meet specified performance requirements.
CO5: Interface various i/o devices and Memory with 8086 microprocessor.6CO6Write assembly language and C programs for microprocessors

Subject: Basic Human Rights
Course code: BTHM3401

CO1: Discuss the importance, philosophical and historical perspectives of human rights.
CO2: Analyze the challenges of the pluralistic society and the rising conflicts and tensions in the
CO3: name of particular loyalties to caste, religion, region and culture.
CO4: Explain prominent issues such as Economy, Poverty, Unemployment and the responsibility of the government.

CO5: Discuss Fundamental Rights and Directive Principles of State Policy in the Constitution of India in context with the present situation

Subject: Python Programming
Course Code: BTCOL307

CO1: Use and Explain the fundamentals of Python programming, conditional statements, control statements and loops

CO2: Apply the proficiency in handling Numbers, Strings and functions to solve computational problems.

CO3: Select various data structures in python such as List, Tuple, Set and Dictionary.

CO4: Use common operations involved in file handling and Exception handling

CO5: Design and Develop solution for real-time application using Database operations

Python Programming Lab

CO1: Use programming basics and loops for the solution of real-time applications.

CO2: Apply String, Functions and Exception handling for solving diverse problems.

CO3: Implement various Data Structures (such as List, Dictionary, Tuple, Set) and its operations.

CO4: Demonstrate programs using File Handling operations.

Subject: Data Structures Lab
Course Code: BTCOL308

CO1: Differentiate static and dynamic memory allocation techniques

CO2: Implement various operations on linear and non-linear data structures

CO3: Analyze and implement different searching and sorting techniques

CO4: Identity the appropriate data structure to solve a given problem

CO5: Compute time complexities of different algorithms

Subject: Digital Electronics & Microprocessor Lab
Course Code: BTCOL309

CO1: Identify the various digital ICs and elaborate their operation.

CO2: Verify functionalities of digital gates.

CO3: Construct Boolean equations, design circuits and verify functionalities of circuits.

CO4: Analyze, design and implement combinational and sequential circuits.

CO5: Analyze the sequential logic circuits design in synchronous and asynchronous modes for various complex logic and switching devices.

Semester IV

Subject: Design and Analysis of Algorithm
Course Code: BTCOC401

CO1: Describe the major modern algorithms and selected techniques that are essential to today's computers.

CO2: Identify the key characteristics of a given problem and analyze the suitability of a specific algorithm design technique for the problem. (Knowledge, Application (level 1, level 3))

CO3: Describe, apply and analyze the complexity of certain divide and conquer, greedy and dynamic programming algorithm.(Knowledge, Application (level 1, level 3).

CO4: Analyze NP-complete problems and develop algorithms to solve the problems.

Subject: Probability & Statistics
Course Code: BTCOC402

CO1: Demonstrate the concept of probability to solve real world problems using addition, multiplication and Baye's theorem.

CO2: Apply the concept of random variable and mathematical expectation .

CO3: Demonstrate the ability to apply different probability distribution.

CO4: Compute and inter pet result of regression and correlation analysis.

CO5: Apply the technique of curve fitting to straight line , parabola and more general curves.

Subject: Operating System
Course Code: BTCOC403

CO1: Explain the basic concepts, types, and system components of OS

CO2: Illustrate and compare the performance of process scheduling techniques

CO3: Apply the knowledge of process management, synchronization, deadlock to solve basic problems.

CO4: Analyze various memory management techniques.

CO5: Exemplify I/O management and file systems

Subject: Object Oriented Programming in Java (Elective-I)

Course Code: BTCOE404(B)

CO1: Use an integrated development environment to write, compile, run and test simple object oriented Java programs

CO2: Identify classes, objects, members of a class and relationships among them

CO3: Use arrays and class array

CO4: Create and access packages

CO5: Describe features of classes and interfaces in Java

CO6: Demonstrate the concepts of polymorphism and inheritance

Subject: Numerical Methods (Elective-II)
Course Code: BTCOE405(A)

CO1: Apply numerical methods to obtain approximate solutions to mathematicalproblems

CO2: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations

CO3: Analyze and evaluate the accuracy of common numerical methods

CO4: Apply various interpolation methods and finite difference concepts

CO5: Interpret calculation and errors in numerical method.

Subject: Introduction to Data Science with R
Course Code: BTCOL408

CO1: Understand the basics in R programming in terms of constructs, control statements and functions.

CO2: Import, review, manipulate and summarize data-sets in R

CO3: Apply the R programming from a statistical perspective.

CO4: Create and edit visualizations with R

R Programming Lab

CO1: Install and master the use of the R and RStudio interactive environment

CO2: Explore and understand how to use the R documentation

CO3: learn and implement the various data structures of R

CO4: Implement the control statements and loop constructs in R

CO5: Compute basic summary statistics & produce data visualizations

Subject: Object Oriented Programming Lab
Course Code: BTCOL409

CO1: Familiarize the students with language environment and use of OOPs concepts.

CO2: Solve real world problems using OOP techniques.

CO3: Implement programs using C++ features such as composition of objects, overloading, inheritance, Polymorphism etc.

CO4: Create own Packages and Interface in java.

CO5: Develop and understand exception handling, multithreaded applications with synchronization.

Subject: Operating System Lab
Course Code: BTCOL410

CO1: Study and implement Unix Operating System Commands

CO2: Implement the different algorithms for CPU Scheduling.

CO3: Implement algorithms for handling synchronization.

CO4: Implement algorithms for memory management.

Semester V

Subject: Theory of Computations
Course Code: BTCOC502

CO1: Acquire fundamental understanding of the core concepts in automata theory and formal languages.

CO2: Design grammars and automata (recognizers) for different language classes.

CO3: Model, compare & analyze different computational models and identify their capabilities and limitations.

CO4: Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO5: Model various kinds of real-time problems such as designing the compilers.

Subject: Machine Learning
Course Code: BTCOC503

CO1: Explain fundamentals and importance of machine learning

CO2: Compare supervised, unsupervised machine learning

CO3: Use collaborative filtering based learning and Bayes learning

CO4: Define and Apply regression, classification and clustering techniques of Machine learning.
CO5: Discover basics of Deep Learning, specialized field of machine learning.
CO6: Discuss computational learning.

Subject: Cyber Laws (Elective-III)
Course Code: BTCOE504(B)

CO1: Utilize knowledge of cyberspace, jurisdiction and basic concepts of Cyber Law
CO2: Explore the legal and policy developments in various countries to regulate Cyberspace
CO3: Acquire in-depth knowledge of Information Technology Act and legal framework of right to privacy, data security and data protection.
CO4: Prepare learner conversant with Intellectual Property issues emerging from Cyberspace
CO5: Identify knowledge of Penalties, Compensation and Offenses under the Cyberspace and Internet in India

Subject: Economics and Management (Elective-IV)
Course Code: BTCOE505(A)

CO1: Analyze the basic concepts of demand, supply and equilibrium and their determinants.
CO2: Apply the basic concepts of managerial economics in the economic goals of the firms and optimal decision making.
CO3: Identify different depreciation methods, evolution of management thoughts and generic functions of management.
CO4: Make use of basic mathematical-statistical methods and tools applying them to economic and financial problems and to the assessment and management of business activities.
CO5: Demonstrate knowledge about the characteristics & role of an entrepreneur to start and operate small business in the modern economy.

Subject: Competitive Programming-I
Course code: BTCOC506

CO1: Discuss the concepts of online Judges, feedback and the standard input output to solve the programming challenges.
CO2: Design and implement the basic programs of Arrays, Linked list, Strings etc on Hackerrank, Codechef nwebsites.
C03: Use the guidelines for designing the test cases for the various programs.

CO4: Participate in the programming challenges in competitive platforms like codechef.com, uva.onlinejudge.com.
CO5: Practice the challenging problems to succeed in the programming challenges of reputed recruiting organization like TCS, INFOSYS.

Subject: Database System Lab
Course code: BTCOL507

CO1: Discuss the basics of SQL and construct queries using SQL. CO1
CO2: Identify the sound design principles for logical design of databases, including the E-R method and normalization approach.CO2
CO3: Implement Basic DDL, DML , DCL commands, Understand Data selection and operators used in queries and restrict data retrieval and control the display order.CO3
CO4: Use Aggregate and group functions to summarize data, join multiple tables using different types of joins. CO4
CO5: Demonstrate the PL/SQL architecture and write PL/SQL code for procedures, triggers, cursors, exception handling etc.CO5

Subject: Machine Learning Lab
Course code: BTCOL508

CO1: Read and examine the real-world dataset.
CO2: Apply Machine Learning techniques of Regression, Classification and Clustering
CO3: Analyze the results of Machine Learning technique.
CO4: Predict answer for given value from learned model or technique

Subject: Seminar
Course code: BTCOS509

CO1: To study research papers for understanding of a new field, in the absence of a textbook, to summarize and review them.
CO2: To identify promising new directions of various cutting edge technologies.
CO3: To impart skills in preparing detailed report describing the project and results
CO4: To effectively communicate by making an oral presentation before an evaluation committee

Semester VI

Subject: Computer Network
Course code: BTCOE602

CO1 Demonstrate the functions of each layer/ protocols , headers in OSI, TCP/IP model and LAN Technologies

CO2 Compare LAN Technologies such as ATM, Ethernet (802.3), FDDI, Token Rings, Wireless LANs: Wi-Fi (802.11), Wireless: Wi-MAX (802.16), Bluetooth (802.15.1), RFID.

CO3 Evaluate error correcting codes, error detecting codes, routing paths

CO4 Analyze Network Layer and Congestion Control policies

CO5 Apply the knowledge of Application Layer Protocols such as DNS, SMTP, POP, FTP, HTTP. to design the Socket

CO6 Identify Various Network security principles such as Authentication, firewalls

Subject: Artificial Intelligence (Elective-V)
Course code: BTCOE603(B)

CO1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

CO2: Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners.

CO3: Design good evaluation functions and strategies for game playing.

CO4: Implement and execute by hand alpha-beta search.

CO5: Carry out proofs in first order and propositional logic using techniques such as resolution, unification, backward and forward chaining.

CO6: Discuss the core concepts and algorithms of advanced AI, including informed searching, CSP, logic, uncertain knowledge and reasoning, dynamic Bayesian networks and so on.

Subject: Object Oriented Analysis and Design (Elective-V)
Course code: BTCOE603(C)

CO1: Use the knowledge of object oriented concepts for solving system modeling and design problems.

CO2: Illustrate UML constructs for software modeling and design solution

CO3: Design and develop object oriented models using appropriate UML notations.

CO4: Analyze different approaches of object orientated system

CO5: Use the concept of design patterns for constructing software architectures

CO6: Implement from Design using programming Style, object oriented languages and databases

Subject: Internet of Things (Elective-VI)
Course code: BTCOE604(C)

CO1: Apply the concepts of IOT.

CO2: Identify the different technology.

CO3: Apply IOT to different applications.

CO4: Analysis and evaluate protocols used in IOT.

CO5: Design and develop applications in IOT.

CO6: Analyze and evaluate the data received through sensors in IoT.

Subject: Development Engineering (Elective-VII)
Course Code: BTCOE605

CO1: Demonstrate basics of Engineering and classify the concept of development engineering in detail.

CO2: Analyze and illustrate the concept of poverty, and define the role of engineers in culture, global competence.

CO3: Explain and Define social justice engineering in religious, secular perspectives.

CO4: Use and apply different development strategies for society, economics, health and educational perspectives.

CO5: Define the engineering for sustainable community and humanitarian education.

CO6: Select and apply modern engineering tools like ICT, AI, Blockchain for social development

Subject: Competitive Programming-II
Course code: BTCOC606

CO1: Discuss the concepts of online Judges, feedback and the standard input output to solve the programming challenges.

CO2: Design and implement the advanced programs of Arrays, Linked list, Strings, Dynamic Programming, Greedy method, Graph Algorithm etc on Hackerrank, Codechef websites.

CO3: Use the guidelines for designing the test cases for the various programs.

C04: Participate in the programming challenges in competitive platforms like codechef.com, uva.onlinejudge.com.

CO5: Practice the challenging problems to succeed in the programming challenges of reputed recruiting organization like TCS, INFOSYS.

Subject: Computer Network LaB
Course code: BTCOE608

CO1 Execute Network and debugging commands in Unix/Linux

CO2 Analyze various networking protocols using packet sniffers (tcpdump and wireshark) Install and practice various tcpdump utilities.

CO3 Develop a networking application using UDP/TCP socket programming in C and Java.

Semester VII

Subject: Software Engineering
Course code: BTCOC701

CO1 Comprehend software development life cycle

CO2 Prepare SRS document for a project

CO3 Apply software design and development techniques

CO4 Identify verification and validation methods in a software engineering project

CO5 Implement testing methods at each phase of SDLC

CO6 Analyze and Apply project management techniques for a case study

Subject: Big Data Analytics (Elective-VIII)
Course code: BTCOC702(A)

CO1: Identify the key issues in big data management and its associated applications in intelligent business and scientific computing.

CO2: Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.

CO3: Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.

CO4: Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc

Subject: Cloud Computing (Elective-VIII)
Course code: BTCOE703(A)

CO1: Implement the concept of virtualization and how this has enabled the development of Cloud Computing.

CO2: Know the fundamentals of cloud; cloud Architectures and types of services in cloud.

CO3: Understand scaling, cloud security and disaster management.

CO4: Design different Applications in cloud.

CO5: Explore some important cloud computing driven commercial systems.

Subject: Blockchain Technology
Course code: BTCOE704 (A)

CO1: Discuss and overview the concepts of crypto-currency, bitcoin and blockchain technology

CO2: Study and apply basic crypto primitives such as Hash function, Public key cryptography and digital signatures.

CO3: Use Permissioned model and its use cases in blockchain technology and discuss the design issues for Permissioned blockchain and contracts execution.

CO4: Design and implement Enterprise applications of Blockchain such as cross border payment, KYC, food security etc

CO5: Develop Blockchain Application Development Hyperledger Fabric- Architecture.

Subject: Computer Graphics
Course code: BTCOE704 (B)

CO1 Identify and Understand the core concepts of computer graphics

CO2 Illustrate and discover a selection of classic raster algorithms

CO3 Apply linear affine transformations such as scaling, translation, and rotation to points in two- and three dimensional space and analyze the effects

CO4 Analyze and Define and perform the perspective and orthographic projections on points and scenes in three-dimensional space and to solve graphics programming issues

CO5 Define the fundamentals of animation and use of graphics tool

Subject: Full Stack Development
Course code: BTCOL705

CO1: Use and apply the basic concepts of HTML and CSSto design and implement static web sites.

CO2: Design a responsive web site using HTML5 and CSS3 and JavaScripts.

CO3: Create PHP programs that uses various PHP library functions, and that manipulate files and directories.

CO4: Create PHP Programs to connect, access, and update a MySQL database.

CO5: Design and develop the web based applications using a combination of client-side (JavaScript, HTML) and server-side technologies (PHP).

Subject: System Administration
Course code: BTCOL706

CO1: Understand the role and responsibilities of a Unix system administrator

CO2: Demonstrate the Installation and configuration of Linux operating system

CO3: Perform the file and directory sharing using FTP Server and Samba Server

CO4: Perform the remote desktop login using Telnet Server and SSH Server

CO5: Host their personal websites on Local Network or on Internet using HTTP Server Configuration

CO6: Do the Installation and Configuration of Squid Server (Proxy Server) for Internet sharing, filtering traffic, security, DNS lookups.

Project phase - I

CO1: Undertake problem identification, formulation and solution.

CO2: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

CO3: Demonstrate a sound technical knowledge of their selected project topic.

CO4: Develop a software application or solution to complex engineering problem using modern tools.

CO5: Communicate with engineers and the community at large in written an oral forms.