

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

code of subject	Name of subject	CO NO.	Course Outcomes
BTBS301	Engineering Mathematics – III	CO.1	To apply Laplace transform to solve real world problems
		CO.2	To apply Inverse Laplace transform to solve linear differential equations
		CO.3	To apply Fourier Transform to solve Engineering problems
		CO.4	To apply partial differential techniques to solve the physical engineering problems
		CO.5	To solve Engineering problems using complex variable techniques
		CO.6	To evaluate the line integrals of a complex valued function
BTCOC302	Discrete Mathematics	CO.1	Ability to apply mathematical logic to solve problems
		CO.2	Understand sets, relations, functions and discrete structures
		CO.3	Able to use logical notations to define and reason about fundamental mathematical concepts such as sets relations and functions
		CO.4	Able to formulate problems and solve recurrence relations
		CO.5	Able to model and solve real world problems using graphs and trees
BTCOC303	Data Structures	CO.1	Determine representation and storage mechanisms of data structures
		CO.2	Understand basic fundamentals of data structures like array, skip list, linked list, stack, queue, tree, graph, hashing and their application

		CO.3	Implement operations like searching, insertion, deletion, traversing mechanism etc. On linked list data structures
		CO.4	Implement operations like searching, insertion, deletion, traversing mechanism etc. On trees and graph data structures
		CO.5	Perform appropriate sorting and searching technique for given problem
BTCOC304	Computer Architecture & Organization	CO.1	Demonstrate an understanding of the design of the functional units of a digital computer system.
		CO.2	Understand the basics of instructions sets, addressing modes & assembly language structure
		CO.3	Manipulate representations of numbers stored in digital computers
		CO.4	Understand & differentiate various types of memories and its organization
		CO.5	Understand the basics of hardwired, pipelined architectures, i/o organization, dma and develop micro-operation using micro-programmed control unit
BTCOC305	Elective –I (B) Object Oriented Programming In Java	CO.1	Convert different type of codes and number systems which are used in digital communication and computer systems.familiar with basic gates.understand boolean algebra and basic properties of boolean algebra.
		CO.2	Able to optimize simple logic using karnaugh maps, understand "don't care".familiar with combinational digital circuit.
		CO.3	Familiar with basic sequential logic components: sr latch, d flip-flop and their usage and able to analyze sequential logic circuits.

		CO.4	Understand internal architecture of 8086 microprocessor with memory segmentation.
		CO.5	Understand the memory interfacing, i/o, dma, and interrupt interfaces for the 8086 microprocessor.
		CO.6	Familiar with 8086 instruction set and addressing modes. Interrupts, memory and i/o interfacing in 8086.
BTCOL306	Data Structures Lab & Object Oriented Programming Lab	CO.1	Design and analyze the time and space efficiency of the data structure
		CO.2	Identify the appropriate data structure for given problem
		CO.3	Implement the stack, Queue and their applications
		CO.4	Implement various types of linked lists and their applications
		CO.5	Implement different sorting and searching algorithms
		CO.1	Understand the basics of object-oriented programming using java
		CO.2	Apply the concept of classes, java, jdk components and develop simple java programs
		CO.3	Develop simple java programs using inheritance and exception handling
		CO.4	Develop programming on interfaces
		CO.5	Programs on dealing with arrays.
BTCOS307	Seminar I	CO.1	To choose and propose suitable topics on emerging trends in the field

		CO.2	To encourage critical thinking and in-depth analysis of research papers and industry trends.
		CO.3	To facilitate discussions and interactions among students, fostering a collaborative learning environment.
		CO.4	To develop students' presentation and communication skills, enabling them to effectively convey complex technical concepts.
		CO.5	To write well-structured seminar report using elements of technical writing and engage in critical thinking to present information clearly and logically.
BTCOC401	Design & Analysis Of Algorithms	CO1	Understand the basic notations for analyzing the performance of the algorithms
		CO2	Use divide and conquer techniques for solving suitable problems
		CO3	Use of backtracking techniques for solving acceptable problems
		CO4	Use greedy approach to solve an appropriate problem for optimal solution
		CO5	Apply dynamic programming approach to solve suitable problems
		CO6	Understand the limitations of algorithm power and study how to cope with the limitations of algorithm power for various problems
BTCOC402	Operating Systems	CO1	Acquire functional architecture of an operating system
		CO2	Analyze processes and cpu scheduling

		CO3	Understand synchronization techniques to achieve better performance of a computer system
		CO4	Apply segmentation and paging techniques
		CO5	Understand file system working
BTHM403	Basic Human Rights	CO1	To explain the basic concepts of human rights & its origin.
		CO2	To describe the fundamental rights & social problems in society.
		CO3	To explore the concept of migrant workers, human rights violations & various issues
		CO4	To acquire in depth knowledge of constitution of India
		CO5	To explore udhr & nhrc
BTBS404	Probability Theory And Random Processes	CO1	Apply probability to solve problems also develop the logical understanding of students
		CO2	Apply random variable to solve probability problems
		CO3	Calculate probabilities by applying probability laws and theoretical results
		CO4	Using correlation solve the real life problems
		CO5	Construct linear regression models
		CO6	"To apply the hypothesis & estimation estimate techniques to solve the engineering problems "
BTES405	Digial Logic Design And Microprocessors	CO1	Able to optimize simple logic using Karnaugh maps, understand "don't care". Familiar with combinational digital circuit.
		CO2	Familiar with basic sequential logic components: SR Latch, D Flip-Flop and their usage and able to analyze sequential logic circuits.

		CO3	Understand internal architecture of 8086 microprocessor with memory segmentation.
		CO4	Familiar with 8086 instruction set and addressing modes. Interrupts, memory and I/O interfacing in 8086
		CO5	Convert different type of codes and number systems which are used in digital communication and computer systems. Familiar with basic gates. Understand Boolean algebra and basic properties of Boolean algebra.
BTCOL406	Operating Systems & Python Programming Lab	CO1	Compare the performance of various CPU Scheduling Algorithms
		CO2	Implement Deadlock avoidance and Detection Algorithms.
		CO3	Create processes and implement IPC.
		CO4	Analyze the performance of the various Page Replacement Algorithms.
		CO1	Interpret the fundamental python syntax and semantics and be fluent in the use of python control flow statements.
		CO2	Express proficiency in the handling of strings and functions.
		CO3	Determine the methods to create and manipulate python programs by utilizing the data structures like lists, dictionaries, tuples and sets.
		CO4	To learn how to design object? Oriented programs with python classes
		CO5	To learn how to use exception handling in python applications for error handling
BTCOS407	Seminar II	CO.1	To study research papers for understanding of a new field, in the absence of a textbook, to summarize and review them.
		CO.2	To identify promising new directions of various cutting edge technologies. Committee

		CO.3	To impart skills in preparing detailed report describing the project and results
		CO.4	To effectively communicate by making an oral presentation before an evaluation
BTCOC501	Database Systems	CO1	Understand the basic principles of database management systems. Design ER-models to represent simple database application scenarios
		CO2	Demonstrate the basic elements of a relational database management system. Understanding Relational Algebra.
		CO3	Design SQL queries for a given context in relational database. Accessing database using programming language.
		CO4	Improve the database design by normalization.
		CO5	To decompose the given project in various phases of a lifecycle.
BTCOC502	Theory Of Computation	CO1	Able to design Finite Automata (FA) machines for any given examples
		CO2	Able to analyze a given finite automata machine and generate a language and re for given fa
		CO3	Able to outline Pushdown Automata machine for given CF language(s)
		CO4	Able to form the strings of a given context-free languages using its grammar
		CO5	Able to design Turing machines for given any computational problem
		CO6	Able to understand the limitations of computation, i.e. The unsolvability of problems.
BTCOC503	Software Engineering	CO.1	To decompose the given project in various phases of a lifecycle.

		CO.2	To demonstrate Agile Methodology
		CO.3	To Illustrate various types of System Modelling
		CO.4	To apply System Patterns in various scenarios
		CO.5	To demonstrate software testing concepts
BTCE504	Elective – II (A) Human Computer Interaction	CO.1	To explain the interaction process between human & computer
		CO.2	To describe the fundamentals of design process in hci
		CO.3	To explore the concept of implementation & evaluation in hci process
		CO.4	To acquire in depth knowledge of the models & systems in hci process
		CO.5	To explore modern systems in hci process
BTHM505	Elective – Iii Business Communication	CO.1	To demonstrate his/her ability to write error free while making an optimum use of correct business vocabulary and grammar.
		CO.2	To distinguish among various levels of organizational communication and communication barriers while developing an understanding of communication as a process.
		CO.3	To draft effective business correspondence with brevity and clarity.
		CO.4	To stimulate their critical thinking by designing and developing clean and lucid handwriting skills.
		CO.5	To demonstrate his verbal and non-verbal communication ability through presentations.

BTCOL506	Database Systems & Software Engineering Lab	CO.1	Design schema for any real time applications.
		CO.2	Implementing crud properties of database using sql
		CO.3	Implementing subqueries ,join and set operation using sql
		CO.4	Design given relation using normalization.
		CO.5	Implementing transactions using sql
		CO.1	Understand and Describe basic concept of UML, design, implementation of test cases and OOP concepts using java
		CO.2	Discuss and Analyses how to develop software requirements specifications for a given problem.
		CO.3	Explain and build DFD models
		CO.4	Understand and develop various structure and behavior UML diagrams.
		CO.5	Explain the knowledge of project management tool Demonstrate how to manage file using Project Libre project management tool.
BTCOM507	Mini Project I	CO.1	To identify complex problems, define project objectives, scope effectively and also develop the skills needed to recognize and address industry-specific challenges and issues.
		CO.2	To enable students to perform a comprehensive literature survey, critically evaluate sources, synthesize information, and contribute to knowledge in a specific field.
		CO.3	To analyze intricate problems by conducting a comprehensive review of the current state of the art and then formulate practical and feasible solutions.

		CO.4	To create well-structured reports using elements of technical writing and engage in critical thinking to present information clearly and logically.
		CO.5	To deliver compelling and well-organized presentations.
BTCOC601	Compiler Design	CO.1	To analyze and be able to know the various phase of compiler.
		CO.2	To design and implement a lexical analyzer.
		CO.3	To design and implement a parser.
		CO.4	To know about intermediate code generation. To know about syntax directed translation.
		CO.5	To optimize and design code generator.
BTCOC602	Computer Networks	CO.1	Analyzing the functioning of data communication and computer network
		CO.2	Understand different types of lan technologies
		CO.3	Analyze the transmission errors in data link layer
		CO.4	Analyze network layer and congestion control.
		CO.5	Configure different application protocols
		CO.6	Analyze the network security

BTCOC603	Machine Learning	CO.1	Demonstrate a clear understanding of basic machine learning definitions and concepts, differentiate between various types of learning, explore hypothesis space and inductive bias, apply evaluation techniques like cross-validation, implement Linear Regression and Decision Trees, identify and address over fitting issues, utilize Instance-based learning approaches, apply Feature Reduction techniques, and comprehend Collaborative Filtering-based recommendation systems.
		CO.2	Comprehensive understanding of Probability and Bayes learning, proficiency in applying Logistic Regression and Support Vector Machines (SVM), and a clear grasp of the role of Kernel functions and their applications in Kernel SVM.
		CO.3	Understand Perceptron, multilayer networks, back propagation, and gain an introduction to deep neural networks.
		CO.4	Understanding of Computational learning theory, PAC learning model, concept of Sample complexity and VC Dimension, and gain knowledge of Ensemble learning.
		CO.5	Apply the concept of clustering, including k-means, adaptive hierarchical clustering, and the Gaussian mixture model.
BTCOE604	Elective – IV (B) Internet Of Things	CO.1	Able to understand the application areas of IoT.
		CO.2	Able to understand the architecture & smart objects.
		CO.3	Explore IoT enabling technologies, architectures, and standards.
		CO.4	Apply IoT knowledge to implement small scale IoT projects.
BTHM605	Elective – V (A) Development Engineering	CO.1	To Describe basic Concepts in Development Engineering
		CO.2	To Explain World Poverty and Sustainable Development

		CO.3	To Explain the role of Social Justice in Religious & Secular Perspectives
		CO.4	To Explore various Development Strategies in Development Engineering
		CO.5	To acquire in depth Knowledge of Engineering for Sustainable Community Development & Use of ICT for Development Engineering
BTCOL606	Competitive Programming & Machine Learning Lab	CO.1	Read and examine the real-world dataset.
		CO.2	Apply Machine Learning techniques of Regression, Classification and Clustering
		CO.3	Analyze the results of Machine Learning technique.
		CO.4	Predict answer for given value from learned model or technique
		CO.1	Discuss the concepts of online Judges, feedback and the standard input output to solve the programming challenges.
		CO.2	Design and implement the advanced programs of Arrays, Linked list, Strings, Dynamic Programming, Greedy method, Graph Algorithm etc on Hackerrank, Codechef websites.
		CO.3	Use the guidelines for designing the test cases for the various programs.
		CO.4	Participate in the programming challenges in competitive platforms like codechef.com, uva.onlinejudge.com. Organization like TCS, INFOSYS.
		CO.5	Practice the challenging problems to succeed in the programming challenges of reputed recruiting
BTCOM607	Mini Project II	CO.1	To identify complex problems, define project objectives, scope effectively and also develop the skills needed to recognize and address industry-specific challenges and issues.

		CO.2	To enable students to perform a comprehensive literature survey, critically evaluate sources, synthesize information, and contribute to knowledge in a specific field.
		CO.3	To analyze intricate problems by conducting a comprehensive review of the current state of the art and then formulate practical and feasible solutions.
		CO.4	To create well-structured reports using elements of technical writing and engage in critical thinking to present information clearly and logically.
		CO.5	To deliver compelling and well-organized presentations.
BTCOC701	SOFTWARE ENGINEERING	CO.1	Comprehend software development life cycle testing methods at each phase of SDLC
		CO.2	Prepare SRS document for a project
		CO.3	Apply software design and development techniques
		CO.4	Identify verification and validation methods in a software engineering project
		CO.5	Implement testing methods at each phase of SDLC
		CO.6	Analyze and Apply project management techniques for a case study
BTCOE703 A	Cloud Computing	CO.1	To describe the basic concepts in cloud computing.
		CO.2	To compare different cloud service models & deployment models.
		CO.3	To explain cloud service models & the process of disaster recovery.

		CO.4	To use Aneka, cloud application platform
		CO.5	To analyze various cloud application platforms & use them
BTCOC702(A)	Elective – VI (C) Big Data Analytics	CO.1	Understand and implement the basics of big data structures, Characteristics of big data, distribution packages.
		CO.2	Demonstrate the knowledge of big data analytics and implement different file management task in Hadoop.
		CO.3	Understand Map Reduce Paradigm and develop data applications using variety of systems.
		CO.4	Analyze and perform different operations on data using Pig Latin scripts.
		CO.5	Illustrate and apply different operations on relations and databases using Hive.
BTCOE704 (A)	Open Elective – VII (C) Block chain Technology	CO1	Understand the structure of a blockchain and Learn about Bitcoin, Cryptocurrency, Security
		CO2	Discuss how the individual components of the Bitcoin protocol make the whole system works: transactions, script, blocks, the peer-to-peer network, Consensus and pow
		CO3	Understand Permissioned Blockchain and different Consensus mechanism
		CO4	Understand Enterprise application of Blockchain
		CO5	Implement Simple Blockchain Application and Learn about Hyperledger Fabric model and Multichain Blockchain platforms
BTCOL705	Full Stack Development	CO.1	To use the skill , techniques of web pages using html and JSP, CSS
		CO.2	Understand real time application at client-side technologies for web development
		CO.3	Analyze the concepts of CSS, AJAX, servlet and JSP

		CO.4	Analyze the web services and frameworks of client & server
		CO.5	Apply the server side technologies for web development
BTCOL706	System Administration	CO.1	Install and configure the Linux operating system
		CO.2	Install and configure the SSH,telnet, ftp server.
		CO.3	To implement file services.
		CO.4	Install and configure the samba server, http server and proxy server.
BTCOL707	Elective – VIII Lab Big Data Analytics	CO.1	Demonstrate the knowledge of big data analytics and implement different file management task in Hadoop.
		CO.2	Understand map reduce paradigm and develop data applications using variety of systems.
		CO.3	Analyze and perform different operations on data using pig latin scripts.
		CO.4	Illustrate and apply different operations on relations and databases using hive.
BTCOL708	Elective – IX Lab Cloud Computing	CO.1	To understand the basic concepts of cloud computing
		CO.2	To use Moodle & create a warehouse application in Salesforce
		CO.3	To create a virtual machine and preform virtualization
		CO.4	To analyze architecture of Aneka & perform scenario
		CO.5	To use Microsoft azure & analyze it

		CO.6	To use planio, AWS cloud tool box & analyze it
BTCOF609	FIELD TRAINING	CO.1	Participate in the projects in industries during his or her industrial training.
		CO.2	Describe use of advanced tools and techniques encountered during industrial training and visit.
		CO.3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
		CO.4	Develop awareness about general workplace behavior and build interpersonal and team skills.
		CO.5	Prepare professional work reports and presentations.
BTCOP709	Project phase - I	CO.1	Identify the problem statement in the technical domain of his/her interest.
		CO.2	Collect literature and prepare review on given topic/problem.
		CO.3	Analyze the problem in details for primary preparation
		CO.4	Prepare report (details of work, results and calculations, etc) of the work completed time to time
		CO.5	Presentation on the project work completed to learn the communication and teamwork to complete the task.
BTCOE801	Social Networks	CO.1	To describe concepts of social networks
		CO.2	To understand strong, weak relationships

		CO.3	To differentiate positive, negative relationships
		CO.4	To solve problems on link analysis
		CO.5	To illustrate power laws, rich get richer phenomena
		CO.6	To illustrate small world phenomenon
BTCOE802	Introduction to Industry 4.0 and Industrial Internet of Things	CO.1	To explain basics of industry 4.0 and industrial internet of things
		CO.2	To explore the role of various technologies in industry 4.0 and industrial internet of things
		CO.3	To explain industrial internet of things business models, reference architectures and industrial internet of things layers
		CO.4	To acquire in depth knowledge of industrial internet of things layers and data management in industrial internet of things
		CO.5	To explain the DCN and industrial internet of things application domains
		CO.6	To acquire in depth knowledge of various industrial internet of things application domains