

Course Outcomes(CO)

Course	CO
Computer Architecture (BTCS301)	<ul style="list-style-type: none"> a) Explain the organization of basic computer , its design and the design of control unit. b) Demonstrate the working of central processing unit and RISC and CISC Architecture. c) Describe the operations and language f the register transfer, micro operations and input- output organization. d) Understand the organization of memory and memory management hardware. e) Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization.
Engg. Mathematics-III (BTAM302)	<ul style="list-style-type: none"> a) Perform operations on various discrete structures such as sets, functions, relations, and sequences. b) Ability to solve problems using Counting techniques, Permutation and Combination, Recursion and generating functions. c) Apply algorithms and use of graphs and trees as tools to visualize and simplify Problems. d) Use of K-Maps and Truth Tables to construct and verify correctness of a Boolean expression. e) Understand the various properties of algebraic systems like Rings, Monoids and Groups.
Digital Circuits and Logic Design (BTCS303)	<ul style="list-style-type: none"> a) Apply the principles of number system, binary codes and Boolean algebra to minimize logic expressions b) Develop K-maps to minimize and optimize logic functions up to 5 variables c) Acquire knowledge about various logic gates and logic families and analyze basic circuits of these families. d) Design various combinational and sequential circuits such as encoders , decoders and counters using multiplexers, and flip - flops e) Describe and compare various memory systems, shift registers and analog to digital and digital to analog conversion circuits
Data Structures and Programming Methodology (BTCS304)	<ul style="list-style-type: none"> a) Understand the concept of Dynamic memory management, data types, algorithms, Big O notation. b) Understand basic data structures such as arrays, linked lists, stacks and queues. c) Describe the hash function and concepts of collision and its resolution methods d) Solve problem involving graphs, trees and heaps e) Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data
Object Oriented Programming Using C++ (BTCS305)	<ul style="list-style-type: none"> a) Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects. b) Understand dynamic memory management techniques

	<p>using pointers, constructors, destructors, etc</p> <p>c) Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.</p> <p>d) Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.</p> <p>e) Demonstrate the use of various OOPs concepts with the help of programs.</p>
Software Lab-I (DSPM) (BTCS306)	<p>a) Implement basic data structures such as arrays and linked list.</p> <p>b) Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.</p> <p>c) Implement various searching and sorting algorithms.</p> <p>d) Programs to demonstrate the implementation of various operations on stack and queue.</p>
H/W Lab-I (Digital Circuits and Logic Design) (BTCS308)	<p>a) Study of logic gates and realization of OR,AND,NOT AND XOR Functions using universal gates</p> <p>b) Design and implement combinational circuits like half adder/full adder, half subtractor/full subtractor, code converters, comparators, MUX/DEMUX</p> <p>c) Design and implement sequential circuits like flip-flops, counters and shift registers</p> <p>d) Study of 8-bit DAC and 8-bit ADC.</p>
Software Lab-II (OOPS) (BTCS309)	<p>a) Develop solutions for a range of problems using objects and classes.</p> <p>b) Programs to demonstrate the implementation of constructors, destructors and operator overloading.</p> <p>c) Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.</p> <p>d) Understand generic programming, templates, file handling.</p>
Operating System (BTCS401)	<p>a) Understand the basics of operating systems like kernel, shell, types and views of operating systems</p> <p>b) Describe the various CPU scheduling algorithms and remove deadlocks.</p> <p>c) Explain various memory management techniques and concept of thrashing</p> <p>d) Use disk management and disk scheduling algorithms for better utilization of external memory.</p> <p>e) Recognize file system interface, protection and security mechanisms.</p> <p>f) Explain the various features of distributed OS like Unix, Linux, windows etc.</p>
Discrete Structures (BTCS402)	<p>a) Perform operations on various discrete structures such as sets, functions, relations, and sequences.</p> <p>b) Ability to solve problems using Counting techniques, Permutation and Combination, Recursion and generating functions.</p> <p>c) Apply algorithms and use of graphs and trees as tools to visualize and simplify Problems.</p> <p>d) Apply algorithms and use of graphs and trees as tools to</p>

	<p>visualize and simplify Problems.</p> <p>e) Use of K-Maps and Truth Tables to construct and verify correctness of a Boolean expression.</p> <p>f) Understand the various properties of algebraic systems like Rings, Monoids and Groups.</p>
Computer Networks-I (BTCS403)	<p>a) Understand computer network basics, network architecture, TCP/IP and OSI reference models.</p> <p>b) Identify and understand various techniques and modes of transmission</p> <p>c) Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN</p> <p>d) Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme</p> <p>e) Discuss the elements and protocols of transport layer</p> <p>f) Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS</p>
Microprocessor and Assembly Language Processing (BTCS404)	<p>a) Understand the taxonomy of microprocessors and knowledge of contemporary microprocessors.</p> <p>b) Describe the architecture, bus structure and memory organization of 8085 as well as higher order microprocessors.</p> <p>c) Explore techniques for interfacing I/O devices to the microprocessor 8085 including several specific standard I/O devices such as 8251 and 8255.</p> <p>d) Demonstrate programming using the various addressing modes and instruction set of 8085 microprocessor</p> <p>e) Design structured, well commented , understandable assembly language programs to provide solutions to real world control problems</p>
System Programming (BTCS405)	<p>a) To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.</p> <p>b) Describe the various concepts of assemblers and macro-processors.</p> <p>c) To understand the various phases of compiler and compare its working with assembler.</p> <p>d) To understand how linker and loader create an executable program from an object module created by assembler and compiler.</p> <p>e) To know various editors and debugging techniques.</p>
Software Lab-III (OS) (BTCS406)	<p>a) Demonstrate the installation process of various operating systems.</p> <p>b) Implement virtualization by installing Virtual Machine software.</p> <p>c) Apply UNIX/LINUX operating system commands.</p> <p>d) Understand different UNIX/LINUX shell scripts and execute various shell programs.</p>
Computer Networks-I LAB (BTCS407)	<p>a) Identify and use various networking components Understand different transmission media and design cables for establishing a network</p> <p>b) Implement any topology using network devices</p> <p>c) Understand the TCP/IP configuration for Windows and</p>

	<p>Linux</p> <p>d) Implement device sharing on network</p> <p>e) Learn the major software and hardware technologies used on computer networks</p>
<p>H/W Lab.-III (Microprocessor & Assembly Language Prog.) (BTCS408)</p>	<p>a) Solve basic binary math operations using the instructions of microprocessor 8085.</p> <p>b) Apply programming knowledge using the capabilities of the stack, the program counter</p> <p>c) Design, code and debugs Assembly Language programs to implement simple programs</p> <p>d) Execute a machine code program on the training boards.</p>
<p>Software Lab IV (SP) (BTCS409)</p>	<p>a) Design, implement, test, debug and document programs in C++.</p> <p>b) Develop programs to create symbol table for assembly and high level language program.</p> <p>c) Implement Single Pass Assembler.</p> <p>d) Explore features of debug command.</p> <p>e) Use of LEX and YACC Tools.</p>
<p>Computer Networks-II (BTCS501)</p>	<p>a) State the fundamentals related to network security and basics of IPv6 and IPsec.</p> <p>b) State the fundamentals related to network security and basics of IPv6 and IPsec.</p> <p>c) Explain various protocols related to internet key exchange.</p> <p>d) Study Adhoc network and its protocols.</p> <p>e) Define various examples of wireless communication system, standards related to 2G and 3G wireless networks.</p> <p>f) Design wireless mobile network according to parameters such as frequency reuse, handoff strategies and system capacity.</p>
<p>Relational Database Management System (BTCS502)</p>	<p>a) Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.</p> <p>b) Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.</p> <p>c) Learn and apply Structured query language (SQL) for database definition and database manipulation.</p> <p>d) Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.</p> <p>e) Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.</p>
<p>Design and Analysis of Algorithms (BTCS503)</p>	<p>a) Define the basic concepts of algorithms and analyze the performance of algorithms.</p> <p>b) Discuss various algorithm design techniques for developing algorithms.</p> <p>c) Discuss various searching, sorting and graph traversal algorithms.</p> <p>d) Understand NP completeness and identify different NP</p>

	<p>complete problems.</p> <p>e) Discuss various advanced topics on algorithms.</p>
Computer Graphics (BTCS504)	<p>a) Understand the basics of computer graphics, different graphics systems and applications of computer graphics.</p> <p>b) Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.</p> <p>c) Use of geometric transformations on graphics objects and their application in composite form.</p> <p>d) Extract scene with different clipping methods and its transformation to graphics display device.</p> <p>e) Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.</p> <p>f) Render projected objects to naturalize the scene in 2D view and use of illumination models for this.</p>
Computer Peripherals & Interfaces (BTCS505)	<p>a) Understand basics of different computer peripherals and interfaces.</p> <p>b) Describe architecture of various computer hardware devices and their functioning.</p> <p>c) Study the details of system buses, memory system, and I/O interfaces.</p> <p>d) Identify the existing configuration of the computers and peripherals.</p> <p>e) Analyze progress in contemporary peripherals and bus systems.</p>
Software Lab (RDBMS Lab) (BTCS506)	<p>a) Implement Basic DDL, DML and DCL commands</p> <p>b) Understand Data selection and operators used in queries and restrict data retrieval and control the display order</p> <p>c) Write sub queries and understand their purpose</p> <p>d) Use Aggregate and group functions to summarize data</p> <p>e) Join multiple tables using different types of joins</p> <p>f) Understand the PL/SQL architecture and write PL/SQL code for procedures, triggers, cursors, exception handling etc..</p>
Hardware Lab-IV (CN-II) (BTCS507)	<p>a) Configure a LAN based on IPv4 address scheme and understand and implement IPv6 address scheme for a LAN.</p> <p>b) Configure and simulate any scenario of an Adhoc network and analyze various parameters related with their study.</p> <p>c) Devise and design a system to capture and analyze the incoming traffic using packet capturing software package</p> <p>d) Configure WLL, PAN's, WLANS and wireless access points.</p>
Design and Analysis of Algorithms Lab (BTCS508)	<p>a) Identify the problem given and design the algorithm using various algorithm design techniques.</p> <p>b) Implement various algorithms in a high level language.</p> <p>c) Analyze the performance of various algorithms.</p> <p>d) Compare the performance of different algorithms for same problem.</p>
Computer Graphics Lab (BTCS509)	<p>a) Understand the basic concepts of computer graphics.</p> <p>b) Design scan conversion problems using C++</p>

	<p>programming.</p> <ul style="list-style-type: none"> c) Apply clipping and filling techniques for modifying an object. d) Understand the concepts of different type of geometric transformation of objects in 2D and 3D. e) Understand the practical implementation of modeling, rendering, viewing of objects in 2D.
Simulation and modeling (BTCS601)	<ul style="list-style-type: none"> a) Discuss the fundamental elements of discrete-event simulation including statistical models, random processes, random variates, and inputs to simulation b) Analyze a real world problem and apply modelling methodologies to develop a discrete-event simulation model c) Recognize the cost/benefits of computer simulation, the generation of meaningful results, decision making, and risks d) Interpret and contrast discrete-event techniques for implementing a solution to a simulation problem e) Compare and evaluate alternative system designs using sampling and regression
Relational Data Base Management Systems – II (BTCS602)	<ul style="list-style-type: none"> a) Define database system concepts and apply normalization to the database. b) Explain the basic processing and optimization techniques for high level query. c) Describe different transaction processing concepts and use different concurrency control techniques. d) Discuss different types of databases such as object oriented and distributed databases. e) Identify different types of database failures and techniques to recover from such failures. f) Discuss advanced database technologies and products used in enterprise.
Software Engineering (BTCS603)	<ul style="list-style-type: none"> a) Plan a software engineering process life cycle , including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements b) Able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project c) Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology. d) Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice e) Able to use modern engineering tools necessary for software project management, time management and software reuse.
Web Technologies (BTCS901)	<ul style="list-style-type: none"> a) Explain the history of the internet and related internet concepts that are vital in understanding web development.

	<ul style="list-style-type: none"> b) Discuss the insights of internet programming and implement complete application over the web. c) Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet. d) Utilize the concepts of JavaScript and Java e) Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.
Human Resource management system. (HU-251)	<ul style="list-style-type: none"> a) Comprehend the role and function of human resource management in industry b) Describe how to strategically plan for the human resources needed to meet the organizational needs. c) Understand various steps-recruitment, selection, training, development, maintenance and appraisal of human factor at work and their legal provisions. d) Gain insight of concepts of job analysis and compensation function and their legal provisions. e) Identify and explain the issues involved in establishing industrial relations, integration function and impact of legislation on human resource management practice.
Software Lab - VIII (RDBMS-II) (BTCS604)	<ul style="list-style-type: none"> a) Understand the normalization of databases through various case studies b) Use of query optimization techniques, backup and recovery features of database management software c) Create a new database and administer the database management software d) Develop different web databases and object oriented database management system e) Describe the usage of data mining tools
Free/open source software lab (BTCS605)	<ul style="list-style-type: none"> a) Understand, analyze and apply the role of languages like HTML, DHTML, CSS, JavaScript and PHP. b) Analyze a web page and identify its elements and attributes. c) Create web pages using HTML, DHTML and Cascading Style Sheets. d) Create dynamic web pages using JavaScript, XML. e) Build web applications using PHP.
Software Engineering Lab (Software Lab-IX) (BTCS606)	<ul style="list-style-type: none"> a) Able to prepare SRS document, design document, test cases and software configuration management and risk management related document. b) Develop function oriented and object oriented software design using tools like rational rose. c) Able to perform unit testing and integration testing. d) Apply various white box and black box testing techniques e) Able to track the progress of a project using Openproj tool.
Simulation and	<ul style="list-style-type: none"> a) Ability to implement queuing model using C++

Modelling lab (BTCS607)	<ul style="list-style-type: none"> b) Use network simulators to analyze various network parameters c) Understand how to use MATLAB and its Functionality. d) Use the concepts like branching statements, loops, functions and additional datatypes.
Symbolic Logic & Logic Processing (CS-402)	<ul style="list-style-type: none"> a) Define fuzzy neural network based expert systems and represent the world knowledge using syntax of Propositional Logic and First Order Predicate Logic b) Interpret the logical consequences and validity of formulae using the rules of propositional and predicate logic c) Assess the completeness of Resolution Procedure, Soundness and completeness of Linear Resolution, Unification and Selective Linear Definite Resolution. d) Demonstrate Logic Programming Paradigm, Prolog execution models, Prolog's basic and advanced prolog concepts such as LIST, CUT, and Fail using illustrative programming examples. e) Convert world knowledge into FOPL formula and construct well-crafted prolog programmes of moderate size and sophistication to solve real life problems using efficient and good programming techniques.
Formal Language and Automata Theory (CS-404)	<ul style="list-style-type: none"> a) Understand the basic concepts of formal languages, automata and grammar types, as well as the use of formal languages and reduction in normal forms b) Demonstrate the relation between regular expressions, automata, languages and grammar with formal mathematical methods c) Design push down automata, cellular automata and turing machines performing tasks of moderate complexity d) Analyze the syntax and formal properties, parsing of various grammars such as LL(k) and LR(k) e) Describe the rewriting systems and derivation languages
Major Project (CS406)	<ul style="list-style-type: none"> a) Students should be able to design and construct a hardware and software system, component, or process to meet desired needs. b) Students are provided to work on multidisciplinary Problems. c) Students should be able to work as professionals, with portfolio ranging from data management, network configuration, designing hardware, database and software design to management and administration of entire systems.
Principles of Engineering Economics and Management Techniques (CS-408)	<ul style="list-style-type: none"> a) Analyze, understand and manage critical financial situations b) Evaluate the economic potential of investment. c) Understand the various parameters like resource availability, depreciation, cost accounting etc and

	<p>analyze project economic feasibility</p> <p>d) Understand the importance of HRM in industry</p> <p>e) Comprehend procurement process and analyze the proper utilization of human resources.</p> <p>f) Examine the importance of job satisfaction as well as integration and maintenance function.</p>
Organizational Structures (CS-410)	<p>a) Explore the organization structures and systems approach to organization development.</p> <p>b) Interpret behavior and its various dimensions in the organization.</p> <p>c) Classification of various organizational structures.</p> <p>d) Understanding the various ways of departmentalization based on organization functionalities.</p> <p>e) Analysis of organizational theories and conceptualize these with contemporary organizational designs.</p>
Symbolic Logic & Logic Processing Labs (CS-416)	<p>a) Apply truth functional propositional Logic(PL) and first order predicate logic (FOPL) to world knowledge</p> <p>b) Develop structured prolog programmes for various tasks of moderate complexity and requirements</p> <p>c) Demonstrate improvement in efficiency of prolog programs using good programming techniques</p> <p>d) Describe the basic predicates to manipulate list data structure and sorting algorithms using PROLOG programming.</p>
Expert Systems (CS-424)	<p>a) Understand the theoretical base of the expert system and its development process.</p> <p>b) Differentiate between different knowledge representation techniques and describe methods of knowledge acquisition and extraction.</p> <p>c) Describe various learning and planning techniques for different types of expert systems such as neural, fuzzy and real expert system.</p> <p>d) Develop expert systems using various available tools.</p> <p>e) Analyze the development process of expert system through various case studies.</p>
Expert System Lab (CS-430)	<p>a) Recognize the problem domain.</p> <p>b) Understand different techniques and methodologies available for knowledge acquisition.</p> <p>c) Develop an expert system of moderate complexity in LISP or PROLOG.</p> <p>d) Have practical exposure to expert system shell, neural network and simulator.</p>
Environmental Sciences (CE-216)	<p>a) Conceptualize the processes and various factors involved in the formation of environment.</p> <p>b) Recognize the importance of environment and the sustainable of natural resources.</p> <p>c) Analyze interaction between social and environmental processes.</p> <p>d) Use scientific reasoning to identify and understand environment problems and evaluate potential solutions.</p> <p>e) Visualize the impacts of human activities on</p>

	<p>environment and role of society in these impacts.</p> <p>f) Recall critically about their role as citizens, consumers and environmental actors in a and inter connected world.</p>
--	---