Course Specific Outcomes (CSOs) for B.Sc. in Computer Science

Paper-CC1: Programming Fundamentals using C/C++

After course completion the students will have the following learning outcomes:

CO1: Understanding a functional hierarchical code organization.
CO2: Ability to define and manage data structures based on problem subject domain.
CO3: Ability to work with textual information, characters and strings.
CO4: various Ability to work with arrays of complex objects.
CO5: Understanding a concept of object thinking within the framework of functional model.
CO6: Understanding a concept of functional hierarchical code organization.
CO7: Understanding a defensive programming concept. Ability to handle possible errors during program execution.

Paper-CC2: Computer System Architecture

After course completion the students will have the following learning outcomes:

CO1: Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
CO2: To understand and examine the structure of various number system and its application in digital design.
CO3: The ability to understand , analyze and design various combinational and sequential circuits.
CO4: Ability to identify basic requirements for a design application and propose a cost effective solution.
CO5: Ability to identify and prevent various hazards and timing problems in a digital design.
CO6: To develop skill to build and troubleshoot digital circuits.

Paper-CC3: Introduction to Java

After course completion the students will have the following learning outcomes:

CO1: Ability to work with textual information, characters and strings.
CO2: Ability to work with arrays of complex objects.
CO3: Understanding a concept of object thinking within the framework of functional model.
CO4: Understanding a concept of functional hierarchical code organization.
CO5: Understanding a defensive programming concept. Ability to handle possible errors during program execution.

Paper-CC4: Discrete Structures

After course completion the students will have the following learning outcomes:

CO1: Students completing this course will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives.
CO2: Students completing this course will be able to apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.
CO3: Students completing this course will be able to use tree and graph algorithms to solve problems.
CO4: Students completing this course will be able to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

Paper-CC5: Data Structures

After course completion the students will have the following learning outcomes:

CO1: Ability to analyze algorithms and a algorithm correctness.
CO2: Ability to summarize searching and sorting techniques .
CO3: Ability to describe stack, queue and linked list operation.
CO4: Ability to have knowledge of tree and graphs concepts.

Paper-CC6: Operating System

After course completion the students will have the following learning outcomes:

CO1:   an ability to understand basic concepts about operating system.
CO2:   an ability to describe process management ,scheduling and concurrency control mechanisms.
CO3:   an ability to analyze memory management and deadlocks.
CO4:   an ability to compare various file systems and its operating systems examples.

Paper-CC7: Computer Networks

After course completion the students will have the following learning outcomes:

CO1:   Independently understand basic computer network technology.
CO2:   Understand and explain Data Communications System and its components.
CO3:   Identify the different types of network topologies and protocols.
CO4:   Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
CO5:   Identify the different types of network devices and their functions within a network
CO6:   Understand and building the skills of subnetting and routing mechanisms.
CO7: Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Paper-CC8: Design and Analysis of Algorithms

After course completion the students will have the following learning outcomes:

CO1:   Analyze the asymptotic performance of algorithms.
CO2:   Write rigorous correctness proofs for algorithms.
CO3:   Demonstrate a familiarity with major algorithms and data structures.
CO4:   Apply important algorithmic design paradigms and methods of analysis.
CO5:   Synthesize efficient algorithms in common engineering design situations.

Paper-CC9: Software Engineering

After course completion the students will have the following learning outcomes:

CO1:   Basic knowledge and understanding of the analysis and design of complex systems.
CO2:   Ability to apply software engineering principles and techniques.
CO3:   Ability to develop, maintain and evaluate large-scale software systems.
CO4:   To produce efficient, reliable, robust and cost-effective software solutions.
CO5:   Ability to perform independent research and analysis.

Paper-CC10: Database Management Systems

After course completion the students will have the following learning outcomes:

CO1:   Understand terms related to database design and management
CO2:   Understand the objectives of data and information management
CO3:   Understand the database development process
CO4:   Understand the relational model and relational database management system

Paper-CC11: Internet Technologies

After course completion the students will have the following learning outcomes:

CO1:   Analyze a web page and identify its elements and attributes.
CO2:   Create web pages using XHTML and Cascading Style Sheets.
CO3:   Build dynamic web pages using JavaScript (Client side programming).
CO4:   Create XML documents and Schemas.
CO5:   Build interactive web applications using AJAX.

Paper-CC12:Theory of Computation

After course completion the students will have the following learning outcomes:

CO1: introduce students to the mathematical foundations of computation including automata theory;
CO2: the theory of formal languages and grammars;
CO3: the notions of algorithm, decidability, complexity, and computability.

Paper-CC13: Artificial Intelligence

After course completion the students will have the following learning outcomes:

CO1: Apply the basic principles, models, and algorithms of AI to recognize, model, and solve problems in the analysis and design of information systems.
CO2: Analyze the structures and algorithms of a selection of techniques related to searching, reasoning, machine learning, and language processing.

Paper-CC14: Computer Graphics

After course completion the students will have the following learning outcomes:

CO1: Explain the applications, areas, and graphic pipeline, display and hardcopy technologies.
CO2: Apply and compare the algorithms for drawing 2D images also explain aliasing, anti aliasing and half toning techniques.
CO3: Discuss OpenGL application programming Interface and apply it for 2D & 3D computer graphics.
CO4: Analyze and apply clipping algorithms and transformation on 2D images.
CO5: Solve the problems on viewing transformations and explain the projection and hidden surface removal algorithms.

Paper- DSE 1 :

After course completion the students will have the following learning outcomes:
CO1: Obtain numerical solutions of algebraic and transcendental equations.
CO2: Find numerical solutions of system of linear equations and check the accuracy of the solutions.
CO3: Learn about various interpolating and extrapolating methods.
CO4: Solve initial and boundary value problems in differential equations using numerical methods.
CO5: Apply various numerical methods in real life problems.

Paper- DSE 2:

After course completion the students will have the following learning outcomes:

CO1: Obtain numerical solutions of algebraic and transcendental equations.
CO2: Find numerical solutions of system of linear equations and check the accuracy of the solutions.
CO3: Learn about various interpolating and extrapolating methods.
CO4: Solve initial and boundary value problems in differential equations using numerical methods.
CO5: Apply various numerical methods in real life problems.

Paper: DSE 3

After course completion the students will have the following learning outcomes:

CO1: Define multimedia to potential clients.
CO2: Identify and describe the function of the general skill sets in the multimedia industry.
CO3: Identify the basic components of a multimedia project.

CO4: Identify the basic hardware and software requirements for multimedia development and playback.

Paper- DSE 4:

After course completion the students will have the following learning outcomes:

CO1: Introducing the fundamental theory and concepts of computational intelligence methods, in particular neural networks, fuzzy systems, genetic algorithms and their applications in the area of machine intelligence.

CO2: This can be summarized as to understand the fundamental theory and concepts of neural networks, neuro modeling, several neural network paradigms and its applications.

CO3: To understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.

CO4: To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

CO5: To develop communication and problem solving skills.

CO6: To re-engineer attitude and understand it s influence on behavior

Paper- SEC 1:

After course completion the students will have the following learning outcomes:

CO1: Students are able to develop a dynamic webpage by the use of java script and HTML/ DHTML/ASP.

CO2: Will be able to write a well formed / valid XML document

CO3: Will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.

Paper-SEC 2:

After course completion the students will have the following learning outcomes:

CO1: Students are able to develop a dynamic webpage by the use of java script and HTML/ DHTML/ASP/PHP/ R program .

CO2: Students will be able to write a well formed / valid XML document

CO3: Students will be able to connect a java program to a DBMS and perform insert, update and delete

CO4: operations on DBMS table.

Paper- GE1: Computer Fundamentals

After course completion the students will have the following learning outcomes:

CO1: Bridge the fundamental concepts of computers with the present level of knowledge of the students.

CO2: Familiarise operating systems, programming languages, peripheral devices, networking, multimedia and internet

CO3: Understand binary, hexadecimal and octal number systems and their arithmetic.

CO4: Understand how logic circuits and Boolean algebra forms as the basics of digital computer.

Paper- GE2 : Introduction to Programming

After course completion the students will have the following learning outcomes:

CO1: Understanding a functional hierarchical code organization.
CO2: Ability to define and manage data structures based on problem subject domain.
CO3: Ability to work with textual information, characters and strings.
CO4: Ability to work with arrays of complex objects.
CO5: Understanding a concept of object thinking within the framework of functional model.
CO6: Understanding a concept of functional hierarchical code organization.
CO7: Understanding a defensive programming concept. Ability to handle possible errors during
       program execution.

Paper- GE3: Multimedia and Applications

After course completion the students will have the following learning outcomes:

CO1: Define multimedia to potential clients.
CO2: Identify and describe the function of the general skill sets in the multimedia industry.
CO3: Identify the basic components of a multimedia project.
CO4: Identify the basic hardware and software requirements for multimedia development and
       playback

Paper- GE4: Web and E-Commerce Technologies

After course completion the students will have the following learning outcomes:

CO1: Students are able to develop a dynamic webpage by the use of java script and HTML/
       DHTML/ASP.
CO2: Students will be able to write a well formed / valid XML document
CO3: Students will be able to connect a java program to a DBMS and perform insert, update and
       delete operations on DBMS table.
CO4: Students will be able to write a server side java application called Servlet to catch form data sent
       from client and store it on database.
CO5: Students will be able to write a server side java application called JSP to catch form data sent
       from
CO6: client, process it and store it on database.

Course Specific Outcomes (CSOs) for M.Sc. in Computer Science

Semester-I

COS-101: Data Structure and algorithm

After course completion the students will have the following learning outcomes:

CO1: recall the fundamentals of data structure with their implementation and its applications.
CO2: infer the complexity of algorithms.
CO3: apply the Greedy methods to solve real time problems.
CO4: compare different sorting and searching techniques.
CO5: design new algorithms with Dynamic Programming Techniques for Analytical Problems.

COS-102: Advanced Computer Architecture

After course completion the students will have the following learning outcomes:

CO1: define the principles of Parallel Algorithm Design.
CO2: understand the fundamental concepts, techniques in Parallel Computation Structuring and Design.
CO3: solve the algorithms using Parallel Programming Principle
CO4: distinguish various architectures of high-performance computing systems.
CO5: interpret modern design structures of pipelined and multiprocessors systems.

COS-103: Data Communication and Computer Network

After course completion the students will have the following learning outcomes:

CO1: Understand computer network basics, network architecture, TCP/IP and OSI reference models.
CO2: Identify and understand various techniques and modes of transmission.
CO3: Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN
CO4: Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme.

CO5:   Discuss the elements and protocols of transport layer.
CO6:   Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS

COS-104: Software Engineering and project management

After course completion the students will have the following learning outcomes:

CO1: Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice.
CO2: Able to use modern engineering tools necessary for software project management, time management and software reuse.
CO3: 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.
CO4: Able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project
CO5: Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.

COS-191: Data Structure Lab

After course completion the students will have the following learning outcomes:

CO1:   implement the   recall the fundamentals of data structure with their implementation and its applications.
CO2:   implement the infer the complexity of algorithms.
CO3:   implement the apply the Greedy methods to solve real time problems.
CO4:   implement the compare different sorting and searching techniques.
CO5:   implement the   design new algorithms with Dynamic Programming Techniques for Analytical Problems.

COS-192: Network Programming Lab

After course completion the students will have the following learning outcomes:

CO1:   Practice the Understand computer network basics, network architecture, TCP/IP and OSI reference models.
CO2:   Practice the Identify and understand various techniques and modes of transmission.
CO3:   Practice the Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN
CO4:   Practice the Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme.
CO5:   Practice the Discuss the elements and protocols of transport layer.
CO6:   Practice the Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS

<u>Semester-II</u>

COS-201: Advanced Database Management System

After course completion the students will have the following learning outcomes:

CO1:   Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
CO2:   Identify basic database storage structures and access techniques such as file organizations, indexing methods including B—tree, and hashing.
CO3:   Learn and apply Structured query language (SQL) for database definition and database manipulation.

CO4: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
CO5: Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.

COS-202:M1: Automata Theory M2: Compiler Construction

After course completion the students will have the following learning outcomes:

CO1: Understand the basic concepts of formal languages, automata and grammar types, as well as the use of formal languages and reduction in normal forms
CO2: Demonstrate the relation between regular expressions, automata, languages and grammar with formal mathematical methods
CO3: Design push down automata, cellular automata and turing machines performing tasks of moderate complexity
CO4: Analyze the syntax and formal properties, parsing of various grammars such as LL(k) and LR(k)
CO5: Describe the rewriting systems and derivation languages
CO6: Define the Loop Optimization and DAG for source code.
CO7: Explain the data structures for Block Structured Languages.
CO8: Apply various parsing and conversion techniques for the design of a compiler.
CO9: Analyze the concept of parsing techniques.
CO10: Evaluate the Code Optimization and code generation techniques.

COS-203:M1: OOPS using JAVA   M2: Programming in R

After course completion the students will have the following learning outcomes:

CO1: Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
CO2: Understand dynamic memory management techniques using pointers, constructors, destructors, etc
CO3: Describe the concept of function overloading, operator overloading, virtual functions and
CO4: polymorphism.
CO5: Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
CO6: Demonstrate the use of various OOPs concepts with the help of program
CO7: Demonstrate the use of various implementation of R program language.

COS-204: M1: Computer Fundamentals M2: Programming Concepts

After course completion the students will have the following learning outcomes:

CO1: Bridge the fundamental concepts of computers with the present level of knowledge of the students.
CO2: Familiarise operating systems, programming languages, peripheral devices, networking, multimedia and internet
CO3: Understand binary, hexadecimal and octal number systems and their arithmetic.
CO4: Understand how logic circuits and Boolean algebra forms as the basics of digital computer.
CO5: Understanding a functional hierarchical code organization.
CO6: Ability to define and manage data structures based on problem subject domain.
CO7: Ability to work with textual information, characters and strings.
CO8: Ability to work with arrays of complex objects.
CO9: Understanding a concept of object thinking within the framework of functional model.
CO10: Understanding a concept of functional hierarchical code organization.
CO11: Understanding a defensive programming concept. Ability to handle possible errors during program execution.

COS-291: DBMS Lab

After course completion the students will have the following learning outcomes:

CO12: connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
CO13: develop a dynamic webpage by the use of java script and HTML/ DHTML/ASP.
CO14: write a well formed / valid XML document
CO15: write a server side java application called Servlet to catch form data sent from
CO16: client and store it on database.
CO17: write a server side java application called JSP to catch form data sent from client, process it and store it on database.

COS-292: M1: OOPS Lab M2: R Lab

After course completion the students will have the following learning outcomes:

CO1: design and implement programs in the Java programming language that make strong use of classes and objects.
CO2: print formatted text to the console output and read/parse console input text using a Scanner object.
CO3: apply logical constructs for branching and loops as well as use integrator objects when appropriate.
CO4: define classes and methods.
CO5: implement R programming logic.

Semester-III

COS-301: Advanced operating System

After course completion the students will have the following learning outcomes:

CO1: Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System
CO2: Demonstrate UNIX commands for file handling and process control
CO3: Write Regular expressions for pattern matching and apply them to various filters for a specific task
CO4: Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem

COS-302:M1: Computer Graphics   M2: Image Processing

After course completion the students will have the following learning outcomes:

CO1: Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO2: Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
CO3: Use of geometric transformations on graphics objects and their application in composite form.
CO4: Extract scene with different clipping methods and its transformation to graphics display device.
CO5: Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
CO6: Render projected objects to naturalize the scene in 2D view and use of illumination models for this.
CO7: Review the fundamental concepts of a digital image processing system.
CO8: Analyze images in the frequency domain using various transforms.
CO9: Evaluate the techniques for image enhancement and image restoration.
CO10: Categorize various compression techniques.
CO11: Interpret Image compression standards.
CO12: Interpret image segmentation and representation techniques.

COS-303: Elective – I

After course completion the students will have the following learning outcomes:

CO1:   Describe important types of combinatorial optimization problems
CO2:   Formulate combinatorial optimization problems as mathematical models and determine the
CO3:   difficulty of the problems with the help of complexity theory
CO4:   Explain the design of and the principles behind efficient solution methods and use the methods for
CO5:   solving combinatorial optimization problems
CO6:   Use available software for solving optimization problems take part of development of software for
CO7:   optimization problems

COS-304: M1: DBMS   M2: Internet Technology (CBCS)

After course completion the students will have the following learning outcomes:

CO1:   Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
CO2:   Identify basic database storage structures and access techniques such as file organizations, indexing methods including B—tree, and hashing.
CO3:   Learn and apply Structured query language (SQL) for database definition and database manipulation.
CO4:   Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
CO5:   Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.
CO6:   develop a dynamic webpage by the use of java script and DHTML.
CO7:   write a well formed / valid XML document.
CO8:   connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.

COS-391: M1: Graphics Lab   M2: OS Lab

After course completion the students will have the following learning outcomes:

CO1:   Understand the fundamental concepts of mobile devices and types of mobile operating systems to know about comprehensive knowledge in the field of computer science.
CO2:   Extract scene with different clipping methods and its transformation to graphics display
CO3:   device.
CO4:   Explore projections and visible surface detection techniques for display of 3D scene on 2D
CO5:   screen.
CO6:   Implement various field of computer graphics and Operating system application

COS-392: M1: Industrial Tour M2: Term Paper

After course completion the students will have the following learning outcomes:

CO1:   comprehend the state-of-the-art requirements of the Industry.
CO2:   apply critical thinking, reasoning and creative thinking for Software Design in an industry as an individual or as a part of a team.
CO3: analyze the problem and provide Solution by Decision Making.
CO4: develop Interpersonal, Communication and Presentation skills.
CO5: build the modules for a specific problem.

COS-401: Artificial Intelligence

After course completion the students will have the following learning outcomes:

CO1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3: Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
CO4: Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
CO5: Demonstrate proficiency in applying scientific method to models of machine learning.
CO6: Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal
CO7: implications.

COS-402: Elective – II

After course completion the students will have the following learning outcomes:

CO1: develop a dynamic webpage by the use of java script and DHTML.
CO2: write a well formed / valid XML document.
CO3: connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
CO4: write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
CO5: write a server side java application called JSP to catch form data sent from client and store it on database.

COS-403: Elective – III

After course completion the students will have the following learning outcomes:

CO1: Understand the Importance of IT and its acts in India.
CO2: Understanding the basic concept of computer fundamentals and number systems
CO3: Describe about the basic components of computer.
CO4: Understand the applications of MS Word, MS Excel and MS Power Point in documentation and other areas.
CO5: Understanding the concept of DBMS and its importance in record maintenance.
CO6: Describe important types of combinatorial optimization problems
CO7: Formulate combinatorial optimization problems as mathematical models and determine the difficulty of the problems with the help of complexity theory

COS-491: AI Lab

After course completion the students will have the following learning outcomes:

CO1: Learn programming concept in PROLOG platform
CO2: Improve logic building for programming

COS-492: Project work

After course completion the students will have the following learning outcomes:

CO1: understand how to work at corporate field.
CO2: comprehend the state-of-the-art requirements of the Industry.

CO3: apply critical thinking, reasoning and creative thinking for Software Design in an industry as an individual or as a part of a team.

CO4: analyze the problem and provide Solution by Decision Making.

CO5: develop Interpersonal, Communication and Presentation skills.

CO6: build the modules for a specific problem.

COS-493 Grand Viva

After course completion the students will have the following learning outcomes:

CO1: analyze the problem and provide Solution by Decision Making.

CO2: develop Interpersonal, Communication and Presentation skills.

CO3: build the modules for a specific problem.