

## Department of Computer Science



**PROGRAMME NAME : B.Sc COMPUTER SCIENCE**

### PROGRAMME OUTCOMES

PO 1	Be aware of the history of the discipline of latest technology and understand the conceptual underpinnings of the subject
PO 2	Illustrate the nature of the software development process , including the need to provide appropriate documentation
PO 3	Be able to develop program in one or two programming languages
PO 4	Be able to analyze a technique for a specific problem to meet a particular objective .
PO 5	Compare the basic theory of computer architectures , including computer hardware and networking
PO 6	Construct new information technology applicable to the society , business and the individual , both from a technical and from an ethical and legal point of view

SL. NO.	COURSE NAME	COURSE OUTCOME	
1	PROGRAMMING IN C	CO 1	To obtain knowledge about the structure of the programming language C
		CO 2	To develop the program writing and logical thinking skill.
		CO 3	To summarize statements and arrays
		CO 4	To make use of defined functions
		CO 5	To explain pointers and files
2	PROGRAMMING IN C	CO 1	To define the features of C by applying sample problems
		CO 2	To explore skills in implementing algorithms through the programming Language C
		CO 3	To develop array of elements
		CO 4	To evaluate matrices
		CO 5	To develop the programs using pointers and functions

3	DISCRETE MATHEMATICS	CO 1	To recall basic concepts for clear understanding of mathematical principles
		CO 2	To explain practical problems.
		CO 3	To construct matrices using discrete mathematics
		CO 4	To analyze techniques to draw graph using mathematics
		CO 5	To design graphs using the representations
4	PROGRAMMING IN C++	CO 1	To define the basic knowledge of object oriented programming concepts
		CO 2	To relate the idea of classes and objects
		CO 3	To analyze and develop constructors and destructors
		CO 4	To design C++ streams, Inheritance, Overloading of operators, functions, constructors, File Handling and templates concepts of C++ programming.
		CO 5	To develop the knowledge about how to work on files
5	PROGRAMMING IN C++	CO 1	To define object oriented programming concepts using class and member functions.
		CO 2	To develop overloading operators
		CO 3	To analyze friend function
		CO 4	To gain the knowledge about the importance of constructor
		CO 5	To design C++ virtual functions
6	LINUX	CO 1	To find various Linux commands
		CO 2	To interpret and make effective use of Linux utilities
		CO 3	To construct Shell scripting language to solve problems.
		CO 4	To list shell scripting conditions
		CO 5	To develop Linux communication oriented commands

7	JAVA PROGRAMMING	CO 1	To recall the basic concepts of Object Oriented Programming
		CO 2	To apply the tools of Object – Oriented Paradigm in Java programming
		CO 3	To understand the fundamentals of applet, event – driven programming
		CO 4	To analyze the ability to develop Applet programs with tools of Java
		CO 5	To design the skills to develop software
8	JAVA PROGRAMMING LAB	CO 1	Illustrate and make effective use of Java Programming to develop software
		CO 2	Develop Java application programs using OOP principles..
		CO 3	Apply Constructors and Overriding methods
		CO 4	Develop Multithreaded programs
		CO 5	To implement error handling techniques using exception handling.
9	SCRIPTING LANGUAGES	CO 1	To understand the basic concepts of HTML and web programming.
		CO 2	To Demonstrate the concepts of scripting languages for developing web-based projects
		CO 3	Ability to compare the differences between Scripting languages and programming languages
		CO 4	To understand CSS files HTML Multimedia.
		CO 5	Ability to develop projects using HTML and Web
10	SCRIPTING LANGUAGES LAB	CO 1	To develop knowledge in web-based projects
		CO 2	To demonstrate programming skills in scripting languages.
		CO 3	To construct the skill of designing GUI in scripting languages
		CO 4	To categorize CSS files
		CO 5	To design JavaScript programs

11	DIGITAL DESIGN	CO 1	To recall the concept of digital systems, to operate on various number systems and simplify Boolean functions and to distinguish logical and combinational circuits.
		CO 2	Illustrate the concept of digital and binary systems
		CO 3	Be able to develop combinational logic circuits.
		CO 4	Be able to design and analyze sequential logic circuits.
		CO 5	Construct and implementation of digital circuits and systems.
12	DATA STRUCTURES	CO 1	To understand the concepts of basic data structures.
		CO 2	To acquire the knowledge about stack, Queues and Linked list.
		CO 3	To have general understanding of the network structures through trees and graph.
		CO 4	To make the students to understand the basic algorithms for sorting.
		CO 5	Define data structure Algorithms
13	DATA STRUCTURE L A B	CO 1	To develop skills in implementing sort and search data structure algorithms
		CO 2	To implement queue and stack techniques
		CO 3	To design tree traversals
		CO 4	To implement binary search tree
		CO 5	To Compile sorting algorithms
14	MACHINE LEARNING TEQUINIQUES	CO 1	To introduce students to the basic concepts of Machine Learning.
		CO 2	To acquire various techniques in Machine learning.
		CO 3	To have a thorough understanding of the Supervised and Unsupervised learning techniques
		CO 4	To study the probability based learning techniques
		CO 5	To understand graphical models of machine learning algorithms

15	PYTHON	CO 1	To understand the basic concepts in python
		CO 2	To understand the concepts and develop python programs
		CO 3	To acquire the knowledge about menu driven programs
		CO 4	To improve the knowledge in CSV files
		CO 5	To understand the functions of python
16	COMPUTER ARCHITECTURE	CO 1	Understand the basics of Computers and its Organization
		CO 2	Know the various Technologies behind the Computer Architecture
		CO 3	An ability to apply knowledge about hardware implementation and algorithms
		CO 4	To evaluate various input output organisations
		CO 5	To develop the architecture using various memories
17	RELATIONAL DATABASE MANAGEMENT SYSTEM	CO 1	To outline relational database concepts
		CO 2	To relate transaction management concepts in database system.
		CO 3	To utilize Normalizations techniques.
		CO 4	To write SQL programs that use: procedure, function, package, cursor and Exceptions.
		CO 5	To Use current techniques and tools necessary for complex computing practices.
18	DATA COMMUNICATION AND COMPUTER NETWORKS	CO 1	To define the concepts in Computer Network and Data Communication
		CO 2	To outline the various protocols used in network
		CO 3	To compare OSI Layers in Computer networks
		CO 4	To list about Switching Techniques
		CO 5	To discuss wireless LAN's

19	PHP and mySQL	CO 1	To define and use open source database management system MySQL
		CO 2	To explain dynamic web pages and websites.
		CO 3	To identify web pages with database.
		CO 4	To compare the concepts of open sources
		CO 5	To assess the knowledge about Arrays
20	PHP	CO 1	To develop knowledge about basic PHP Programs.
		CO 2	To evaluate PHP scripts and functions
		CO 3	To develop arrays in PHP
		CO 4	To design loops in PHP
		CO 5	To compare the scripts and functions in PHP
21	Machine learning lab	CO 1	Apply the concepts and practical knowledge in analysis, design and Development of computing systems
		CO 2	To make use of applications to multidisciplinary problems.
		CO 3	To discuss the knowledge about various algorithms
		CO 4	To interpret the knowledge about various datasets
		CO 5	Develop data frames in Machine Learning
22	Green foot Lab	CO 1	To know about the various Applications of Multimedia.
		CO 2	To develop two- dimensional graphical applications
		CO 3	To design multimedia animations
		CO 4	To know the knowledge about video works in multimedia applications
		CO 5	To implement interactive games.

23	MOBILE APPLICATION DEVELOPMENT	CO 1	To recall the basics, field of computing sciences and Multidisciplinary of Mobile Applications
		CO 2	To build interactive applications
		CO 3	To develop multiple activities and indent in mobile applications
		CO 4	To understand Fragments of mobile application development
		CO 5	To develop mobile application development using Sqlite Database
24	INTRODUCTION TO SECURITY IN COMPUTING	CO 1	To relate the concepts of basic concepts in security in computing
		CO 2	To explain about the various encryption and decryption security algorithms
		CO 3	To enquire Number theory and key algorithms
		CO 4	To list the authentication
		CO 5	To identify the intruder of security in computing
25	CLOUD COMPUTING	CO 1	To understand the History of cloud computing
		CO 2	To know in detail about the various Cloud Computing concepts
		CO 3	To enquire cloud computing Architecture
		CO 4	To understand SOA components
		CO 5	To know about cloud security and privacy
26	OPERATING SYSTEM	CO 1	To acquire the fundamental knowledge of the operating system architecture and components and to know the various operations performed by the operating system.
		CO 2	Understand the basic working process of an operating system.
		CO 3	Understand the importance of process and scheduling.
		CO 4	To explain the issues in synchronization and memory management.
		CO 5	To discuss about mass storage structures

27	SOFTWARE ENGINEERING AND TESTING	CO 1	To define the fundamental knowledge of Software Engineering
		CO 2	To classify the various testing methods.
		CO 3	To analyze various software life cycle models
		CO 4	To interpret User Interface design
		CO 5	To select software project managements
28	COMPUTER GRAPHICS AND VISUALIZATION	CO 1	To understand the overview of the graphics visualization
		CO 2	To acquire the fundamental knowledge of Computer Graphics and Visualization.
		CO 3	To understand the Algorithms in Computer Graphics
		CO 4	To acquire the transformation technique in Graphics
		CO 5	To understand the Interactive methods easily
29	COMPUTER GRAPHICS LAB	CO 1	To illustrate skills in programming computer graphics
		CO 2	To apply multimedia concepts
		CO 3	To compile the algorithms to draw line, circle etc
		CO 4	To develop image using Scaling, Rotating and translation technique
		CO 5	To demonstrate the image using random and bouncing balls
30	MySQL Lab	CO 1	To illustrate skills in database
		CO 2	To apply database concepts
		CO 3	To create database and operate update, remove etc
		CO 4	To develop various query functions
		CO 5	To demonstrate the security by setting password and its privilages.
31	INTERNET OF THINGS	CO 1	To define the fundamentals of IOT
		CO 2	To outline about IOT working
		CO 3	To discuss the Architecture of IOT
		CO 4	To outline how IOT is used in Education and Agricultural level
		CO 5	To explain security in IOT



32	INTRODUCTION TO DIGITAL IMAGE PROCESSING	CO 1	To define the fundamental knowledge of introduction to Digital Image Processing.
		CO 2	To explain the features present in Digital Image Processing.
		CO 3	To outline the enhancement of spatial domain
		CO 4	To analyze the color Image processing
		CO 5	To interpret the image using compression
33	NEURAL NETWORKS	CO 1	To recall the Historical Development of Neural Networks.
		CO 2	To compare Basic neuron models: McCulloch-Pitts model and the generalized one, distance or similarity based neuron model, radial basis function model, etc
		CO 3	To discuss Basic neural network models: multilayer perception, distance or similarity based neural networks, associative memory and self-organizing feature map, radial basis function based multilayer perception, neural network decision trees, etc.
		CO 4	To evaluate Basic learning algorithms: the delta learning rule, the back propagation algorithm, self-organization learning
		CO 5	To discuss the Applications: pattern recognition, function approximation, information visualization, etc.
34	DIGITAL IMAGE PROCESSING USING SCILAB	CO 1	To get knowledge about the basic programs on Digital Image Processing
		CO 2	To acquire the knowledge from Thresholding Technique
		CO 3	To read the colour image and separate the planes
		CO 4	To perform the brightness of th image
		CO 5	To manipulate the contrast image.

**PROGRAMME NAME : M.Sc COMPUTER SCIENCE****PROGRAMME OUTCOMES**

PO - 1	Identify and understand the need for basic mathematical and Computational Concepts and apply them to real world problems.
PO - 2	Design and develop applications using computers to analyze and solve computer science related problems.
PO - 3	Design, implement and evaluate a computer-based system, process, component, or programs to meet the stakeholder needs
PO - 4	Analyze, design and choose efficient algorithms and apply them in appropriate Computational solutions.
PO - 5	Analyze large data sets in the context of real world problems and interpret results using data analytics.
PO - 6	Understand research methods and apply them to analyze data for decision Making.
PO - 7	Realize the importance of lifelong learning and continuous professional development.

SL. NO.	COURSE NAME		COURSE OUTCOME
1	DESIGN AND ANALYSIS OF ALGORITHMS	CO - 1	Identify the Characteristics of an algorithm
		CO - 2	Understand the problem-solving approaches using computers
		CO - 3	Compute the time complexity of an algorithm
		CO - 4	Analyze the performance of an algorithm in solving a problem
		CO - 5	Compare the performance of various algorithms in solving a specific-problem
		CO - 6	Develop algorithms for solving real-time problems

2	ADVANCED JAVA PROGRAMMING	CO - 1	Understand swing components and its usage.
		CO - 2	Implement Networking and Data base connectivity in Java for given application.
		CO - 3	Implement webpage with dynamic content and server side web application using Servlet and JSP.
		CO - 4	Develop Java application using spring framework.
3	MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE	CO - 1	Evaluate the validity of logical arguments and construct mathematical proofs
		CO - 2	administer all the basic operations with sets
		CO - 3	understand abstract algebraic structure like groups and their properties
		CO - 4	Analyze whether given graphs are isomorphic and apply different algorithms to find the shortest path Apply Mathematical techniques into many areas of Computer science like Algorithms, Computer Networks, and Cryptography etc.
		CO - 5	Apply Mathematical techniques into many areas of Computer science like Algorithms, Computer Networks, and Cryptography etc.
4	COMPILER DESIGN	CO - 1	Understand the different phases of compiler.
		CO - 2	Design a lexical analyzer for a sample language.
		CO - 3	Apply different parsing algorithms to develop the parsers for a given Grammar.
		CO - 4	Understand syntax-directed translation and run-time environment.
		CO - 5	Learn to implement code optimization techniques and a simple code Generator.
		CO - 6	Design and implement a scanner and a parser using LEX and YACC tools.

5	DISTRIBUTED OPERATING SYSTEM	CO - 1	Gain knowledge about the history of the Linux operating system, its unique licensing model and the major distributions that are available to use
		CO - 2	start and stop services from running in the Linux operating systems.
		CO - 3	Implement process scheduling algorithms
		CO - 4	Learn to manage files and directories in the Linux operating system
		CO - 5	To use the Linux environment for problem solving
6	CORE - 6 ALGORITHM LAB (USE C++/JAVA) CORE - 7 ADVANCED JAVA LAB	CO - 1	Implement algorithms for solving real-time problems
		CO - 1	Understand swing components and its usage.
		CO - 2	Implement Networking and Data base connectivity in Java for given application.
		CO - 3	Implement webpage with dynamic content and server side web application using Servlet and JSP.
		CO - 4	Develop Java application using spring framework.
7	ADVANCED WEB TECHNOLOGY	CO - 1	Design a webpage with Web form fundamentals and web control classes
		CO - 2	Recognize the importance of validation control, cookies and session
		CO - 3	Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.
		CO - 4	Recognize the difference between Data list and Data grid controls in accessing data
8	MACHINE LEARNING	CO - 1	Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
		CO - 2	Have an understanding of the strengths and weaknesses of many popular machine learning approaches.

		CO - 3	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
		CO - 4	Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
		CO - 5	Be able to design and implement various machine learning algorithms in a range of real- world applications.
9	ADVANCED DBMS	CO - 1	Recognize the importance of Various Data models and Architecture
		CO - 2	Analyze and Design the normalized database schema
		CO - 3	Decide the database for his problem
		CO - 4	Develop database solutions
		CO - 5	Write database queries in SQL, PL SQL and NoSQL
10	CRYPTOGRAPHY AND NETWORK SECURITY	CO - 1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
		CO - 2	Apply the different cryptographic operations of symmetric/asymmetric cryptographic algorithms.
		CO - 3	Analyze various authentication protocols and apply them in real time.
		CO - 4	Analyze the security threats and study the various countermeasures.
		CO - 5	Identify the applications of network security in various fields.
		CO - 6	Design and Develop a security model.
11	FREE OPEN SOURCE SOFTWARE	CO - 1	Ability to use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.
		CO - 2	Ability to write Shell Programming using Linux commands.

		CO - 3	Ability to design and write application to manipulate internal kernel level Linux File System.
		CO - 4	Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs.
		CO - 5	Structure simple Python programs for solving problems.
		CO - 6	Decompose a Python program into functions
12	DATA MINING	CO - 1	To evaluate various mining techniques on complex data objects
		CO - 2	To develop applications using Data Mining Tools.
		CO - 3	To develop ability to design various algorithms based on data mining tools.
		CO - 4	To develop further interest in research and design of new Data Mining techniques
13	DATA SCIENCE & BIG DATA ANALYTICS	CO - 1	Work with big data tools and its analysis techniques
		CO - 2	Design efficient algorithms for mining the data from large volumes
		CO - 3	Design an efficient recommendation system
		CO - 4	Design the tools for visualization
		CO - 5	Learn NoSQL databases and management.
14	ADVANCED WEB TECHNOLOGY LAB	CO - 1	Design a webpage with Web form fundamentals and web control classes
		CO - 2	Recognize the importance of validation control, cookies and session
		CO - 3	Apply the knowledge of ASP.NET object, ADO.NET dataaccess and SQL to develop a client server model.
		CO - 4	Recognize the difference between Data list and Data grid controls in accessing data

15	MACHINE LEARNING LAB USING PYTHON	CO - 1	To learn to use Weka tool for implementing machine learning algorithms related to numeric data
		CO - 2	To learn the application of machine learning algorithms for text data
		CO - 3	To use dimensionality reduction algorithms for image processing applications
		CO - 4	To apply CRFs in text processing applications
		CO - 5	To use fundamental and advanced neural network algorithms for solving real-world data
16	DIGITAL IMAGE PROCESSING	CO - 1	Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms.
		CO - 2	Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques.
		CO - 3	Interpret Image compression standards, and Interpret image segmentation and representation techniques
		CO - 4	Gain idea to process various image used in various fields such as weather forecasting
		CO - 5	Diagnosis of various disease using image such as tumor, cancer etc.
17	SOFT COMPUTING	CO - 1	To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.
		CO - 2	Comprehend the fuzzy logic and the concept of fuzziness Involved in various systems and fuzzy set theory.

		CO - 3	Understand the concept soft fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic.
		CO - 4	Understand appropriate learning rules for each of the architectures and learn several Genetic algorithms paradigms and its applications
18	ADVANCED COMPUTER NETWORKS	CO - 1	Understand fundamental underlying principles of computer networking
		CO - 2	Understand details and functionality of layered network architecture.
		CO - 3	Apply mathematical foundations to solve computational problems in computer networking
		CO - 4	Analyze performance of various communication protocols.
		CO - 5	Compare routing algorithms
		CO - 6	Practice packet /file transmission between nodes.
19	RESEARCH METHODOLOGY	CO - 1	Ability to apply different research approaches and methodologies
		CO - 2	Develop data collection instrument according to the underlying theoretical framework.
		CO - 3	Analyze quantitative data and qualitative data using software packages
		CO - 4	Construct and document an appropriate research design
		CO - 5	Discuss limitations and potential contribution to theory and practice of research
		CO - 6	Effectively apply the appropriate computer tools in each stage of research
		CO - 7	Ability to perform ICT based Teaching Methods



20	CLOUD COMPUTING	CO - 1	Interpret the key dimensions of the challenges of Cloud Computing
		CO - 2	Examine the economics, financial, and technological implications for selecting cloud computing for own organization
		CO - 3	Assessing the technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications
		CO - 4	Evaluate own organizations' needs for capacity building and training in cloud computing-related IT areas
		CO - 5	Illustrate Virtualization for Data-Centre Automation
21	MOBILE COMPUTING	CO - 1	Describe what Mobile Computing is and how it works today
		CO - 2	Recognize the factors that contributed to the emergence of Mobile Computing
		CO - 3	Able to Understand different mobile application paradigms
		CO - 4	Apply different protocols for mobile communication
		CO - 5	Define and identify infrastructure requirement for Mobile Applications
		CO - 6	Ability to conceptualize new ideas and present them as intellectual property
22	OPTIMIZATION TECHNIQUES	CO - 1	Recognize the areas of problem solving that needs optimization methods
		CO - 2	Describe and develop various optimization algorithms for real-world problems
		CO - 3	Apply algorithms for optimizing mathematical problems and interpret results
		CO - 4	Identify appropriate problem solving technique based on problem's nature
		CO - 5	Construct scientific research papers and present them in a seminar

23	DIGITAL IMAGE PROCESSING LAB USING SCILAB	CO - 1	Able to identify the need for various digital images processing techniques apply them and Analyze deferent types of real world images
		CO - 2	Evaluate the techniques for image enhancement and image restoration. Categorize various image compression techniques.
		CO - 3	Interpret Image compression standards, and Interpret image segmentation and representation techniques.
		CO - 4	Apply various morphological operators for image pre and post processing in specific applications.