

BSC- COMPUTER SCIENCE- COURSE OUTCOMES
FY BSC- COMPUTER SCIENCE

Semester I:

Problem Solving Using Computers and ‘C’ Programming(BS12001)

- Know and understand the foundation of computing, programming and problem- solving using computers.
- Illustrate the ability to analyse a problem and devise an algorithm to solve it.
- Write an algorithm, and flowcharts for arithmetic and logical problems
- Recognize structured programming approach.
- Apply the basic concepts and terminology of programming in general.
- Describe the algorithms using the ‘C’ language, debug and execute programs.

Database Management System (BS12002)

- Interpret the fundamental concepts of DBMS (PL/PgSQL)
- Develop an ability to understand database management operations
- Create an E-R Model for given requirements and convert the same into relational model.
- Analyse the raw data and design data dependencies.

Discrete Mathematics (BS12003)

- Demonstrate the skills of mathematical reasoning: Deduction, Proof and Recursive Thinking.
- Write an argument using logical notation and determine if the argument is or is not valid.
- Prove mathematical theorems using the Principles of Mathematical Induction.
- Construct a solid foundation in some of the new and different branches of Mathematics like Logic, Set Theory and Lattices.
- Distinguish among various counting principles and apply them accordingly.
- Determine properties of relations, identify equivalence and partial order relations, sketch relations.
- Know the wide nature of the subject through various mathematical skills and techniques and apply them in different disciplines.
- Inculcate a positive attitude towards Mathematics and enjoy triumph of solving interesting problems from different areas of the subject.

Calculus and Number Theory(BS12004)

- Ability to describe various relations in Number theory.

- Ability to explain the notion of continuity as related to functions and to relate an intuitive notion of continuity to the mathematical definition of continuity.
- Ability to compare and contrast the ideas of continuity and differentiability.
- Ability to distinguish between linear, nonlinear, partial and ordinary differential equations.
- Ability to identify areas in mathematics and other fields where Calculus is useful.
- Habit to work effectively with others to complete homework and class assignments.

Descriptive Statistics(BS12005)

- Organize, manage and present data. Analyse statistical data graphically using frequency distributions and cumulative frequency distributions.
- Calculate and apply measures of central tendency for grouped and ungrouped data. Represent mode, median, quartiles graphically.
- Calculate and apply measures of dispersion for grouped and ungrouped data.
- Analyse statistical data using measures of central tendency, dispersion.
- Calculate and apply measures of skewness and kurtosis. Analyse natures of skewness and kurtosis using graphs.
- Apply Likert scale, classification, relationship among different class frequencies (up to two attributes), calculate coefficient of association and interpret.

Mathematical Statistics:(BS12006)

- Understand and apply methods of Counting Principles, Permutation, and Combination to real life situations.
- Understand concepts of experiments, sample space, events to be applied further in the calculation of probabilities.
- Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.
- Translate real-world problems into probability models.
- Understand and calculate conditional probabilities of random variables.
- Understand and apply discrete and continuous probability distributions to various real-life problems.

Electronics-I- Semiconductor Devices and Basic Electronic Systems(BS12007)

- Understand the basic knowledge of semiconductor devices and their working through characteristics.
- Differentiate between different types of rectifiers, Understand the concept of filter identify different voltage regulator circuits
- Describe working about BJT and its I-V Characteristics and compare different transistor configuration and amplifier
- Differentiate between E-MOSFET and D-MOSFET

Electronics-I Principles of Digital Electronics (BS12008)

- Understand and represent numbers in powers of base and translate one number system to another and solve binary arithmetic problems
- Identify gates, examine and solve Boolean Algebraic expressions for designing digital circuits using K-Maps
- Analyse, design and construct combinational logic circuits.

Practical Course based on (BS12001 and BS12002)**Problem Solving using Computer and 'C' Programming and Database Management System (Subject Code: BSP12009)**

- Understand the program development life cycle.
- Solve simple computational problems using modular design and basic features of the 'C' language.
- Solve real world computational problem.
- Understand basic query processing operations. Design E-R Model for given requirements and convert the same into database tables.

Mathematics Practical (BSP12010)

- Construct a solid foundation in the field of programming handling various mathematical concepts using 'C' Programming.
- Write C- Programs more efficiently with the help of various mathematical problems.

Statistics Practical 1 (BS12011)

- Tabulate and make frequency distribution of the given data.
- Apply various graphical and diagrammatic techniques and interpret.
- compute various measures of central tendency, dispersion, skewness and kurtosis.
- fit the Binomial and Poisson distributions.
- compute the measures of attributes.
- The process of collection of data, its condensation and representation for real life data.
- Study free statistical softwares and use them for data analysis in project.

Electronics Practical (BSP12012)

- Identify and measure different components, measure ac/dc voltages, frequency and amplitude of a signal, relate to the electronic communication between devices, understand the basics of analog and digital electronics,
- Describe the characteristics of semiconductor devices, illustrate applications in voltage regulated power supplies and amplifiers.
- Construct basic combinational circuits and verify their functionalities.

- Ability to apply knowledge and perform electronics experiments as well as to analyse and interpret data of electronics in computer science.
- Ability to work effectively and responsibly as a team member to perform experiments and presentations.
- Develop skills in scientific writing to make lab reports, activity reports, collecting relevant information.
- Acquire skills in handling scientific instruments, planning and performing Laboratory experiments using modern tools and techniques.
- Ability to communicate effectively in oral and written communication skills

Semester II:

Advanced ‘C’ Programming (BS22001)

- Construct the code organization with complex data types, structures and preprocessor directives.
- Write programming code for files manipulation.
- Recognize the advanced concepts of programming using the ‘C’ language.

Relational Database Management System(BS22002)

- Perform database management operations
- Apply the fundamental concepts of RDBMS (PL/PgSQL)
- Analyse the basic issues of transaction processing and concurrency control
- Apply their mind to implement data security.

Graph Theory (BS22003)

- Know about the new branch of mathematics - Graph Theory and its applications which will help to construct a strong foundation in the subject.
- Define graphs, digraphs and trees, and identify their main properties.
- Classify different types of graphs and identify the areas of their applications.
- Formulate and relate real life situations with different types of graphs and techniques used in Graph Theory.
- Describe and apply some basic algorithms for graphs.
- Demonstrate different traversal methods for trees and graphs.
- Determine the wide nature of the subject through various key concepts in Graph Theory and their real-life applications.

Linear Algebra(BS22004)

- Apply computational techniques and algebraic skills essential for the study of systems of linear equations.
- Set up equations based on real life situations and solve system of linear equations.

- Describe r^2 and r^3 spaces, as well as conceptually extend these results to higher dimensions.
- Explain the concept/theory in linear algebra.
- Apply computational techniques and algebraic skills essential for the study of eigenvalues and eigenvectors, orthogonality and diagonalization. (computational and algebraic skills).
- Recognize the basic applications of the chosen topics and their importance in the modern science and search engines.
- Provide insight into the applicability of Linear algebra.

Methods of Applied Statistics (BS22005)

- Calculate and interpret the correlation between two variables.
- Represent graphically and calculate the simple linear regression and non-linear regression equations for a set of data. Interpret the results of bivariate regression and correlation analysis, for forecasting.
- Calculate multivariate regression for three variables. Interpret the results of multivariate regression for forecasting.
- Analyse the trend in time series and how to remove it.

Continuous Probability Distributions and Testing of Hypothesis (BS22006)

- Apply the knowledge of standard continuous probability distributions to solve real life problems by calculating probabilities.
- Apply the concepts and definitions related to testing of hypothesis.
- Perform Test of Hypothesis for a population parameter for single sample and two sample cases. Understand the concept of p-values.
- Ability to generate model sample from given distributions.
- Apply concepts of hypothesis testing, parametric and non-parametric tests in research methodology at higher level studies and applications.

Enhance Visualization Skills -Electronics-I Instrumentation System (BS22007)

- Define different OPAMP parameters, comparison of ideal and practical parameters. Identify and discuss OPAMP Applications
- Classify different types of ADC and DAC, conversion of digital to analog and vice-versa
- Explain working principle of sensors and transducers, their classification, Identify and apply the knowledge of sensors in smart instrumentation system

Electronics-II (BS22008) Basics of Computer Organization

- Analyse, design and implement a sequential logic circuit.
- Classify different semiconductor memories, recognize the principal memory technologies from a hierarchical view point with emphasis on cache memory.

- Identify and explain different parts of CPU and I/O devices, Organize them according to their functions.

Advanced ‘C’ Programming and Relational Database Management System (BSP22009)

- Construct the code organization with complex data types, structures and pre-processor directives.
- Write programming code for files manipulation.
- Recognize the advanced concepts of programming using the ‘C’ language.

Mathematics Practical(BSP22010)

- Demonstrate skills of programming handling the mathematical concepts using a new mathematical software Maxima and ‘C’ Programming.
- Develop C- Programs more efficiently with the help of arrays in ‘C’.
- Learn new Mathematical Software MAXIMA.
- Applying commands in MAXIMA verify all theoretical concepts learned in class.

Statistics Practical 2 (BSP22011)

- Analyse the relationship between two variables using scatter plot.
- Compute coefficient of correlation, coefficient of regression.
- Apply and Fit various regression models and to find best fit.
- Apply and Fit the Normal distribution.
- Perform Test of Hypothesis for a population parameter for single sample and two sample cases. Understand the concept of p-values
- Analyse the trend in time series and how to remove it.
- Generate model sample from given distributions.
- Explain the importance and functions of different statistical organizations in the development of nation.
- Report writing on application of some statistical technique in the field of computers.

Electronics Practical(BSP22012)

- Arrange, assemble and design a working model using simulation software like PSPICE/Circuit Mod
- Demonstrate the application of OPAMP, ADC and DAC and its applications
- Experiment and understand different sensors
- Apply the design procedures to design basic sequential circuits.
- Explain the working of RAM, ROM, Identify different parts of computer hardware like Motherboard, Hard disk, CDROM
- Develop skills in scientific writing to make lab reports, project reports, collecting relevant information.

- Acquire skills in handling scientific instruments, planning and performing Laboratory experiments using modern tools and techniques.

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Semester III

Data Structures and Algorithms-I

- Explain basic SW engineering methods and practices, and their appropriate application
- Illustrate data models, object models, context models and behavioral models.
- Compare and choose a process model for a software project development.
- Decide the Software Requirement Specification, Design document, Project plan of a given software system.

Mathematics

- Relate and describe the basic algebraic structure like Group and its type.
- Solve arithmetic problems in finite groups.
- Apply and analyze the linear block codes for error detection and correction.
- Describe and explain the basics of Cryptography and Network Security.

Numerical Analysis

- Demonstrate understanding of common numerical methods and how these methods are used to obtain solutions of mathematical problems.
- Derive and apply numerical methods to obtain best approximations to the exact solutions of non-linear equations, Linear Systems, Interpolation problems, Integration problems and Ordinary Differential Equations.
- Analyze and evaluate the convergence and accuracy of different numerical methods and thus compare the methods.
- Equip mathematical modelling abilities, problem solving skills, Selection of appropriate method etc.

Electronics-I

- Summarize the basics of PIC microcontroller architecture
- Make use of instruction set to write programs in Assembly Language and C for arithmetic and code conversions, I/O port programming
- Solve delay problems and illustrate programs for Timers, Serial communication, and relate to Interrupts
- Explain how to interface I/O peripherals to PIC microcontroller and develop programs using C, demonstrate advanced microcontrollers

Electronics-II

- Explain the basic knowledge of the communication system and differentiate between them.
- recognize the need for data coding and error detection/correction mechanisms.
- Recall and identify different modulation techniques.
- Explain multiplexing techniques and comparison between them, to know data link layer protocol: media access control
- Compare and contrast osi and tcp/ip models of networking, identify functions of data link layer and network layer while accessing communication link.
- Apply appropriate and advanced techniques to build the computer network.

English

- Identify and learn to critically appreciate poetry.
- Discover various trends around the globe and movements in socially responsible art.
- Enhance their vocabulary for analysis and evaluation of art.
- Acquire interest in the appreciation of literature.
- Facilitate individualistic, innovative as well as systematic critical thinking in order to have an in depth understanding of life.
- Ensure overall linguistic competence and enrich communication skills of the students.

Practical on Data Structures and Algorithms I and Software Engineering

- Illustrate different methods of organizing the large amount of data
- Summarize well-organized data structures in solving various problems
- Compare and contrast the usage of various data structures in problem solving
- Demonstrate algorithms to solve problems using appropriate data structures

Electronics of BSc (Computer Science)

- Examine output across different pins of microcontroller-based systems.
- Acquire skills of Embedded C programming and apply the knowledge to interface the circuits with it.
- Design and build his/her own microcontroller-based projects.
- Build multiplexing and modulation techniques useful in developing wireless application
- Build and develop practical skills of network set up.

Mathematics Practical

- Relate and demonstrate the use of built-in data structures "list" and "tuples".

- Compare and apply various control structures in programming.
- Explain the basic concepts of linear algebra in python.
- Practice linear algebra problems using python.
- Apply and analyse concepts of python programming to solve problems based on numerical methods and numerical integration.
- Compare and contrast the rate of convergence of numerical methods using Python Programming.

Semester IV

Computer Science

- Illustrate different methods of organizing the large amount of data
- Summarize well-organized data structures in solving various problems
- Compare and contrast the usage of various data structures in problem solving
- Demonstrate algorithms to solve problems using appropriate data structures.

Computer Networks-I

- Describe how computer networks are organized with the concept of layered approach.
- Explain the osi and tcp/ip reference models
- Categorize the working of various protocols.
- Analyze, evaluate and design networks, services and technologies for an organization's LAN and WANs.

Mathematics

- Illustrate the basic structures of 2D and 3D graphics systems, construct and apply composite transformations.
- Explain the core concepts of computer graphics, including projection, perspective, and transformation in two and three dimensions.
- Identify the parallel and perspective projections.
- Develop the points on various curves.

Operations Research

- Develop the skills of mathematical analysis: Formulation, Deduction, Proof and a clear perception of mathematical ideas and tools.
- Illustrate the applications of Operations Research and formulate a linear programming problem and apply appropriate method to solve it.
- Illustrate and analyze the managerial problems in the industry and use the resources (Machines, Materials, Staff etc.) more effectively.
- Build and solve Transportation problem and Assignment problem using suitable method.
- Compare the initial solutions of Transportation problems obtained by different methods and obtain the optimality of the solution.

- Solve the Sequencing problem by identifying the type of the problem and obtain the optimal sequence.

Electronics – I

- Distinguish between general computing and the Embedded systems.
- Explain the fundamentals of embedded systems.
- Demonstrate the use of single board Computer (Such as Raspberry Pi) for an embedded system application.
- Identify the programming environment to develop embedded systems and their interfaces with peripheral devices.
- Show familiarity with tools used to develop an embedded environment.

Electronics-II

- Explain different wireless communication system and Different techniques used for same
- Identify different types of architecture of short-range Wireless Technologies and design and manage its application
- Recognize and practice th Basics of Internet of Things, upcoming technology
- Apply and demonstrate the applications of IoT

English

- Identify and learn to critically appreciate poetry.
- Discover various trends around the globe and movements in socially responsible art.
- Enhance their vocabulary for analysis and evaluation of art.
- Acquire interest in the appreciation of literature.
- Facilitate individualistic, innovative as well as systematic critical thinking in order to have an in depth understanding of life.
- Ensure overall linguistic competence and enrich communication skills of the students.

Computer Science Practical

- Illustrate different methods of organizing the large amount of data
- Summarize well-organized data structures in solving various problems
- Compare and contrast the usage of various data structures in problem solving
- Demonstrate algorithms to solve problems using appropriate data structures

Mathematics Practical

- Illustrate 2D and 3D objects using numpy, matplotlib libraries.
- Illustrate and interpret graphical aspects of two-dimensional and three-dimensional transformation

- Demonstrate the Bezier curve through given points in python.
- Apply Python Programming to solve Linear Programming Problems using graphical method, Simplex method and interpret the solution type.

Electronics of BSc (Computer Science)

- Build and develop own smart applications using Raspberry-Pi and write Python program for simple applications
- Demonstrate different wireless communication techniques.
- Build and implement basic IoT based system

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Semester V

Operating Systems–I

- Discuss the underlying structure of the operating system
- Describe the concept of process & threads.
- Apply different process scheduling algorithms and synchronization techniques to
- Achieve better performance of a computer system.
- Apply segmentation and paging techniques for memory management.

Computer Networks-II

- Illustrate different Application layer protocols
- Explore technical aspects of multimedia system
- Compare and contrast different cryptographic techniques for data security
- Explore different internet security protocols

Web Technologies – I (BS52203)

- Illustrate how to develop dynamic and interactive Web Page
- Explore Core-PHP, Server-Side Scripting Language
- Implement different array and file handling methods for writing programs
- Determine PHP-Database handling concept

Foundations of Data Science (BS52204)

- Apply the fundamental concepts and techniques in data science.
- Discover data from different sources, clean/process, and transform data
- Develop the ability to build and assess data-based models using statistical concepts
- Show data using various data visualisation tools and techniques.

Object Oriented Programming using Java-I (BS52205)

- Explore fundamental concepts of Object-Oriented Programming
- Develop an ability to learn and implement various java programming concept like Interface, File and Exception Handling etc

- Design user interfaces using Swing and AWT classes

Theoretical Computer Science

- Explain the use of automata during language design.
- Demonstrate Chomsky hierarchy.
- Classify the Regular Language, Context Free Language, Context Sensitive Language and Unrestricted Language.
- Construct the Finite Automata, Pushdown Automata and Turing Machine.

Practical Course Based on Operating system-I

- Implement Process synchronization through simulation
- Implement Processes and Thread Scheduling by operating system using simulation
- Implement Memory management by operating system using with the help of various schemes using simulation

Practical course based on BS52203 and BS52204

- Design dynamic and interactive Web pages.
- Develop program based on Core-PHP, Server Side Scripting Language and PHP-Database handling.
- Apply statistical methods for data pre-processing.
- Apply visualization techniques to represent data for analysis.

Practical Course Based on BS52205

- Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs
- Analyse and write Java programs that solve real-world problems
- Validate input in a Java program using Exception Handling
- Design graphical user interfaces using Swing and AWT library

Python Programming

- Explain the basic constructs of python programming such as data types, control statements etc.
- Use modules, packages and files in python programs
- Select the methods and data structures like Lists, functions, tuples, dictionaries and Sets in Python programs.
- Develop logic for problem solving.

Blockchain Technology

- Explain how blockchain systems (mainly Bitcoin and Ethereum) work
- Use Ethereum, smart contracts and related technologies, and solidity language
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from blockchain technology into their own projects.

Semester VI

Computer Science paper-I

- Discuss the issue of Deadlocks in Process management and apply different algorithms/techniques to handle the deadlocks.
- Describe the concept of File system management
- Describe the disk structure and compare various disk scheduling algorithms.
- Analyze the design and functioning of distributed operating systems and mobile operating system

Software Testing

- Classify various software testing methods and strategies
- Interpret a variety of software metrics, and identify defects, and managing those defects for improvement in quality for a given software
- Design test cases and test plans, review reports of testing for qualitative software
- Compare and contrast the latest testing methods used in the software industries.

Web Technologies – II (BS62203)

- Explore different technologies used for client-Side Scripting Language
- Write programs based on XML and XML parsers.
- Create dynamic applications using JavaScript and AJAX.
- Implement web application using PHP framework

Data Analytics (BS62204)

- Apply appropriate analytic techniques and tools to analyze data, create models, and identify insights that can lead to actionable results.
- Develop understanding of key technologies in data analytics.
- Use various data mining patterns to access the data.
- Analyze various sources of text data and explain the text and social media analytics.

Object Oriented Programming using Java-II (BS62205)

- Learn database programming using Java
- Study web development concept using Servlet and JSP
- Develop multi-core applications using multithreading
- Use Spring Framework to create web applications

Compiler Construction

- Explain the phases of compiler.
- Apply the process of scanning and parsing of source code.
- Use techniques in code generation and code optimization.
- Implement tools like LEX and YACC.
- Design the conversion code written in source language to machine language.

Practical Course Based on Operating system-II

- Implement Banker's algorithm for Deadlocks in Process management.
- Simulate File system management
- Study and implement various algorithms of disk scheduling

Practical Course based on BS62203 and BS62204

- Implement different concepts for client-Side Scripting Language
- Develop dynamic web application with XML and AJAX and PHP framework
- Use various data mining patterns to access the data.
- Analyze various sources of text data and explain the text analytics framework.

Practical Course Based on BS62205

- Use multithreading to write multi core applications
- Learn database Programming using Java
- Create dynamic web pages using Servlets and JSP.
- Use basics of framework to develop secure web applications

Software Testing Tools

- Learn various software testing methods and strategies

- Interpret a variety of software metrics and identify defects and managing those defects for improvement in quality for given software
- Design test cases and test plans, review reports of testing for qualitative software
- Use latest testing tools used in the software industries

Project

- Use data structures, algorithms and programming languages, and software engineering techniques in their projects.
- Distinguish significant programming projects.
- Analyze and test resulting system's quality for computer software solutions.
- Develop a wide range of skills like communication, teamwork and technical skills.
- Design, construct and deliver a system and meet the stated requirements.
