

UG-B.E (CS) 2022-Scheme COs

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE CODE	BPOPS103/203-PRINCIPLES OF PROGRAMMING USING C
C01	Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts
C02	Apply programming constructs of C language to solve the real world problem
C03	Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
C04	Explore user-defined data structures like structures, unions and pointers in implementing solutions
C05	Design and Develop Solutions to problems using modular programming constructs using functions
COURSE CODE	BPLCK105B/205B-INTRODUCTION TO PYTHONPROGRAMMING
C01	Demonstrate proficiency in handling loops and creation of functions.
C02	Identify the methods to create and manipulate lists, tuples and dictionaries.
C03	Develop programs for string processing and file organization
C04	Interpret the concepts of Object-Oriented Programming as used in Python.
COURSE CODE	BCS301-MATHEMATICS FOR COMPUTER SCIENCE
C01	Explain the basic concepts of probability, random variables, probability distribution
C02	Apply suitable probability distribution models for the given scenario.
C03	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
C04	Use statistical methodology and tools in the engineering problem-solving process.
C05	Compute the confidence intervals for the mean of the population.
C06	Apply the ANOVA test related to engineering problems.
COURSE CODE	BCS302-DIGITAL DESIGN AND COMPUTER ORGANIZATION
C01	Apply the K–Map techniques to simplify various Boolean expressions.
C02	Design different types of combinational and sequential circuits along with Verilog programs.
C03	Describe the fundamentals of machine instructions, addressing modes and Processor performance
C04	Explain the approaches involved in achieving communication between processor and I/O devices
C05	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.

COURSE CODE	BCS303-OPERATING SYSTEMS
C01	Explain the structure and functionality of operating system
C02	Apply appropriate CPU scheduling algorithms for the given problem.
C03	Analyse the various techniques for process synchronization and deadlock handling.
C04	Apply the various techniques for memory management
C05	Explain file and secondary storage management strategies
C06	Describe the need for information protection mechanisms.
COURSE CODE	BCS304-DATA STRUCTURES AND APPLICATIONS
C01	Explain different data structures and their applications.
C02	Apply Arrays, Stacks and Queue data structures to solve the given problems.
C03	Use the concept of linked list in problem solving.
C04	Develop solutions using trees and graphs to model the real-world problem.
C05	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.
COURSE CODE	BCSL305-DATA STRUCTURES LABORATORY
C01	Analyze various linear and non-linear data structures
C02	Demonstrate the working nature of different types of data structures and their applications
C03	Use appropriate searching and sorting algorithms for the give scenario
C04	Apply the appropriate data structure for solving real world problems
COURSE CODE	BCS306A-OBJECT ORIENTED PROGRAMMING WITH JAVA
C01	Demonstrate proficiency in writing simple programs involving branching and looping structures.
C02	Design a class involving data members and methods for the given scenario.
C03	Apply the concepts of inheritance and interfaces in solving real world problems.
C04	Use the concept of packages and exception handling in solving complex problem
C05	Apply concepts of multithreading, autoboxing and enumerations in program development

COURSE CODE	BSCK307-SOCIAL CONNECT & RESPONSIBILITY
C01	Communicate and connect to the surrounding.
C02	Create a responsible connection with the society.
C03	Involve in the community in general in which they work.
C04	Notice the needs and problems of the community and involve them in problem –solving.
C05	Develop among them a sense of social & civic responsibility & utilize their knowledge I finding practical solutions to individual and community problems.
C06	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democraticattitudes.
COURSE CODE	BCS358D-DATA VISUALIZATION WITH PYTHON
C01	Demonstrate the use of IDLE or PyCharm IDE to create Python Applications
C02	Use Python programming constructs to develop programs for solving real-world problems
C03	Use Mat plot lib for drawing different Plots
C04	Demonstrate working with Seaborn, Bokeh for visualization.
C05	Use Plotly for drawing Time Series and Maps.
COURSE CODE	BCS401-ANALYSIS & DESIGN OF ALGORITHMS
C01	Apply asymptotic notational method to analyse the performance of the algorithms in terms of time complexity.
C02	Demonstrate divide & conquer approaches and decrease & conquer approaches to solve computational problems.
C03	Make use of transform & conquer and dynamic programming design approaches to solve the given real world or complex computational problems.
C04	Apply greedy and input enhancement methods to solve graph & string based computational problems.
C05	Analyse various classes (P,NP and NP Complete) of problems
C06	Illustrate backtracking, branch & bound and approximation methods.
COURSE CODE	BCS402-MICROCONTROLLERS
C01	Explain the ARM Architectural features and Instructions.
C02	Develop programs using ARM instruction set for an ARM Microcontroller.
C03	Explain C-Compiler Optimizations and portability issues in ARM Microcontroller.

C04	Apply the concepts of Exceptions and Interrupt handling mechanisms in developing applications.
C05	Demonstrate the role of Cache management and Firmware in Microcontrollers.
COURSE CODE	BCS403-DATABASE MANAGEMENT SYSTEM
C01	Describe the basic elements of a relational database management system
C02	Design entity relationship for the given scenario.
C03	Apply various Structured Query Language (SQL) statements for database manipulation.
C04	Analyse various normalization forms for the given application.
C05	Develop database applications for the given real world problem.
C06	Understand the concepts related to NoSQL databases
COURSE CODE	BCS404-ANALYSIS & DESIGN OF ALGORITHMS LAB
C01	Develop programs to solve computational problems using suitable algorithm design strategy.
C02	Compare algorithm design strategies by developing equivalent programs and observing running times for analysis (Empirical).
C03	Make use of suitable integrated development tools to develop programs
C04	Choose appropriate algorithm design techniques to develop solution to the computational and complex problems.
C05	Demonstrate and present the development of program, its execution and running time(s) and record the results/inferences.
COURSE CODE	BCS405A-DISCRETE MATHEMATICAL STRUCTURES
C01	Apply concepts of logical reasoning and mathematical proof techniques in proving theorems and statements.
C02	Demonstrate the application of discrete structures in different fields of computer science.
C03	Apply the basic concepts of relations, functions and partially ordered sets for computer representations.
C04	Solve problems involving recurrence relations and generating functions.
C05	Illustrate the fundamental principles of Algebraic structures with the problems related to computer science & engineering.
COURSE CODE	BCS456C-UI/UX
C01	Explain the user experience design requirements.
C02	Relate design thinking concepts and mental models to UX design.
C03	Illustrate UX design in line with design goals, metrics and targets.
C04	Demonstrate different prototyping in relation with software engineering.
C05	Explain UX design principles with case examples.

COURSE CODE	BBOC407-BIOLOGY FOR ENGINEERS (CSE)
C01	Elucidate the basic biological concepts via relevant industrial applications and case studies.
C02	Evaluate the principles of design and development, for exploring novel bioengineering projects.
C03	Corroborate the concepts of biomimetics for specific requirements.
C04	Think critically towards exploring innovative biobased solutions for socially relevant problems.
COURSE CODE	BCS501-SOFTWARE ENGINEERING & PROJECT MANAGEMENT
C01	Differentiate process models to judge which process model has to be adopted for the given scenarios.
C02	Derive both functional and nonfunctional requirements from the case study.
C03	Analyze the importance of various software testing methods and agile methodology.
C04	Illustrate the role of project planning and quality management in software development.
C05	Identify appropriate techniques to enhance software quality.
COURSE CODE	BCS502-COMPUTER NETWORKS
C01	Explain the fundamentals of computer networks.
C02	Apply the concepts of computer networks to demonstrate the working of various layers and protocols in communication network.
C03	Analyze the principles of protocol layering in modern communication systems.
C04	Demonstrate various Routing protocols and their services using tools such as Cisco packet tracer.
COURSE CODE	BCS503-THEORY OF COMPUTATION
C01	Apply the fundamentals of automata theory to write DFA, NFA, Epsilon-NFA and conversion between them.
C02	Prove the properties of regular languages using regular expressions.
C03	Design context-free grammars (CFGs) and pushdown automata (PDAs) for formal languages.
C04	Design Turing machines to solve the computational problems.
C05	Explain the concepts of decidability and undecidability.
COURSE CODE	BCSL504-WEB TECHNOLOGY LAB
C01	Design the experiment for the given problem using HTML, JavaScript and CSS.
C02	Develop the solution for the given real-world problem using jQuery, Ajax and PHP.
C03	Analyze the results and produce substantial written documentation.

COURSE CODE	BCS515D-DISTRIBUTED SYSTEMS
C01	Identify the goals and challenges of distributed systems
C02	Demonstrate the remote invocation techniques for communication
C03	Describe the architecture of distributed file systems and name services
C04	Apply clock synchronization algorithms to monitor and order the events.
C05	Analyze the performance of mutual exclusion, election and consensus algorithms.
C06	Illustrate the fundamental concepts and algorithms related to distributed transactions and replication
COURSE CODE	BRMK557-RESEARCH METHODOLOGY & IPR
C01	To know the meaning of engineering research.
C02	To know the procedure of the literature Review and Technical Reading
C03	To understand the fundamentals of the patent laws and drafting procedure
C04	Understanding the copyright laws and subject matters of copyrights and designs
C05	Under standing the basic principles of design rights
COURSE CODE	BCS508-ENVIRONMENTAL STUDIES AND E-WASTE MANAGEMENT
C01	Comprehend the principles of ecology and environmental issues pertaining to air, land, and water on a global scale.
C02	Acquire observation skills for solving problems related to the environment.
C03	Conduct survey to describe the realities of waste management system.
COURSE CODE	BCS601-CLOUD COMPUTING
C01	Describe various cloud computing platforms and service providers.
C02	Illustrate the significance of various types of virtualization.
C03	Identify the architecture, delivery models and industrial platforms for cloud computing based applications.
C04	Analyze the role of security aspects in cloud computing.
C05	Demonstrate cloud applications in various fields using suitable cloud platforms.
COURSE CODE	BCS602-MACHINE LEARNING
C01	Describe the machine learning techniques, their types and data analysis framework.
C02	Apply mathematical concepts for feature engineering and perform dimensionality reduction to enhance model performance.
C03	Develop similarity-based learning models and regression models for solving classification and prediction tasks.

C04	Build probabilistic learning models and design neural network models using perceptron's and multilayer architectures
C05	Utilize clustering algorithms to identify patterns in data and implement reinforcement learning techniques
COURSE CODE	BCS613D-ADVANCED JAVA
C01	Apply appropriate collection class/interface to solve the given problem
C02	Demonstrate the concepts of String operations in Java
C03	Apply the concepts of Swings to build Java applications
C04	Develop web based applications using Java servlets and JSP
C05	Use JDBC to build database applications
COURSE CODE	BCSL606-MACHINE LEARNING LAB
C01	Illustrate the principles of multivariate data and apply dimensionality reduction techniques.
C02	Demonstrate similarity-based learning methods and perform regression analysis.
C03	Develop decision trees for classification and regression problems, and Bayesian models for probabilistic learning.
C04	Implement the clustering algorithms to share computing resources.
COURSE CODE	BAIL657C-GENERATIVE AI
C01	Develop the ability to explore and analyze word embeddings, perform vector arithmetic to investigate word relationships, visualize embeddings using dimensionality reduction techniques
C02	Apply prompt engineering skills to real-world scenarios, such as information retrieval, text generation.
C03	Utilize pre-trained Hugging Face models for real-world applications, including sentiment analysis and text summarization.
C04	Apply different architectures used in large language models, such as transformers, and understand their advantages and limitations.
COURSE CODE	BCV654C-INTEGRATED WASTE MANAGEMENT FOR A SMART CITY
C01	Understand basic idea about Sustainable Development.
C02	Get knowledge about Sustainable Cities.
C03	Gain knowledge on Saving Biodiversity.
C04	Understand Sustainable Development Goals.
COURSE CODE	BIKS609-INDIAN KNOWLEDGE SYSTEMS
C01	Provide an overview of the concept of the Indian Knowledge System and its importance.
C02	Appreciate the need and importance of protecting traditional knowledge.

C03	Recognize the relevance of Traditional knowledge in different domains.
C04	Establish the significance of Indian Knowledge systems in the contemporary world.
COURSE CODE	BCS701-INTERNET OF THINGS
C01	Explain the evolution of IoT, IoT networking components, and addressing strategies in IoT. C
C02	Analyze various sensing devices and actuator types.
C03	Demonstrate the processing in IoT.
C04	Apply different connectivity technologies.
C05	Elaborate the need for Data Analytics and Security in IoT.
COURSE CODE	BCS702-PARALLEL COMPUTING
C01	Explain the need for parallel programming
C02	Demonstrate parallelism in MIMD system.
C03	Apply MPI library to parallelize the code to solve the given problem.
C04	Apply OpenMP pragma and directives to parallelize the code to solve the given problem
C05	Design a CUDA program for the given problem.
COURSE CODE	BCS703-CRYPTOGRAPHY & NETWORK SECURITY
C01	Explain the basic concepts of Cryptography and Security aspects
C02	Apply different Cryptographic Algorithms for different applications
C03	Analyze different methods for authentication and access control.
C04	Describe key management, key distribution and Certificates.
C05	Explain about Electronic mail and IP Security.
COURSE CODE	BCS714D-BIG DATA ANALYTICS
C01	Illustrate Big Data concepts, tools and applications.
C02	Develop programs using HADOOP framework.
C03	Use Hadoop Cluster to deploy Map Reduce jobs, PIG,HIVE and Spark programs.
C04	Analyze the given data set to identify deep insights.
COURSE CODE	BCV755B-CONSERVATION OF NATURAL RESOURCES
C01	Apprehend various components of land as a natural resource and land use planning.

C02	Know availability and demand for water resources as applied to India.
C03	Analyse the components of air as resource and its pollution.
C04	Discuss biodiversity & its role in ecosystem functioning.
C05	Critically appreciate the environmental concerns of today.