DEPARTMENT OF COMPUTER SCIENCE

PO, PSO, CO (NEP)

(With Effect from AY 2021-22)

Program Outcomes

PO1 - Discipline Knowledge: Graduates will possess a strong foundational knowledge of Computer Science principles, applying them to design innovative solutions for diverse complex problems, and demonstrating proficiency in design methodologies.

PO2 - Problem Solving and Mathematical Reasoning: Graduates will excel in logical reasoning, demonstrating strong mathematical abilities. They will adeptly identify, analyse, and solve computer science problems, with expertise in data structures and algorithms to craft efficient solutions.

PO3 - Designing Algorithmic Solutions: Graduates will skilfully design and develop algorithmic solutions for real-world problems, employing statistical and optimization techniques.

PO4 - Proficient Programming Skills: Graduates will exhibit strong programming proficiency, mastering various languages to code solutions for diverse daily applications and challenges.

PO5 - Application Systems Knowledge and Development: Graduates will gain a deep understanding of computer application software and adeptly design and develop applications to efficiently tackle practical problems.

PO6 - Modern Tools and Techniques Mastery: Graduates will adeptly select and utilize contemporary scientific and IT tools for modelling, prediction, data analysis, and problem-solving, including mobile application development.

PO7 - Communication Proficiency: Graduates will excel in both oral and written communication, enabling effective collaboration and clear conveyance of technical concepts.

PO8 - Project Management and Entrepreneurial Proficiency: Graduates will gain hands-on project management experience, showcasing independence and the skills necessary to identify gaps in existing solutions and initiate their projects. They will also embrace an entrepreneurial mindset.

PO9 - Ethical Responsibility and Social Awareness: Graduates will uphold professional ethics, preserving workplace integrity, and demonstrate a commitment to considering societal impacts when creating computer-based solutions, with a focus on environmental and social responsibility.

PO10 - Lifelong Learning and Adaptability: Graduates will develop a strong capacity for independent learning and adaptability, allowing them to stay current with emerging technologies and maintain a continuous learning mindset.

PO11 - Motivation for Advanced Studies: Graduates will be inspired and motivated to pursue further education in Computer Science, showcasing a keen interest in advanced studies and research opportunities in the field.

Program Specific Outcomes (PSOs)

PSO1 - Software Engineering Practices: Apply standard software engineering practices and strategies effectively in real-time software project development.

PSO2 - Computer Program and System Design: Design and develop computer programs and computer-based systems in various areas such as AI, algorithms, networking, web design, cloud computing, IoT, and data analytics.

PSO3 - Contemporary Problem Solving: Acquire knowledge of contemporary trends in industrial and research settings, enabling the innovation of novel solutions to existing problems.

PSO4 - Information Handling Analysis: Apply acquired knowledge and understanding to analyse information handling problems effectively.

PSO5 - Independent and Collaborative Work: Demonstrate the ability to work independently on substantial software projects and contribute effectively as a team member.

Program Educational Objectives

PEO1 - Computing and Business Foundation: Provide a solid foundation in computing principles and business practices, enabling graduates to effectively use and manage information systems and enterprise software.

PEO2 - System Analysis and Exposure to Business Software: Equip students with the ability to analyse system development requirements and expose them to various business software and information systems.

PEO3 - Specialization Options: Offer students the opportunity to specialize in legacy application software, system software, or mobile applications.

PEO4 - Practical Application of Knowledge: Produce exceptional IT professionals who can apply theoretical knowledge to real-world scenarios, independently developing live projects.

PEO5 - Modern Information Processing and Applications: Provide students with the chance to study contemporary methods of information processing and their practical applications.

PEO6 - Programming and Problem-Solving Skills: Cultivate programming techniques and problem-solving skills in students through hands-on programming experiences.

PEO7 - Preparation for Further Studies: Prepare students who aspire to pursue further studies in computer science and related subjects.

PEO8 - Proficiency in Office Productivity Software: Familiarize students with the effective use of a range of current standard office productivity software applications.

Course Outcomes

Course Title: **Fundamentals of Computers**

Course Code: **DCCA101**

CO1: Recall and describe the introduction to computers, their classification, anatomy, constituents, architecture, and the role of microcontrollers.

CO2: Recall and explain the concepts of operating systems, their functions, classification, kernel, shell, Unix basics, shell programming, and booting process.

CO3: Demonstrate an understanding of databases, their purpose, users, SQL, SQL data types, and basic SQL queries including select, alter, update, delete, truncate, and the use of where, and or, and not in clauses.

CO4: Recall and describe the basics of the internet, its features, applications, services, internet service providers, the domain name system, browsing, email, and searching.

CO5: Demonstrate an understanding of web programming basics and the introduction of HTML and CSS programming.

CO6: Recall and describe the introduction to computers, their classification, anatomy, constituents, architecture, and the role of microcontrollers.

Course Title: **Programming in C**

Course Code: **DCCA102**

CO1: Apply desktop computer operations to perform computational tasks confidently.

CO2: Demonstrate an understanding of hardware, software, and the significance of operating systems.

CO3: Demonstrate an understanding of programming languages, number systems, peripheral devices, networking, multimedia, and internet concepts.

CO4: Understand and trace the execution of C language programs.

CO5: Apply C programming skills to write code for specific problems.

CO6: Apply C programming to perform input and output operations.

CO7: Apply programming skills to write programs that perform operations on arrays.

Course Title: Mathematical Foundation

Course Code: DCCA103

CO1:   Apply the concepts of connectives, predicates, and quantifiers to solve problems in various contexts.

CO2:   Apply basic knowledge of matrices to solve equations, including the use of Cramer's rule.

CO3:   Demonstrate an understanding of the concept of Eigenvalues.

CO4:   Apply knowledge about derivatives and explore various applications of differentiation.

CO5:   Demonstrate an understanding of the fundamental concepts of mathematical reasoning, sets, and functions.

Semester: II

Course Title: Data Structures using C

Course Code: DCCA201

CO1:   Demonstrate an understanding of how various data structures (e.g., arrays, records, linked structures, stacks, queues, trees, and graphs) are stored in memory and utilized by algorithms.

CO2:   Explain the typical applications and use cases for arrays, records, linked structures, stacks, queues, trees, and graphs.

CO3:   Apply knowledge to develop programs that utilize arrays, records, linked structures, stacks, queues, trees, and graphs.

CO4:   Analyse and illustrate various methods for traversing tree structures.

CO5:   Analyse and compare different implementations of data structures in terms of their performance characteristics.

CO6:   Explain the concept of recursion and provide examples of its application.

CO7:   Evaluate the computational efficiency of key algorithms used for sorting, searching, and hashing.

Course Title: Object Oriented Programming with JAVA

Course Code: DCCA202

CO1:   Demonstrate an understanding of Java's features and the architecture of the Java Virtual Machine (JVM).

CO2:   Apply knowledge to write, compile, and execute Java programs, including handling basic data types, control flow constructs, and type casting.

CO3:   Analyse specific problem scenarios to identify classes, objects, class members, and their relationships, and demonstrate the concepts of polymorphism and inheritance.

CO4:   Apply knowledge to create programs utilizing interfaces and threads, and explain the advantages of Java's Exception handling mechanism in comparison to other programming languages.

CO5: Utilize Java to write, compile, and execute programs involving GUIs, event-driven programming, and file operations.

Course Title: **Discrete Mathematical Structures**

Course Code: **DCCA203**

CO1: Demonstrate an understanding of fundamental concepts in mathematical reasoning, sets, and functions.

CO2: Illustrate an understanding of different counting techniques and the principle of inclusion and exclusions.

CO3: Demonstrate an understanding of concepts related to various types of relations, partial ordering, and equivalence relations.

CO4: Apply the concept of generating functions to solve recurrence relations.

CO5: Demonstrate an understanding of the fundamental concepts of graph theory and the shortest path algorithm.

Semester: III

Course Title: **Database Management System**

Course code: **DCCA301**

CO1: Demonstrate an understanding of database concepts and the rationale for the existence of database systems.

CO2: Apply knowledge to identify and define database objects while enforcing integrity constraints using a Database Management System (DBMS).

CO3: Apply the concepts of data models and schemas in a Relational Database Management System (RDBMS).

CO4: Analyse real-world problems to identify entities and relationships, and construct Entity-Relationship (ER) diagrams.

CO5: Analyse ER diagrams to transform them into database schemas and normalize them to the desired normal form.

CO6: Apply Relational Algebra and Structured Query Language (SQL) to formulate queries for manipulating databases.

CO7: Demonstrate an understanding of transaction processing and concurrency control techniques in database management.

Course Title: C# and Dot Net Framework

Course code: DCCA302

CO1: Demonstrate an understanding of Object-Oriented Programming concepts such as Inheritance and Polymorphism in the C# programming language.

CO2: Apply the knowledge of interfaces to interpret and develop them for real-time applications in C#.

CO3: Apply the concepts of custom collections and generics to create them in C#.

Course Title: Computer Communication and Networks

Course code: DCCA303

CO1: Demonstrate an understanding of digital data transmission techniques and the function of computer networks in data exchange.

CO2: Apply the fundamentals of data communication and diverse computer network types to solve real-world problems.

CO3: Analyze and compare the various protocol layers within network communication.

CO4: Analyze and compare the essential networking protocols and their hierarchical relationships within conceptual models like TCP/IP and OSI.

Semester: IV

Course Title: Python Programming

Course code: DCCA401

CO1: Demonstrate an understanding of the fundamental concepts in Python programming.

CO2: Apply proficiency in utilizing loops and creating functions in Python programming.

CO3: Apply methods to create and manipulate lists, tuples, and dictionaries in Python.

CO4: Apply common file handling operations in Python.

CO5: Demonstrate an understanding of Object-Oriented Programming concepts as applied in Python.

CO6: Apply Python programming skills to develop applications in various relevant fields.

Course Title: **Computer Multimedia & Animation**

Course code: **DCCA402**

CO1:   Recall and describe the fundamental elements used in web development.

CO2:   Demonstrate an understanding of CSS and its application in creating animations.

CO3:   Apply knowledge to develop animations using HTML5-SVG.

CO4:   Apply knowledge to create animations using HTML5-CANVAS.

Course Title: **Operating System Concepts**

Course code: **DCCA403**

CO1:   Recognize the fundamental concepts of an operating system.

CO2:   Explain the principles behind multithreaded programming, process management, process synchronization, memory management, and storage management in operating systems.

CO3:   Analyse and evaluate the performance differences among various scheduling algorithms used in operating systems.

CO4:   Apply knowledge to identify the features and characteristics of I/O operations and file handling methods in operating systems.

CO5:   Synthesize advanced theoretical knowledge into practical solutions.

Course Title: **Open-Source Tools**

Course code: **SEAI402**

CO1:   Demonstrate an understanding of the advantages and characteristics of Open-Source Technology. Compare and contrast open-source products effectively.

CO2:   Apply suitable open-source tools according to the specific problem's requirements.

CO3:   Utilize coding skills to write and compile various open-source software applications.

Semester: V

Course Title: **Design & Analysis of Algorithms**

Course code: **DCCA501**

CO1: Understand the fundamental concepts of algorithms and their complexity, including time and space complexity, worst-case and average-case analysis, and Big-O notation.

CO2: Design algorithms for solving various types of problems, such as Sorting, Searching, Graph

traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques.

CO3: Analyze and compare the time and space complexity of algorithms with other algorithmic techniques.

CO4: Evaluate the performance of Sorting, Searching, Graph traversal, Decrease-and-Conquer, Divide-and-Conquer and Greedy Techniques using empirical testing and benchmarking, and identify their limitations and potential improvements.

CO5: Apply various algorithm design to real-world problems and evaluate their effectiveness and efficiency in solving them.

Course Title: Statistical Computing and R Programming

Course code: DCCA502

CO1: Explore fundamentals of statistical analysis in R environment.

CO2: Describe key terminologies, concepts and techniques employed in Statistical Analysis.

CO3: Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.

CO4: Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.

CO5: Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

Course Title: Software Engineering

Course code: DCCA503

CO1: How to apply the software engineering lifecycle by demonstrating competence in

communication, planning, analysis, design, construction, and deployment.

CO2: An ability to work in one or more significant application domains.

CO3: Work as an individual and as part of a multidisciplinary team to develop and deliver quality

software.

CO4: Demonstrate an understanding of and apply current theories, models, and techniques that

provide a basis for the software lifecycle.

CO5: Demonstrate an ability to use the techniques and tools necessary for engineering practice.

Course Title: Cloud Computing

Course code: DSECA503

CO1:   Explain the core concepts of the cloud computing paradigm such as how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.

CO2: Apply the fundamental concepts in data centres to understand the trade-offs in power, efficiency and cost.

CO3: Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.

CO4: Analyze various cloud programming models and apply them to solve problems on the cloud.

Course Title: Digital Marketing

Course code: CAVOC501

CO1: Understand the fundamental concepts and principles of digital marketing.

CO2: Develop practical skills to implement various digital marketing strategies and techniques.

CO3: Analyse and evaluate the effectiveness of digital marketing campaigns.

CO4: Apply critical thinking and problem-solving skills to real-world digital marketing scenarios.

CO5: Create comprehensive digital marketing plans and strategies.

Course Title: Cyber Security

Course code: SECSB501

CO1: After completion of this course, students would be able to understand the concept of Cyber security and issues and challenges associated with it.

CO2: Students, at the end of this course, should be able to understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.

CO3: On completion of this course, students should be able to appreciate various privacy and security concerns on online social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.

CO4: After the completion of this module, students would be able to understand the basic concepts related to E-Commerce and digital payments. They will become familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.

CO5: Students, after completion of this module will be able to understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices.

Semester: V

Course Title: Artificial Intelligence and Applications

Course code: DSC16

CO1: Gain a historical perspective of AI and its foundations.

CO2: Become familiar with basic principles and strategies of AI towards problem solving

CO3: Understand and apply approaches of inference, perception, knowledge representation, and learning.

CO4: Understand the various applications of AI

Course Title: **PHP and MySQL**

Course code: **DSC17**

CO1: Design dynamic and interactive web pages and websites.

CO2: Run PHP scripts on the server and retrieve results.

CO3: Handle databases like MySQL using PHP in websites.

Course Title: **Fundamentals of Data Science**

Course code: **DSE-E2**

CO1: Understand the concepts of data and pre-processing of data.

CO2: Know simple pattern recognition methods

CO3: Understand the basic concepts of Clustering and Classification

CO4: Know the recent trends in Data Science

Course Title: **Web Content Management System**

Course code: **Voc-1**

CO1: Understand content development basics;

CO2: Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting

CO3: Host websites and develop content for social media platforms such as wiki and blog

CO4: Understand e-publications and virtual reality

CO4: Use of e-learning platform Moodle and CMS applications Drupal and Joomla.

Course Title: **Logical Reasoning**

Course code: **SEC-5**

CO1: Quickly understand the given problem and come up with the correct answer.

CO2: Identify, construct and compute numerical situations by work with numbers.

CO3: Conceiveanddevelopamethodologyforanalyzingdataandsolvingaproblem.

CO4: Define, modify and apply critical thinking to real time situations.

DEPARTMENT OF COMPUTER SCIENCE

PO, PSO, CO (SEP)

(With Effect from AY 2024-25)

Program Outcomes

PO1: Discipline knowledge: Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity

PO2: Problem Solving: Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.

PO3: Design and Development of Solutions: Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.

PO4: Programming a computer: Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.

PO5: Application Systems Knowledge: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.

PO6: Modern Tool Usage: Identify, select and use a modern scientific and IT tool or technique for modelling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.

PO7: Communication: Must have a reasonably good communication knowledge both in oral and writing.

PO8: Project Management: Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.

PO9: Ethics on Profession, Environment and Society: Exhibiting professional ethics to maintain the integrity in a working environment and also have concern on societal impacts due to computer-based solutions for problems.

PO10: Lifelong Learning: Should become an independent learner. So, learn to learn ability.

PO11: Motivation to take up Higher Studies: Inspiration to continue educations towards advanced studies on Computer Science.

Program Specific Outcomes (PSOs)

PSO 1: Ability to apply learned skills to build optimized solutions for the problems in multidisciplinary domain using latest technologies.

PSO2: Ability to analyse a problem and explore technical knowledge in diverse areas of Computer Applications and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.

Course Outcomes

Course Title: Fundamentals of Computers

Course Code: CA1T1

CO1:   Recall and describe the introduction to computers, their classification, anatomy, constituents, architecture, and the role of microcontrollers.

CO2:   Recall and explain the concepts of operating systems, their functions, classification, kernel, shell, Unix basics, shell programming, and booting process.

CO3:   Demonstrate an understanding of databases, their purpose, users, SQL, SQL data types, and basic SQL queries including select, alter, update, delete, truncate, and the use of where, and or, and not in clauses.

CO4:   Recall and describe the basics of the internet, its features, applications, services, internet service providers, the domain name system, browsing, email, and searching.

CO5:   Demonstrate an understanding of web programming basics and the introduction of HTML and CSS programming.

CO6:   Recall and describe the introduction to computers, their classification, anatomy, constituents, architecture, and the role of microcontrollers.

Course Title: Programming in C

Course Code: CA1T2

CO1:   Apply desktop computer operations to perform computational tasks confidently.

CO2:   Demonstrate an understanding of hardware, software, and the significance of operating systems.

CO3:   Demonstrate an understanding of programming languages, number systems, peripheral devices, networking, multimedia, and internet concepts.

CO4:   Understand and trace the execution of C language programs.

CO5:   Apply C programming skills to write code for specific problems.

CO6:   Apply C programming to perform input and output operations.

CO7:   Apply programming skills to write programs that perform operations on arrays.

Course Title: Computational Discrete Mathematics

Course Code: CA1T3

CO1: Demonstrate an understanding of fundamental concepts in mathematical reasoning, sets, and functions.

CO2: Illustrate an understanding of different counting techniques and the principle of inclusion and exclusions.

CO3: Demonstrate an understanding of concepts related to various types of relations, partial ordering, and equivalence relations.

CO4: Apply the concept of generating functions to solve recurrence relations.

CO5: Demonstrate an understanding of the fundamental concepts of graph theory and the shortest path algorithm.

Semester: II

Course Title: Data Structures using C

Course Code: CA2T1

CO1: Demonstrate an understanding of how various data structures (e.g., arrays, records, linked structures, stacks, queues, trees, and graphs) are stored in memory and utilized by algorithms.

CO2: Explain the typical applications and use cases for arrays, records, linked structures, stacks, queues, trees, and graphs.

CO3: Apply knowledge to develop programs that utilize arrays, records, linked structures, stacks, queues, trees, and graphs.

CO4: Analyse and illustrate various methods for traversing tree structures.

CO5: Analyse and compare different implementations of data structures in terms of their performance characteristics.

CO6: Explain the concept of recursion and provide examples of its application.

CO7: Evaluate the computational efficiency of key algorithms used for sorting, searching, and hashing.

Course Title: Statistical Computing and R Programming

Course Code: CA2T2

CO1: Explore fundamentals of statistical analysis in R environment.

CO2: Describe key terminologies, concepts and techniques employed in Statistical Analysis.

CO3: Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.

CO4: Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.

CO5: Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

Course Title: Operating System Concepts

Course code: CA2T3

CO1:   Recognize the fundamental concepts of an operating system.

CO2:   Explain the principles behind multithreaded programming, process management, process synchronization, memory management, and storage management in operating systems.

CO3:   Analyse and evaluate the performance differences among various scheduling algorithms used in operating systems.

CO4:   Apply knowledge to identify the features and characteristics of I/O operations and file handling methods in operating systems.

CO5:   Synthesize advanced theoretical knowledge into practical solutions.