- **BCA**

SEMESTER 1

1. BCA1CJ101 - FUNDAMENTALS OF COMPUTERS AND COMPUTATIONAL THINKING

- **CO1**: Develop a foundational knowledge of computing systems, encompassing their historical development, evolutionary milestones, and notable contributions of key figures in the field.
- **CO2**: Acquire familiarity with diverse hardware components constituting a computer system.
- **CO3**: Gain practical expertise by engaging in hands-on activities focused on the installation and configuration of diverse hardware components within a computer system.
- **CO4:** Explore the spectrum of software types and actively participate in the partitioning, installation, and configuration of operating systems to cultivate a comprehensive understanding of software systems.
- **CO5**: Develop a foundational understanding of computer science as a discipline, examining problems through the lens of computational thinking and cultivating analytical skills to address challenges in the field.
- **CO6**: Represent complex problems using algorithmic approaches and enhance problem- solving skills by visualizing solutions through the utilization of various software tools.

2. BCA1CJ102 - MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

- **CO1:** Reflect the concept of matrices and determinants as a way to depict and streamline mathematical ideas to perform basic operations.
- **CO2**: Able to find the inverse of square matrices using different methods and demonstrate a solid understanding of eigenvalues.
- **CO3:** Proficiency in solving linear equations using different techniques and understanding the geometric interpretation of solutions.
- **CO4:** Gain proficiency in representing vectors geometrically and algebraically, understanding vector addition, dot and cross products.
- **CO5**: Able to apply differential and integral calculus to various functions encountered in computer applications such as polynomials, exponentials, and logarithmic functions.

- **CO6**: Represent various mathematical problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of software tools.

4. BCA1CJ103 - DISCRETE STRUCTURES FOR COMPUTER APPLICATIONS

- **CO1**: Acquire a comprehensive understanding of propositional logic and its applications, with a focus on constructing and interpreting truth tables.
- **CO2**: Able to proficiently define and manipulate sets, analyze relations and functions, and their representation by Venn diagrams.
- **CO3:** Acquire a basic understanding of graph theory including representations, types of graphs, their properties such as connectivity, cycles, paths, and degrees.
- **CO4**: Able to demonstrate a deep understanding of advanced graph theory concepts, focusing on Euler's graph, Hamiltonian graphs, Isomorphism, and Homeomorphism.
- **CO5:** Able to proficiently understand tree data structures, spanning trees, and associated algorithms for solving problems such as Prim's and Kruskal.
- **CO6**: Represent various mathematical problems using algorithmic approaches and enhance problem-solving skills by visualizing solutions through the utilization of software tools.

5. MDC-BCA1FM105 - DIGITAL MARKETING

- **CO1**: Understand key digital marketing concepts and how they integrate with traditional marketing strategies.
- **CO2**: Analyze customer behaviour and value journey in digital contexts.
- **CO3**: Learn website optimization techniques to enhance online visibility and engagement.
- **CO4**: Explore digital marketing channels like SEO, social media, email, and content marketing.
- **CO5**: Implement basic digital marketing strategies, focusing on ethical considerations, privacy, and consumer trust

6. SEC-BCA1FS111 - INTRODUCTION TO COMPUTERS AND OFFICE AUTOMATION

- **CO1**: Gain foundational knowledge about computer systems and their operations.
- **CO2**: Understand the fundamentals of word processing and its importance in office automation. Demonstrate proficiency in creating, editing, and formatting documents using word processing software. Explore advanced formatting options and features

7.

- **CO3**: Acquire proficiency in document formatting and data organization.
- **CO4**: Understand the fundamentals of electronic spreadsheets and their role in data analysis, manipulation, and presentation. Demonstrate proficiency in creating, saving, and editing workbooks and worksheets within electronic spreadsheet software. Utilize various data entry techniques. Handle operators in formulas and utilize a wide range of functions.
- **CO5**: Perform basic troubleshooting and problem-solving using office software applications.

8. AEC-ENG1FA101 - ENGLISH

- **CO1**: Improve communication skills and fluency in English.
- **CO2**: Enhance reading comprehension and analytical writing abilities.
- **CO3**: Build confidence in expressing ideas through structured communication.
- **CO4**: Develop vocabulary and language usage in professional and academic contexts.

SEMESTER 2

1. BCA2CJ101 - FUNDAMENTALS OF PROGRAMMING (C LANGUAGE)

- **CO1**: Understand the basic concepts and structure of the C programming language.
- **CO2**: Apply decision-making and looping constructs to solve programming problems.
- **CO3**: Demonstrate proficiency in using arrays and strings for data manipulation.
- **CO4**: Implement user-defined functions and understand their significance in modular programming.
- **CO5**: Develop programs using pointers for dynamic memory allocation.
- **CO6**: Understand file handling in C for data storage and retrieval.

2. BCA2CJ102 - STATISTICAL FOUNDATION FOR COMPUTER APPLICATIONS

- **CO1**: Understand the basic concepts of statistics and their role in data analysis.
- **CO2**: Apply measures of central tendency and dispersion to interpret data sets.
- **CO3**: Use correlation and regression techniques to analyze relationships between variables.
- **CO4**: Perform hypothesis testing and interpret the results for decision-making.
- **CO5**: Utilize probability concepts in solving real-world problems.
- **CO6**: Apply statistical tools and techniques using appropriate software.

3. BCA2CJ103 - NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

- **CO1**: Understand numerical methods for solving equations and their applications.
- **CO2**: Apply interpolation and approximation techniques to estimate values.
- **CO3**: Use numerical differentiation and integration for solving computational problems.
- **CO4**: Develop optimization models and apply techniques like linear programming.
- **CO5**: Solve systems of linear equations using numerical approaches such as Gaussian elimination and LU decomposition.
- **CO6**: Implement numerical methods and optimization algorithms using programming tools.

4. SEC-BCA2FS112 - DATA ANALYSIS USING SPREADSHEET

- **CO1**: Understand the basic operations of spreadsheet tools for data management.
- **CO2**: Perform data cleaning and transformation techniques in spreadsheets.
- **CO3**: Use formulas and built-in functions for statistical analysis.
- **CO4**: Create and interpret data visualizations such as charts and graphs.
- **CO5**: Apply advanced spreadsheet features like pivot tables for data summarization.
- **CO6**: Utilize spreadsheet tools for solving real-life data analysis problems.

5. AEC-ENG2FA103 - ENGLISH

- **CO1**: Enhance proficiency in English grammar and usage for effective communication.
- **CO2**: Develop critical reading skills through the analysis of texts.
- **CO3**: Improve technical writing skills for academic and professional purposes.
- **CO4**: Build confidence in verbal communication through presentations and discussions.
- **CO5**: Expand vocabulary for better articulation in diverse contexts.

6. ABILITY ENHANCEMENT COURSE 4 - ADDITIONAL LANGUAGE

- **CO1**: Develop proficiency in an additional language for improved communication skills.
- **CO2**: Gain cultural awareness through the study of language and literature.
- **CO3**: Build foundational language skills including speaking, reading, and writing.
- **CO4**: Enhance comprehension and analytical abilities in the chosen language.

SEMESTER 3

1. BCA3CJ201 - DATA STRUCTURES USING C

- **CO1**: Understand the fundamental concepts of data structures, including arrays, linked lists, stacks, and queues.
- **CO2**: Implement various operations on linear data structures such as insertion, deletion, and traversal.\
- **CO3**: Explore non-linear data structures like trees and graphs and their applications in problem-solving.
- **CO4**: Apply searching and sorting algorithms to optimize data handling.
- **CO5**: Analyze the time and space complexity of algorithms and choose efficient data structures for different scenarios.
- **CO6**: Develop modular programs in C to implement various data structures and algorithms.

2. BCA3CJ202 - COMPUTER NETWORKS

- **CO1**: Understand the basics of computer networks, including their architecture and protocols.
- **CO2**: Analyze various network models such as OSI and TCP/IP.
- **CO3**: Gain knowledge of networking hardware, such as routers, switches, and network interfaces.
- **CO4**: Explore key networking concepts like IP addressing, subnetting, and routing.
- **CO5**: Understand network security principles and the use of firewalls and encryption.
- **CO6**: Demonstrate the ability to set up basic networking environments and troubleshoot common networking issues.

3. BCA3CJ203 - INTRODUCTION TO DATA SCIENCE

- **CO1**: Understand the fundamentals of data science and its applications in various fields.
- **CO2**: Explore data collection, cleaning, and preprocessing techniques.
- **CO3**: Gain proficiency in data visualization tools and techniques.
- **CO4**: Understand statistical methods and their applications in data analysis.
- **CO5**: Learn to work with structured and unstructured data using appropriate tools.
- **CO6**: Implement basic machine learning algorithms to solve data-driven problems.

4.

5. BCA3CJ204 - FOUNDATIONS OF ARTIFICIAL INTELLIGENCE
    - **CO1**: Understand the basics of artificial intelligence, including its history and applications.
    - **CO2**: Learn problem-solving techniques such as state-space search and heuristic methods.
    - **CO3**: Explore knowledge representation techniques and reasoning methods.
    - **CO4**: Understand the fundamentals of machine learning and neural networks.
    - **CO5**: Apply AI techniques to real-world problems such as natural language processing and robotics.
    - **CO6**: Gain practical experience in implementing AI algorithms using programming tools.

6. SEC- BCA3FS113 - WEBSITE DESIGNING USING CONTENT MANAGEMENT SYSTEM (CMS)
    - **CO1**: Understand the principles of website design and development.
    - **CO2**: Learn to use content management systems (CMS) for creating dynamic websites.
    - **CO3**: Develop skills in designing user-friendly and responsive web interfaces.
    - **CO4**: Implement website functionalities using CMS plugins and modules.
    - **CO5**: Understand website hosting, domain management, and maintenance.
    - **CO6**: Design and deploy a fully functional website using a CMS platform.

7. MDC- BCA3FS113 - KERALA KNOWLEDGE SYSTEM
    - **CO1**: Understand the cultural and historical heritage of Kerala.
    - **CO2**: Learn about Kerala's contributions to literature, art, and science.
    - **CO3**: Explore the social and economic developments in Kerala's history.
    - **CO4**: Analyze the significance of Kerala's natural resources and biodiversity.
    - **CO5**: Gain awareness of contemporary issues and sustainable practices in Kerala.
    - **CO6**: Develop a project or case study on a topic related to Kerala's knowledge system.

SEMESTER 4

1. BCA4CJ205 - DATABASE MANAGEMENT SYSTEM

    - **CO1**: Understand the fundamental concepts of database systems and their applications.
    - **CO2**: Design database schemas using Entity-Relationship (ER) modelling and relational modelling techniques.

- **CO3**: Implement Structured Query Language (SQL) queries for data definition, manipulation, and retrieval.
- **CO4**: Apply normalization techniques to optimize database designs.
- **CO5**: Understand the concepts of transaction management and concurrency control.
- **CO6**: Explore database security and recovery techniques.

2. BCA4CJ206 - PYTHON PROGRAMMING

- **CO1**: Understand the syntax and semantics of Python programming language.
- **CO2**: Develop programs using Python's control structures and data types.
- **CO3**: Work with Python libraries for file handling, regular expressions, and data manipulation.
- **CO4**: Implement object-oriented programming concepts using Python.
- **CO5**: Explore Python's libraries for scientific computing, such as NumPy and Pandas.
- **CO6**: Build real-world applications using Python frameworks and libraries.

3. BCA4CJ207 - SOFTWARE ENGINEERING

- **CO1**: Understand the principles of software development life cycle (SDLC).
- **CO2**: Learn software requirement analysis and specification techniques.
- **CO3**: Design software systems using architectural and modular design principles.
- **CO4**: Apply software testing techniques to ensure the quality and reliability of software.
- **CO5**: Explore software maintenance strategies and configuration management.
- **CO6**: Understand contemporary trends and practices in software development, such as agile methodologies.

4. BCA4CJ208 - AUTOMATION AND ROBOTICS

- **CO1**: Understand the basic concepts of automation and its applications in various industries.
- **CO2**: Learn the fundamentals of robotics, including kinematics and dynamics.
- **CO3**: Explore different types of sensors and actuators used in robotic systems.
- **CO4**: Understand robot programming languages and simulation tools.
- **CO5**: Analyze the role of AI in robotics for intelligent decision-making.
- **CO6**: Develop basic robotic systems and automate simple tasks using programming tools.

5. **VAC- BCA4FV108 - INTRODUCTION TO CYBER LAWS (VALUE-ADDED COURSE)**
    - **CO1**: Understand the legal framework governing cyberspace in India and globally.
    - **CO2**: Explore key provisions of the Information Technology Act, 2000.
    - **CO3**: Learn about intellectual property rights and cybercrime regulations.
    - **CO4**: Understand the importance of privacy and data protection laws.
    - **CO5**: Analyze case studies on cyber law applications and their implications.
    - **CO6**: Develop awareness of ethical practices and responsibilities in the digital world.

6. **VAC- ENG4FV109 - ENGLISH(VALUE-ADDED COURSE)**
    - **CO1**: Enhance written and verbal communication skills for academic and professional contexts.
    - **CO2**: Develop advanced reading and comprehension skills.
    - **CO3**: Build proficiency in technical and business writing.
    - **CO4**: Improve critical thinking through the analysis of diverse texts.
    - **CO5**: Develop presentation skills and confidence in public speaking.
    - **CO6**: Expand vocabulary and refine grammar for effective communication.

SEMESTER 5

1. BCA5CJ301 - OBJECT-ORIENTED PROGRAMMING IN JAVA

    - **CO1**: Understand the principles of object-oriented programming and its advantages over procedural programming.
    - **CO2**: Learn the syntax and structure of Java programming language.
    - **CO3**: Implement object-oriented concepts such as inheritance, polymorphism, and encapsulation in Java.
    - **CO4**: Develop applications using Java's built-in libraries and APIs.
    - **CO5**: Explore exception handling and multithreading for robust application development.
    - **CO6**: Build GUI-based applications using JavaFX or Swing.

2. BCA5CJ302 - PROGRESSIVE WEB APPLICATION USING PHP
    - **CO1**: Understand the architecture and components of Progressive Web Applications (PWA).
    - **CO2**: Learn the fundamentals of PHP programming for dynamic web development.
    - **CO3**: Develop server-side scripts to manage user interactions and data.

- **CO4**: Implement responsive web designs with caching and offline capabilities.
- **CO5**: Integrate databases with PHP to create data-driven applications.
- **CO6**: Deploy and optimize PWAs for performance and scalability.

3. BCA5CJ303 - DIGITAL FUNDAMENTALS AND COMPUTER ORGANIZATION
    - **CO1**: Understand the basics of digital systems, including binary arithmetic and logic gates.
    - **CO2**: Explore the architecture and functioning of various computer components.
    - **CO3**: Learn about memory organization and hierarchy.
    - **CO4**: Understand the concepts of microprocessors and their role in computer systems.
    - **CO5**: Analyze the control unit's operation and instruction execution cycles.
    - **CO6**: Apply digital concepts to solve real-world problems related to computer organization.

7. BCA5EJ301(X) - ELECTIVE COURSE 1 (SPECIALIZATIONS)-DATA ANALYTICS AND VISUALIZATION
    - **CO1:** Understand the principles of data visualization and its role in analytics.
    - **CO2:** Use visualization tools and techniques to explore and interpret data.
    - **CO3:** Develop dashboards and interactive visualizations for real-world data.
    - **CO4:** Implement data preprocessing techniques to clean and organize datasets.
    - **CO5:** Utilize Python libraries such as Matplotlib and Seaborn for creating visualizations.
    - **CO6:** Apply data visualization for effective communication of insights.

8. **BCA5EJ301(X) - ELECTIVE COURSE 2 (SPECIALIZATIONS)- SECURITY AND PRIVACY IN CLOUD**
    - **CO1:** Understand fundamental security concepts in cloud computing.
    - **CO2:** Analyze threats and vulnerabilities in cloud environments.
    - **CO3:** Explore encryption techniques and secure protocols for data protection.
    - **CO4:** Implement access control and authentication mechanisms in cloud services.
    - **CO5:** Understand regulatory and compliance aspects like GDPR and data sovereignty.
    - **CO6:** Evaluate cloud service providers based on their security offerings.

5. SEC-BCA5FS114 - PROFESSIONAL SKILL DEVELOPMENT FOR IT CAREER EXCELLENCE
    - **CO1**: Understand the soft skills required for a successful IT career.
    - **CO2**: Develop effective communication and interpersonal skills.
    - **CO3**: Learn time management and teamwork strategies for workplace efficiency.
    - **CO4**: Build resume writing and interview preparation skills.
    - **CO5**: Gain confidence in public speaking and presentation delivery.
    - **CO6**: Explore leadership and conflict-resolution strategies for career growth.

6. BCA5FS115 – INTERNSHIP 1
    - **CO1**: Gain hands-on experience in applying theoretical knowledge to practical problems.
    - **CO2**: Understand the functioning and workflow of IT industries or research organizations.
    - **CO3**: Develop technical skills relevant to the internship domain.
    - **CO4**: Build problem-solving abilities through real-world projects.
    - **CO5**: Enhance professional networking and collaboration skills.
    - **CO6**: Prepare detailed reports and presentations based on internship experiences.

SEMESTER 6

1. BCA6CJ304 - INTRODUCTION TO AI AND ML
    - **CO1:** Understand the fundamental concepts and applications of Artificial Intelligence (AI) and Machine Learning (ML).
    - **CO2:** Differentiate between supervised, unsupervised, and reinforcement learning techniques.
    - **CO3:** Implement basic algorithms like linear regression, logistic regression, and k-means clustering.
    - **CO4:** Utilize Python libraries like Scikit-learn and TensorFlow for machine learning tasks.
    - **CO5:** Analyze and evaluate machine learning models using performance metrics.
    - **CO6:** Apply AI and ML techniques to solve real-world problems.

2. BCA6CJ305 - PRINCIPLES OF OPERATING SYSTEM
    - **CO1:** Understand the architecture and functions of modern operating systems.
    - **CO2:** Analyze process management concepts such as scheduling, synchronization, and deadlock handling.

- **CO3:** Explore memory management techniques including paging, segmentation, and virtual memory.
- **CO4:** Understand file system organization and implementation.
- **CO5:** Examine I/O management and disk scheduling algorithms.
- **CO6:** Develop shell scripts to automate tasks in Linux-based systems.

3. BCA6EJ303 ELECTIVE COURSE 3 (SPECIALIZATIONS)- ADVANCED PYTHON FOR DATA SCIENCE
    - **CO1:** Understand the concepts of arrays, matrices and their transformations.
    - **CO2:** Create informative plots using Python packages.
    - **CO3:** Understand the loading mechanism of different types of data and manipulate them.
    - **CO4:** Analyse the data using Pandas and Data Frames.
    - **CO5:** Understand the concepts of random tensors and generate tensors from various distributions.
    - **CO6:** Familiarize with various TensorFlow operations needed for Data Science.

4. BCA6EJ304(X) - ELECTIVE COURSE 4 (SPECIALIZATIONS)-NEURAL NETWORKS AND DEEP LEARNING
    - **CO1:** Illustrate the basic concepts of neural networks and its practical applications
    - **CO2:** Implementing basic concept of neural networks
    - **CO3:** Applying the optimization technique in neural networks
    - **CO4:** Implement the foundation layer of CNN
    - **CO5:** Implement a sequence model using recurrent neural network
    - **CO6:** Explore the application area of deep learning like NLP, Voice Recognition, Speech

5. VAC- BCA6FV110 - BUSINESS INTELLIGENCE AND INNOVATION
    - **CO1**: Acquire a comprehensive understanding of Business Intelligence and its applications
    - **CO2**: Students can implement data driven decision-making processes in various business contexts.
    - **CO3**: Develop customised Business Intelligence solutions tailored to specific organisational needs.
    - **CO4**: Evaluate emerging trends and technologies in IT for potential business impact.
    - **CO5**: Lead entrepreneurial initiatives by applying lean startup methodologies and securing.

- **CO6**: Analyse case studies of successful IT innovations for practical insights and application.

6. SEC- BCA6FS116 - PROJECT 1
    - **CO1:** Apply theoretical knowledge to design and implement a comprehensive IT project.
    - **CO2:** Demonstrate proficiency in software development lifecycle methodologies.
    - **CO3:** Develop technical documentation and maintain version control.
    - **CO4:** Collaborate effectively within a team to deliver project milestones.
    - **CO5:** Present and defend the project outcomes to a panel of evaluators.
    - **CO6:** Submit a final project report highlighting the technical and managerial aspects of the project.

SEMESTER 7

1. BCA7CJ401 - ADVANCED DATA STRUCTURES AND ALGORITHMS
    - **CO1:** Understand the concepts of advanced data structures like tree, graphs, and heaps.
    - **CO2:** Gain familiarity with algorithmic techniques such as brute force, greedy, and divide and conquer.
    - **CO3:** Perform asymptotic analysis (big-O notation, time and space complexity).
    - **CO4:** Apply advanced abstract data types (ADT) and data structures in solving real-world problems.
    - **CO5:** Combine fundamental data structures and algorithmic techniques to build complete algorithmic solutions.
    - **CO6:** Use data structures for real-world problem-solving through projects and practical.

2. BCA7CJ402 - DATA SCIENCE PROGRAMMING USING R
    - **CO1:** Demonstrate the installation and configuration of RStudio.
    - **CO2:** Apply object-oriented programming concepts in R.
    - **CO3:** Utilize data structures and loop functions in R.
    - **CO4:** Understand the concept and applications of data frames.
    - **CO5:** Implement data manipulation and visualization using DPLYR and R packages.
    - **CO6:** Apply R programming concepts to real-world data science scenarios.

3. **BCA7EJ401/402 - ELECTIVE COURSES- THEORY OF COMPUTATION**
    - **CO1:** Understand the fundamental concepts of computation, including automata, pushdown automata, and Turing machines.

- **CO2:** Classify languages into regular, context-free, and unrestricted categories.
- **CO3:** Design and analyze Turing machines and understand their capabilities and limitations.
- **CO4:** Construct finite automata, pushdown automata, and Turing machines based on grammar and languages.
- **CO5:** Analyze decidability and undecidability in computational problems.
- **CO6:** Solve computational problems and prove theoretical results in computation.

4. BCA7EJ402(X) - BLOCKCHAIN TECHNOLOGY

- **CO1:** Understand cryptographic building blocks used in blockchain technology.
- **CO2:** Explain the fundamental concepts of blockchain and its architecture.
- **CO3:** Summarize various consensus algorithms and their classifications.
- **CO4:** Describe the first decentralized cryptocurrency, Bitcoin, and its key components.
- **CO5:** Explore the use of smart contracts and their applications.
- **CO6:** Develop simple blockchain applications using blockchain platforms.

5. BCA7FS117 - INTERNSHIP 2

- **CO1:** Gain practical experience by applying theoretical knowledge in real-world projects.
- **CO2:** Enhance technical, analytical, and problem-solving skills through hands-on tasks.
- **CO3:** Develop communication and teamwork skills in a professional environment.
- **CO4:** Learn industry best practices and professional work ethics.
- **CO5:** Prepare a detailed internship report summarizing key learnings and contributions.
- **CO6:** Demonstrate work readiness and adaptability in an organizational setting.

SEMESTER 8

1. BCA8EJ404 – ELECTIVE COURSE- COMPILER DESIGN

- **CO1:** Identify different phases in the compilation process and model a lexical analyser.
- **CO2:** Model language syntax using Context-Free Grammar and develop parse tree representation using leftmost and rightmost derivations.
- **CO3:** Compare different types of parsers and construct a parser for a given grammar.

- **CO4:** Build Syntax Directed Translation for a context-free grammar, compare various storage allocation strategies, and classify intermediate representations.
- **CO5:** Design and implement lexical analysers to recognize tokens in source programs.
- **CO6:** Illustrate code optimization and code generation techniques in compilation.

3. BCA8EJ405 - ELECTIVE COURSE- MIXED REALITY

- **CO1:** Understand virtual reality and the creation of immersive VR experiences along with human physiology's interaction with virtual environments.
- **CO2:** Define the geometry of the virtual world, including transformations and optics that define human perception.
- **CO3:** Acquire a comprehensive understanding of different techniques used for visual perception and visual rendering for the creation of the virtual world.
- **CO4:** Understand motion in virtual worlds, evaluation of VR systems, and perceptual training techniques.
- **CO5:** Familiarize with the concept of augmented reality, their characteristics, and various tracking technologies used.
- **CO6:** Understand output and input modalities for navigation and the software engineering requirements for AR technologies.

4. BCA8EJ406 - ELECTIVE COURSE- SYSTEM SECURITY

- **CO1:** Understand different types of securities in information and computer systems, including security goals such as confidentiality, integrity, and availability.
- **CO2:** Outline computer system threats and various types of system attacks.
- **CO3:** Identify different issues associated with system attacks and various types of attackers.
- **CO4:** Provide knowledge in operating system security, file protections, and security assurance.
- **CO5:** Understand important elements of database security.
- **CO6:** Define security planning, various types of security policies, and risk analysis.

5. BCA8FS118 - PROJECT 2

- **CO1:** Demonstrate the ability to apply theoretical knowledge to solve real-world problems.

- **CO2:** Develop a comprehensive project involving system design, implementation, and testing.
- **CO3:** Present the project deliverables effectively, showcasing technical and analytical skills.
- **CO4:** Collaborate within a team to achieve project milestones and solve challenges.
- **CO5:** Prepare a detailed project report documenting objectives, methodology, results, and conclusions.
- **CO6:** Showcase professional skills and adherence to ethical practices in project development.

6. BCA8FS119 - RESEARCH PROJECT

- **CO1:** Conduct a systematic investigation into a research problem, utilizing appropriate methodologies and tools.
- **CO2:** Analyze and interpret data to draw meaningful conclusions.
- **CO3:** Prepare a well-structured research report, including a literature review, methodology, results, and discussion.
- **CO4:** Demonstrate effective communication skills through research presentations and viva- voce.
- **CO5:** Exhibit critical thinking and problem-solving skills in addressing complex research questions.
- **CO6:** Uphold research ethics and academic integrity throughout the research process.