Bachelor of Technology in Computer Science and Engineering (Cybersecurity)

Program Outcomes (POs)

A graduate of the Engineering program will demonstrate

PO1- Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2- Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

PO3- Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4- Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5- Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6- The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

PO7- Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8- Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO9- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO10–Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11- Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 - Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

PSO 1: Apply cybersecurity skills to construct secure systems, from the hardware to the software to the human-computer interface.

PSO 2: Develop cybersecurity skills including network defense, ethical hacking, penetration testing, application security, encryption and cryptography as well as digital forensics.

Department of Computer Science and Engineering (Cybersecurity)

Course Outcomes (COs)

2020 – 2023 Batch

Semester	Course Code	Course Name	Course Outcomes (COs)
iii	20CS3AC01	DATA STRUCTURES	CO 1 Discuss the concepts and operations of arrays, pointers and functions. CO 2 Demonstrate the different memory allocation functions. CO 3 Demonstrate the implementation of different types of data structures and their operations on linked list CO 4 Demonstrate the different operations and applications of stack and queues. CO 5 Describe the different operations and applications of nonlinear data structure. CO 6 Develop a mini project by understanding the essential data structure concepts.
	20HSS09	FUNDAMENTALS OF BUSINESS MANAGEMENT	CO 1 Explain relationship between components of financial statements used to describe a business. CO 2 Demonstrate the knowledge of framing financial statements and compute simple ratios to capture key elements of a firm's performance. CO 3 Use fundamental concepts in business communication, including planning, writing, presenting and executing successful business communication strategies. CO 4 Solve quantitative problems by reviewing key mathematics concepts. CO 5 Discuss how to analyse quantitative information and make better business decisions. CO 6 Create spreadsheet models to solve business problems.
	20CS3CY01	INTRODUCTION TO CYBERSECURITY	CO 1. Demonstrate the skills in three different areas namely information security, network security, and computer forensics CO 2. Discuss information processing, and communications are protected against the confidentiality, integrity, and availability of information and information processing CO 3. Experiment the methods of fundamentals of information security. CO 4. Develop skill sets in network security,

			and computer forensics areas **CO 5. Outline knowledge of approval and authorization of information, non-alteration of data, and the non-repudiation of communication or stored data** **CO 6. Identify, verify and record the approval and authorization of information, non-alteration of data, and the non-repudiation of communication or stored data.**
	20CS3AC02	**PROGRAMMING IN JAVA**	**CO 1 Describe the concepts of Object-Oriented programming** **CO 2 Demonstrate the concepts of inheritance and interfaces through programming** **CO 3 Demonstrate exception handling mechanisms through Java applications** **CO 4 Demonstrate multithreading with real world examples** **CO 5 Examine the event driven programs using swings** **CO 6 Test java applications using JDBC connectivity and execute the necessary queries**
	20CS3AC03	**COMPUTER ARCHITECTURE AND ORGANIZATION**	**CO 1 Discuss the theory, functionality and basic architecture of CPU.** **CO 2 Examine of design issues on the basis of speed, technology, cost and performance.** **CO 3 Demonstrate the working of a simple CPU by making use of theoretical concepts.** **CO 4 Explain the different concepts of parallel processing, pipelining and interprocessor communication.** **CO 5 Discuss the I/O and memory organization in a better way.** **CO 6 Summarise the different number systems, binary addition and subtraction, 2's complement representation and operations along with-its representation.**
	20CS3AC04	**DATA COMMUNICATION AND COMPUTER NETWORKS**	**CO 1 Discuss OSI and TCP/IP models** **CO 2 Examine the analog to Digital conversions and vice versa, Multiplexing and various types of transmission media used in data communication** **CO 3 Compare different types of switching networks and MAC layer protocols.** **CO 4 Employ the different error detection and correction techniques in data link layer** **CO 5 Demonstrate the ability to explain networking as it relates to the connection of**

			computers, media, and devices (routing) **CO 6 Design and simulate various topologies using layer 2 and layer 3 devices.**
	20CS3AC01L	**DATA STRUCTURES LABORATORY**	**CO 1 Illustrate the concepts of Arrays.** **CO 2 Demonstrate the working of pointers and functions.** **CO 3 Implement the different operations of Stack and Queue.** **CO 4 Demonstrate the concepts of Linked List and apply various operations on them.** **CO 5 Choose appropriate recursive techniques to solve given problem.** **CO 6 Illustrate the concepts of Binary Search Tree (BST) and its operations.**
	20CS3AC02L	**PROGRAMMING IN JAVA LABORATORY**	**CO 1 Use java programming constructs to explore different looping constructs and to work with arrays.** **CO 2 Demonstrate the different types of constructors and inheritance** **CO 3 Examine why java is a robust language using Exception handling mechanism.** **CO 4 Demonstrate the advantages of multithreading concepts through programming.** **CO 5 Demonstrate the delegation model of event handling mechanism using Applets and Frames.** **CO 6 Demonstrate the use the JDBC connectivity using MySQL/Oracle database.**
	18MCC02	**ENERGY STUDIES**	**CO 1. Students will have knowledge of energy scenario and its importance to the society** **CO 2. Students can understand and suggest few energy management and energy conservation techniques in daily life.** **CO 3. Students will be aware of energy policies** **CO 4. Students can get the emerging technologies importance in today's energy scenario.**
	21PC1ED8	**FUNDAMENTALS OF INNOVATION AND VENTURE DEVELOPMENT IN ENTREPRENEURSHIP – 1**	**CO 1. Illustrate the Innovation and Entrepreneurship knowledge and skills** **CO 2. Examine aspects of starting and growing a successful global venture including: Deciding to be a global entrepreneur, coming with the best global idea for the venture, evaluating and selecting the best global market(s), and launching and growing the venture.**

			CO 3. Assess the significance of developing and implementing a Marketing survey plan, using and changing a business idea and identifying the critical factors for success of the global venture **CO 4. Outline the types of resources at various stages of the global venture and valuing their business through various methods** **CO 5. Describe the impact of external forces of change, policies and generate solutions for overcoming/minimizing the external impact on Business and innovations**
	18MADIP01	**DIPLOMA MATHEMATICS-1**	**CO1: Understand Mean value theorems and determine the power series expansion of the function** **CO2: Estimate the extreme values of the multivariable function and determine potential** **functions for irrotational force fields** **CO3:Understand the concept of Integration, improper integrals and its applications** **CO4:Solve first and higher order ordinary differential equations.**
iv	**20BS4MA04**	**OPERATING SYSTEM**	**CO 1 Describe the important computer system resources and the role of operating system in their management policies and algorithms.** **CO 2 Discuss the process, management policies and scheduling of the processes by the CPU.** **CO 3 Test the requirement for process synchronization and coordination handled by OS.** **CO 4 Describe and analyse the memory management schemes and allocation methods.** **CO 5 Classify different file systems and their implementations.** **CO 6 Compare the security and protection mechanisms related to an OS.**
	20BS4MA04	**DISCRETE MATHEMATICS AND GRAPH THEORY**	**CO1: Demonstrate critical thinking, analytical reasoning, and problem-solving skills** **CO2: Use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems** **CO3: Identify a problem and analyse it in terms of its significant parts and the information needed to solve it** **CO4: Demonstrate the formulation and**

			evaluation of possible solutions to problems, select and defend the chosen solutions **CO5: Construct graphs and charts, interpret them, and draw appropriate conclusions** **CO6: Employ functions and recurrence relations for the pattern identified in the numbers and the functions**
	20CS4AC06	**DATABASE MANAGEMENT SYSTEM**	**CO 1 Use the appropriate symbols for the construction of Entity-Relationship (ER) model** **CO 2 Demonstrate by providing solutions through Relational Algebraic expressions.** **CO 3 Test simple and complex SQL queries for retrieving of tuples.** **CO 4 Test the execution of NOSQL queries.** **CO 5 Differentiate the different normalization techniques by understanding the essential DBMS concepts.** **CO 6 Demonstrate the ACID properties of Transaction and concurrency control in databases**
	20CS4CY02	**NETWORK DEFENSE FOR CYBERSECURITY**	**CO 1. Discuss the concepts and foundations of computer security.** **CO 2. Identify vulnerabilities of IT systems.** **CO 3. Use basic security tools to enhance system security** **CO 4. Use basic security enhancements for stand-alone applications in IT infrastructure.** **CO 5. Demonstrate skill sets to monitor the threats.** **CO 6. Demonstrate the knowledge in assessing the threats and responding.**
	20CS4AC07	**PYTHON PROGRAMMING**	**CO 1 Discuss both the principles and the practice of programming, using Python.** **CO 2 Use iteratively function and loops in Python for managing and transforming data.** **CO 3 Demonstrate the working of basic String operations** **CO 4 Demonstrate the programming skill using class operations.** **CO 5 Implement the writing and reading files in Python.** **CO 6 Demonstrate the visualisation of data using Python plots and perform search and sort functions.**
	20CS4AC05L	**OPERATING SYSTEMS LABORATORY**	**CO 1 Demonstrate practical knowledge on principles of operating systems.** **CO 2 Employ the process synchronous concept using message queue, shared memory, semaphore and Dekker's algorithm**

			for the given situation. **CO 3 Demonstrate the working of CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queuing)** **CO 4 Demonstrate the Banker's Algorithm for Deadlock Avoidance and Prevention.** **CO 5 Employ the various methods in memory allocation and page replacement algorithm.** **CO 6 Demonstrate the various operations of file system**
	20CS4AC06L	**DATABASE MANAGEMENT SYSTEM LABORATORY**	**CO 1 Implement Data Definition Language, Data Manipulation Language, Data Control Language and Transaction Control Language commands on sample database.** **CO 2 Choose a Student database with necessary constraints and get it populated with the data.** **CO 3 Examine the execution of simple and complex queries on Student Database.** **CO 4 Examine the execution of simple and complex queries on Student Database.** **CO 5 Demonstrate the execution of NoSQL queries** **CO 6 Develop a mini project for the benefits of society /community**
	20CS4CY02L	**NETWORK DEFENSE FOR CYBERSECURITY LAB**	**CO 1. Demonstrate the knowledge on defending and wining the war against network breaches in a post-pandemic world.** **CO 2. Discuss the latest technologies including virtualization and remote worker Threat Intelligence, Software Defined Networks (SDN), Network Function Virtualization (NFV) and container security.** **CO 3. Use of latest tools techniques and methodologies of top cybersecurity experts around the world.**
	21PC1EPG8	**Fundamentals of Innovation and Venture Development in Entrepreneurship – 2**	**CO 1. Illustrate the Innovation and Entrepreneurship knowledge and skills** **CO 2. Examine aspects of starting and growing a successful global venture including: Deciding to be a global entrepreneur, coming with the best global idea for the venture, evaluating and selecting the best global market(s), and launching and growing the venture.** **CO 3. Assess the significance of developing and implementing a Marketing survey plan, using and changing a business idea and identifying the critical factors for success of**

			the global venture **CO 4. Outline the types of resources at various stages of the global venture and valuing their business through various methods** **CO 5. Describe the impact of external forces of change, policies and generate solutions for overcoming/minimizing the external impact on Business and innovations.**
	18MADIP02	**DIPLOMA MATHEMATICS-2**	**CO1:Apply multiple integrals to find area, surface area and volume and to evaluate line, surface and volume integrals of vector fields** **CO2:Apply Laplace Transforms to solve ordinary differential equations** **CO3: Understand the differentiation and integration of complex valued functions.** **CO4 :Determine the Eigen values and Eigen vector to solve system of first order differential equations**