Bachelor of Technology (Computer Science and Engineering - Mobile Applications and Cloud Technology)

Program Outcomes (POs)

Engineering Graduates will be able to:

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

- **PO9: Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- **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.

- **PO13:** Introspect and evolve into dynamic and creative individuals capable of socially productive, constructive actions that positively impact our Nation and the World at large.

FACULTY OF ENGINEERING AND TECHNOLOGY

Program Specific Outcomes (PSOs)

- **PSO1:** Apply the software development life cycle process in building web, mobile and cross-platform based applications using analytical skills, creativity, communication, problem solving skills and programming languages.

- **PSO2:** Provide cloud-based solution for real time problems using suitable service providers such as Amazon Web Service, Microsoft Azure, Google Cloud and OpenStack.

FACULTY OF ENGINEERING AND TECHNOLOGY

Course Outcomes (COs)

2017-2021 Batch

Semester	Course Code	Course Name	CO Numbers	CO Statements
III	17CCC31	DATA STRUCTURES AND ALGORITHMS	CO1	Describe linear data structures using array and linked list
			CO2	Apply data structures like stacks, queues in linear data structure

			CO3	Discuss non-linear data structures tree and its application
			CO4	Apply various algorithms in graph
			CO5	Solve searching, sorting and hashing techniques in data structures
			CO6	Interpret sorting algorithms for a give problem
	17CCC31L	DATA STRUCTURES AND ALGORITHMS LAB	CO1	Compare various kinds of searching and sorting techniques
			CO2	Construct Linear and nonlinear data structures using arrays and linked list
			CO3	Develop Programs employing dynamic memory management
			CO4	Choose appropriate data structure to solve various computing problems
			CO5	Originate hash tables and collision resolution Techniques
			CO6	Identify suitable data structure and algorithm to solve a real world problem
	17CS3SP01	OBJECT ORIENTED PROGRAMMING USING JAVA	CO1	Define and understand Object Oriented programming concepts using basic syntaxes of control Structures, strings and function for developing skills of logic building activity
			CO2	Explain classes, objects, members of a class and the relationships among them needed for finding the solution to specific problem
			CO3	Demonstrate how to achieve reusability using inheritance, interfaces and packages and describe how faster application development can be achieved.
			CO4	Design and create applications using JDBC connectivity
			CO5	Create grpahic applications
			CO6	Create front end and back end applications
	17CS3SP01L	OBJECT ORIENTED PROGRAMMING USING JAVA - LAB	CO1	Discuss OOP concepts and basics of Java programming
			CO2	Apply OOP and Java programming in problem solving
			CO3	Extend his/her knowledge of Java programming further on his/her own
			CO4	Create different programms using packages
			CO5	Analyze various techniques with

				functions
			CO6	Evaluate inhenritance using Java
	17BS3CS02	Mathematics for Computer Science	CO1	Solve logical reasoning to verify the correctness of the logical statements and Perform set operations to describe the languages.
			CO2	Apply the concepts of relations, partially ordered sets and lattices in relational data bases and data structures.
			CO3	Analyze the concepts of graphs to understand Mathematical structures and techniques in computer applications.
			CO4	Understand and apply the foundations of probabilistic and statistical analysis mostly used in various applications in engineering and computer sciences.
			CO5	Apply the concept of random variables, Distributions and its properties to analyze the statistical data.
	17HSSC08	ECONOMICS FOR ENGINEERS	CO1	Describe the fundamental theories and principles used in Engineering Economics and Management and to some extent are able to compare and evaluate them
			CO2	Learn, compare and apply various cost concepts and analysis techniques
			CO3	Select a business plan for an entrepreneurship project using economics and Management fundamentals
			CO4	Apply the knowledge and techniques, skills and methods to become successful project leaders
			CO5	Apply professional ethical principles and corporate social responsibility concepts in personal, financial and economic decisions for sustainable growth and development
			CO6	Analyze and think through basic economic problems of our country
		Computer Organization and Archietecture	CO1	Understand basic structure of computer and instruction sets.
			CO2	Perform computer arithmetic operations.
			CO3	Write control signals for any operations.
			CO4	Understand the concept of cache mapping techniques.

			CO5	Conceptualize the I/O organization and its registers.
	17MCC03	ENERGY STUDIES	CO1	Discuss energy scenario and its importance to the society.
			CO2	Recommend few energy management and energy conservation techniques in daily life.
			CO3	interpret energy policies.
			CO4	Discuss emerging technologies importance in today's energy scenario
IV	17CS4SP04	Operating System Building Blocks	CO1	Discuss the features of the operating system functions, structures, and design issues associated with operating systems.
			CO2	Use the various process management issues including scheduling, synchronization, deadlocks and multithreading.
			CO3	Apply the concepts of memory management including virtual memory, resource sharing among the users, and Process scheduling techniques to solve the real world problems
			CO4	Use UNIX tools using features such as filters, pipes, Unix file systems, redirection, and regular expressions Customize their UNIX working environment and security
	17CS4SP04L	Operating System Building Blocks–Lab	CO1	Experiment basic commands of shell script.
			CO2	Apply basic operations in shell scripts which are required for different applications
			CO3	Identify and understand concept of file systems in shell script
			CO4	Apply concept of creating new process from parent process
	17CS0SP02	RELATIONAL DATABASE MANAGEMENT SYSTEM	CO1	Construct Entity-Relationship (ER) model and also to learn different issues in the design and implementation of a Database system
			CO2	Demonstrate by providing solutions through Relational Algebraic expressions and structured query language commands.
			CO3	Construct SQL queries for retrieving multiple tuples using Iterators CURSORs and Triggers.
			CO4	Analyze the different normalization techniques by understanding the essential DBMS concepts

			CO5	Demonstrate the ACID properties of Transaction
			CO6	Apply techniques for achieving Concurrency control and for database recovery.
	17CS0SP02L	RELATIONAL DATABASE MANAGEMENT SYSTEM LAB	CO1	Apply Data Definition Language, Data Manipulation Language, Data Control Language and Transaction Control Language commands on sample database.
			CO2	Create a Student database with necessary constraints and to get it populated with the data.
			CO3	Execute simple and complex queries on Student Database.
			CO4	Create Employee database with necessary constraints, populate it with the data and to execute queries on the database.
			CO5	Create Library database with necessary constraints, populate it with the data and to execute queries on the database.
			CO6	Demonstrate the learned concepts through exhibiting a mini project
		Android Programming	CO1	Use Android Studio to develop Android Apps
			CO2	Design simple Android Apps using UI Elements
			CO3	Develop data oriented Android Apps
			CO4	Deploy and test Android Apps
	17CS0SP03	COMPUTER NETWORKS	CO1	Describe basic computer network technology.
			CO2	Demonstrate the layers of the OSI model and TCP/IP and explain the functions of each layer.
			CO3	Identify the design issues, perform error detection and correction.
			CO4	Apply the various routing algorithms for the different network designs.
			CO5	Analyze the various protocols used in respective layers of OSI reference model.
			CO6	Design a network for the given scenario.
	17HSS04	Business Communication and Presentation Skills	CO1	Overcome common obstacles in public speaking.
			CO2	Demonstrate critical and innovative thinking.
			CO3	Illustrate oral, written and visualization.
			CO4	Discuss the importance of research in developing your topic.

			CO5	Use resources to gather information effectively.
		Mobile Archietecture and App Development	CO1	Understand the wireless communications and data transmission standards.
			CO2	Describe the knowledge concerning mobile OS and their architecture.
			CO3	Select appropriate data transmission standards for a mobile development framework to the development of a mobile application.
			CO4	Analyze the ecosystem of current mobile platforms as well as their features and their differences.
V		Principles of Virtualization	CO1	Explain Virtualization concepts and identify various challenges in typical data center.
			CO2	Understand need for Virtualization and Virtualization Technologies
			CO3	Deploy and manage an Enterprise Desktop Virtualization Environment
			CO4	Configure and manage virtual networks, virtual storage and virtual machine management
			CO5	Understand various parameters required to design the virtual infrastructure and adopt security techniques to protect the infrastructure
		Storage Management	CO1	Recognize the storage devices
			CO2	Illustrate the storage at network level
			CO3	List and explain types of storage in infrastructure
			CO4	Compare and contrast SAN NAS and CAS
			CO5	Explain backup and recovery
		Enterprise Application development	CO1	Implement a code in JDBC to communicate with database
			CO2	Develop web applications using Servlets and JSP
			CO3	Integrate Servlets, JSP and JDBC and build a web application
			CO4	Build Enterprise Applications using Session Bean, Entity Bean and MDB
		iOS Application Developemnt	CO1	Develop simple iOS Apps.
			CO2	Develop iOS Apps with UI elements.
			CO3	Develop iOS Apps using SQLite.
			CO4	Deploy and test iOS Apps on real device.

		Installation and Configuration of Server	CO1	Recognize and explore various services provided by windows server
			CO2	Analyze and apply centralized services with client nodes of the network
			CO3	Recognize the importance of Domain Name services in the server network infrastructure
			CO4	Justify the minimal management and attain improved performance with Hyper v client
		Data Center	CO1	Understand a datacenter, its architecture and various component associated with it.
			CO2	Analyze and identify requirements for setting up a Data center based on business needs
			CO3	Design a Datacenter based on various guidelines which can be maintained effectively
			CO4	Understand and implement the disaster recovery model for datacenters
		Principles of Virtualization Lab	CO1	Explain Virtualization concepts and identify various challenges in typical data center.
			CO2	Understand need for Virtualization and Virtualization Technologies
			CO3	Deploy and manage an Enterprise Desktop Virtualization Environment
			CO4	Configure and manage virtual networks, virtual storage and virtual machine management
			CO5	Understand various parameters required to design the virtual infrastructure and adopt security techniques to protect the infrastructure
VI		Cloud Technology	CO1	Compare various services and deployment models of cloud computing
			CO2	Distinguish the services offered by various cloud service providers and find the feasible /optimal solution for a given business scenario
			CO3	Recognize the cloud governance solution and legal issues of cloud
			CO4	Interpret how the cloud management strategies helps in achieving business goals
		Enterprise Network	CO1	Understand the Networking basics and Architecture

		Engineering	CO2	Configuring networking devices such as switches, routers, VLAN etc.,
			CO3	Analyze and configure networking protocols
			CO4	Design, build and troubleshoot enterprise level network infrastructure
		Andvanced Android Programming	CO1	Apply Native and Location API to build Android Apps
			CO2	Implement Game based android apps using Threads and Graphics API
			CO3	Integrate third party APIs to build rich Android Apps
			CO4	Design a Universal App and Use material design elements, surfaces, transitions across multiple form factors.
		Andavanced iOS Application Development	CO1	Use core motion and location api to build iOS Apps
			CO2	Use web services to build iOS web-based Apps
			CO3	Develop iOS Apps with Core data
			CO4	Understand the need of testing and steps in publishing iOS Apps to App Store
		Enterprise Network Engineering Lab	CO1	Analyze the differences between switches and routers and their configurations.
			CO2	Execute various network protocols DHCP, OSPF, EIGRP, Static and Dynamic Routing protocols.
		Andvanced Android Programming Lab	CO1	Design android app to demonstrate services and Notifications
			CO2	Implement Bounded Services through chat App
			CO3	Integrate web service API to Android App
			CO4	Develop simple games using Android Graphics APIs
		Elective 1:Data Mining	CO1	Know the important concepts on data types and data quality measures.
			CO2	Know the important data pre-processing techniques for data mining process.
			CO3	Know the decision tree and ensemble methods and their business application.
			CO4	Know the concepts of neural network and SVM for binary class and continuous variable.
			CO5	Know the algorithm related to association analysis and cluster analysis.

		Elective 2:Design and Analysis of Algoriithms	CO1	Understand the process of designing and analyzing an algorithm through basic problem types and asymptotic notations.
			CO2	Identify the key characteristics of a given problem, suitable design approach and its impact on performance.
			CO3	Design an algorithm through appropriate design strategy to solve the real time problems.
			CO4	Evaluate the correctness of the algorithm through valid and invalid inputs.
			CO5	Analyze the space and time efficiency of the algorithm.
			CO6	Implement the algorithm using appropriate design strategies for problem solving.
		Elective 2: Software Engineering	CO1	Apply the software engineering lifecycle models by demonstrating competence in communication, planning, analysis, design, construction, and deployment of software
			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
VII		Elective 3: Cloud Web Services	CO1	Recognize various cloud services available on AWS cloud and provision various IT services for different deployment models.
			CO2	Demonstrate creation and launching of EC2 services.
			CO3	Employ appropriate AWS services for launching web applications.
			CO4	Choose the various storage and security services provided by AWS for the instances.
			CO5	Schedule the networking services of AWS as per the requirements.

			CO6	Examine the various scenarios of application requirements and choose the appropriate services required.
		Elective 3: Infrastructure Solution on Cloud	CO1	Create a Windows Azure Account, Virtual Machines and install Windows server images
			CO2	Manage website applications on Azure platform
			CO3	Perform Database migration
			CO4	Create storage accounts
		Elective 4: Mobile Testing	CO1	Write java code for unit testing using Junit framework
			CO2	Test Android Apps using Android testing framework
			CO3	Test Android Apps using Robotium framework
			CO4	Test Android Apps using Espresso framework
		Elective 4: Web Technology	CO1	To introduce students to web technologies such as HTML, CSS, XML, PHP
			CO2	to create static and simple dynamic web pages or applications using these technologies
			CO3	Understand web application deployment and software architectures.
			CO4	Students will learn basic web application design, development and testing skills.
		Elective 4: Cross Platform Application Development	CO1	Understand the architecture of cross-platform apps over native apps and hybrid apps
			CO2	Design and develop mobile web applications using HTML5 and CSS3 technologies.
			CO3	Develop SPA mobile web applications using AngularJS tool.
			CO4	Design creative UI Hybrid Apps using ionic framework.
			CO5	Build cross platform apps using React Native tool
		Elective 5: Introduction to UI / UX	CO1	Follow design models for UI design
			CO2	Use mobile design models for mobile UI design
			CO3	Follow best practices for attractive UI design
			CO4	Use UI design models to improve UX
		Elective 5:Mobile Ecosystem,	CO1	To monetize Mobile Apps
			CO2	How mobile market works

		Business Analysis and Models	CO3	Identify apps belongs to mobile gaming
			CO4	Identify apps belongs to M-Commerce
		Elective 6: Linux Administration	CO1	Understand the basics of Linux Operating System
			CO2	Recognize the directory and file structure in Linux Operating System
			CO3	Demonstrate the management of user and groups and installation of various packages
			CO4	Manage system storage devices and configure file system for the Linux operating system
			CO5	Configuration of Infrastructure services
			CO6	Configuring SSH server and client with security
		Elective 6: Exchange Server Administration	CO1	Perform deployment and basic management of Exchange Server 2013.
			CO2	Implement backup and disaster recovery for Exchange Server 2013.
			CO3	Monitor and troubleshoot Exchange Server 2013.
			CO4	Secure and maintain Exchange Server 2013.
		Open Elective 1: Web Technology	CO1	To introduce students to web technologies such as HTML, CSS, XML, PHP
			CO2	to create static and simple dynamic web pages or applications using these technologies
			CO3	Understand web application deployment and software architectures.
			CO4	Students will learn basic web application design, development and testing skills.
		Open Elective 1: Enterprise Application Development	CO1	Implement a code in JDBC to communicate with database
			CO2	Develop web applications using Servlets and JSP
			CO3	Integrate Servlets, JSP and JDBC and build a web application
			CO4	Build Enterprise Applications using Session Bean, Entity Bean and MDB
		Open Elective 2: Basic Android App Development	CO1	Install, Configure and Understand the Android Studio tool.
			CO2	Understanding layout designing.
			CO3	Design and Develop user Interfaces for the Android Apps
			CO4	Create Data-Oriented Android Apps

			CO5	Developing Applications to react to notifications.
			CO6	Test and Deploy Android Apps.
		Open Elctive 2: Mobile Architecture and Application Development	CO1	Understand the wireless communications and data transmission standards.
			CO2	Describe the knowledge concerning mobile OS and their architecture.
			CO3	Select appropriate data transmission standards for a mobile development framework to the development of a mobile application.
			CO4	Analyze the ecosystem of current mobile platforms as well as their features and their differences.
VIII		Open Elective 3: Basic iOS Application Development in Swift	CO1	Explain the design process involved in code structuring and creating custom types using fundamental units of swift language.
			CO2	Outline the steps involved in setting up Xcode for iOS application development and understand the various built-in features.
			CO3	Use the design principles in creating swift programs using playground and Xcode.
			CO4	Choose appropriate user interface elements and actions in designing and developing iOS applications.
			CO5	Demonstrate the need of AutoLayout and StackViews in designing applications.
			CO6	Create simple workflows and navigation hierarchies using navigation controllers, tab bar controllers and segues on applying MVC design pattern.
		Open Elective 3: Advanced Android Application Development	CO1	Apply Native and Location API to build Android Apps
			CO2	Implement Game based android apps using Threads and Graphics API
			CO3	Integrate third party APIs to build rich Android Apps
			CO4	Design a Universal App and Use material design elements, surfaces, transitions across multiple form factors.
		Open Elective 4: Infrastructure Solution on Cloud	CO1	Create a Windows Azure Account, Virtual Machines and install Windows server images
			CO2	Manage website applications on Azure platform

			CO3	Perform Database migration
			CO4	Create storage accounts
		Open Elective 4: Linux Administration	CO1	Understand the basics of Linux Operating System
			CO2	Recognize the directory and file structure in Linux Operating System
			CO3	Demonstrate the management of user and groups and installation of various packages
			CO4	Manage system storage devices and configure file system for the Linux operating system
			CO5	Configuration of Infrastructure services
			CO6	Configuring SSH server and client with security