B.Tech (Computer Science and Engineering - Internet of Things)

Programme Outcomes (PO's):

PO01	Apply mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.
PO02	Identify, formulate, research literature and solve complex engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.
PO03	Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO04	Conduct investigations of complex problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO05	Create, select and apply appropriate techniques, resources, and modern engineering tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.
PO06	Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
PO07	Understand the impact of engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development.
PO08	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO09	Understand and commit to professional ethics and responsibilities and norms of engineering practice.
PO10	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	Demonstrate a knowledge and understanding of management and business practices, such as risk and change management, and understand their limitations.
PO12	Recognize the need for, and have the ability to engage in independent and life-long learning.

Program Specific Outcomes(PSO)

PSO1: Ability to apply their skills in the field of Project management, Quality and cost management, cultivating skills through higher studies and entrepreneurship.

PSO2: Ability to apply their skill in the field of new product Development, Cost Cutting and Improving Existing Techniques through engagement in Post Graduate Programs study or engagement in Research and Innovation

Course Outcomes(COs)

Batch:2017-2021

Semester	Course Code	Course Name	COs	Course Outcomes
III July 2018 to Dec 2018	17BS3CS02	Mathematics for Computer Science	CO1	Classify Mathematical structures as well as operations and identify the correctness in Programs in computer science.
			CO2	Contrast the properties of relations and examine the partially ordered sets and lattices.
			CO3	Explain the concepts of Graphs and needs of mathematical structures by introducing the techniques of computing applications.
			CO4	Choose Basic probability axioms /rules and the moments of discrete /continuous random variables..
	17CS3IOT01	Data Structures using C	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.
	17CS3IOT01L	Data Structures using C 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.
	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.
	17CCC32	**Computer Organization and Architecture**	**CO1**	Describe basic structure of computer and instruction sets.
			CO2	Solve computer arithmetic operations.
			CO3	Use control signals for any operations.
			CO4	Describe the concept of cache mapping techniques.
			CO5	Examine the I/O organization and its registers.
	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	Apply knowledge of Java programming in different applications.
			CO4	Create different programms using packages.
			CO5	Demonstrate the various OOPs concepts using functions.
			CO6	Evaluate inhenritance using Java.
	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 Jan 2019 - Jun 2019	**17CS4IOT02**	**Microprocessors and Microcontrollers**	**CO1**	Discriminate the various pins and its functions of 8051 microcontroller.
			CO2	Explain the instruction sets of 8051
			CO3	Classify various addressing modes in 8051 and write assembly language programs.
			CO4	Write embedded c programs for on chip resources of 8051.
			CO5	Select the external devices with 8051 microcontroller.
	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.
	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**	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.
	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.
	17CS4CI01	**Information Security**	**CO1**	Explain the basic concepts and importance of information Security for an individual and to organization/Enterprise.
			CO2	
			CO3	Apply the skills learned in the information security into the real life scenarios.
	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.
V Jul 2019 - Dec 2019	**17CS5IOT03**	**Sensor Technologies**	**CO1**	Explain the characteristics of measurement of the sensors.
			CO2	Differentiate the static and dynamic characteristics of transducers.

			CO3	Discriminate the characteristics for embedded sensors.
			CO4	Design the applications of Sensors in Real time systems.
	17CS5IOT04	**Design and Analysis of Algorithm**	**CO1**	Examine the asymptotic performance of algorithms
			CO2	Explain choice of data structures and the algorithm design methods impact the performance of programs.
			CO3	Apply important algorithmic design paradigms and methods of analysis.
			CO4	Design an algorithm using appropriate design strategies for problem solving
	17CS5IOT05	**Big Data Analytics**	**CO1**	Explain the concept of BigData
			CO2	Define the concept of Hadoop
			CO3	Describe the concept of storage layer and processing layer of Hadoop
			CO4	Demonstrate the internals of MapReduce and YARN
			CO5	Examine the different modes and distribution of Hadoop
			CO6	Write MapReduce job for word count
	17CS5IOT06	**Python Programming**	**CO1**	Explore Python language fundamentals, including basic syntax, variables, types, control statements and functions.
			CO2	Applying various data structures, integrate data from disparate sources, transform data from one format to another, and program data management in relational databases.
			CO3	Create and customize plots on real data using various test and analysis of data.
			CO4	Implement regression models using machine learning.
	17CS5IOT07	**Introduction to IoT, Cloud And Big Data**	**CO1**	Explain Key concepts of Internet of things and Internet of Everything
			CO2	Describe The architecture view and strategy of deploying things using cloud
			CO3	Demonstrate How cloud plays an important role in IoT Infrastructure
			CO4	Judge the real time applications and defend future scope related to same.
	17CS5IOT08	**Digital Signal Processing**	**CO1**	Explain Digital signal and its characteristics.
			CO2	Compose the operations performed on Digital signals.
			CO3	Test the role of digital signals operations in digital communication system.
			CO4	Design digital filters and compare

				with Analog filters.
	17CS5IOT03L	**Sensor Technologies Lab**	**CO1**	Demonstrate Sensors
			CO2	Experiment the role and applications of sensors.
			CO3	Design an Embedded application application using sensors
	17CS5IOT06L	**Python Programming Lab**	**CO1**	Applying various data structures, integrate data from disparate sources, transform data from one format to another, and program data management in relational databases.
			CO2	Create and customize plots on real data using various test and analysis of data.
			CO3	Implement regression models using machine learning.
			CO4	Implement Machine learning models to solve real world problems.
VI Jan 2020 - Jun 2020	**17CS6IOT09**	**Embedded C with Arduino**	**CO1**	Explain the basics of Embedded systems and Arduino
			CO2	Compare architecture and instructions used in Arduino
			CO3	Propose Arduino, Embedded applications
			CO4	To apply different protocols used in IoT.
			CO5	Design an Embedded applications used in daily life.
			CO6	Invent an real time application in IoT.
	17CS6IOT10	**Mobile Application Development**	**CO1**	Explain the Web architecture and explore tools for web development.
			CO2	Create web page using HTML, CSS, Javascript and NodeJS.
			CO3	Demonstrate the structure of android studio environment.
			CO4	Design UI and develop android apps.
			CO5	Create dynamic android apps using data persistency in mobile environment.
			CO6	Design Control of real time Embedded System Applications from Cloud/Mobile.
	17CS6CI02	**Database Security**	**CO1**	Explain Concepts of Database Security Management System
			CO2	Summarize importance and need of NoSQL
			CO3	Summarize importance and need of UnSQL
			CO4	Demonstrate encrypt SQL server 2012 data using different techniques
			CO5	Experiment with enabling/disabling and altering security setting in SQL server 2012
			CO6	Experiment access SQL Server Auditing effectively for different

				purposes
	17CS6IOT11	**Machine Learning**	**CO1**	Discuss the basic concepts of statistical learning methods and models.
			CO2	Analyse the importance of unsupervised learning to handle multivariate data sets.
			CO3	Apply the different supervised algorithms related to classification techniques.
			CO4	Compare the performance of different machine learning algorithms.
			CO5	Apply multiple linear regression model to solve a real-world problem based on predictive data analytics.
			CO6	Analyse the concepts of hypothesis testing in parametric and nonparametric classification techniques.
	17DE6IOT11	**Elective I - Cloud Computing**	**CO1**	Compare various services and deployment models of cloud computing
			CO2	Contrast the services offered by various cloud service providers and find the feasible /optimal solution for a given business scenario
			CO3	Examine the cloud governance solution and legal issues of cloud
			CO4	Test how the cloud management strategies helps in achieving business goals
			CO5	Experiment the risks and consequences of Cloud Computing.
			CO6	Compare different cloud provider Amazon, Microsoft, SalesForce, Open Stack, Google
	17DE6IOT12	**Elective I - Cloud Web Services**	**CO1**	Identify and locate various cloud services available on a given cloud and provision various IT services at different deployment models.
			CO2	Compare and suggest the optimal / best web services for the respective service requirements
			CO3	Compare and contrast various cloud web services and utilize them to minimize cloud cost for a business organization.
			CO4	Design and illustrate the steps and techniques to migrate to the cloud web services
	17DE6IOT22	**Elective II - Cyber security incident response management**	**CO1**	Explain the possible adversary incidents in cyber space
			CO2	To understand handling and recovering from cyber security incidents
			CO3	Interpret possible ways of incident response and response

				management
			CO4	Examine incident management and incident detection
			CO5	Differntiate incident types and identify an incident response plan
			CO6	Apprise how security incidents are responded to by security teams
	17DE6IOT23	**Elective II - Software Engineering**	**CO1**	Apply software engineering principles and techniques to build software
			CO2	Develop and Conclude large-scale software systems, and produce efficient, reliable, robust and cost-effective software solutions.
			CO3	Apprise software quality and risk management.
			CO4	Examine ethical standards and legal responsibilities in software development.
			CO5	Test ability to work in one or more significant application domains
	17CS6IOT10L	**Mobile Application Development Lab**	**CO1**	Dvelop dynamic website
			CO2	Develop Android App
	17CS6IOT09L	**Embedded C with Arduino Lab**	**CO1**	Write Program for the Interface sensors and actuators on Microcontroller Board
			CO2	Apply basic concepts of embedded and analyze simple IoT prototype Projects.
			CO3	Examine practical applications of IoT and Test through mobile application.
			CO4	Identify and apply the suitable knowledge of IoT Cloud and Social Networking to Automate the day to day task.
VII Jul 2020 to Dec 2020	**17DE7IOT31**	**NLP**	**CO1**	Explain basic concepts of natural language processing and its important terminologies
			CO2	Interpret the key role of syntactic parsing and semantic analysis in natural language processing.
			CO3	Illustrate the importance of corpus creation in natural language processing
			CO4	Examine the statistical techniques used in natural language processing.
			CO5	Classify the words based on concept of Part-of-Speech tagging in English
			CO6	Outline the application of natural language processing in sentimental analysis and in biological sciences.
	17DE7IOT41	**IoT System Design**	**CO1**	Explain Practical approach to the communication network protocols
			CO2	Examine IoT System (Hardware) design using open source platforms

			CO3	Test IoT System design using Industry standard hardware.
			CO4	Classify Real time IoT Applications design using multiple platforms.
	17DE7IOT52	**Neural Networks**	**CO1**	Explain basic concepts of neural networks and its components.
			CO2	Examine neural network learning and adaption techniques.
			CO3	Describe the detailed concepts of single layer perceptron neural networks.
			CO4	Discuss detailed concepts of multilayer perceptron neural networks.
			CO5	Classify different associative memory concepts in retrieving information in data.
			CO6	Propose different field of application on neural network models.
	17DE7IOT61	**IoT Security and Analytics**	**CO1**	Explain what Security and Privacy challenges are face by IoT and how are they managed
			CO2	Discuss on important aspects of integrating Security with IoT
			CO3	Examine Manage and control the security features in a network
			CO4	Assess compliance with the legal frameworks of an IoT network
			CO5	Explain Systems Architecture of Smart Cloud Applications and Services for IoT System
			CO6	Test Disaster response and recovery
	17DE7IOT31 L	**NLP Lab**	**CO1**	Design and develop various text pre-processing and text analysis algorithms.
			CO2	Create and compose perfect language generators and corpus structure for text data analysis and interpretation.
			CO3	Apply the simple data visualization techniques which can be easily understood by the Non-IT people
	17DE7IOT41 L	**IoT System Design Lab**	**CO1**	Create day to day applications using Raspberry Pi and Arduino
			CO2	Combine cloud and security in day to day applications
VIII Jan 2021 - Jun 2021 Open Electives	**17IOT OE 821**	**Sensor Technologies**	**CO1**	Test characteristics of measurement of the sensors.
			CO2	Examine the static and dynamic characteristics of transducers.
			CO3	Experiment the characteristics for embedded sensors.
			CO4	Design the applications of Sensors in Real time systems.
	17IOT OE 822	**Introduction to IoT, Cloud And Big Data**	**CO1**	Discuss Key concepts of Internet of things and Internet of Everything
			CO2	Demonstrate The architecture view and strategy of deploying things

				using cloud
			CO3	Examine How cloud plays an important role in IoT Infrastructure
			CO4	Propose real time applications and what is future scope related to same.