M.Tech - Embedded System Technologies

Program Outcomes (POs)

PO 1   An ability to independently carry out research /investigation and development work to solve practical problems

PO 2   An ability to write and present a substantial technical report/document

PO 3   Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Program Specific Outcomes (PSOs)

PSO 01   Be able to offer customized solutions in the design and development ofvarious embedded system applications.

PSO 02   Exhibit the ability to carry out state of the art research inembedded systems and related domains.

Course Outcomes (Cos)

2017-2021 Batch

SEMESTER	Subject Name	Subject Code	CO Code	CO Statements
I	**EMBEDDED SYSTEMS DESIGN**	**18MTEST101**	**18MTEST101.1**	Compare general-purpose systems and embedded systems based on their characteristics.
			18MTEST101.2	Describe the components, peripherals and communication interfaces of an embedded system.
			18MTEST101.3	Illustrate the development and debugging process of an embedded system.
			18MTEST101.4	Compare the different scheduling techniques available in RTOS.
			18MTEST101.5	Illustrate the Embedded System Development Life Cycle and Trends in Embedded Industry.
	SOFTWARE TECHNOLOGIES FOR EMBEDDED SYSTEMS	**18MTEST102**	**18MTEST102.1**	Describe the concepts related to basics of SMART CARD and it's development.
			18MTEST102.2	Develop programs related to JAVA card Applets and APDU's.
			18MTEST102.3	Analyze the methodology of Embedded JAVA and J2ME.
			18MTEST102.4	Apply the concept of Python Basic functions.
			18MTEST102.5	Implement the various concepts of Python Programming.
	EMBEDDED SYSTEMS DESIGN LAB	**18MTEST101L**	**18MTEST101L.1**	Design and simulate the different sorting & code conversion algorithms using C language
			18MTEST101L.2	Design and Simulate the different LCD & LED Interfacing algorithms using PIC18 Microcontroller
			18MTEST101L.3	Implement and Simulate the different analog and digital conversion algorithms using PIC18 Microcontroller
			18MTEST101L.4	Implement and Simulate the Stepper and DC motor algorithms using PIC18 Microcontroller
			18MTEST101L.5	Perform case study on the CPU usage in multitasking environments.
	SOFTWARE TECHNOLOGIES FOR EMBEDDED SYSTEM LAB	**18MTEST102L**	**18MTEST102L.1**	write code in embedded C to to blink LED and display message
			18MTEST102L.2	write code in embedded C to drive serial communication using UART
			18MTEST102L.3	code in python program for implementing arithmetic and logical operations
			18MTEST102L.4	code in Python program to Create list, tuples, dictionary and Classes in python
			18MTEST102L.5	write Python code to interface RasberRy Pi with various sensors such as switch, temperature and himidity sensors
			18MTEST102L.6	Write a python program to interface camera and to send an alert message through mail

RESEARCH METHODOLOGY AND IPR	18MTRM01	18MTRM0.11	Understand research problem formulation.
		18MTRM0.12	Analyze research related information
		18MTRM0.13	Follow research ethics
		18MTRM0.14	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
		18MTRM0.15	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
		18MTRM0.16	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.
ADVANCED COMPUTER ARCHITECTURE	**18MTEST132**	**18MTEST132.1**	An ability to understand the operations of multiprocessor and multicomputer systems.
		18MTEST132.2	To understand the various advanced processor technology, pipelining and scalable architectures.
		18MTEST132.3	To know the working of superscalar pipeline, cache memory organization.
		18MTEST132.4	To understand the principles of multithreading, multithread architecture, static and dynamic data flow.
		18MTEST132.5	Improved Employability and entrepreneurship capacity due to knowledge up gradation on recent trends in embedded systems design
SENSORS AND WIRELESS SENSOR NETWORKS	**18MTEST133**	**18MTEST133.1**	Recognize the basics and applications of wireless sensor networks
		18MTEST133.2	Describe various concepts of MAC layer and routing protocols that exist for sensor networks
		18MTEST133.3	Demonstrate the Transport layer protocols and Middleware architecture
		18MTEST133.4	Analyze the operating systems and its design issues
		18MTEST133.5	Select the network management system and the infrastructure
		18MTEST133.6	Build the sensor networks with network simulators
NETWORKED EMBEDDED SYSTEMS	**18MTEST141**	**18MTEST141.1**	Explain the serial and parallel communication protocol related to embedded networking.
		18MTEST141.2	Discuss the concepts of USB & CAN bus.
		18MTEST141.3	Familiarize the basics of Ethernet communication
		18MTEST141.4	Explain the concepts of Embedded Ethernet.
		18MTEST141.5	Recognize the need for wireless protocols to indulge in Real world interfacing.

		18MTEST14 2.1	Understand the Hardware Infrastructure of Embedded Computing	
DISTRIBUT ED EMBEDDED COMPUTIN G	18MTEST1 42	**18MTEST14 2.2**	Elaborate the concept of Internet	
		18MTEST14 2.3	Write simple programs using JAVA for distributed applications	
		18MTEST14 2.4	Understand the concepts of embedded agents	
		18MTEST14 2.5	Demonstrate sound knowledge of embedded computing architectures	
EMBEDDED SIGNAL PROCESSO RS	18MTEST1 43	**18MTEST14 3.1**	Understand the various signal processing activities --- with embedded system	
		18MTEST14 3.2	Understand different processors used for embedded signal processing	
		18MTEST14 3.3	Understand the Architecture of the Blackfin Processor and its Filters design	
		18MTEST14 3.4	Analyze the processor code optimization and power management	
		18MTEST14 3.5	Design the different digital filter concepts using the simulation tools	
		18MTEST14 3.6	Study of the Different Blackfin processor Applications	
EMBEDDE D OS AND RTOS	**18MTEST 201**	**18MTEST2 01.1**	Understand the basics of Real -Time Operating System.	
		18MTEST2 01.2	Describe the concepts related to RTOS such as Scheduling techniques, threads.	
		18MTEST2 01.3	Develop Real Time software programs for real time services, multithreaded applications using advanced RTOS tool.	
		18MTEST2 01.4	Analyze the methodology of various Exceptions , Interrupts , Timers.	
		18MTEST2 01.5	Apply the concepts in Real Time case Studies. CO-	
		18MTEST2 01.6	Build real-time embedded systems using freeRTOS and VxWorksRTOSes.	
ADVANCE D VLSI TECHNOL OGY AND DESIGN	**18MTEST 202**	**18MTEST2 02.1**	Understand the design methodology and combination all logic circuits.	
		18MTEST2 02.2	Design sequential logic circuits.	
		18MTEST2 02.3	Understand interconnect and timing issues in digital circuits.	
		18MTEST2 02.4	Design arithmetic building blocks.	
		18MTEST2 02.5	Design memory and array structures.	
		18MTEST2 02.6	Originate case studies in memory design.	
EMBEDDE D OS AND RTOS LAB	**18MTEST 201L**	**18MTEST2 01L.1**	Understand the basics of UNIX Commands and Shell Programming.	
		18MTEST2	Describe the concepts related to CPU Scheduling and Task	

II

		01L.2	Management.	
		18MTEST2 01L.3	Develop algorithms and programs related to Task Synchronization and InterTask Communication.	
		18MTEST2 01L.4	Analyze the methodology of various Software Interrupts.	
		18MTEST2 01L.5	Apply the concepts in mutex Semaphores. CO6 : Implement Shared Memory and IPC.	
III	**ADVANCED VLSI TECHNOLOGY AND DESIGN LAB**	**18MTEST 202L**	**18MTEST2 02L.1**	Design/Simulation of other analog building blocks
			18MTEST2 02L.2	Design/Simulation Pipelined MIPS Processor
			18MTEST2 02L.3	Implement Out of Order Execution with Tomasulo's Algorithm
			18MTEST2 02L.4	Simulate Tools for Backend Design using Mentor Graphics/Cadence
			18MTEST2 02L.5	Simulate Tools for Semicustom Design using Mentor Graphics/Cadence
	REAL TIME EMBEDDED SYSTEMS	18MTEST2 31	18MTEST23 1.1	Apply appropriate scheduling policies to achieve higher system feasibility.
			18MTEST23 1.2	Understand hard real time theory and soft real-time concepts.
			18MTEST23 1.3	Devise and evaluate different embedded systems design for robotic, computer vision and media applications.
			18MTEST23 1.4	Evaluate the requirements of programming Embedded Systems, related software architectures and tool chain for Embedded Systems.
			18MTEST23 1.5	Analyze the embedded systems specification and develop software programs.
			18MTEST23 1.6	Develop Real Time applications but not restricted to Robotic and Computer Vision.
	RECONFIGURA BLE COMPUTING	18MTEST2 32	18MTEST23 2.1	Understand the Concept of Reconfigurable Computing and FPGA Architectures.
			18MTEST23 2.2	Understand and explore the various FPGA computing platforms in terms of design tools.
			18MTEST23 2.3	Explore and apply the basic building blocks of FPGA designing in terms of Programming (HDLs).
			18MTEST23 2.4	Analyze the Coarse-grained and Fine Grain configurability for performance enhancement using multi-FPGA systems.
			18MTEST23 2.5	Design, Analyze and apply reconfigurable computing in various applications for optimization.
			18MTEST23 2.6	To be able to create new designs and analyze advanced techniques such as Fault tolerance and Partial Reconfiguration.
	SOFTWARE AND SYSTEM ENGINEERI NG FOR EMBEDDED SYSTEMS	18MTEST 233	18MTEST2 33.1	Describe and illustrate the concept of Software Engineering , including their architecture and review concepts associated with hardware and software.
			18MTEST2 33.2	Describe and illustrate Embedded operation system , Software Quality, Integration, Testing Techniques and software development tools

		18MTEST2 33.3	To understand designing application from architectural perspective.
		18MTEST2 33.4	Perform various activities related to embedded software testing
		18MTEST2 33.5	Develop embedded software for automotive applications.
INTERNET OF THINGS	18MTEST 241	18MTEST2 41.1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
		18MTEST2 41.2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.
		18MTEST2 41.3	Appraise the role of IoT protocols for efficient network communication.
		18MTEST2 41.4	Elaborate the need for Data Analytics and Security in IoT.
		18MTEST2 41.5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
ARTIFICIAL NEURAL NETWORKS	18MTEST 242	18MTEST2 42.1	organize synaptic connectivity as the basis of neural computation and learning
		18MTEST2 42.1	Learn the ideological basics of artificial neural networks
		18MTEST2 42.2	learn the origins of artificial neural networks
		18MTEST2 42.3	know some application of artificial neural networks
		18MTEST2 42.4	identify the different structures of artificial neural networks.
		18MTEST2 42.5	Perceptron and dynamical theories of recurrent networks including amplifiers, attractors, and hybrid computation would be studied
EMBEDDED MEMORY TECHNOLO GIES	18MTEST 243	18MTEST2 43.1	Understand the basics of Embedded Memory Technologies
		18MTEST2 43.2	Apprehend SRAM, DRAM and Nonvolatile Memory Architectures
		18MTEST2 43.3	Understand Memory Fault Modeling, Testing,Memory Design for Testability.
		18MTEST2 43.4	Understand design trade-off in Memory design.
		18MTEST2 43.5	Classify Embedded Memory Technologies for various applications
3 HIGH PERFORMA NCE EMBEDDED SYSTEMS	18MTEST 351	18MTEST3 51.1	Interpret Control for MPSoC architecture
		18MTEST3 51.2	Discuss Dynamic compilation for everyone
		18MTEST3 51.3	Elaborate Hardware NDAP cache for arrays prefetchs
		18MTEST3 51.4	Analyzethe performance of transactional memory applications on multicore
		18MTEST3 51.5	Augment the Roofline Model via Lower Bound on Data Movement
EMBEDDED	18MTEST 352	18MTEST3 52.1	Understand Demand Response Management for Dependable Power Grids

			18MTEST3 52.2	Establish Intelligent Small Scale Decentralized Energy Systems
	SYSTEMS FOR SMART APPLIANCES AND ENERGY MANAGEMENT		18MTEST3 52.3	Provide Model Based Design of Smart Appliances
			18MTEST3 52.4	Discuss Wireless Network Standards for Building Automation
			18MTEST3 52.5	Analyze Security Considerations for Smart Embedded Appliances Networks
	NETWORK SECURITY & CRYPTOGRAPHY	18MTEST 353	18MTEST3 53.1	Perform encryption and decryption using classical encryption techniques
			18MTEST3 53.2	Establish strong understanding on various block cipher principles
			18MTEST3 53.3	Use public key and private key algorithms for securing communications
			18MTEST3 53.4	Demonstrate sound knowledge in different message authentication mechanims
			18MTEST3 53.5	Analyze security issues in web
			18MTEST3 53.6	Provide solutions to various kinds of internet security threats