Semester - I

3EC3109 Advanced Digital System Design [3 0 2 4]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Design digital circuits and system using MSI & LSI logic.
2. Implement digital systems using finite state machine and state machine chart.
3. Analyze timing performance of digital systems.
4. Implement the digital systems on reconfigurable platform using hardware description language.

3EC3110 Processor Architecture and Design [3 1 0 4]

Course Outcomes (COs):

At the end of the course, students will be able to –

1. Comprehend architecture of modern processer/controller and bus protocols for embedded system.
2. Appraise the concept of the instruction and thread level parallelism,
3. Analyze the performance of symmetric and distributed shared memory based multiprocessors.

3EC3111 Digital Signal Processing and Applications [3 0 2 4]

Course Outcomes (COs):

At the end of the course, students will be able to –

1. Design and implement various kinds of FIR, IIR and Adaptive filters
2. Design System based on multirate signal processing
3. Implement DSP algorithms and applications on DSP processor

3EC3112 Embedded Systems Programming [3 0 2 4]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Comprehend the requirements of Embedded Systems Software
2. Utilize the Software Architectures for Embedded System programming
3. Program Embedded Systems
4. Solve issues related to Run-time Environment and Memory management in Embedded Systems

3EC3113 Electronic System Design [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Analyze the design issues in analog, digital and mixed signal circuit design.
2. Utilize ADC-DAC for electronic systems.
3. Design op-amp based circuits and power supply used in electronic systems.
4. Interpret the concept of electromagnetic interference, electrostatic discharge and techniques to reduce them in electronic systems.

3EC3114 Embedded Networking Laboratory [0 0 2 1]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Interface microcontroller/microprocessor using popular buses
2. Experiment with network of devices using popular network standards.

Semester - II

3EC3209 Embedded Operating System [3 0 2 4]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Comprehend concepts of processes, threads, tasks, multitasking, multithreading in context of real time systems.
2. Decide for a given an embedded system whether an operating system will be required for its design.
3. Evaluate the performance of Rate-Monotonic Scheduling and Earliest-Deadline First Scheduling policies for a given real time system for task scheduling, turnaround time, waiting time, average waiting time of the processes.
4. Analyze the performance of RTx51Tiny and Micro-C Operating System in a given real time system for effects of scheduling, response-time, interrupt latency, memory management, process scalability, inter process communication and resource sharing.

Department Elective I

3EC32D101 Multimedia Systems and Applications [3 0 0 3]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Evaluate lossy and lossless compression algorithms for text, image, audio and video data.
2. Analyse audio, image and video compression standards - LZW, JPEG, MPEG, HEVC, LPC.
3. Comprehend different protocols of multimedia communication networking and their applications.

3EC32D102 Design of Integrated Circuits [3 0 0 3]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Analyse MOS based circuits working under linear and saturation region of operation.
2. Evaluate performance of MOS based analog and digital integrated circuit applications.
3. Design and optimize CMOS based digital combinational and sequential circuits for given specifications.
4. Design single stage amplifier and current mirror circuits using MOS.

3EC32D103 Industrial Automation and Control [3 0 0 3]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Comprehend industrial automation systems architecture, sensors and measurement systems for process control.
2. Evaluate the need of electric drive for given industrial control requirement and select the drive for it.
3. Propose industrial automation and control system using networking of sensors, actuators, drives and controllers for given specifications.

3EC32D104 Advanced Computer Networks [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Evaluate the performance of ATM, TCP/IP protocol suite, IEEE 802.11, Bluetooth, ZigBee, WiMAX for a given computer network for reliability and delay.
2. Evaluate the performance of Internet Protocol Version 6 (IPv6), Integrated Services Architecture (ISA), Weighted Fair Queuing (WFQ), Random Early detection (RED), Differentiated Services for a given network for congestion control and reliability.
3. Analyze the performance of Dynamic Destination-Sequenced Distance-Vector Routing Protocol, Ad hoc On-demand Distance Vector Routing, Dynamic Source Routing Protocol for a given network for power consumption, scalability and latency parameters.
4. Evaluate the performance of Multicast Routing, Resource Reservation Protocol, and Traffic Rate control for a given network for power consumption, scalability and latency parameters.

3EC32D105 Virtual Reality Engineering [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Comprehend the basics of Virtual Reality and its technology.
2. Analyze the available Virtual Reality mechanism of sensing, haptics, tracking and rendering.
3. Design Virtual Reality applications using hardware interfaces.

3EC32D106 Autonomous Navigation [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Compare and select the sensor technologies for autonomous navigation of robots and drones.
2. Plan the path of navigation using obstacle avoidance algorithms and exploration.
3. Apply tracking and motion estimation techniques for autonomous navigation.

Department Elective II

3EC32D201 Sensor Networks [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Design a wireless sensor network for given sensor data using microcontroller, transceiver and operating system.
2. Evaluate the performance of schedule based and random Medium Access Control protocols for a given wireless sensor networks for power consumption, fairness, channel utilization and control packet overhead.
3. Analyze gossiping and agent-based unicast forwarding, energy-efficient unicast, broadcast/ multicast techniques and Geographic routing protocol for power consumption, scalability and latency parameters.
4. Evaluate the performance of transport control protocols for a given wireless sensor network for congestion detection and avoidance, reliability and control packet overhead parameters.

3EC12D204 VLSI System on Chip [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Analyze modeling styles for design of system on chip.
2. Design data path architectures and solve intra-chip communication issues for given system on chip.
3. Apply partitioning and floor planning algorithms for effective system on chip design.
4. Utilize System Verilog, TLM, and System C for modeling and testing of system on chip.

3EC32D202 Software Engineering [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Propose the use of software models and understand the software engineering process in terms of requirements, design, and implementation for given applications.
2. Apply software engineering process to an embedded software project.
3. Produce software design based on requirements and conduct verification, validation and documentation.

3EC32D203 VLSI Digital Signal Processing [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Estimate the iteration bound of given digital systems using data flow graph representation.
2. Apply pipelining and parallel processing to improve speed and power performance of the digital systems.
3. Perform folding, unfolding and retiming operations on the given digital systems.
4. Design digital processing systems architecture for performance improvement in terms of area, power and speed.

3EC32D204 Cyber Physical Systems [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Address challenges in implementing a cyber-physical system from a computational perspective.
2. Integrate real valued and dense time real time systems with software based discrete automated control.
3. Design and validate problems for Cyber Physical Systems using formal methods, safety assurance and security aspects.

3EC32D205 Hardware Security [3 0 0 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Identify and analyze vulnerabilities in Digital Logic Design and its solution using Crypto Algorithms.
2. Analyze physical and side-channel attacks and provide solution for its countermeasures.
3. Analyze and design secured cryptographic Hardware using trusted Trojan detection mechanism, trusted IC and FPGA implementation of crypto hardware.

Department Elective III

3EC32D301 Mobile Programming [2 0 2 3]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Design and develop Mobile User Interfaces for given embedded system.
2. Evaluate and choose suitable wireless connectivity, mobile security and mobile development process for embedded systems.
3. Develop mobile applications using the Android Programming for given specification for embedded system.

3EC32D302 Speech and Image Processing [2 0 2 3]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Analyse speech processing feature extraction and speaker recognition methods using Fourier Transform.
2. Analyse and process Images using multi-resolution transform, segmentation, edge detection and colour image processing algorithms.
3. Apply speech and image processing algorithms for voice and object recognition problems.

3EC32D303 Internet of Things [2 0 2 3]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Design framework for Internet of Things (IoT) for given applications using suitable sensor, microcontroller, and communication protocol and cloud architecture.
2. Comprehend sensor types, power management, IP based and non-IP based WLAN, WPAN and WWAN communication protocols and cloud messaging protocols related to IoT.
3. Evaluate the performance of cloud service models for the given IoT based applications.

3EC32D304 Testing and Verification of Embedded Systems [2 0 2 3]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Propose the verification architecture of given Embedded Systems.
2. Apply the concepts of hardware – software co design from testing and verification point of view.
3. Design SoC test wrapper for embedded systems.
4. Perform testing on given embedded software components.

3EC32D305 High Performance Computing [2 0 2 3]

Course Outcomes (COs):
At the end of the course, students will be able to -

1. Comprehend parallel processing mechanism and analyze the issues related with the High Performance Computing.
2. Program graphics processor using CUDA.
3. Propose Power aware computing and communication for high performance computing.

3EC32D306 Machine Learning for Embedded Systems [2 0 2 3]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Analyze and compare machine learning approaches as supervised, unsupervised, regression and ensemble algorithms.
2. Demonstrate the implementation of machine learning algorithms on embedded platform of GPU, CPU and FPGA and analyze the issues of computational complexity, memory and speed.
3. Apply machine learning concepts of Neural Network and Deep Learning for the given application.

3SS1201 Research Methodology and IPR [2 0 0 2]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Formulate a research problem for a given engineering domain.
2. Analyse the available literature for given research problem.
3. Develop technical writing and presentation skills.
4. Comprehend concepts related to patents, trademark and copyright.

3EC3210 Minor Project [0 0 10 5]

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Identify the issues related to the recent trends in the field of embedded systems.
2. Formulate the problem definition, analyse and do functional simulation of the same.
3. Design, implement, test and verify the engineering solution related to the problem definition.
4. Compile, comprehend and present the work carried out.