III Year II Semester Course Code: 23EE6E05	EMBEDDED SYSTEMS FROM EEE (OPEN ELECTIVE-II)	L	T	P	C
		3	0	0	3

CO1	Illustrate the building blocks, Core, characteristics, quality attributes of typical embedded system.	L2
CO2	Identify various electronic devices to design an embedded hardware.	L3
CO3	Identify different approaches and concepts for embedded Firmware design.	L3
CO4	Choose an Operating System for a Real – Time system and Identify fundamental issues in system co-design.	L3
CO5	Illustrate the process of embedded system development, implementation and testing using different utility tools..	L2

Unit-I: Introduction: Embedded System-Definition, History, Classification, application areas and purpose of embedded systems, The typical embedded system-Core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, PCB and passive components. Characteristics, Quality attributes of an Embedded systems, Application-specific and Domain-Specific examples of an embedded system.

Unit-II: Embedded Hardware Design: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

Unit-III: Embedded Firmware Design: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

Unit-IV: Real Time Operating System: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Threads, Processes and Scheduling, Task Scheduling, Communication, Synchronization, Device Drivers, How to choose an RTOS.

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Hardware Software Co-Design: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

Unit-V: Embedded System Development: The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

Embedded System Implementation and Testing: The main software utility tool, CAD and the hardware, Translation Tools-Pre-processors, Interpreters, Compilers and Linkers, debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

Text Books:

1. Embedded Systems Architecture by Tammy Noergaard, Elsevier Publications, 2005
2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications.

References:

1. Embedded Systems, Raj Kamal-Tata McGraw Hill Education Private Limited, Second Edition, 2008.

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