

Embedded Systems

CourseCode	23EC2702A	Year	IV	Semester	I
Course Category	OE-IV	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Microprocessors & Microcontrollers
ContinuousInternal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		BL
CO1	Understand the basic concepts of an embedded system and be able to build an embedded system.	L2
CO2	Apply hardware and firmware design concepts for embedded system development.	L3
CO3	Analyse embedded systems using RTOS concepts and hardware-software co-design principles.	L4
CO4	Analyse development tools, debugging and testing techniques for embedded systems.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1:Low)													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3				1			2	2			2	3
CO2	3				1			2	2			2	3
CO3	2	3	2		1			2	2			2	3
CO4	3	3	2		1			2	2			2	3
Avg.	3	3	2		1			2	2			2	3

Syllabus		
UnitNo.	Contents	Mapped CO
1	Introduction: Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.	CO1
2	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.	CO2
3	Embedded Firmware Design: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.	CO2
4	Real Time Operating System: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Processes and Scheduling, Task communication, Task synchronization. Hardware Software Co-Design: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design.	CO3

5	Embedded System Development, Implementation and Testing: The integrated development environment, Types of files generated on cross-compilation, Deassembler/ De-compiler, Simulators, Emulators and Debugging, Target hardware debugging, Embedded Software development process and tools, Testing on host machine, Simulators, Laboratory Tools.	CO4
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Learning Resources	
Text Books	
1. Shibu. K.V-Embedded Systems- Tata McGraw Hill Education Private Limited, 2013. 2. Rajkamal, Embedded Systems Architecture, Programming and Design, 2 nd Ed., McGraw Hill Education	
Reference Books	
1. Tammy Noergaard, Embedded Systems Architecture- Elsevier Publications, 2013. 2. Frank Vahid, Tony Givargis, Embedded System Design, John Wiley Publications, 2013. 3. Lyla B.Das- Embedded Systems- Pearson Publications, 2013.	
e- Resources & other digital material	
1. https://nptel.ac.in/courses/108102169	