

## Embedded and Real Time Systems

<b>Course Code</b>	20EC4703E	<b>Year</b>	IV	<b>Semester</b>	I
<b>Course Category</b>	Program Elective-V	<b>Branch</b>	ECE	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	--
<b>Continuous Internal Evaluation:</b>	30	<b>Semester End Evaluation:</b>	70	<b>Total Marks:</b>	100

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### Course Outcomes

Upon successful completion of the course, the student will be able to	
CO1	<b>Illustrate</b> the Embedded Systems and its constituents. (L2)
CO2	<b>Apply</b> design methodologies for embedded systems. (L3)
CO3	<b>Build</b> fundamental embedded system. (L3)
CO4	<b>Develop</b> embedded systems with specifications and technological choice. (L3)
CO5	<b>Utilize</b> modern hardware/software tools for building prototypes of embedded systems. (L3)

### Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation      2-Medium correlation      3-Strong correlation

\* - Average value indicates course correlation strength with mapped PO

CO/PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	2									2			2	
CO-2	2									2			2	
CO-3	2									2			2	
CO-4	3					2				3			3	
CO-5	2				2					2			2	
Average* (Rounded to nearest integer)	2									2			2	

### Syllabus

Unit No.	Contents	Mapped CO
1	<b>Introduction:</b> History of Embedded Systems, Major Application Areas of Embedded Systems, Purpose of Embedded Systems, Core of the Embedded System, Sensors and Actuators, Communication Interface, Embedded Firmware.	CO1,CO2
2	<b>Hardware Software Co-Design And Programme Modeling:</b> Characteristics of an Embedded System, Quality Attributes of Embedded Systems, Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Hardware Software Trade-offs.	CO1,CO3
3	<b>Devices in Embedded Systems:</b> Types of supporting devices for	CO1,CO4

	an embedded system – various forms of ROM, RAM devices, interrupt sources, Interrupt Service Mechanism, serial port devices, parallel port devices, timers and counting devices.	
4	<b>Communication Buses for Device Networks:</b> Interfacing Features in Device Ports, Wireless Devices, Networked Embedded Systems, Serial Bus Communication Protocols, Parallel Bus Device Protocols- Parallel Communication Network Using ISA, PCI, PCI-X and Advanced Buses.	CO1,CO4
5	<b>Design of Real Time Systems:</b> processors in complex embedded systems, design process in embedded system, optimizing design metrics, Case study for adaptive cruise control system in car.	CO1,CO5

### Learning Resources

#### Text Books

1. Raj Kamal, Embedded Systems Architecture, Programming and Design, 2<sup>nd</sup> Ed., McGraw Hill
2. Shibu KV, Introduction to Embedded System, Mc-Graw Hill.

#### References

1. Peckol, Embedded system Design, John Wiley & Sons, 2010
2. Lyla B Das, Embedded Systems-An Integrated Approach, Pearson, 2013
3. Dr. K.V.K.K. Prasad, Embedded/Real-Time Systems, Dream Tech press

#### e- Resources

1. Microsoft PowerPoint - pcp\_embedded\_system\_intro (iitb.ac.in)
2. NPTEL :: Electrical Engineering - Embedded Systems