

7 th Semester	REC7D002	Embedded Systems	L-T-P 3-0-0	3 CREDITS
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Module-I (12 hrs)

Hardware Concepts Embedded System: Application and characteristics of embedded systems, Overview of Processors and hardware units in embedded system, embedded software in a system, Examples of Embedded system.

ARM:ARM pipeline, Instruction Set Architecture ISA: Registers, Data Processing Instructions, Data Transfer Instructions, Multiplication's instructions, Software interrupt, Conditional execution, branch instruction, Swap instruction, THUMB instructions.

Module-II (8hrs)

Devices and device drivers: I/O devices, Serial peripheral interfaces,IIC, RS232C, RS422, RS485, Universal serial bus, USB Interface, USB Connector IrDA, CAN, Bluetooth, ISA, PCI, PCI -X and advance busses, Device drivers.

Module –III (9 hrs)

Real Time Operating System (RTOS): Real-Time Task Scheduling: Some important concepts, Types of real-time tasks and their characteristics, Task scheduling, Clock-Driven scheduling, Hybrid schedulers, Event-Driven scheduling, Earliest Deadline First (EDF) scheduling, Rate monotonic algorithm (RMA)

Module –IV (8 hrs)

Modelling Techniques: Software and programming concept: Processor selection for an embedded system, State chart, SDL, Petri-Nets, Unified Modeling Language (UML). Hardware software codesign. Hardware and software partitioning: K-L partitioning, Partitioning using genetic algorithm,

Module –V (8 hrs)

Low power embedded system design: Dynamic power dissipation, Static power dissipation, Power reduction techniques, system level power management. Software design for low power devices.

Books:

- [1] "Embedded system architecture, programming and design" By Raj Kamal, TMH.
- [2] "Embedded System Design" by Santanu Chattopadhyay, PHI
- [3] Frank Vahid and Tony Givargis, Embedded Systems Design – A unified Hardware /Software Introduction, John Wiley, 2002.
- [4] "Hardware software co-design of Embedded systems" By Ralf Niemann, Kulwer Academic.
- [5] "Embedded real time system programming" By Sriram V Iyer, Pankaj Gupta, TMH.

Digital Learning Resources:

Course Name: Embedded Systems
Course Link: <https://nptel.ac.in/courses/108/102/108102045/>
Course Instructor: Prof. Santanu Chaudhary, IIT Delhi

Course Name: Embedded Systems
Course Link: <https://nptel.ac.in/courses/108/105/108105057/>
Course Instructor: Prof. Amit Patra et al, IIT Kharagpur

Course Name: Embedded Systems Design
Course Link: <https://nptel.ac.in/courses/106/105/106105159/>
Course Instructor: Prof. Anupam Basu, IIT Kharagpur