

# EMBEDDED COMPUTING SYSTEMS

Written by Administrator  
Sunday, 08 November 2009 09:33 -

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Subject Code

:

06CS74/IS752

IA Marks

:

25

No. of Lecture Hrs./ Week

:

04

Exam Hours

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:

03

Total No. of Lecture Hrs.

:

52

Exam Marks

:

100

**PART - A**

## UNIT - 1

**INTRODUCTION TO EMBEDDED SYSTEMS – 1:** Embedded systems; Processor embedded into a system; Embedded hardware units and devices in a system; Embedded software in a system; Examples of embedded systems; Embedded System-on-Chip (SoC) and use of VLSI circuit design technology; Complex systems design and processors; Design process in embedded system.

**7 Hours**

## UNIT - 2

**INTRODUCTION TO EMBEDDED SYSTEMS – 2, DEVICES - 1:** Formalization of system design; Design process and design examples; Classification of embedded systems; Skills required for an embedded system designer. I/O types and examples; Serial communication devices; Parallel device ports; Sophisticated interfacing features in device ports.

**6 Hours**

## UNIT - 3

**DEVICES - 2, COMMUNICATION BUSES FOR DEVICE NETWORKS:** Wireless devices; Timer and counting devices; Watchdog timer; Real time clock; Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems;

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Wireless and mobile system protocols.

**6 Hours**

**UNIT - 4**

**DEVICE DRIVERS AND INTERRUPTS SERVICE MECHANISM:** Device access without interrupts; ISR concept; Interrupt sources; Interrupt servicing

mechanism; Multiple interrupts; Context and the periods for context-switching, interrupt latency and deadline; Classification of processors' interrupt service mechanism from context-saving angle; Direct memory access; Device drivers programming.

**7 Hours**

**PART - B**

**UNIT - 5**

**PROGRAM MODELING CONCEPTS, PROCESSES, THREADS, AND TASKS:** Program

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models; DFG models; State machine programming models for event controlled program flow; Modeling of multiprocessor systems. Multiple processes in an application; Multiple threads in an application; Tasks and task states; Task and data; Distinctions between functions, ISRs and tasks.

**7 Hours**

## UNIT - 6

**REAL-TIME OPERATING SYSTEMS – 1:** Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/O sub-systems management; Interrupt routines in RTOS environment and handling of interrupt source calls.

**6 Hours**

## UNIT - 7

**REAL-TIME OPERATING SYSTEMS – 2:** Real-Time Operating Systems; Basic design using an RTOS; RTOS task scheduling models, interrupt latency and response times of the tasks as performance metrics; OS security issues.

**6 Hours**

## UNIT - 8

**EMBEDDED SOFTWARE DEVELOPMENT, TOOLS:** Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system; Issues in hardware-software design and co-design; Testing on host machine; Simulators; Laboratory tools.

**7 Hours**

### TEXT BOOK:

1. **Embedded Systems Architecture: Programming and Design** – Rajkamal, 2<sup>nd</sup> Edition, Tata McGraw Hill, 2008.

### REFERENCE BOOKS:

1. **Computers as Components: Principles of Embedded Computer System Design** – Wayne Wolf, Elsevier, 2005.

2. **Embedded Systems Architecture** – Tammy Noergaard, Elsevier, 2005.
  
3. **Embedded Systems Design** – Steve Heath, 2<sup>nd</sup> Edition, Elsevier, 2003.
  
4. **Embedded/Real-Time Systems: Concepts, Design and C Programming: The Ultimate Reference** – Dr.  
K.V.K.K. Prasad, Dreamtech Press, 2004.
  
5. **Embedded C** – Michael J.Point, Pearson Education, 2002.