

Semester-II Paper-4
EMBEDDED SYSTEM DESIGN

Teaching Scheme

Lecturers: 4 Hrs / week

Practical: 2 Hrs / week

Examination Scheme

Theory: 100 marks

Term work: 25 marks

Unit 1.

(10 Hrs, 20 Marks)

Introduction to functional building blocks of embedded systems: Register, memory devices, ports, timer, interrupt controllers using circuit block diagram representation for each categories.

Unit 2.

(10 Hrs, 20 Marks)

Structural units in a processor; selection of processor & memory devices; shared memory; DMA; interfacing processor, memory and I/O units; memory management – Cache mapping techniques, dynamic allocation - Fragmentation.

Unit 3.

(10 Hrs, 20 Marks)

I/O devices; timer & counting devices; serial communication using I²C, CAN, USB buses; parallel communication using ISA, PCI, PCI/X buses, arm bus; interfacing with devices/ports, device drivers in a system – Serial port & parallel port.

Unit 4.

(10 Hrs, 20 Marks)

Intel I/O instruction: Transfer rate, latency; interrupt driven I/O, Non-maskable interrupts; software interrupts, writing interrupt service routine in C & assembly languages; preventing interrupt overrun; disability interrupts.

Multi threaded programming: Context switching, premature & non-premature multitasking, semaphores.

Scheduling: Thread states, pending threads, context switching, round robin scheduling, priority based scheduling, assigning priorities, deadlock, watch dog timers.

Unit 5.

(10 Hrs, 20 Marks)

Introduction to basic concepts of RTOS, Basics of real time & embedded system operating systems, RTOS – Interrupt handling, task scheduling; embedded system design issues in system development process, Action plan, use of target system, emulator, use of software tools.

References:

1. Embedded System – Architecture, Programming, Design, “Rajkamal”, Tata McGraw Hill, 2003.
2. Fundamentals of Embedded Software, “Daniel W. Lewis”, Prentice Hall of India, 2004.
3. An Embedded Software Primer, “David E. Simon”, Pearson Education, 2004.
4. Embedded System Design – A Unified hardware & Software Introduction, “Frank Vahid”, John Wiley, 2002.
5. Embedded Real Time Systems Programming, “Sriram V. Iyer, Pankaj Gupte”, Tata McGraw Hill, 2004.
6. Embedded System Design, “Steve Heath”, II edition, Elsevier, 2003.

List of Experiments:

Term work shall consist of at least **eight** experiments based on above topics