

EMBEDDED SYSTEM [EX] - SYLLABUS

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Lecture : 3 Year : III

Tutorial : 1 Part : II

Practical : 1.5

Course Objective:

To introduce students to understand and familiarization on applied computing principles in emerging technologies and applications for embedded systems

1. Introduction to Embedded System [3 Hours]

- 1.1 Embedded Systems overview
- 1.2 Classification of Embedded Systems
- 1.3 Hardware and Software in a system
- 1.4 Purpose and Application of Embedded Systems

2. Hardware Design Issues [4 Hours]

- 2.1 Combination Logic
- 2.2 Sequential Logic
- 2.3 Custom Single-Purpose Processor Design
- 2.4 Optimizing Custom Single-Purpose Processors

3. Software Design Issues [6 Hours]

- 3.1 Basic Architecture
- 3.2 Operation
- 3.3 Programmer's View
- 3.4 Development Environment
- 3.5 Application-Specific Instruction-Set Processors
- 3.6 Selecting a Microprocessor
- 3.7 General-Purpose Processor Design

4. Memory [5 Hours]

4.1 Memory Write Ability and Storage Permanence

4.2 Types of Memory

4.3 Composing Memory

4.4 Memory Hierarchy and Cache

5. Interfacing [6 Hours]

5.1 Communication Basics

5.2 Microprocessor Interfacing: I/O Addressing, Interrupts, DMA

5.3 Arbitration

5.4 Multilevel Bus Architectures

5.5 Advanced Communication Principles

6. Real-Time Operating System (RTOS) [8 Hours]

6.1 Operating System Basics

6.2 Task, Process, and Threads

6.3 Multiprocessing and Multitasking

6.4 Task Scheduling

6.5 Task Synchronization

6.6 Device Drivers

7. Control System [3 Hours]

7.1 Open-loop and Close-Loop control System overview

7.2 Control System and PID Controllers

7.3 Software coding of a PID Controller

7.4 PID Tuning

8. IC Technology [3 Hours]

- 8.1 Full-Custom (VLSI) IC Technology
- 8.2 Semi-Custom (ASIC) IC Technology
- 8.3 Programming Logic Device (PLD) IC Technology

9. Microcontrollers in Embedded Systems [3 Hours]

- 9.1 Intel 8051 microcontroller family, its architecture and instruction sets
- 9.2 Programming in Assembly Language
- 9.3 A simple interfacing example with 7 segment display

10. VHDL [4 Hours]

- 10.1 VHDL overview
- 10.2 Finite state machine design with VHDL

Practical:

Student should be complete project work related to this subject.

Reference Books:

1. David E. Simon, "An Embedded Software Primer", Addison-Wesley, 2005
2. Muhammad Ali Mazidi, "8051 Microcontroller and Embedded Systems", Prentice Hall, 2006
3. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley & Sons, 2008
4. Douglas L. Perry, "VHDL Programming by example", McGraw Hill, 2002

Evaluation Scheme:

The question will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

Unit	Hour	Mark Distribution*
1	3	4
2	4	8
3	6	8
4	5	8
5	6	8
6	8	12
7	3	8
8	3	8
9	3	8
10	4	8
Total	45	80

*There may be minor variation in marks distribution.