

Microprocessor Based Design

Course Title: Microprocessor Based Design
Course No: CSC324
Nature of the Course: Theory + Lab
Semester: V

Full Marks: 60 + 20 + 20
Pass Marks: 24 + 8 + 8
Credit Hrs: 3

Course Description: In this course, the range of issues to be considered in designing a microprocessor-based system is discussed. First, the criteria for selecting a microprocessor/microcontroller are discussed, and second, the hardware and software aspects of designing systems are focused.

Course Objective: The course objective is to demonstrate the concept of microprocessor and to be able to design a microprocessor based system to get desired results. It also emphasizes on hardware interfacing of 8051 to develop solutions of real world problems.

Detail Syllabus:

Unit 1	Teaching Hours (12)
Introduction to Microcontroller	
Overview of Typical Microcontroller, The Pico controller	2
The Microcontroller's Memory, The Central Processor, Timing	2
The I/O Interface, The Address, Data, and Control Buses	2
The Pico controller Design	2
Software/Firmware Development Architecture	1.5
Interfacing, Interfacing Types, Interfacing Techniques	1.5
Introduction of PIC, and ARM	1
Unit 2	Teaching Hours (7)
Sensors and Actuators	
Sensors	1
Analog to Digital Conversion	2
Control Algorithm,	1
Digital to Analog Conversion	2
Actuator	1
Unit 3	Teaching Hours (8)
Bus and Communication Technology	
Common Parallel and Serial Bus Systems	2
Topology	0.5
Arbitration	1
Synchronization	0.5
CAN-Protocol	1
Bluetooth, PCI	1
ISA	1.5
WIFI	0.5
Unit 4	Teaching Hours (12)
Introduction to 8051 Microcontroller and Programming	
8051 architecture and pin diagram	3
Registers, Timers, Counters, Flags	

Special Function Registers	1
Addressing Modes	1
Data types, Instructions and Programming	0.5
Single-bit Operations	1.5
Timer and Counter Programming	1
Interrupts Programming	1
Serial Communication	1
Memory Accessing and their Simple Programming Applications	1
Unit 5	Teaching
Electromagnetic Interference and Compatibility	Hours (6)
Basics of PCB Design	1
Design Consideration	1
Impact of EMI	1
Sources of EMI	1
Types of Noise	0.5
Grounding, Shielding	1
EMI, and EMC Standard	0.5

Laboratory works:

- Programming and Application development using any microcontroller like 8051, Atmel, Arduino platform
- Interfacing different Sensors and I/O Devices
- Small scale PCB design using software design tool
- Interfacing to ADC, DAC, and Sensors

Recommended Books:

1. D. V. Hall, **Microprocessors and Interfacing - Programming and Hardware**, McGraw Hill
2. K. J. Ayala, **The 8051 Microcontroller: Architecture, Programming and Applications**, West
3. Mazidi, M.A., **The 8051 Microcontroller and Embedded System**, Pearson Education (2008)
4. T. Bansod, Pratik Tawde, **Microcontroller Programming (8051, PIC, ARM7 ARM Cortex)**, Shroff Publishers & Distributors Pvt. Ltd

Model Question

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Section A

Attempt any two questions. (2 × 10 = 20)

1. Explain 8051 block diagram and also highlight on its unique features. (10)
2. What are different interfacing techniques of a microcontroller? Explain (10)
3. Explain about various types of addressing modes. (10)

Section B

Attempt any eight questions. (8 × 5 = 40)

4. Highlight on the functionality of CAN protocol layer.(5)
5. Explain various serial data transmission modes of 8051. (5)
6. Explain on the basics of PCB design. (5)
7. Differentiate between serial and parallel bus systems.(5)
8. What are the basic features of ARM.? Discuss on its applicability. (3+2)
9. Explain about various Timer modes of 8051. (5)
10. What are the major roles of Instruction Set? Explain Instruction Set Architecture.(2+3)
11. Differentiate between sensors and actuators. Explain various types of noises. (5)
12. Write short notes on: (2 × 2.5 = 5)
 - a. PCI
 - b. Shielding