

Microprocessor Based Design (CSC-305)
Tribhuvan University
Institute of Science and Technology
Soch College of Information Technology

Course Title: Microprocessor Based Design

Course no: CSC-305 ----- Full Marks: 60+20+20

Credit hours: 3 ----- Pass Marks: 24+8+8

Nature of course: Theory (3 Hrs.) + Lab (3 Hrs.)

Goal: The course objective is to apply the knowledge of microprocessor with other digital/analog system and interfacing to design a complete system.

Course Contents:

Unit 1. Interfacing Concept ----- 4 Hrs.

Interfacing, Interfacing Types, Address Decoding, I/O Mapping, Memory Mapping, I/O Memory Mapping, Registers and Input/output Registers, PC Interfacing Techniques.

Unit 2. Digital Interfacing ----- 12 Hrs.

Input/output and Microcomputer, Simple input, Simple output, Programmable Parallel Ports, Handshaking, Single handshaking IO, Double handshaking IO, Introduction to Programmable Peripheral Interface 8255 A, Functional Block Diagram, Different Modes of Operations, Introduction to Programmable Interval Timer 8253 and Difference between 8253 and 8254, Functional Block Diagram, Different Modes of Operation, Keyboard Interfacing, Alphanumeric Display Interfacing, Microcomputer ports Interfacing to high-power devices.

Unit 3. Interrupts & Interrupt Controller ----- 6 Hrs.

Interrupt Vector Tables, Types of Interrupts, Assembly Language program and Interrupt Procedure Hardware interrupts and Applications, Examples of Various ISR, Introduction to Programmable Interrupt Controller 8259, Functional Block Diagram, Operations of Interrupt, Programming of 8259

Unit 4. Analog Interfacing ----- 5 Hrs.

Operational Amplifier Basics, Sensors and Transducers, Digital to Analog Conversion and Analog to Digital Conversion – Basics, Operations, Specification, Applications and Interfacing, A Microcomputer Based Industry-Process Control System.

Unit 5. Serial and Parallel Data Communication ----- 6 Hrs.

Synchronous and Asynchronous Data Communication, Parity and other error control, Baud rates, Serial Interface Device, Serialization, RS 232 Interface Pin Description, Simplex Connection, Duplex Connection, Full Duplex Connection, Connection Between DTE to DTE, Connection to Printers and Zero Modem.

Unit 6. Microcontroller & Interfacing ----- 8 Hrs.

General Microcontroller Concept, Pin Configuration, I/O Port Structure, Memory Organization, Special Function Registers, External Memory, Reset Operations, Instruction Set, Timer Operation, Serial Port Operation, Interrupt Design and Processing, Assembly Instructions and Programming.

Unit 7. Grounding and Shielding ----- 4 Hrs.

Outline for grounding and shielding, Single point grounding and grouped loop, Noise, noise coupling mechanism and prevention, Filtering and smoothing, Different kinds of shielding mechanism, Protecting against electrostatic discharge, Line filters, isolators and transient suppressors

Laboratory works:

Assembly language based programming. PPI, ADC and various interfacing with RS232, Printer Port should be experimented. At the semester end, individual project work based on microcontroller for industry process control should be done.

Lab exercise may comprise some of the followings:

Assembly language programming

Simple data transfer using PPI

Handshake transfer using PPI

Interfacing of A/D converter using PPI

Interfacing of A/D using Micro controller

Interfacing of A/D converter using Printer port

Demonstration of other interfacing techniques and devices

Writing an interrupt Service Routine

Text / Reference books:

D. V. Hall, Microprocessors and Interfacing - Programming and Hardware, McGraw Hill

K. J. Ayala, The 8051 Microcontroller: Architecture, Programming and Applications, West Publishing

K.R. Fowler, "Electronic Instrument Design", New York Oxford, Oxford University Press.

E.O. Duebelin, "Measurement System Application and Design" Tata McGraw Hill, New Delhi