Indian Institute of Technology Kharagpur
Department of Computer Science & Engineering
Autumn Semester 2004

Course: Microprocessors & Microcontrollers (CS43003)

L-T-P :(3 – 0 – 3), Credits 5

Faculty : **Ajit Pal**
Lecture hours : **MON-3, WED-(1)2, THU-3** Room #: **108**, CSE Building
Lab Wed-6-8, Hardware Lab, CSE Department

Scope: This course is intended as a first level course for microcomputer and embedded system design. Designer of an embedded system must have a through understanding of hardware, software and system integration. In view of this, various aspects of hardware design, such as interfacing of memory and different types of I/O devices, will be covered in details. As it is customary to write software in machine or assembly language for embedded system applications, laboratory assignments will be on assembly language programming of 8085 and 8051. The students will also learn to use development aids, such as a simulator and an in-circuit-emulator to perform software development, hardware development and hardware-software integration. Finally, each batch of students will implement a complete microcontroller-based system as part of the lab assignment.

Prerequisite: The students should have good background on digital circuits (should have attended the course *Switching Circuits and Logic Design (CS23003)*).

Text Books:

T1 Gaonkar R., Microprocessor Architecture, Programming, and Applications with the 8085, Penram

T2 Pal A., Microprocessors: Principles and Applications, TMH

T3 Ayala K. J., *The 8051 MicrocontrollerArchitecture, Programming & Applications*, Penram

T4 Mazidi and Mazidi, Microcontroller and Embedded Systems, Pearson Education

T5 Kapadia, R., 8051 Microcontroller and Embedded Systems, Jaico

Evaluation:

Theory	60%
Lab	40%
Mid-term	30%
End-term	50%
Term Assessment	20%

Course Outline:

Microprocessors: Historical background; Organization & Architectural Features of Microprocessor & Micro Controllers; The Instruction Set: Instruction format, addressing modes; Assembly language programming of 8085 and 8051; Interfacing of memory devices; Data transfer techniques and I/O ports; Interfacing of keyboard and display devices; Programmable Interrupt and DMA controllers; Interfacing of sensors, transducers, actuators, A/D & D/A Converters, Analog Signal Conditioning Circuits, Data acquisition systems; Standard Interfaces – RS232, USB; Development aids and troubleshooting techniques; Application examples; Advanced microprocessors and microcontrollers.

Laboratory Assignments:

Assembly and Machine Language Programming, Signal Generators, Interfacing Basic I/O Devices like Keypad, LED Display, Usage of Timers & USART Peripherals, Multi-Port Device access, Stepper Motor Movement Control, DC Motor Speed Control. Bootstrap Programming & Interfacing various peripherals for embedded applications; Building a complete microcontroller-based system.

* * * Classes to start from August 4, 2004