

## T.E. (ELECTRONICS) SEMESTER V

### Microprocessors & Microcontrollers

<b>Lectures: 3 hours / week</b>	<b>Theory Paper: 3 hours and 100 marks</b>
<b>Practicals: 3 hours / week</b>	<b>Termwork: 25marks</b>

*Rationale:: This second course on Microprocessors discusses the organization, architecture and operation of the popular Intel MCS 8051 family of eight bit microcontrollers. It also lays an indepth foundation of sixteen bit microprocessors using the Intel 8086 family. The subject introduces the concept of multiprocessors.*

#### **Overview**

Overview of microcomputer systems. Hardware and software principles.

#### **Intel MCS 51 family**

Introduction to Single chip microcontrollers of Intel MCS 51 family. Architectural and operational features. Its instruction set. CPU timing and machine cycles. Interrupt structure and priorities. Internal Timer / counters, serial interface. Connection of external memory. Power saving modes. Interfacing of 8051 with EPROM programming for EPROM versions. 8051 variations

#### **Intel 8086/8088 microprocessor family**

Architecture and organisation of 8086/8088 microprocessor family. Study of its Instruction set. Assembly language programming, Introduction to mixed language programming using C and Assembly language. 8086 family minimum and maximum mode operation. Timing diagram for 8086 family, detailed study of maximum mode connection: study of 8288 bus controller. 8086 interrupt structure.

#### **Memory & I/O design**

Memory system design for 8086 family including interface of dynamic Read/ write memory, timing considerations for memory interfacing. Connection of I/O Controllers 8255AH programmable peripheral Interface, Programmable Interrupt Controller 8259A, UART 8250, programmable D.M.A. Controller 8237. Data communications, EIA RS-232C serial interface and IEEE 488 General purpose interface. Error detection and correction - parity and cyclic redundancy check.

#### **8087 Math Co-processor**

Study of architecture of 8087 floating point co- processor. Data types supported by 8087. Host and co - processor interface, Assembly language Programming for 8086 - 8087 based systems.

#### **Introduction to Multiprocessor systems**

Multiprocessor configurations. Study of the 8289 bus arbiter. Design of 8086 based multiprocessor systems (witho ut timing considerations).

#### **Text Books:**

1. John Uffenback, 8086 / 8088 Design, Programming and Interfacing, second edition, ninth Indian reprint, Prentice Hall of India, 2001
2. Kenneth Ayala, The 8051 Microcontrollers Architecture, Programming & Applications, Penram International (India)
3. Douglas Hall, Microprocessors interfacing and programming, Tata McGraw Hill, third edition

#### **Additional Reading:**

1. Muhammad A Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, first Indian reprint, 2002
2. John Uffenback, The 80X86 family Design, Programming and Interfacing, third edition, Pearson Education Asia, 2002
3. Intel Corporation, Data manuals

#### **Termwork:**

The Termwork shall consist of at least ten programs covering the whole syllabus and atleast one comprehensive design assignment duly recorded and graded. This will carry a weightage of fifteen marks. A test shall be conducted and will carry a weightage of ten marks.