

SUBJECT TITLE : MICROPROCESSORS
SUBJECT CODE : 3070

COURSE CATEGORY : B
PERIODS/WEEK : 4
PERIODS /SEMESTER : 72
CREDITS : 4

UNIT	TOPIC	PERIODS
I	Intel 8086 Microprocessor Architecture	17
	Test I	1
II	Assembler and Programming	17
	Test II	1
III	Interrupts and Interfacing	17
	Test III	1
IV	Case Study- Pentium Microprocessors	17
	Test IV	1
Total		72

OBLECTIVES

UNIT – I

1.1.0 Introduction to Microprocessor

- 1.1.1 Understand the brief history of Microprocessor.
- 1.1.1 Discuss the general architecture of computer system.
- 1.1.2 Know about the evolution of Intel Microprocessors.
- 1.1.3 Understand the types of Microprocessors- reprogrammable and embedded.

1.2.0 Software architecture of 8086

- 1.2.1 Study the functional Block diagram of 8086.
- 1.2.2 Explain about Memory Address Space and Data Organization-Data Types.
- 1.2.3 Discuss about Segment Registers and Memory Segmentation.
- 1.2.4 Describe the functions of Memory-Instruction Pointer, Data Registers, Pointer, Index Registers and Status Registers.
- 1.2.5 Explain about the addressing modes of 8086

1.3.0 Hardware Structure of 8086

- 1.3.1 Explain how 20 bit physical address is generated
- 1.3.2 Give the idea of Hardware organization of the Memory Address Space.
- 1.3.3 Describe memory bank
- 1.3.4 Discuss minimum mode configuration of 8086
- 1.3.5 Describe maximum mode configuration of 8086
- 1.3.6 Discuss Memory Control Signals, Read and Write , Input / Output Bus Cycles.
- 1.3.7 Explain types of Input / Output : Isolated and Memory mapped I/O

UNIT – II

2.1.0 Programming the 8086

- 2.1.1 Discuss Different addressing modes of 8086
- 2.1.2 Explain different instructions in 8086
- 2.1.3 Explain different instruction types

2.2.0 Discuss ALP concepts

- 2.2.1 Discuss Program Description, Planning solution, creating source program.
- 2.2.2 Study assembling into object module.
- 2.2.3 Simple Programs

UNIT – III

3.1.0. Basic Interrupt mechanism

- 3.1.1 Types of interrupts
- 3.1.2 Priority of Interrupts
- 3.1.3 Discuss interrupt vector table.
- 3.1.4 Study enabling and disabling of interrupts.
- 3.1.2 Explain about external hardware interrupts.
- 3.2.0 Interfacing the 8255A PPI chip.
- 3.3.0 Interfacing the 8257 DMA controller
- 3.4.0 Interfacing the 8279 Keyboard/ Display interface

UNIT – IV

4.1.0 Case Study : Pentium Processors

- 4.1.1 Compare CISC and RISC processors.
- 4.1.2 Understand Special registers and Memory management of Pentium processor
- 4.1.3 Discuss about MMX technologies and MMX Instructions.
- 4.1.4 Understand internal structure and memory management of Pentium
- 4.1.5 Study the features of Pentium II and Pentium IV Processors
- 4.1.6 Discuss about hyper threading technology.

CONTENT DETAILS

MODULE I – INTRODUCTION TO MICROPROCESSORS AND ITS ARCHITECTURE

Brief History of Microprocessors-General Architecture of a Computer System-Evolution of Intel microprocessor architecture-Types of Microprocessor – Reprogrammable and Embedded Software Architecture of 8086-Memory Address Space and Data Organization-Data Types-Segment Registers and Memory Segmentation-Dedicated, Reserved and General Use of Memory-Instruction Pointer, Data Registers, Pointer and Index Registers-Status Registers-Generating a Memory Address-stack- Input / Output Address Space -Addressing Modes of 8086. Hardware Structure of 8086-Minimum Mode and Maximum Mode Operation-Bus Cycles and Time states-Hardware organization of the Memory Address Space-Memory Control Signals Read and Write, Input / Output Bus Cycles.-Types of Input / Output : Isolated and Memory mapped I/O

MODULE II - Instruction Set of 8086

Data Transfer Instructions-MOV, XCHG, XLAT, LEA, LDS and LES Instructions

Arithmetic instructions-Addition Instructions: ADD, ADC, INC, AAA and DAA

Subtraction Instructions: SUB, SBB, DEC, AAS, DAS, NEG

Multiplication and Division Instructions: MUL, DIV, IMUL, IDIV, AAM, AAD, CBW & CWD

Logic Instructions- AND, OR, XOR and NOT Instructions, Clearing, Setting and Toggling Bits of an operand-Shift and Rotate Instructions- SHL, SHR, SAL and SAR Instructions

Isolating the value of a Bit in an operand-ROL, ROR, RCL and RCR Instructions

Alignment of data in operands-Compare Instructions-Control Flow and Jump Instructions

Unconditional and Conditional Jump Instructions-Subroutines and Subroutine Handling

Instructions-Loops and Loop Handling Instructions-Strings and String Handling instructions

Assembly Language Programming Concepts-Problem Description, Planning the solution,

Coding the solution with Assembly Language, Creating Source Program, Assembling into object module, producing a Run module, Programs involved in the assembly language programming.

MODULE III – INTERRUPT INTERFACE OF 8086

Interrupts-interrupt mechanism, types and priority of Interrupts, interrupt vector table, interrupt instructions, enabling and disabling interrupts, external hardware interrupt interface sequence.

Interfacing

Programmable Peripheral Interface : 8255 Chip-pin description, different modes of operation-control word formation- Interfacing with 8086.

DMA Controller- IC 8257- pin description Functional behavior of a DMA, Data Transfer-Programmable - programming and reading the 8257 registers-DMA operation-interfacing of DMA Controller with 8086.

Keyboard and Display Interfacing- 8279 - pin description, internal block diagram, commands, operating modes, keyboard- key debouncing- keyboard interfacing circuit, Displays- Interfacing 8279 with 8086.

MODULE IV- Case Study : Pentium Processors

Pentium Processor-Architecture, Registers, Integer Pipeline, Super Scalar Execution

Floating Point Unit of Pentium-Branch Prediction-Cache Organization-Memory Organization

Introduction to MMX-MMX Registers, Data types, MMX Technology Instructions

Pentium Pro Processor:-

Intel Pentium II, III Processors-Pentium IV Processor- Hyper Threading Technology

Reference Books:

1. The 8088 and 8086 Microprocessors – Programming, Interfacing, Software and Hardware Applications by Walter A. Triebel & Avatar Singh, Fourth Edition, PEARSON
2. Microprocessor 8086 Architecture, Programming and Interfacing by Sunil Mathur, PHI.