

## ADVANCED MICROPROCESSOR

<b>Subject Title</b>	:	<b>Advanced Microprocessor</b>
<b>Subject Code</b>	:	<b>EC</b>
<b>Hours Per Week</b>	:	<b>04</b>
<b>Hours Per Semester</b>	:	<b>64</b>

### TOPIC ANALYSIS

SL.No	Major Topics	Hours Allotted
<b>UNIT-I</b>		
01	<b>8086 Microprocessor Architecture and Pin functions</b>	05
02	<b>8086 Operating Modes and Addressing Modes</b>	07
03	<b>8086 Instruction set , Assembler Directives And 8087 co-processor</b>	10
<b>UNIT-II</b>		
04	<b>Program development steps and Assembly language programs</b>	08
05	<b>8086 Interrupts</b>	04
06	<b>Programmable Peripheral ICs</b>	08
<b>UNIT-III</b>		
07	<b>Advanced Microprocessors</b>	12
08	<b>Bus standards</b>	06
	<b>Tests and revision</b>	04
	<b>Total</b>	<b>64</b>

**On completion of the course the students should be able to:**

- 1 Understand the Architecture and programming model of 8086
- 2 Comprehend the working of various types of programmable peripheral IC'S
- 3 Understand the instruction set and programming 8086
- 4 Comprehend the features of advanced microprocessors

### COURSE CONTENTS

#### **01. 8086 Microprocessor Architecture and Pin functions**

Microprocessor based system- Features of 8086-Internal architecture of 8086  
Pin details(functions) of 8086

#### **02. 8086 Operating Modes and Addressing Modes**

Physical address calculation-Minimum mode configuration with timings  
Maximum mode configuration with timings- Memory organization of 8086  
Addressing modes

#### **03. 8086 Instruction set , Assembler Directives And 8087 co-processor**

Instruction format- Instruction set of 8086-Assembler directives-8087 Co-processor.

#### **04. Program development steps and Assembly language programs**

Program development process-8086 sample programs  
Procedure & MACRO

## 05. 8086 Interrupts

Interrupts of 8086- Interrupt cycle of 8086 & Interrupt Vector table- Interrupt hierarchy  
DOS & BIOS Interrupts

## 06. Programmable Peripheral ICs

Functional block diagram 8255 (PPI) -list operating modes- Functional block diagram 8253-List operating modes- Functional block diagram 8251 (USART)-list operating modes -Functional block diagram 8259 (PIC)-list operating modes-Functional block diagram 8257 and DMA operation

## 07. Advanced Microprocessors

Block diagram of advanced microprocessor-BIU-Cache-IU-FPU-MMU- Super scalar issue of instructions-Memory Hierarchy- Virtual memory, paging & segmentation- Pipe lining - pipe line hazards - Instruction level parallelism, Features of 80286, 80386, 80486, Pentium IV, Dual core processors

08. Bus standards- Need and different bus standards- Centronics - Serial RS 232 –I<sup>2</sup>C  
SATA - USB Bus standards

### TEXT BOOKS:

1. Microprocessor - A P Godse & D A Godse (Technical Publications)  
(ISBN 978-93-5038-162-5)
2. Advanced Microprocessor & Peripherals – A K Ray & K M Bhurchandi (Tata Mc Graw Hill)
3. Advanced Microprocessors - Daniel Tabak (Tata Mc Graw Hill)

### REFERENCE BOOKS

1. Advanced Microprocessors- By K Shashidhar, Sapna Publications
2. X 86 Microprocessor Programming --- Venugopal and Rajkumar TMH
3. Microprocessor and Microcontroller --- R.Theogarajan Scitech
4. The Intel Microprocessor --- Berry.B Brey Pearson
5. Microprocessors Theory and applications intel and motorola  
-- Rafiquzzaman PHI
6. Microprocessors ans Interfacing Programming and Hardware  
-- Douglas V. Hall McGraw Hill
7. Microprocessor 8086/8088 by ---Gibson
8. An Introduction to the Intel family of Microprocessors by James  
--- L.Antonakos Pearson

## *SPECIFIC INSTRUCTIONAL OBJECTIVES*

### 01. 8086 Microprocessor Architecture and Pin functions

- 1.1 Explain the block diagram of a Microprocessor based system
- 1.2 List the features of 8086
- 1.3 Explain the internal architecture of 8086
- 1.4 Explain flag register
- 1.5 Calculation of physical address
- 1.6 Explain pin details(functions) of 8086

(Refer Text 1)

## **02. 8086 Operating Modes and Addressing Modes**

- 2.1 Explain minimum mode configuration and bus timing (Read & Write) of 8086
- 2.2 Explain maximum mode configuration and bus timing (Read & Write) of 8086
- 2.3 Explain physical memory organization of 8086
- 2.4 Explain addressing modes of 8086 with Examples

(Refer Text 1)

## **03. 8086 Instruction set , Assembler Directives & 8087 co-processor**

- 3.1 Explain 8086 Instruction formats
- 3.2 Discuss instruction set  
Data transfer - Arithmetic and logical instructions  
Shift & Rotate-Branching instructions  
Loop control - String instructions  
Processor control instructions  
External Hardware synchronization instructions
- 3.3 Explain the various assembler directives
- 3.4 Know about co-processor
- 3.5 Features of 8087 co-processor
- 3.6 Explain the interaction between 8086 and 8087

(Refer Text 1)

## **04.Program development steps and Assembly language programs**

- 4.1 Discuss program development process & execution of assembly language program
- 4.2 Write 8086 sample programs
  - Add and Subtract two 16 bit numbers
  - Data Block Move
  - Code Conversion (ASCII<--->HEX, BCD<-->HEX)
  - Largest/Smallest of Five numbers
  - Search a number in the array
  - Ascending/Descending order
  - To check Given string is Palindrome
  - To add 3X3 matrix
  - To read and display string using dos routine
- 4.3 Program to Illustrate Procedure & MACRO with example program.

(Refer Text 1)

## **05. 8086 Interrupts**

- 5.1 Explain Interrupts of 8086 – External & Internal interrupts
- 5.2 Explain Interrupt cycle of 8086 , Interrupt Vector table & Interrupt priorities
- 5.3 Discuss DOS and BIOS Interrupt basics and difference between DOS & BIOS interrupts

(Refer Text 1)

## **06. Programmable Peripheral ICs**

- 6.1 Explain functional block diagram 8255 - Programmable Peripheral Interface and Explain different modes of operation
- 6.2 Explain functional block diagram 8253 - Programmable timer / counter & Mention the Operating modes (Refer Text 2)
- 6.3 Explain functional block diagram 8259 - Programmable interrupt controller and Mention the operating modes
- 6.4 Explain functional block diagram 8251 – USART and Mention the operating modes (Refer Text 2)
- 6.5 Explain functional block diagram 8257 - DMA controller and explain DMA operation state diagram (Refer Text 2)

(Refer Text 1 & Text 2)

## **07. Advanced Microprocessors**

- 7.1 Explain the Block diagram of Advanced Microprocessor
- 7.2 Explain the Block Diagram and Functions of
  - 1. Bus Interface Unit
  - 2. Integer Unit
  - 3. Floating Point Unit
  - 4. Memory Management Unit
  - 5. Cache
- 7.3 To Know Super Scalar Issue of instructions
- 7.4 Explain Memory Hierarchy - Register file - Cache
- 7.5 Define virtual memory, paging & segmentation
- 7.6 Discuss Pipe lining - Pipe line hazards ,Instruction level parallelism
- 7.7 Features of 80286, 80386, 80486, Pentium IV, Dual core processors  
(Refer Text 3)

## **08. Bus standards**

- 8.1 Discuss the Need for Bus standards
- 8.2 Explain Parallel Centronics Bus
- 8.3 Explain Serial RS 232 Standard
- 8.4 Explain SATA Bus
- 8.5 Explain I<sup>2</sup>C Bus
- 8.5 Explain USB Bus standards  
Refer Text 1)

**Department of Technical Education**  
**Diploma Course in Electronic and Communications**  
**Fifth Semester**  
**Subject: Advanced Microprocessors (Elective)**

**MODEL QUESTION PAPER**

**Instructions**

- 1) **Section I is compulsory**
- 2) **Answer any 2 full questions from Each Section II, III, IV**
- 3) **Maximum Marks: 100**

**SECTION I**

- 1 a) Fill in the blanks with appropriate word(s) (1\*5=5)
- i) 8086 is --- bit microprocessor
  - ii) Number of bus cycle required to read word data stored from even address is---
  - iii) 8259 is programmable ----- controller.
  - iv) Expansion for USB is -----
  - v) 80486 is ---- bit microprocessor.
- b) Write short notes on Centronics interface (5)

**SECTION II**

- 2 a) Explain the internal architecture of 8086 with neat block diagram (8)
- b) Write the function of following pin signals i)NMI ii)RESET (4)
- c) Calculate physical address if (CS)=2000h (IP)=43AEh (3)
- 3 a) Explain the following instruction of 8086 (6)
- i) XLAT ii)IMUL iii)ESC
- b) Explain the block diagram of memory organization of 8086 system (5)
- c) Explain procedure operation using CALL and RET (4)
- 4 a) Write a program to find largest of five numbers (5)
- b) Explain the following addressing modes with example (6)
- i) Indirect ii) Based-indexed iii) Register
- c) What is assembler directive ? explain the following assembler directives (4)
- i) ASSUME ii)DW

### SECTION III

- 5 a) Write a program to add two 16 bit nubmers (4)  
b) Explain interrupt cycle when initiated by external device (6)  
c) Explain program development steps in executing assembly language program (5)
- 6 a) Explain 8086 minimum mode configuration with block diagram (8)  
b) Write Read & Write bus timings of 8086 in Maximum mode configuration (5)  
c) List Interrupt priorities of 8086 system (2)
- 7 a) Write the block diagram of 8255 PPI and mention the mode of operations (7)  
b) Explain the block diagram of 8251 and mention the mode of operations (8)

### SECTION IV

- 8 a) Explain the block diagram of advanced microprocessor (10)  
b) Write block diagram of MMU and list its function (5)
- 9 a) Explain memory hierarchy in an advanced microprocessor system (5)  
b) Explain the concept of virtual memory with block diagram (5)  
c) What is pipe line hazard ? explain data hazard (5)
- 10 a) Write any six features of Pentium processors (3)  
b) Write the needs for bus standard and explain USB bus (6)  
c) List the features 80486 & Pentium IV microprocessors (6)

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