

Course Name : Computer Engineering Group**Course Code : CO/CD/CM/CW/IF****Semester : Fourth****Subject Title : Microprocessor and Programming****Subject Code : 17431****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	25#	--	25@	150

NOTE:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

Rationale:

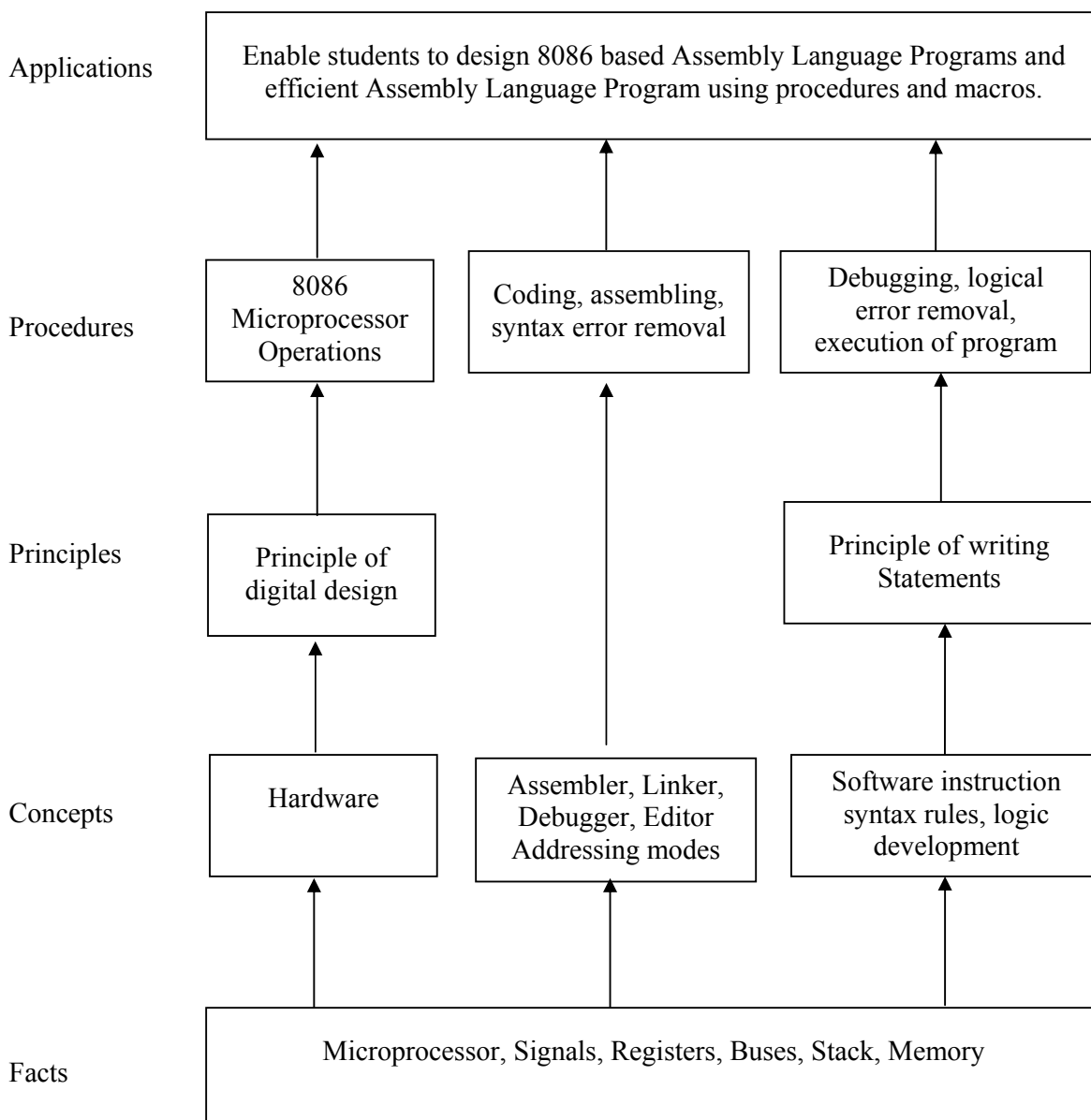
Microprocessor is brain of computer. Intel family is widely used all over the world. 8085 is the 8-bit CPU and 8086 is the 16-bit CPU. 8086 is the base of all upward developed processors. It is more powerful and efficient computing machine. It overcomes all major limitations of the previous processors. It is able to get interfaced with 8-bit, 16-bit systems. IBM PC is introduced in 1980 with 10MB hard disk, one double side double density floppy disk drive, KBD, monitor and asynchronous communications adapter.

This subject covers Basics of 8085, architecture of 8086 along instruction set. It also covers assembly language programming with effective use of procedure and macros. This will act as base for the advanced assembly language programming for next generation microprocessors.

General objectives:

Students will be able to:

1. Understand the execution of instructions in pipelining and address generation.
2. Write syntax of given instructions.
3. Apply instructions in Assembly Language Program for different problem statements.
4. Use the procedures and macros in assembly language programming.

Learning Structure:

Theory

Name of Topics	Hours	Marks
Topic 1: Basics of Microprocessor Specific Objective: Students will be able to <ul style="list-style-type: none"> ➤ Draw the architecture of 8085 ➤ Define the functions of different pins of 8085 ➤ Identify status of different flags 1.1 Evolution of Microprocessor and types 1.2 8085 Microprocessor, <ul style="list-style-type: none"> • Salient features • Pin description, • Architecture of 8085 - Functional Block diagram, • Register organization, 	04	08
Topic 2 :16 Bit Microprocessor: 8086 Specific Objective: Students will be able to <ul style="list-style-type: none"> ➤ Define the functions of different pins ➤ Draw functional block diagram of 8086 ➤ Understand the operating modes of 8086 2.1 8086 Microprocessor, <ul style="list-style-type: none"> • Salient features • Pin descriptions • Architecture of 8086 - Functional Block diagram • Register organization, • Concepts of pipelining, • Memory segmentation • Physical memory addresses generation. 2.2 Operating Modes of 8086 <ul style="list-style-type: none"> • 8284 Clock Generator • 8288 Bus Controller • 74LS245 Bi-directional Buffer • 74LS373 Octal Latch • Minimum Mode operation and its timing diagram • Maximum Mode operation and its timing diagram 	12	24
Topic 3 : Instruction Set of 8086 Microprocessor Specific Objective: Students will be able to <ul style="list-style-type: none"> ➤ Understand the different types of instructions ➤ Identify the addressing modes of instructions ➤ State the operation of an instructions 3.1 Machine Language Instruction format, addressing modes 3.2 Instruction set, Groups of Instructions <ul style="list-style-type: none"> • Arithmetic Instructions • Logical Instructions • Data transfer instructions • Bit manipulation instructions • String Operation Instructions, • Program control transfer or branching Instructions • Process control Instructions 	10	20
Topic 4 :The Art of Assembly Language Programming	04	08

<p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Know the program development steps ➤ Use the different program development tools ➤ Illustrate the functions of assembler directive and operators <p>4.1 Program development steps</p> <ul style="list-style-type: none"> • Defining problem, • Writing Algorithms • Flowchart • Initialization checklist • Choosing instructions • Converting algorithms to assembly language programs. <p>4.2 Assembly Language Programming Tools</p> <ul style="list-style-type: none"> • Editors • Assembler • Linker • Debugger. <p>4.3 Assembler directives and Operators</p>		
<p>Topic 5: 8086 Assembly Language Programming.</p> <p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Write a appropriate programs using editor ➤ Run program using assembler and linker ➤ Debug program using debugger <p>5.1 Model of 8086 assembly language programs</p> <p>5.2 Programming using assembler -</p> <ul style="list-style-type: none"> • Arithmetic operations on Hex and BCD numbers - Addition, Subtraction, Multiplication and Division • Sum of Series • Smallest and Largest numbers from array • Sorting numbers in Ascending and Descending order • Finding ODD/EVEN numbers in the array • Finding Positive and Negative Numbers in array • Block transfer • String Operations - Length, Reverse, Compare, Concatenation, Copy • Count Numbers of '1' and '0' in 8/16 bit number • BCD to Hex and Hex to BCD number conversion 	12	24
<p>Topic 6 : Procedure and Macro in Assembly Language Program</p> <p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the purpose of procedure and macros ➤ Use procedure and macros <p>6.1 Procedure</p> <ul style="list-style-type: none"> • Defining Procedure - Directives used, FAR and NEAR • CALL and RET instructions. • Reentrant and Recursive procedures. • Assembly Language Programs using Procedure <p>6.2 Defining Macros.</p> <ul style="list-style-type: none"> • Assembly Language Programs using Macros. 	06	16
Total	48	100

Skills to be developed:**Intellectual skills:**

- Use of programming language constructs in program implementation.
- To be able to apply different logics to solve given problem.
- To be able to write program using different implementations for the same problem
- Study different types of errors as syntax semantic, fatal, linker & logical
- Debugging of programs
- Understanding different steps to develop program such as
 - Problem definition
 - Analysis
 - Design of logic
 - Coding
 - Testing
 - Maintenance (Modifications, error corrections, making changes etc.)

Motor Skills:

- Proper handling of Computer System.

Practicals:**List of Practical:**

1. Identify the Assembly Language programming tools like Assembler, linker, debugger, editor.
2. Write an Assembly Language Program to add / subtract two 16 bit numbers.
3. Write an ALP to find sum of series of numbers.
4. Write an ALP to multiply two 16 bit unsigned/ signed numbers.
5. Write an ALP to divide two unsigned/ signed numbers (32/16 , 16/8, 16/16, 8/8)
6. Write an ALP to add / Sub / multiply / Divide two BCD numbers.
7. Write an ALP to find smallest/ largest number from array of n numbers.
8. Write an ALP to arrange numbers in array in ascending/ descending order.
9. Write an ALP to perform block transfer data using string instructions / without using string instructions.
10. Write an ALP to compare two strings using string instructions / without using string instructions.
11. Write an ALP to display string in reverse order, string length, Concatenation of two strings.
12. Write an ALP to convert Hex to Decimal, Decimal to Hex.

Learning Resources**1. Books**

Sr. No.	Name of Book	Author	Publication
1.	Microprocessor & interfacing (programming & hardware) Revised Second Edition	Douglas V. Hall	Tata McGraw Hill

2.	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S. Gaonkar	Penram International Publishing (India)
3.	The 8088 and 8086 Microprocessors	Walter A. Triebel, Avtar Singh	Pearson Publications
4.	The 8086.8088 Family, Design, Programming, and Interfacing	John Uffenback	PHI

2. Websites:

www.intel.com

www.pcguides.com/ref/CPU

www.CPU-World.com/Arch/

www.techsource.com/engineering-parts/microprocessor.html