

**Course Name : Computer Engineering Group**

**Course Code : CO/CM/IF/CD**

**Semester : Fourth**

**Subject Title : Microprocessor and Programming**

**Subject Code : 12109**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50@	--	--	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.

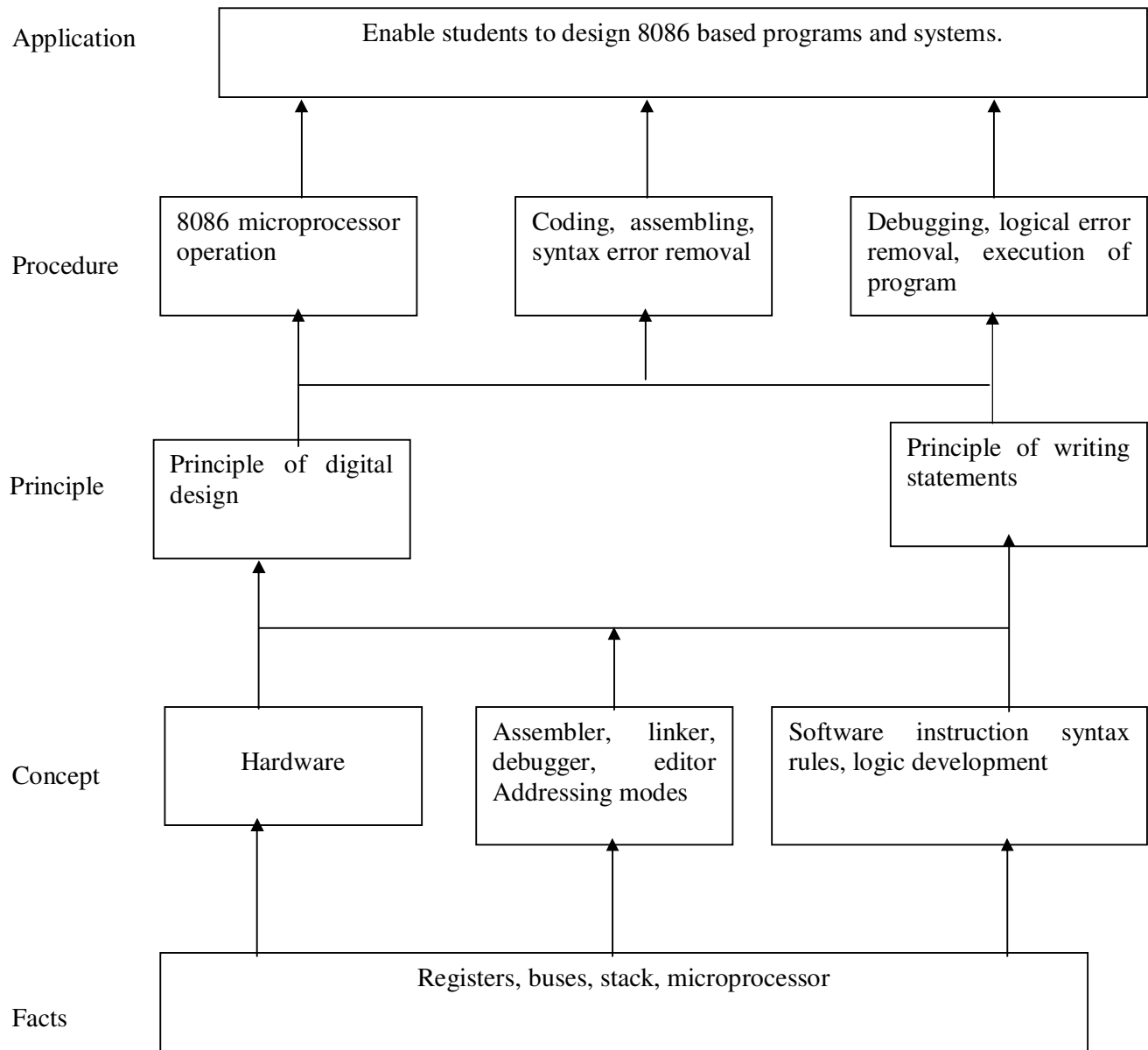
This subject covers Basics of 8085, architecture of 8086 along instruction set. It also covers interfacing with memory devices. This will act as base for the advanced microprocessor based design.

**Objectives:**

Students will be able to:

1. Draw block diagram for architecture of 8085.
2. Draw block diagram for architecture of 8086.
3. Describe concepts of pipelining segmentation and address generation.
4. Write syntax of given instructions.
5. Write the efficient Assembly Language Program for different problem statements.
6. Write the efficient Assembly Language Program using procedures and macros.
7. Design interface of memory chips.

**Learning Structure:**



**Contents: Theory**

Chapter	Name of the Topic	Hours	Marks
01	Basics of Microprocessor 1.1 Evolution of Microprocessor and types 1.2 Silent features of 8085 Microprocessor, architecture of 8085 (Block diagram), register organization, limitations of 8-bit Microprocessor.	04	08
02	16-bit Microprocessor 8086 2.1 Silent features of 8086 Microprocessor, architecture of 8086 (Block diagram, signal description), register organization, concepts of pipelining, memory segmentation and memory address generation. 2.2 Minimum and Maximum Mode operation and diagram	12	24
03	8086 Instruction set 3.1 Machine Language Instruction format, addressing modes 3.2 Instruction set (Arithmetic, logical, data transfer, bit manipulation, string, program control transfer, process control)	10	20
04	The art of assembly Language Programming 4.1 Program development steps defining problem, algorithms flowchart, initialization checklist, choosing instructions, converting algorithms to assembly language programs. 4.2 Assembly Language Programming Tools Editors, Assembler, Linker, Debugger. 4.3 Assembler directives, model of 8086 assembly language programming, programming using assembler.	12	24
05	Procedure and Macro 5.1 Defining Procedure (Directives used, FAR and NEAR, CALL and RET instructions) 5.2 Reentrant and Recursive procedures. 5.3 Defining Macros. 5.4 Assembly Language Programs using Procedure and Macros.	06	16
06	System Interfacing 6.1 Interfacing Techniques (I/O mapped I/O, Memory mapped I/O, memory and I/O addressing, 8086 addressing, and address decoding, memory interfacing As Even and Odd bank)	04	08
<b>Total</b>		<b>48</b>	<b>100</b>

**Practical:**

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.

#### List of Practical:

- 1) Basics of Assembler, linker, debugger, editor
- 2) Write an Assembly Language Program to
  - Add / Sub two 16 bit numbers.
  - Find sum of series of numbers.
  - Multiply two 16 bit unsigned/ signed numbers.
  - Divide two unsigned/ signed numbers (32/16 , 16/8, 16/16, 8/8 )
  - Add / Sub / Multiply / Divide two BCD numbers.
  - Find smallest/ largest number from array of n numbers.
  - Arrange numbers in array in ascending/ descending order.
  - Perform block transfer data using string instructions / without using string instructions.
  - Compare two strings using string instructions / without using string instructions.
  - Display string in reverse order, string length, Concatenation of two strings.
  - Convert Hex to Decimal, Decimal to Hex.

#### Learning Resources:

##### 1. Book

Sr. No	Name of Book	Author	Publication
1	Microprocessor & interfacing (programming & hardware)	Douglas V-Hall	Tata McGraw Hill
2	Advanced microprocessor & peripheral	A.K. Ray & K.M. Bhurchandi	Tata McGraw Hill
3	An introduction to the Intel family of Microprocessors	James L. Antonakos	Pearson Education Asia
4	Microprocessor Architecture programming & application with the 8085	Ramesh A. Gaonkar	Penfam International

##### 2. Websites :

[www.intel.com](http://www.intel.com)

[www.pcguide.com/ref/CPU](http://www.pcguide.com/ref/CPU)

[www.CPU-World.com/Arch/](http://www.CPU-World.com/Arch/)

[www.techsource.com/engineering-parts/microprocessor.html](http://www.techsource.com/engineering-parts/microprocessor.html)

Demo lectures with power point presentations using LCD projector should be arranged to develop programming concepts of students.