Course Name : Electronics Engineering Group

Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/IU/ED/EI

Semester : Fourth

Subject Title : Digital Techniques & Microprocessor **Subject Code :** 9071

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
3	--	2	3	80	20	50 @	--	--	150

Rationale:

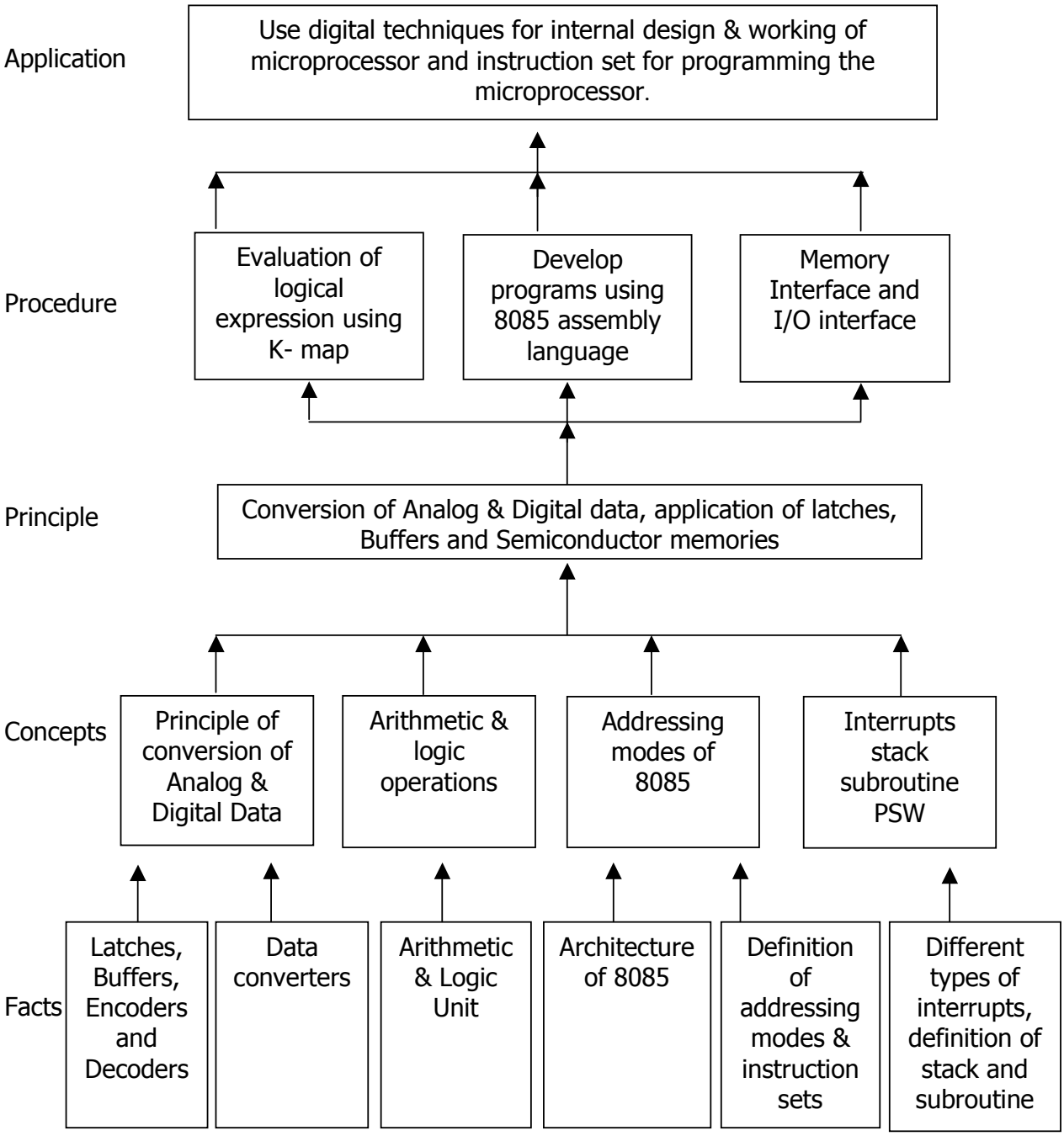
Digital techniques and microprocessor have a wide range of applications in most of the consumer, industrial and computer industries. This course enables the students to use the concept of digital systems and microprocessor for developing systems required for various fields. A thorough understanding of microprocessor is developed using in depth concepts of hardware and programming skills.

Objectives:

The student will be able to:

1. Perform arithmetic operations with help of a standard ALU design.
2. Describe the operational features of A/D and D/A converters.
3. Differentiate between the different types of memories and their applications.
4. Describe the basic architecture of a microprocessors based system.
5. Develop a minimum system with 8085 microprocessors.

LEARNING STRUCTURE:



Contents: Theory

Chapter	Name of the Topic	Hrs.	Marks
1.	**Review of Combinational & Sequential Logic Circuits** 1.1 Encoders – Definition , Decimal to BCD, Octal to Binary, Hexadecimal to Binary, priority encoder. 1.2 Tristate logic, Buffers, Unidirectional buffer – 74244, Bidirectional buffers – 74245. 1.3 Latches – IC 74373. 1.4 Adder: serial / parallel binary adder, Single digit BCD adder using IC 7483. 1.5 Study of ALU Ics: 74181, 74381, Carry look ahead adder.	**08**	**16**
2.	**Data Converters** 2.1 Introduction – Necessity and their types 2.2 Digital to analog converters, a) Weighted – Resistor D/A converter (Mathematical derivation), b) R – 2R ladder D/A Converter (Mathematical derivation) 2.3 Specifications of D/A converter, 2.4 Analog to Digital Converter, Principle of A/D conversion 2.5 Block Diagram and working of following ADC: a) Single slope ADC b) Dual slope ADC c) Successive Approximation ADC 2.6 Specifications of ADC 2.7 Study of ICs DAC – 0800, ADC – 0809.	**08**	**12**
3.	**Semiconductor Memories** 3.1 Introduction of memories 3.2 Memory organization & operation, 3.3 Characteristics & classification of memories RAM, ROM, volatile & non- volatile, static & dynamic ,Flash memory 3.4 ROM types: PROM, EPROM, EEPROM & mask programmable ROM 3.5 Memory ICs – 2716, 7481, 6116.	**06**	**08**

4.	**Microprocessor – 8085** 4.1 Terminology used in microprocessor- Hardware, software Firmware, Bus, Address Bus, Data Bus, control Bus, Comparison of machine language, assembly language and high-level language. Microprocessor, microcomputer and micro controller comparison and their application areas. 4.2 Evolution of microprocessors. 4.3 Schematic diagram of microcomputer and microprocessor based system , Features of 8085 microprocessor 4.4 Architecture of 8085 microprocessor. 4.5 Pin definition of 8085 microprocessor.	**08**	**16**
5.	**8085 Instructions and programming** 5.1 Instruction Format (one byte, two byte and three byte instruction) opcode format 5.2 Addressing modes of 8085 5.3 8085 Instruction set. Definition of machine cycle, T state and instruction cycle. 5.4 Different operations of 8085 with respect to the status of IO/M, S_1, S_0, RD, WR signals. Instructions related with interrupt. 5.5 Timing diagram of opcode fetch cycle or memory read cycle, Memory write, I/O read and I/O write cycle, MVI A, 8 bit data; LXI rp, 16 bit data; STA, 16 bit address. 5.6 Concept of stack, subroutine and interrupts. 5.7 Hardware and software interrupts, maskable and non-maskable interrupts , vectored interrupts. 5.8 Hardware structure of the interrupts of 8085	**10**	**16**
6	**Memory system Design with 8085** 6.1 Demultiplexing of address and data bus by ALE signal. 6.2 Generation of control signals (MERM, MEMWR, IOR, IOW signal) 6.3 Typical 8085 system configuration 6.4 Address decoding techniques : Partial decoding 6.5 Simple example of memory interfacing with RAM /ROM & Memory mapped I/O system 6.6 Comparison of I/O mapped I/O & memory mapped I/O system 6.7 Interfacing with 8085 microprocessor Interfaceing input port & output port to 8085 with I/O mapped. Interfaces of I/O port with memory mapped I/O Transmission & Reception of 8 bit serial data using SID & SOD lines.	**08**	**12**
	Total	**48**	**80**

PRACTICAL:
Skills to be developed:

Intellectual Skills:

1. Identification of different ICs of buffers, latches, data converters, memories.
2. Ability to design algorithm, flowchart, assembly language program & decode.

Motor Skills:

1. Ability to test the different digital ICs.
2. To load the program in user memory of microprocessor kit.
3. To provide commands to execute the program.
4. To observe the result in specific memory locations and registers.

List of Practical:

1. Verify Truth Table of bi directional buffer – IC 74245.
2. Verify function table of ALU 74181.
3. Verify the operational features of ADC – IC 0809, IC 0808 and DAC – IC 0800.
4. Verify the operational features of RAM (use suitable RAM IC).
5. Write assembly language programs for addition and subtraction of two 8 bit & 16 bit numbers.
6. Write assembly language programe to transfer data bytes from memory block to another memory block.
7. Write Assembly Language Programme to multiply two 8 bit numbers using add and shift techniques **OR**
   Arrange the given bytes in ascending & descending order using bubble sort.
8. Find one's and two's complement of a given number.
9. Write Assembly Language Programme to exchange the lower & upper nibble of a byte.
10. To sort odd and even byte from given 10 bytes.
11. Using any hardware interrupt write a program to count the interrupt events.
12. Write Assembly Language Programme to Transmit / Receive a 8 bit serial data using SID & SOD lines.

Mini Project: (ANY ONE)

1. Design a stepper motor interface card using driver IC.
2. Design an interface A/D converter using 8085 microprocessor.
3. Interface D/A converter using 8085 microprocessor.
4. Design 4 bit R-2R D/A converter.

LEARNING RESOURCES:
BOOKS:

Sr. No.	Author	Title	Publisher
01.	Malvino	Digital Principles	Tata McGrew Hill (TMH)
02.	R. P. Jain	Modern Digital Electronics	TMH
03.	Malvino & Leach	Digital Principles and Applications	TMH
04.	Floyd	Digital Fundamentals	Universal Book Stall New Delhi
05.	M. Morris Mano	Digital Logic and Computer Design	PHI
07.	Ramesh S. Gaonkar	Microprocessor Architecture, Programming and Applications with 8085	Penram International
08.	B. Ram	Fundamentals of Microprocessors and Microcomputers	Dhanpat Rai Publications