Bachelor of Engg. (Electronics and Telecommunication Engg.) Exam., 2024
(3rd Year, 1st Semester Examination, 2023-2024)

MICRPROCESSORS & MICROCONTROLLERS

Time: Three Hours   Full Marks: 100

Answer ALL the Questions
(All Parts of the same question must be answered at one place only)

Module I – M1 (CO1)

1. (a) (i) Draw the Block Diagram of Microprocessor Unit (MPU) divided into the three segments and a brief description of these segments with respect to Intel 8085 MPU. (ii) Differentiate the terms Microprocessor (or MPU) and Microcomputer.
(b) (i) In Single Board Microcomputers / small systems, name the Program that governs the interaction between the Microprocessor, Memory and I/Os and its primary function(s). (ii) The function of this Program in a small system is similar to that of the _____ _____ in a large systems.
(c) (i) How many address lines are required to address two megabytes (2048K) of memory? (ii) Design / Draw the Decode logic for LED Output Port with the address 01H.
(d) (i) In a memory-mapped I/O, how does the microprocessor differentiate between an I/O and Memory? Can an I/O have the same address as that of a memory register? (iii) Are the data latched in the IC7475 at the leading edge, during the level, or at the trailing edge of the Enable signal?   (5 Marks X4)

Module II (CO2)

2. (a) (i) Differentiate Assembler and Compiler. (ii) Let (A) = 00H, (B) = 01H. List all the steps involved execution of the instruction SUB B. Interpret the final result in the A register and Carry Bit. (iii) The method of defining address of the operand is called _____ _____
(b) (i) The following Block of data is stored in the memory locations 8055H to 805AH. Transfer the data to the locations 9080H 9085H in the reverse order. Data (in Hexadecimal) : 22, A3, B2, 99, 7F, 37. (ii) Let (8085H) = FFH. Write an 8085 Assembly Language Program (ALP) to increment the content of the memory location 8085H by one, using three instructions only.
(c) For the 8085 ALP given below, calculate the time delay in the loop , T$_L$, with 2MHz clock frequency.

LABEL	Opcode Operand	T-States
	MVI B,FFH	7
LOOP:	DCR B	4
	JNZ LOOP	10/7

(d) (i) Write an 8085 ALP to meet the following specifications: a. Initialize the Stack Pointer register at 8099H. b. Clear the memory locations from 8090H to 809FH. c. Load the register pairs, BC, DE, and HL with data 0237H, 1242H, and 4087H, respectively. d. Push the contents of register pairs BC, DE and HL on the stack. e. When the ALP is executed, verify the contents of memory locations from 8090H to 809FH.   (5 Marks X 4 = 20)

Module III (CO3)

3. (a) Differentiate the methods of Data transfer with Polling, and Interrupt Techniques

(b) If the INTR line is high, and the interrupt is enabled, list the sequence of operations / steps, initiated by the 8085 MPU.

(c) There is one INTR signal available with the 8085 Pin out, and there are eight RST instructions (RST0 to RST7). In this context, justify the need for the special device called the Programmable Interrupt Controller – 8259A, with the brief description of its operation.

(d) (i) List the 8085 Maskable Interrupts (other than INTR). (ii) What are the interrupt related instructions required to enable / for the execution of 8085 Maskable interrupts (other than INTR) ?   [4+6+6+4]

Module III (CO4)

4. (a) (i) Name the important Blocks of the 8255 Programmable Peripheral Interface (PPI) Device. (ii) List the three steps that are required to enable communication between the 8255 PPI and the Peripherals. (iii) List the Input / Output features of Mode 0. (iv) In the I/O Mapped I/O mode, identify the address pin that should be connected to the CS line of the 8255 device.

(b) (i) List the elements / blocks of 8253/54 Timer. (ii) List the input(s) / output signals associated with each block / Counter. (iii) How to operate a counter of 8253/54? (iv) Write the 8253/54 Timer Control word to generate a square wave from Counter 0, with counting in Binary.   [(2+3+3+2)+(2+2+2+4)]

Module V (CO5)

5. (a) With an example, demonstrate the use of DAC to convert the digital outputs from a MPU into an analogue form, and to illustrate the use of LUT (Look Up Table), for the generation of sine waveform. Show the Block Diagram of the Waveform generation, ALP using LUT Procedure, and the Output Waveform.

(b) Differentiate Microprocessors and Microcontrollers. List the salient feature of Intel 8051 Microcontroller Unit (MCU)   [(7+6+4) + (3)]