

MICROPROCESSORS AND MICROCONTROLLERS
(ECEN 3104)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group - A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) How many address lines are required for an 8K-byte (1024*8=8192 registers) memory chip?
(a) 11 (b) 12 (c) 13 (d) 14.
- (ii) The instruction OUT cannot send data from any register other than
(a) Program Counter (b) Register B
(c) Accumulator (d) Flag register.
- (iii) In POP instruction, after each execution of the instruction, the stack pointer is
(a) Incremented by 1 (b) Decremented by 1
(c) Incremented by 2 (d) Decremented by 2.
- (iv) The number of bits which is affected by a BSR control word in 8255 is
(a) 8 (b) 2 (c) 1 (d) 5.
- (v) When subroutine is called, the address of the instruction next to 'CALL' is saved in
(a) stack pointer register (b) program counter
(c) stack (d) PSW.
- (vi) LXI B, 2080H is an example of
(a) 1 - byte instruction (b) 2 - byte instruction
(c) 3 - byte instruction (d) 4 - byte instruction.

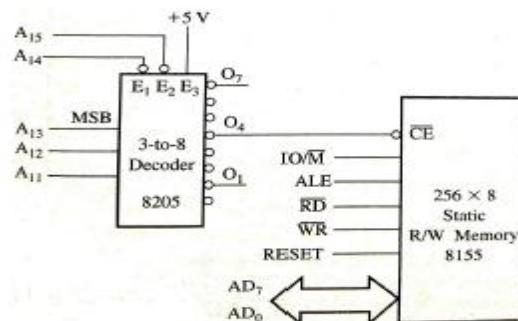
- (vii) If the crystal with 8085 is 2 MHz, the time required to execute an instruction of 20 T states is
 (a) 20 μ S (b) 10 μ S (c) 40 μ S (d) 5 μ S.
- (viii) The instruction which is used to identify the pending interrupts in 8085 is
 (a) RIM (b) SIM (c) DAD (d) POP.
- (ix) The instruction MOV AX, [BX] is an example of
 (a) Indirect addressing (b) Indexed addressing
 (c) Direct addressing (d) Based addressing.
- (x) The internal RAM memory of the 8051 is
 (a) 32 bytes (b) 64 bytes
 (c) 128 bytes (d) None of these

Group - B

- 2. (a) Why is the data bus bidirectional? Why are the program counter and the stack pointer 16-bit registers? How does the microprocessor differentiate between a data and an instruction?
- (b) The memory address of the last location of an 8K byte memory chip is FFFFH. Find the starting address?
- (c) Mention the functions of the Accumulator and the Program counter.

(2 + 2 + 2) + 4 + 2 = 12

- 3. (a) What is an addressing mode? How many addressing modes are available in 8085? Explain with proper examples about immediate addressing mode and implicit addressing mode of 8085?



- (b) In the above figure, specify the memory address range if the output line O4 of the decoder 8205 is connected to the \overline{CE} signal. Define foldback memory and also specify the range of the foldback memory.

(1 + 2 + 3) + 6 = 12

Group – C

4. (a) Differentiate between Memory-Mapped I/O and Peripheral I/O.

Calculate the total delay in the following program, assuming that the clock frequency of the system is $f = 2\text{MHz}$.

Label	Opcode	Operand
	MVI	C,FFH
LOOP:	DCR	C
	JNZ	LOOP

- (b) Explain the bus system of 8085.

$$3 + 5 + 4 = 12$$

5. (a) Explain the operations of BIU and EU present in 8086 microprocessor.

- (b) Compare CALL and RET with PUSH and POP instructions in terms of their properties?

- (c) Define EI and DI in 8085 interrupt?

$$5 + 5 + 2 = 12$$

Group – D

6. (a) What do you mean by Mode 0, Mode 1 & Mode 2 for 8255 PPI chip?

- (b) Explain the function of ISR, IRR and IMR in 8259A.

- (c) List the names of the operating modes of the 8254 programmable interval timer? Define the two new signals available on the 8085 which is introduced due to DMA?

$$4 + 4 + 4 = 12$$

7. (a) Describe how 8253 is used to generate square waves?

- (b) Explain the different types of priority modes commonly used under software control in the 8259A?

- (c) What is the purpose of the operational command words of 8259?

$$5 + 5 + 2 = 12$$

Group – E

8. (a) Draw the TMOD register of 8051. Explain the function of the mode selection bits. How PSW is used to switch register banks in 8051?

- (b) Explain the interrupt system of 8051 microcontroller.

$$3 + (3 + 3) + 3 = 12$$

9. (a) Show the status of the CY,AC, and P flags after addition of 9CH and 64H in the following instructions.
MOV A, #9CH
ADD A, #64H
- (b) Explain the steps required in enabling an interrupt in 8051.
- (c) What is the advantage of register indirect addressing mode? Define polling with respect to 8051 microcontroller.

$$3 + 5 + (2 + 2) = 12$$

Department & Section	Submission Link
ECE A	https://classroom.google.com/w/MTQ3NTk4Mjc1MzM1/tc/Mjc0MTY3MjQyNzQ0
ECE B	https://classroom.google.com/w/MTc1MzExMzk5MTI3/tc/Mjc1MDY3MTY5Njgy
ECE C	https://classroom.google.com/u/1/w/MTIyMjA0MDMwOTQ1/tc/Mjc0MzgyNjIxOTc3