

B.TECH / ECE /5TH SEM/ ECEN 3104/2017
MICROPROCESSORS, MICROCONTROLLERS AND SYSTEMS
(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) Program Counter is used
(a) to store the address of top of stack.
(b) to store the instructions.
(c) to point the address of the next instruction.
(d) none of the above.
- (ii) I/O mapped systems identify their input/output devices by giving them
(a) 8 - bit port number (b) 16 - bit port number
(c) 8 - bit buffer number (d) 8 - bit instruction .
- (iii) An 8 bit processor can have
(a) 8 address lines (b) 32 address lines
(c) 16 address lines (d) cannot be predicted.
- (iv) In the instructions DCR and INR, which of the following flag bit is not affected?
(a) Zero (b) Sign (c) Parity (d) Carry.
- (v) During PUSH operation, the stack operates in the following sequence
(a) Decrement then store (b) Increment then store
(c) Use then increment (d) Use then decrement.
- (vi) In 8085, TRAP is
(a) always maskable
(b) can't interrupt a service sub-routine
(c) use for temporary power failure
(d) lowest priority interrupt.

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- (vii) The instruction MOV AX, [BX] is an example of
(a) Indirect addressing (b) Indexed addressing
(c) Direct addressing (d) Based addressing.
- (viii) 8259 is
(a) programmable DMA controller
(b) programmable interval timer
(c) programmable interrupt controller
(d) none of these.
- (ix) The memory map of the special function registers (SFR) is
(a) 00H - 77H (b) 80H -FFH (c) 40H - 80H (d) 80H - 7FH.
- (x) If the crystal with 8085 is 2 MHZ, the time required to execute an instruction of 20 T states is
(a) 20μS (b) 10μS (c) 40μS (d) 5μS.

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) What are the functions of ALE, INTR and READY signals? Draw the circuit to latch A₈ to A₁₅ using ALE.
- (2+ 2+ 2) + (3 + 3) = 12**
3. (a) Explain the register structure of the 8085 microprocessor. What will be the value in the accumulator, for the 8085 assembly language program as given below:
- ```
MVI C, 7FH
MVI B, 3EH
MOV A, B
RLC
RLC
ANI 7FH
RST 1
```
- (b) What is an addressing mode? How many addressing modes are available in 8085? Explain with two examples of each.

**(4 + 2) + (1+ 2 + 3) =12**

**Group - C**

4. (a) Distinguish clearly between memory mapped I/O and Peripheral mapped I/O.
- (b) Identify the addressing modes of the following instructions:
- (i) LDAX D
  - (ii) ADD M
  - (iii) DCR M
  - (iv) LXI rp, 16-bit
  - (v) CMP R
  - (vi) CPI 24H

Explain the function of SIM instruction.

$$6 + 3 + 3 = 12$$

5. (a) Illustrate the steps and timing of data flow when the instruction and data with codes (MVI A, 40H: 3EH and 40H) stored in location 8000H and 8001H, is being fetched. If the clock frequency is 5 MHz, how much time is required to execute this instruction?
- (b) List out the segmentation registers of 8086. Explain how 8086 provides 1MB memory address space using the segment register? What is the purpose of the extra segment?

$$(6 + 1) + (2 + 2 + 1) = 12$$

**Group - D**

6. (a) What do you mean by Mode 0, Mode 1 & Mode 2 for 8255 PPI chip?
- (b) Write down the control word for the following in Mode 0:  
Port A = Input, Port B = Not used, Port C<sub>U</sub> = Input, Port C<sub>L</sub> = Output.
- (c) Write a BSR control word subroutine to set bits PC<sub>7</sub> and PC<sub>3</sub> and reset them after 10 ms. Assume that a delay subroutine is available and Hexaddress of Port A = 80 H.

$$4 + 2 + 6 = 12$$

7. (a) Describe how 8253 is used to generate square waves.
- (b) Explain the control word format for 8254 programmable interval timer.

$$6 + 6 = 12$$

**Group - E**

8. (a) What is the difference between the instruction MOV R0, #55H and MOV R0, 55H? Describe the PSW register of 8051 microcontroller.
- (b) Explain the interrupt system of 8051 microcontroller.
- 9.(a) Explain with suitable examples various data transfer functions of the 8051 microcontroller.
- (b) Explain the function of the following signals with reference to 8051  
(i) RST (ii) ALE/PROG(bar) (iii) PSEN(bar) (iv) EA(bar)/Vpp

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

$$8 + 4 = 12$$