# 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*
*<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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)     Which bus is a bidirectional bus?
   (a) address bus                                    (b) data bus
   (c) address bus and data bus                       (d) none of the above.

   (ii)    The cycle required to fetch and execute an instruction in an 8085 microprocessor is which one of the following?
   (a) Clock cycle                                    (b) Machine cycle
   (c) Memory cycle                                   (d) Instruction cycle.

   (iii)   A microprocessor is said to be 8 bit, 16 bit etc. depending on its
   (a) address bus                                    (b)data bus
   (c) control bus                                    (d)ALU.

   (iv)    The instruction XCHG exchanges the contents of
   (a)  Accumulator and HL Pair
   (b)  HL pair and BC pair
   (c)  HL pair and DE pair
   (d)  HL pair and Flag Register.

   (v)      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.

(vi) 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.

(vii) 8259 is
(a) programmable DMA controller
(b) programmable interval timer
(c) programmable interrupt controller
(d) none of these.

(viii) What is SIM?
(a) Select Interrupt Mask   (b) Sorting Interrupt Mask
(c) Set Interrupt Mask      (d) None of these.

(ix) HLT opcode means
(a) Load data to the accumulator
(b) Store result in the memory
(c) Load accumulator with the contents of the register
(d) End of the program.

(x) 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.

# Group – B

2. (a) Draw and explain the register section of 8085.

(b) 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?

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

3. (a) Draw the Flag register of 8085.Mention the conditions under which each of the flags goes to Set state.

(b) What are the functions of ALE, INTR and READY signals?

**(2 + 4) + 6= 12**

# Group – C

4. (a)   Describe briefly the interrupt system of 8085.What is the function of the SIM instruction?

   (b)   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?

   **(4 + 2) + 6 = 12**

5. (a)   Distinguish clearly between memory mapped I/O and Peripheral mapped I/O.

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

   **6 + 6 = 12**

# Group – D

6. (a)   Describe the control word register of 8254 Programmable Interval Timer.

   (b)   Write a BSR control word subroutine to set bits $PC_7$ and $PC_3$ and reset them after 10 ms. Assume that a delay subroutine is available and Hex address of Port A = 80 H.

   **6 + 6 = 12**

7. (a)   What is the purpose of the operational command words of 8259? Explain the ICW1 format and its significance.
   (b)   What do you mean by Mode 0, Mode 1 & Mode 2 for 8255 PPI chip?
   (c)   Write down the control word for the following in
         Mode 0 :
         Port A = Input, Port $B$ = Not used, Port $C_U$ = Input, Port $C_L$= Output.

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

# Group – E

8. (a)   Explain the difference between polling and interrupt with respect to 8051 microcontroller.

 (b)   Describe the program status word register of 8051 microcontroller?

**6 + 6  = 12**

9. (a)   Explain the interrupt system of 8051 microcontroller.

 (b)   How many addressing modes are supported by 8051 microcontroller? Discuss the addressing modes with an example of each type?

**6 + (2 + 4) = 12**

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