MICROPROCESSOR & MICROCONTROLLER
(ELEC 3204)

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)   Which of the following instruction is not possible in Intel 8085 microprocessor?
   (a) POP D   (b) POP B
   (c) POP 30H   (d) POP PSW.

   (ii)   While CMP B instruction execute in Intel 8085 microprocessor
   (a) all flags will be affected
   (b) no flags will be affected
   (c) only carry flag will be affected
   (d) carry and zero flags will be affected.

   (iii) Name of the 16 bit register(s) in Intel 8085 microprocessor is/are:
   (a) stack pointer   (b) program counter
   (c) accumulator   (d) both (a) and (b).

   (iv)   The vector location of RST 7.5 interrupt of Intel 8085 microprocessor is
   (a) 0024H   (b) 003CH
   (c) 0034H   (d) 002CH.

   (v)   The upper 128 bytes of internal RAM in 8051 microcontroller from 80H-FFH usually represents
   (a) general purpose registers   (b) special function registers
   (c) program counter   (d) stack pointer.

   (vi)   The number of address lines required for a 2KB EPROM chip is
   (a) 3   (b) 10   (c) 11   (d) 13.

   (vii) What is the value of SP-register of 8051 microcontroller on 'power on reset'?
   (a) 08H   (b) 06H   (c) 07H   (d) 09H.

   (viii) The register(s) that provides control and status information about serial port in 8051 microcontroller is
   (a) TCON & TMOD   (b) SCON & PCON
   (c) IP   (d) IE.

   (ix)   Which interrupt has the highest priority in 8051 microcontroller on 'power on reset'?
   (a) Timer interrupt 0   (b) External interrupt 0
   (c) External interrupt 1   (d) Timer interrupt 1.

   (x)   Which bit must be set in TCON register of 8051 microcontroller to start timer-0?
   (a) TR0   (b) TR1   (c) TF0   (d) TF1.

Group – B

2. (a) Draw the timing diagram of the instruction 'STA 8050H' in Intel 8085 microprocessor. How long would the Intel 8085 microprocessor take to execute the instruction 'STA 8050H' if the crystal frequency of the processor is 6MHz.

   (b) Explain the function of the following signals related to 8085 microprocessor.
   (i) ALE,   (ii) IO/$\overline{M}$,   (iii) $\overline{RD}$.

   (c) Discuss a brief comparison between memory mapped I/O and peripheral mapped I/O.
   (4 + 2) + 3 + 3 = 12

3. (a) Determine the status of (i) Sign, (ii) zero, (iii) Auxiliary Carry, (iv) Parity, (v) Carry flags and hence obtain the content of flag register after execution of the following program for Intel 8085 microprocessor.
   LXI H, F100H
   MVI A, 9B^H
   MOV M, A
   ADD M
   HLT

   (b) Explain following instructions for Intel 8085 microprocessor:
   (i) DAD D   (ii) PUSH PSW.

   (c) Discuss with proper diagram the de-multiplexing of lower order address bus (A_0-A_7) and data bus (D_0-D_7) of Intel 8085 microprocessor.
   5 + 3 + 4 = 12

Group – C

4. (a) Write an assembly language program for Intel 8085 microprocessor to generate a trapezoidal wave.

   (b) Draw the bit pattern of SIM instruction and discuss briefly the function of each bit.

   6 + 6 = 12

5. (a) What are the software interrupts of Intel 8085 microprocessor? Explain with an example how the vector address for a software interrupt is determined.

   (b) Write an assembly language program for Intel 8085 microprocessor to multiply 33^H by 25^H, and store the result in memory locations F101(higher byte) and F100 (lower byte).

   (c) Write an assembly language program for Intel 8085 microprocessor to subtract two BCD numbers (subtract 59 from 81).

   (3 + 2) + 4 + 3 = 12

Group – D

6. (a) Write down the features of 8051 microcontroller.

   (b) What are different segments of internal RAM of 8051 microcontroller and how they are addressed?

   (c) Explain the organization of first 128 bytes of the internal RAM of 8051 microcontroller.

   3 + 4 + 5 = 12

7. (a) What is RS 232 protocol and how many possible ways are there for communicating data using this protocol.

   (b) Describe SCON register. Deduce BAUD rate equation.

   (c) Write an assembly language program for transmitting 10 consecutive bytes of data using '9600, N, 8, 1' protocol. Consider crystal frequency of 11.0592 MHz.

   3 + (2 + 2) + 5 = 12

Group – E

8. Draw and explain the interfacing circuit of 16 × 2 LCD with 8051 microcontroller and write down the Assembly Language Program to display 'MICROPROCESSOR' in that LCD.

   (3 + 3 + 6) = 12

9. (a) Draw the interfacing circuit of 8051 microcontroller with DAC0808 and explain briefly.

   (b) Write an assembly language program to generate a staircase waveform of 5 steps in the above circuit.

   (3 + 3) + 6 = 12