**B.TECH/EE/6TH SEM/ELEC 3204/2019**

**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) When INX H instruction is executed by 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.

 (ii) The non-maskable interrupt is

(a) RST 5.5 (b) RST 6.5 (c) RST 7.5 (d) Trap.

 (iii) Which of the following statement for INTEL 8085 is correct?

(a) Program counter specifies the address of the instruction last executed

(b) Program counter specifies the address of the instruction being executed

(c) Program counter specifies the address of the instruction to be executed

(d) Program counter specifies the number of the instructions executed so far.

 (iv) In Intel 8085 microprocessor PSW signifies

(a) accumulator and flag register contents

(b) accumulator content only

(c) only flag register content

(d) content of stack pointer only.

 (v) The first machine cycle of an instruction is always

(a) a memory read cycle (b) I/O read cycle

(c) a opcode fetch cycle (d) memory write cycle.

 (vi) The number of address lines required for a 16KB EPROM chip is

(a) 11 (b) 10 (c) 14 (d) 13.

 (vii) The address range of SFRs in 8051 is

(a) 00H -77H (b) 40H -80H (c) 80H -7FH (d) 80H -FFH.

 (viii) The timers in mode 0 in 8051 microcontroller overflow when the register reaches

(a) 1FFFH (b) FFFFH (c) FFH (d) 03FFH.

 (ix) $\overbar{EA}$ =1 in 8051 microcontroller indicates

(a) only on chip program memory is accessed

(b) only off chip program memory is accessed

(c) both on chip and off chip program memory is accessed

(d) program memory is not accessed.

 (x) The alternate function of the I/O port 2 in 8051 microcontroller is

(a) high order address bus (A15 -A8)

(b) data bus (D7 –D0)

(c) low order address bus (A7 –A0)

(d) multiplexed address / data bus (AD7 –AD0).

**Group – B**

2. (a) "The address capability of INTEL 8085 is 64 KB." Explain the reason.

 (b) Write a short note on program counter of INTEL 8085 microprocessor.

 (c) Explain the function of the following signals related to INTEL 8085 microprocessor:

(i) $\overbar{RESET IN}$ (ii) RESET OUT (iii) IO/$\overbar{M}$.

 (d) Interface an IC 2764 (8K × 8 EPROM) using NAND gate address decoder such that the address range allocated to the chip is 0000H-1FFFH.

**2 + 2 + (1 + 1 + 1) + 5 = 12**

3. (a) Determine the status of (i) Sign, (ii) Zero, (iii) Auxiliary Carry, (iv) Parity, and (v) Carry flags after execution of the following program for Intel 8085 microprocessor.

MVI A, D2H

ORI 95H

HLT

 (b) Briefly explain the following instructions related to Intel 8085 microprocessor:

(i) SHLD (ii) RRC.

 (c) Write an assembly language program in Intel 8085 microprocessor to add FFH and 12H and store the result in memory locations F001H (higher byte) and F000H (lower byte).

**4 + 4 + 4 = 12**

**Group – C**

4. (a) Define (i) T-state, (ii) machine cycle, and (iii) instruction cycle. How long would the Intel 8085 microprocessor take to execute MVI B, 45H if a 5 MHz crystal is connected with the 8085?

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

**6 + 6 = 12**

5. (a) What are the software interrupts and hardware interrupts supported by Intel 8085 microprocessor? Which interrupt has the highest priority?

 (b) What do you mean by vectored interrupt and non-vectored interrupt?

 (c) Explain the control word format of 8255A.

**(3 + 1) + 2 + 6 = 12**

**Group – D**

6. (a) Discuss in detail the internal RAM structure of 8051 microcontroller.

 (b) How many ports are available in 8051 for I/O purposes? What should be done to make a port an input port? Which I/O port of the 8051 does not have any alternative function and can be used solely for I/O? What is the content of Port 0 (P0) upon RESET of 8051?

 (c) Write an assembly language program to toggle all the bits of P1 continuously after some delay. Assume a delay subroutine is available.

**5 + 4 + 3 = 12**

7. (a) Describe IE and IP registers of 8051 microcontroller.

 (b) Describe TCON and TMOD registers of 8051 microcontroller.

**(3 + 3) + (3 + 3) = 12**

**Group – E**

8. (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**

9. (a) Draw the interfacing circuit of 8051 microcontroller with 16×2 LCD and explain properly.

 (b) Write an Assembly Language Program to display ‘CIRCUIT’ in the LCD of above circuit.

**(3 + 3) + 6 = 12**