B.Sc

2024

ELECTRONICS — HONOURS

Paper : CC-12

(Microprocessors and Microcontrollers)

Full Marks : 50

The figures in the margin indicate full marks.

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

Answer ***question no.*** **1** and ***any four*** questions from the rest.

1. Answer ***any ten*** questions : 1×10

(a) Intel 8085A and 8080A differ in

(i) number of address lines (ii) number of data lines

(iii) instruction set (iv) number of interrupts.

(b) In 8-bit microprocessor, how many opcodes are present?

(i) 246 (ii) 278

(iii) 250 (iv) 256.

(c) Which of the following is true about microprocessors?

(i) It has an internal memory (ii) It has interfacing circuits

(iii) It contains ALU, CU and Registers (iv) It uses Harvard architecture.

(d) How many timers/counters does IC 8051 have?

(i) 1 (ii) 2

(iii) 5 (iv) 4.

(e) How many lines are present in control section of 8255 PPI?

(i) 4 (ii) 6

(iii) 5 (iv) 8.

(f) Which addressing mode is used when the address of data is specified within the instruction?

(i) Register addressing (ii) Direct addressing

(iii) Indirect addressing (iv) Immediate addressing.

(g) The signal used to latch the address is _____.

(i) $\overline{RD}$ (ii) $\overline{RW}$

(iii) $\overline{MEMR}$ (iv) ALE.

(h) What is the main function of ADC in microcontroller interfacing?

(i) Converts analog input to digital (ii) Stores program instructions

(iii) Generates clock signals (iv) Controls I/O devices.

(i) How many T-states are required for execution of POP H instruction?

(i) 8 (ii) 10

(iii) 12 (iv) 13.

(j) Which of the following is a software interrupt?

(i) TRAP (ii) INTR

(iii) RST-6.5 (iv) RST-5.

(k) In 8085, the pins for HOLD and HLDA are

(i) 39 and 38 (ii) 38 and 39

(iii) 36 and 37 (iv) 37 and 36.

(l) How many address lines are required to connect a 2KB RAM to a microprocessor?

(i) 12 (ii) 10

(iii) 11 (iv) 9.

2. (a) What is the role played by the Program Counter and the Instruction Register?

(b) Name the different flags inside the flag-register and mention the role of each.

(c) Explain register addressing mode for the 8085 with proper examples. (2+2)+3+3

3. Explain the following instructions of 8085 (***any five***) : 2×5

(a) MOV A, M (b) ADD B (c) CMP A (d) INX H

(e) STA <address> (f) RAL (g) SPHL.

4. (a) What is the role played by the following signals?

(i) IO / $\overline{M}$ (ii) $\overline{INTA}$ (iii) INTR.

(b) Explain the terms : Instruction cycle, Machine cycle and T-states.

(c) Write an assembly language programming (ALP) for the 8085 to compare two 8-bit numbers which are stored in two memory locations and to place the larger number in the first and the smaller number in the second memory location. 3+3+4

5. (a) Draw and explain the timing diagram for the instruction "MOV A, B".

(b) Explain how the ALU and Flag registers work in 8085.

(c) Describe the indirect addressing mode in 8085 with examples. (3+2)+3+2

6. (a) Explain with a block diagram the functioning of a microcomputer through the exchange of signals, address and data between the processor, memory and I/O ports through the three types of buses.

(b) What is masking? Why is it needed?

(c) What is the function of the instruction NOP? (2+3)+3+2

7. (a) What is the use of a PPI device? Write a short note on the 8255A PPI device briefly explaining its different modes of operation.

(b) Draw the block diagram of the architecture of the 8051 microcontroller.

(c) Name two peripheral devices that are connected with microcontrollers. (1+4)+3+2

8. (a) Draw the block diagram of PIC 16F887 microcontroller.

(b) List the features available in a PIC microcontroller.

(c) Draw the block diagram of Harvard architecture for microcontrollers. 3+3+4
