Instructions: (1) All Questions are compulsory.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

Marks

1. (A) Attempt any THREE of the following: 12
   (a) State difference between Harvard and Von Neumann architecture with suitable diagram.
   (b) List important any eight features of 8051 microcontroller.
   (c) Explain the following 8051 microcontroller instructions:
      (i) XCH A, @ Ri
      (ii) CJNE A, direct, rel
   (d) State any two difference between microcontroller and microprocessor.
   (e) Explain BSR mode of 8255. Write control word in BSR mode to set, Reset of PC4 bit of Port C.

   (B) Attempt any ONE of the following: 6
   (a) Write an assembly language program to exchange ten bytes of data from source location 40H to destination location 60H, for 8051 microcontroller.
   (b) Draw Interfacing of 2 Kbyte EPROM and 2 Kbyte RAM to 8051 microcontroller. Draw the memory map.

2. Attempt any FOUR of the following: 16
   (a) Describe the function of address, data and control bus.
   (b) Draw the format of PSW register of 8051 microcontroller and state the function of each bit.

P.T.O.
(c) Describe the function of following pins of 8051 microcontroller:
   (i) PSEN
   (ii) EA
   (iii) RST
   (iv) ALE

(d) Draw Internal RAM memory organization of 8051 and explain.

(e) List addressing modes of 8051 microcontroller. Explain any four with one example each.

(f) Explain the following directives with example:
   (i) ORG
   (ii) DB
   (iii) EQU
   (iv) CODE

3. Attempt any FOUR of the following:

(a) Distinguish between microprocessor and microcontroller on the basis of following points:
   (i) Architecture used
   (ii) Memory organization
   (iii) Ports
   (iv) Clock frequency

(b) Explain power saving options with diagram.

(c) State the function of Editor, Assembler, Compiler and Linker.

(d) Describe selection factors of microcontroller.

(e) Draw Architecture of 8051 microcontroller.

4. (A) Attempt any THREE of the following:

(a) With the help of ANL instruction explain:
   (i) Direct Addressing Mode
   (ii) Indirect Addressing Mode
   (iii) Register Addressing Mode
   (iv) Immediate Addressing Mode
(b) Draw the format of SCON register. Explain any two modes of serial communication.

(c) Write an assembly language program to transfer the message “MIC” serially at 4800 baud, 8 bit data, 1 stop bit. Do this continuously.

(d) Write an assembly language program to find two’s complement of a number 55H, and store the result in the memory location 3000H.

(B) Attempt any ONE of the following:

(a) Draw the interfacing diagram of stepper motor with 8051 microcontroller and write an assembly language program to rotate stepper motor continuously in counter clockwise.

(b) Write an assembly language program for 8051 to arrange ten numbers in an ascending order.

(c) Draw interfacing diagram showing 4×4 matrix keyboard connections to Port 2 and Port 1 of 8051 microcontroller. Draw flow-chart to detect a pressed key.

5. Attempt any FOUR of the following:

(a) List the various interrupts in 8051 microcontroller along with their priorities and vector locations.

(b) A switch is connected to pin P1.0 and LED to pin P2.7. Write a program to get the status of the switch and send it to the LED.

(c) Draw the circuit diagram of Port 2 of 8052 and describe its function.

(d) Draw the format of TCON register and state the function of each bit.

(e) List the timer modes of 8051 microcontroller. Describe any two timer modes with a suitable diagram.

6. Attempt any FOUR of the following:

(a) Write a program to generate a square wave of 50 Hz frequency on pin P1.2, using an interrupt for Timer 0. Assume that XTAL = 11.0592 MHz.

(b) Describe the steps for programming the 8051 to receive data serially.
(c) Draw the format of IE and IP register.

(d) Explain the timer/counter logic with diagram.

(e) Draw the interfacing diagram of seven segment display with 8051 microcontroller.