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.

1. A) Attempt any three:
   i) Draw the block diagram of Von-Neumann and Harvard architectures.
   ii) Draw the interfacing of two seven segment display with 8051 microcontroller.
   iii) Write C language program for 8051 microcontroller to toggle all 8 lines of port 0 with delay.
   iv) Describe the function of PC and DPTR.

B) Attempt any one:
   i) Draw and describe the internal RAM memory organisation of 8051 microcontroller.
   ii) Write an assembly language program to find largest number out of five numbers. Data is stored in internal RAM memory location 10 H onwards. Store the result at 20 H.

2. Attempt any two:
   a) Describe the addressing modes of 8051 microcontroller with one example.
   b) Draw the interfacing of DAC 0808 with 8051 microcontroller. Write C language program to generate triangular waveform by using DAC 0808.
   c) Draw the interfacing of stepper motor with 8051 microcontroller. Draw a flow chart to rotate stepper motor through 360° in Anticlock wise direction.

3. Attempt any four:
   a) Draw the block diagram of internal architecture of 8051 microcontroller.
   b) Describe the four timer modes of 8051 microcontroller with suitable diagram.
   c) Write C language program for 8051 microcontroller to read data from port 1 and send it to port 3.
   d) Distinguish between microprocessor and microcontroller (any four points).
   e) Draw the interfacing of 8 LEDs to port 2 of 8051 microcontroller. Write C language program to turn ON and OFF LEDs of port 2 with delay.

P.T.O.
4. A) Attempt any three:
   i) Draw the interfacing of relay and optoisolator with 8051 microcontroller.
   ii) What is bus? Describe the function of address, data and control bus.
   iii) Write the instruction for following using C operator:
         a) Bit wise shift data left 4 times.
         b) Bit wise shift data right 4 times.
   iv) Draw the format of PSW register of 8051 microcontroller and describe the function of any two flags.

B) Attempt any one:
   i) Write an assembly language program for 8051 microcontroller to find average of ten 8-bit numbers stored in internal RAM location 20 H onwards. Store the result at 30 H.
   ii) Draw the format of TMOD register of 8051 microcontroller. Describe the function of each bit.

5. Attempt any two:
   a) Draw the interfacing of ADC 0809 with 8051 microcontroller. Write C language program to read the data at channel O of ADC 0809 and store it to 10 H memory location.
   b) Describe the following assembler directives with example.
      i) DB
      ii) ORG
      iii) EQU
      iv) END.
   c) i) Write C language program for 8051 microcontroller to add five 8-bit numbers.
        ii) State any four C data types with their range of value.

6. Attempt any four:
   a) Distinguish between 8051 and 8052 microcontrollers (any four points).
   b) Write C language program for 8051 microcontroller to transmit message ‘WELCOME’ serially at baud rate 9600, 8-bit data, 1-stop bit. Assume crystal frequency is 11.0592 MHz.
   c) Write an assembly language program for 8051 microcontroller to transfer 10 bytes starting from 20 H onwards to 30 H onwards.
   d) Describe alternative functions of port 3 of 8051 microcontroller.
   e) Draw the interfacing diagram for temperature measurement using 8051 microcontroller and ADC 0809.