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.
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. A) Attempt any three:
   a) State any eight features of 8051 microcontroller.
   b) Draw format of PSW register in 8051 microcontroller and state significance of each bit.
   c) Explain the interfacing of 3×3 key matrix with 8051 microcontroller.
   d) State any four C data types with their value range.

   B) Attempt any one:
   a) Draw internal RAM organization of microcontroller 8051 and show address areas for each Section.
   b) Write an ALP to find the largest number in an array of 10 numbers stored in internal RAM.

2. Attempt any two:
   a) Write a assembly language program for 8051 microcontroller to generate a delay of 1 second.
      Use timer1. Assume crystal frequency = 12 MHz. Draw flowchart.
   b) Draw interfacing diagram of 8 bit serial ADC, MAX112 with 8051 microcontroller. Write a ‘C’ language program to read data.

3. Attempt any four:
   a) Draw neat labeled interfacing diagram of LCD with 8051 microcontroller.
   c) Write down instructions to READ input port and send hex data to output port using ‘C’ operators.

P.T.O.
d) Describe timer operations of 8051 microcontroller in mode 1 and mode 2 with respect to application and advantages.
e) Describe stack operations in 8051 microcontroller with suitable examples.

4. A) Attempt any three:
   a) Draw interfacing diagram or temperature measurement using LM35 with 8051 microcontroller.
   b) Write ‘C’ language program to toggle a bit of P1.5 continuously with 250 msec. delay.
      Use timer 0, mode 2. Assume crystal freqn. 11.0592 MHz
   c) Compare RISC and CISC machines with examples.
   d) Describe operations of DPTR register in 8051, along with related instructions.

B) Attempt any one:
   a) Describe any four assembler directives used in 8051 programing.
   b) Draw the format of TCON register in 8051 and describe in short.

5. Attempt any two:
   a) Write an assembly language program for 8051 microcontroller to generate a square wave of 2 KHz frequency on Pin P1.5. Assume crystal freqn. = 11.0592 MHz.
   b) Write ‘C’ language program to receive bytes of data serially and put them in port P1. Set baud rate of 4800, 8 bit data and 1 stop bit. Assume crystal freqn. = 11.0592 MHz.
   c) What is integrated development environment for microcontroller based systems? Describe at least four features of Keil μ-Vision.

6. Attempt any four:
   a) Draw format of IE register in 8051 microcontroller and explain each bit.
   b) Draw and explain the interfacing of ADC with 8051 microcontroller.
   c) Write an ALP for 16 bit multiplication. Assume numbers to be stored in internal RAM.
   d) State and explain the interrupts used in 8051 microcontroller.
   e) Draw neat labeled interfacing diagram to control a lamp at pin P1.0, by using optoisolator with 8051 microcontroller.