24225

03 Hours / 70 Marks   Seat No.

Instructions –   (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

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

(4) Figures to the right indicate full marks.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

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

Marks

1.   **Attempt any FIVE of the following:**   **10**

a) State four advantages of embedded system.

b) State the function of Timers in the 8051.

c) Draw the two switches and two LEDs Interfacing diagram with 8051 microcontroller.

d) List the four different methods of Inter task communication.

e) State the importance of the following characteristics in embedded system.

   i)   time-to-market

   ii) time-to-prototype

f) Draw bit format of TMOD register.

g) List any four codes with description to write in command register of 16×2 LCD.

Marks

2. Attempt any THREE of the following: **12**

a) Explain the purpose of each bit in the SCON register of the 8051.

b) List the classification of an embedded system. Describe any two types.

c) Compare between CAN and I^2C protocols on the following points.
   i) Data Transfer rate
   ii) Number of fields
   iii) Addressing bits
   iv) Applications

d) Develop 'C' program for motion detection using PIR sensor.

3. Attempt any THREE of the following: **12**

a) State the role of decision control and looping statements in Embedded C. Give any one examples of each.

b) Develop 'C' program for obstacle detection using IR sensor.

c) List two features of each of the following:
   i) Bluetooth
   ii) Zig Bee

d) Draw interfacing diagram of ADC with micro controller and explain function of following pins of ADC:
   i) SOC
   ii) EOC

Marks

4. Attempt any THREE of the following: **12**

    a) Compare Harvard and Von-Neumann Architecture based on:

        i)   No. of clock cycles required to execute single instruction.

        ii)   Physical address

        iii)   Speed of execution

        iv)   Cost

    b) Draw labelled diagram to interface 16×2 LCD display with 8051. State function of pins:

        i)   RS

        ii)   R/W

    c) Draw the pin out of RS 232 and describe function of TXD, RXD, DTE and DCE pins.

    d) Write C language program to read P1 and send the 1's complement of P1 to P2.

    e) Draw interfacing of DC motor with 8051 microcontroller also write a 'C' language program to rotate DC motor in clockwise direction.

5. Attempt any TWO of the following: **12**

    a) Explain the need to consider following factors in design matrix of embedded system:

        i)   Processor

        ii)   Memory

        iii)   Power

        iv)   Non-recurring engineering cost

        v)   Flexibility

        vi)   Maintainability

    b) Draw interface of 7 seg LED display to 8051 and write a C program to display 0-9 continuously.

    c) Write 8051 'Embedded C' program to transfer string 'INDIA' serially at 9600 baud rate continuously, use 8 bit data and 1 stop bit. Assume crystal frequency of 11.0592 MHz.

Marks

6. **Attempt any TWO of the following:** 12

a) Sketch interfacing diagram to control stepper motor connected to port 2 through IC ULN 2003 and write C language program to rotate stepper motor in clockwise direction continuously with certain delay.

b) Write a 8051 'C' program to generate 24 Hz square wave on port pin P1.3 using timer 0 in mode 2.

c) Write algorithm, flowchart and C language program to toggle all bits of P0, P1, P2 and P3 continuously with delay of 1 ms assuming crystal frequency of 11.0592 MHz.

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