21222

3 Hours / 70 Marks   Seat No. ☐☐☐☐☐☐☐☐

15 minutes extra for each hour

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

(a)   State :

(i)   Duality Theorem

(ii)   De-Morgan's Theorem

(b)   Draw symbol and truth table of Universal Gates.

(c)   State race arround condition in J-K flip flop.

(d)   Draw symbol and truth table of T-type flip flop.

(e)   Explain assemble directives

(i)   DB   (ii)   EQU

(f)   Explain PUSH instruction with one example.

(g)   State the function of LCD display pins.

(i)   R/W   (ii)   RS

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

(a)   Compare between TTL and CMOS. (Any four points)

(b)   Draw OR gate and AND gate using Universal Gates.

(c)   Design 8:1 MUX using 4:1 & 2:1 MUX. Draw Truth table.

(d)   Minimise the following Boolean expression using K-map and realize it using the basic logic gates.

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

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

    (b) Interface stepper motor to 8051 microcontroller and write an ALP to rotate stepper motor in Anti-clockwise direction continuously.

    (c) Compare between combinational and sequential circuit (Any four points)

    (d) Draw memory organization for $E\overline{A} = 0$ and $E\overline{A} = 1$ and explain the same.

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

    (a) Explain the following instruction :

        (i) DAA

        (ii) DIV AB

        (iii) CJNE A, data, rel

        (iv) SWAP A

    (b) Compare between Harvard and Von-Neuman architecture (Any four points).

    (c) Design Half-adder using K-map and implement using basic logic gates.

    (d) Realize the following equations using NAND Gates only :

        (i) $Y = (A + B) \cdot (B + C)$

        (ii) $Y = AB + C$

    (e) What are the alternate function of port 3 of 8051 micro-controller ?

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

    (a) Interface 8 LED's with port 1 of 8051 micro-controller. Write ALP to make LED's ON and OFF after 10 msec. delays. Assume suitable data.

    (b) Develop an ALP to arrange ten numbers stored in internal memory locations starting from 40H location in descending order.

    (c) Draw Architecture of 8051 micro-controller.

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

   (a) Explain power saving options

      (i) Idle mode

      (ii) Power down mode

   (b) Draw interfacing diagram of 8K × 8 program ROM with 8051 and also write memory map for the same.

   (c) Construct 3 bit asynchronous up-counter using flip-flop. Draw its timing diagram.

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