12223

3 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)   Assume suitable data, if necessary.

(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)   Draw the switching circuit analogy of an AND gate, symbol, Truth Table and logic expression.

(b)   In the K-map, list all the grouping methods with its eliminating variable count.

(c)   How to convert SR flip-flop into D flip-flop ? Draw circuit diagram and truth table of D flip-flop.

(d)   Explain : (i) Fan-in (ii) Fan-out with respect to logic families.

(e)   Identify the addressing mode of the instruction :

(i)   MOV X @ Ro, A

(ii)   CJNE A, # data, rel

(f) Explain working of XCHD instruction with syntax and example.

(g) Find the number of address lines required for :

(i) 4 K RAM

(ii) 8 K ROM

2. Attempt any THREE of the following : **4 × 3 = 12**

(a) Prove NOR gate as universal gate with suitable diagrams.

(b) Design full Adder using K-map. Draw circuit diagram & with Truth Table.

(c) Minimize the following Boolean expression using K-map and realize it using the basic gates. $\gamma_{(A,B,C,D)} = \Sigma m\,(1,3,5,9,11,13)$

(d) Convert following equation into canonical required POS OR SOP form :

(i) $\gamma = (\overline{A} + B)\,(B + \overline{C})\,(\overline{A} + \overline{C})$

(ii) $\gamma = A + BC + ABC$

3. Attempt any THREE of the following : **4 × 3 = 12**

(a) Describe any four addressing modes of 8051 microcontroller with suitable example.

(b) Draw and explain the interfacing of 16 × 2 LCD display with 8051.

(c) Implement the following logic function using suitable multiplexer :

$F(A,B,C) = \Pi M\,(0, 1, 2, 5, 7)$

(d) Draw the architecture of 8051 and label various blocks.

4. Attempt any THREE of the following : **4 × 3 = 12**

(a) Explain different program development steps in assembly language programming.

(b) Compare 8051, 8031 and 8751 on the basis of different parameters.

(c) Realize the following expression using K-map and implement it :

$\gamma_{(A,B,C,D)} = \Sigma m\,(0, 2, 3, 5, 6, 7, 10, 11) + d(8, 14, 15)$

(d) Apply Boolean rules to simplify the following function :

$G = (A + B)\,(A + \overline{B})$

$G = \overline{A}\,\overline{B}\,C + A\,\overline{B}\,C + A\,B\,\overline{C}$

(e) Draw and explain the flag register of 8051 microcontroller.

5. Attempt any TWO of the following : $\qquad$ **6 × 2 = 12**

(a) Draw and explain the interfacing of 4 × 4 matrix keyboard with 8051 using ports.

(b) Write a program to find how many ODD numbers are present in the array of 10 numbers stored in internal memory RAM with algorithm and flowchart.

(c) Explain the various power saving options of 8051.

6. Attempt any TWO of the following : $\qquad$ **6 × 2 = 12**

(a) What is the use of stack in 8051 micro controller and draw and explain the function of SCON register with each bit.

(b) Develop an ALP for interfacing of LED's with port 1 of 8051. Draw interfacing for the same.

(c) Explain triggering methods in Flip-Flops in brief and explain race around condition in JK Flip-Flop and how it is eliminated.

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