11920

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

(7) 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) Sketch symbol and write truth table of two input EX-OR gate.

(b) Define the term 'Multiplexer'. State two examples of multiplexer.

(c) Implement T flip flop using J K flip flop. Write its truth table.

(d) Implement following Boolean equation using fundamental gates :

$Y = ABC + A\overline{B}C + \overline{A}\,\overline{C}B$

(e) Identify direct addressing instructions from following instructions :

(i)   MOV R0, R5

(ii) MOV R0, 80 H

(iii) MOV R0, #75H

(iv) ADD A, 45 H

(f) If initial content of accumulator is 44 H, find out the new content of accumulator after execution of the instruction

RR   A

(g) Find out number of data lines required to interface 16 LEDs arrange in the 4 × 4 matrix form.

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

(a) Define following terms related to logic families :

(i) Noise Margin

(ii) FAN-OUT

(iii) Propagation delay

(iv) Power dissipation

(b) State Demorgan's theorem's and prove both theorems using truth table.

(c) State functions of preset, clear, clock and SR inputs related to SR flip flop.

(d) Sketch diagram of 4 bit asynchronous counter using suitable flip flop. Sketch timing diagram.

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

(a) List out any four assembler directives and state their functions.

(b) Sketch diagram showing interfacing of two chips of RAM having size 2k × 8 to 8051 microcontroller. Write its memory map.

(c) Minimize following Boolean equation using 'k' map :

$Y = A \overline{B} C + \overline{A} \overline{B} C + \overline{A} \overline{B} \overline{C} + ABC$

and implement using basic gates.

(d) List out three types of buses. State their functions.

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

   (a) List out features of any four addressing modes of 8051.

   (b) With the help of PCON register, explain Power down mode and Idle mode of 8051.

   (c) Construct full adder circuit using K map.

   (d) Justify 'NOR gate is called as universal gate'. Sketch relevant diagram.

   (e) Compare microprocessor with microcontroller on the basis of any four factors.

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

   (a) Explain with neat diagram microcontroller based water level controller.

   (b) Develop ALP for 8051 to perform addition, anding, multiplication of two data – Data-1 is at memory location 55 H and Data 2 is 20 H. Store result at internal memory locations.

   (c) Explain internal and external memory organisation of 8051.

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

   (a) Explain functions of all pins of Port 0, Port 1, Port 2 and Port 3.

   (b) Sketch diagram showing interfacing of single 7-segment common Anode display to 8051. Develop ALP to display number '7' on it.

   (c) Convert following Boolean equation to standard SOP form and implement using NAND-NAND logic.

   (i) $y = A\overline{B}C + ABC\overline{D} + A\overline{C}D$

   (ii) $y = PQ + PQR + PQ\overline{R}$

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