22421

24225

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) Assume suitable data, if necessary.

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

Marks

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

(a) Construct OR gate using NAND gate.

(b) Write the excitation table for T-F/F.

(c) Implement D flip-flop using JK flip-flop. Write its truth table.

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

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

(e) Identify direct addressing instructions from following instructions :

(i) MOV R_0, R_5

(ii) MOV R_0, #75H

(iii) MOV R_0, 80H

(iv) ADD A, 45H

(f) If initial content of accumulator is 66H, find out the new content of accumulator after execution of the instruction

RR A

(g) State the function of LCD display pins

(i) R/W

(ii) RS

2. Attempt any THREE of the following : 12

(a) Define following terms related to logic families :

(i) Noise Margin (ii) Fan-out

(iii) Fan-in (iv) Power Dissipation

(b) Draw logic diagram of 8 : 1 MUX and give it's truth table.

(c) Design full adder using K-map. Draw circuit diagram with truth table.

(d) State and explain De-Morgan's 2nd theorem.

3. Attempt any THREE of the following : 12

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

(b) Draw neat labelled interfacing diagram of 8051 with stepper motor.

(c) Explain race around condition in JK Flip-Flop and how it is eliminated ?

(d) Write the alternate function of port 3 pins of 8051 microcontroller.

4. Attempt any THREE of the following : 12

(a) Explain the following instructions :

(i) SWAP A (ii) MUL AB

(iii) DAA (iv) DIV AB

(b) Explain Power Saving options (i) Power down mode (ii) Idle mode of 8051.

(c) Minimize the following Boolean expression using K-map and realize it using the basic gates.

$Y(A, B, C, D) = \Sigma m(1, 3, 5, 9, 11, 13)$

(d) Prove NAND gate as universal gate with suitable diagrams.

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

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

(a) Develop an ALP for interfacing of LED's with port 2 of 8051. Draw interfacing for the same.

(b) Develop an ALP to arrange ten numbers stored in internal memory locations starting from 50H location in ascending order.

(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 of 8051 microcontroller.

(b) Develop an ALP to generate square wave of 2 kHz at port pin P2.1. Draw flow chart for it.

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