2019

Full Marks: 70

Time: As in the programme

The questions are of equal value.

Answer all the questions.

1. Reduce the following function using Quine McCluskey method for a seven variable digital system.

F(P,Q,R,S,T,U,V) = ∑ **(0,2,3,6,7,14,15,30,31,62,63,126,127)** **[14]**

OR

Minimize the following: - **[4 x 3.5 = 14]**

(a) F (A,B,C) = $\overline{A}\,\overline{B}\,C + B\,\overline{C} + \overline{A}\,B\,C + A\,B\,C$

(b) F(W,X,Y,Z) = ∑ m(1,3,7,11,15) + d(0,2,5)

(c) F(A,B,C,D) = π M(3,4,6,7,11,12,13,14,15)

(d) State DeMorgan's theorem. Give suitable examples.

2. Find the decimal equivalent in IEEE 754 single format that is close to the given floating-point binary number:

11000001011110000000000000000000 **[14]**

OR

Answer the following questions: **[2 X 7 = 14]**

(a) Distinguish between Half Adders and Full Adders.

(b) Design a Full Adder and clearly write the truth table for the Full Adder. Generate the Boolean expressions for Sum and Carry of the Full Adder. Also, draw a neat and labeled circuit diagram for the Full Adder.

3. Design a seven segment BCD decoder and clearly write the truth table for the above decoder. Generate the Boolean expressions for each of the outputs of the seven segment decoder. Draw a neat and labeled circuit diagram for the above decoder. **[14]**

OR

Construct a 3-bit synchronous Up/Down counter using T Flip Flop. Draw the circuit diagram neatly. Also, draw the timing diagram when the counter uses a negative clock with positive-edge triggering. **[14]**

4. **(a)** Define ROM and RAM? Explain the different types of ROM and RAM. **[7]**

(b) Explain the internal organization of ROM. Find the size of address and data in a 64 X 16 ROM and also show its internal organization with a neat and labeled diagram. **[7]**

OR

Write short notes on the following: **[4 x 3.5 = 14]**

(a) Magnetic Hard Disk

(b) Optical Disk

(c) Memory Size

(d) Magnetic Tape Systems

5. Explain Booth Multiplication in detail with a neat and labeled flowchart. Multiply (-2) (Multiplicand) and (-6) (Multiplier) in four bits using Booth Multiplication. **[14]**

OR

(a) What do you mean by a Multiplexer? Write the truth table and Boolean expression for 16 X 1 Multiplexer. Also, design an 8 X 1 Multiplexer using 4 X 1 Multiplexer. **[10]**

(b) Calculate the following: **[2 X 2 = 4]**

(i) $(01001111100011)_2 = (\_\_\_\_\_)_{16}$

(ii) $(AA.B)_{16} = (\_\_\_\_\_)_{10}$
