2024

2nd Semester Examination

BCA

Paper : C 3-T

(Digital Logic Design)

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Full Marks : 50 Time : Two Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Group - A

Answer any ***five*** questions : 2×5=10

1. Write De Morgan's theorem.
2. What is meant by logic gate?
3. What are uses of gray code? Convert binary 1010 into its equivalent gray code.
4. Simplify the expression using Karnaugh Map.

$$f(a, b, c) = \sigma(1, 3, 5, 6, 7)$$

5. What is meant by a don't-care condition in Karnaugh Map? How it is indicated?

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6. Convert the following Excess-3 number to its equivalent decimal number :

   0110 1001 1100 0111

7. Explain the meaning of positive-edge-triggered and negative-edge-triggered.

8. What are the primary differences between a JK and an RS flip-flop?

Group - B

Answer any ***four*** questions : 5×4=20

9. Design a 4-bit parallel-in parallel-out shift registers.

10. Write a short note on the following (any ***two***) :

    (a) Encoder

    (b) Full adder

    (c) EBCDIC

11. Using the K-Map method simplify the following Boolean functions :

    F(A,B,C,D) = (C+D)'+A'CD'+AB'C'+A'B'C D+ACD

12. What is NAND Gate? Why NAND Gate is called a universal gate? Design an OR Gate using NAND Gate. 1+1+3

13. Implement a full-subtractor with two half-subtractors and an OR Gate.

14. What is flip-flop? What are the advantages and disadvantages of D flip-flop? 2+3

Group - C

Answer any ***two*** questions : 10×2=20

15. What is race-around condition? Explain the master-slave JK flip-flops with the help of its truth table. Construct it using SR flip-flops. 2+5+3

16. Design a 5-mod counter. Explain its working procedure. 5+5

17. What a Decoder? How it is different from a encoder? Design and explain a 1:16 Decoder with a diagram and truth table. 2+3+5

18. Minimize the following equation and implement its logic circuit using multiplexer : 5+5

$$F(A, B, C, D) = \Sigma(0, 1, 2, 4, 5, 7, 11, 15)$$

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