

2026

COMPUTER APPLICATION

Course Name : Digital Logic Fundamentals

Course Code : BCA-DSC-2014

Full Marks : 60

Time : 2½ Hours

The figures in the margin indicate full marks for the questions

1. Answer the following questions : 1×8=8
 - a) Define binary number system.
 - b) What is 1's complement ?
 - c) Write the full form of ASCII.
 - d) State De Morgan's first theorem.
 - e) What is a logic gate ?
 - f) Define minterm.
 - g) What is a flip-flop ?
 - h) Define BCD.
2. Answer the following questions (any six) : 2×6=12
 - a) Convert $(25)_{10}$ to binary.
 - b) Differentiate between 1's complement and 2's complement.
 - c) Explain XOR gate with truth table.
 - d) What is duality principle in Boolean algebra ?
 - e) Define canonical form of Boolean function.
 - f) What is K-map? State its use.
 - g) Distinguish between combinational and sequential circuits.
 - h) What is a multiplexer ?
3. Answer the following questions (any four) : 5×4=20
 - a) Perform binary subtraction using 2's complement method : $(1011) - (0110)$
 - b) Explain error detection using parity bit with example.

(Turn over)

- c) Simplify the Boolean expression using laws :
 $(A + A' B)$
- d) Minimize the function using K-map :
 $F(A, B, C) = \sum m(1, 2, 5, 6)$
- e) Explain the working of half adder with logic diagrams.
- f) Describe the working of RS flip-flop with truth table.
4. Answer the following questions (any two) : 10×2=20
- a) (i) Convert $(7B)_{16}$ to binary and decimal. 5+5
 (ii) Perform addition using signed binary numbers :
 $(+9 + (-5))$ using 2's complement method.
- b) (i) Prove De Morgan's theorems using truth tables. 4+6
 (ii) Explain NAND and NOR as universal gates with examples.
- c) (i) Minimize the following Boolean function using K-map
 (4 variables) : 7+3
 $F(A, B, C, D) = \sum m(0, 2, 5, 7, 8, 10, 13, 15)$
 (ii) Implement the simplified function using NAND gates only.
- d) (i) Explain the working of JK flip-flop and its race-around condition. 5+5
 (ii) Design a 3-bit binary counter and explain its operation.

