BCA-101

DIGITAL ELECTRONICS

Time Allotted: 3 Hours | Full Marks: 70

The questions are of equal value.
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
(Multiple Choice Type Questions)

1. Answer any *ten* questions. $10 \times 1 = 10$

(i) The 10's complement of 03250 is

(A) 03251 (B) 96749
(C) 96750 (D) 32140

(ii) (AB+BC+CA+1) is equal to

(A) 0 (B) 1
(C) A+B+C (D) ABC

(iii) The addition of 3 bits is done by

(A) half adder (B) full adder
(C) half subtractor (D) full subtractor

(iv) (A.A').(A+B+C+D) is

(A) 1 (B) 0
(C) A (D) A+B+C+D

(v) A decoder is a combinational circuit that converts binary information from n input lines to a maximum of

(A) 2n (B)2+n
(C) 2^n (D) n output lines

(vi) In a J-K flip flop when J = 1 and K = 1 and clock = 1 the output will be

(A) toggle (B) 1

(C) 0 (D) recalls previous output

(vii) (AB + A′B + A′B′)is equal to

(A) A + B′ (B) A′ + B

(C) A + B (D) 1

(viii) A BCD counter is a

(A) decade counter (B) a full modules counter

(C) both (A) and (B) (D) none of these

(ix) X + XY = X. The given expression follows

(A) De Morgan's Law (B) Associative law

(C) Distributive law (D) Absorption law

(x) The output of a sequential circuit depends on

(A) present input only (B) past input only

(C) both present and past inputs (D) present output only

(xi) Subtracting 1111 from 11000 will result to

(A) 1000 (B) 1100

(C) 1001 (D) 1011

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

2. What is flip flop? Draw a block diagram and state the excitation and characteristics table of D flip flop 5

3. (a) $(AC15)_{16} = (?)_{10}$ 2.5

   (b) $(1011001)_2 = (?)_{10}$ 2.5

4. Draw the truth table and logic circuit of a full–Subtractor. Using Karnaugh map find out the expression for difference (d) and borrow (B). 5

5. (a) Design a J- K master slave Flip–Flop with circuit diagram and give the truth table. 3

   (b) Define Flip-Flop and its propagation delay. 2

6. (a) Prove that the multiplexer is a universal logic module. 2

   (b) Use 4–to–1 MUX and other necessary logic gate to design a Full–Subtractor. 3

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

7. (a) Briefly discuss the function of a full adder. 3

   (b) Make a truth table for a full adder. 3

   (c) Simplify the outputs of a full adder using K–map. 5

   (d) Realize the simplified logic equations using NAND gate. 4

8. (a) What is Multiplexer? Why is it called " Data selector"? 3

   (b) Draw the block diagram of a digital multiplexer and explain the function. 4

(c) Draw the functional truth table of a 4:1 multiplexer and realize it using basic gates (AND, OR, and NOT). 4

(d) Implement the expression using a multiplexer 4
$f(A,B,C,D) = \sum m(0,2,3,6,8,9,12,14)$

9. (a) Design a 4-bit up down counter. 5

(b) Design a Ring Counter 5

(c) Design a Mod 3 Counter 5

10.(a) What do you mean race condition in flip-flop? 3

(b) Design a Master-Slave Flip-flop and discuss its operation. 5

(c) Design and explain 4 bit Parallel Adder/Subtractor 7

11. Write short notes on any *three* of the following: 3×5

(a) Ripple Counter
(b) Encoder
(c) Demultiplexer
(d) Flip-Flop excitation table
(e) Priority checker