

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.

10×1 = 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.

3×5 = 15

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