Max Marks : 70   Min Pass Marks : 28

Q.1   **Choose correct answer from the following:**   (1 X 10 = 10)

(i)   **The compound propositions p and q are called logically equivalent if _____ is a tautology.**

(a) p ↔ q   (b) p → q   (c) ¬ (p ∨ q)   (d) ¬p ∨ ¬q

(ii)   **Consider the statement form p ⇒ q where p ="If Tom is Jane's father then Jane is Bill's niece" and q ="Bill is Tom's brother." Which of the following statements is equivalent to this statement?**

(a) If Bill is Tom's Brother, then Tom is Jane's father and Jane is not Bill's niece.

(b) If Bill is not Tom's Brother, then Tom is Jane's father and Jane is not Bill's niece.

(c) If Bill is not Tom's Brother, then Tom is Jane's father or Jane is Bill's niece.

(d) If Bill is Tom's Brother, then Tom is Jane's father and Jane is Bill's niece.

(iii)   **A _____ value is represented by a Boolean expression.**

(a) Positive   (b) Recursive   (c) Negative   (d) Boolean

(iv)   **Which of the following statements is the negation of the statements "4 is odd or -9 is positive"?**

(a) 4 is even or -9 is not negative   (b) 4 is odd or -9 is not negative

(c) 4 is even and -9 is negative   (d) 4 is odd and -9 is not negative

(v)   **What is the use of Boolean identities?**

(a) Minimizing the Boolean expression (b) Maximizing the Boolean expression

(c) To evaluate a logical identity   (d) Searching of an algebraic expression 1

(vi)   **_____ is used to implement the Boolean functions.**

(a) Logical notations   (b) Arithmetic logics

(c) Logic gates   (d) Expressions

(vii)   **Let a binary operation '*' be defined on a set A. The operation will be commutative if _____**

(a) a*b=b*a   (b) (a*b)*c=a*(b*c)

(c) (b o c)*a=(b*a) o (c*a)   (d) a*b=a

(viii) **What is meant by the power set of a set?**

(a) subset of all sets   (b) set of all subsets

(c) set of particular subsets   (d) an empty set

(ix) **Which of the following statements for a simple graph is correct?**

(a) Every path is a trail

(b) Every trail is a path

(c) Every trail is a path as well as every path is a trail

(d) Path and trail have no relation

(x) **The number of edges from the root to the node is called _____ of the tree.**

(a) Height   (b) Depth   (c) Length   (d) Width

Q.2 **Answer any four questions of the following:-**   (2.5 X 4 = 10)

(a) What is tautology and contradiction in mathematics ?

(b) What is a quantifiers and what are the types of quantifiers ?

(c) What are the basic components of Automatic control system ?

(d) What is De Morgan's law ?

(e) What is the difference between conjunctive and disjunctive?

Q3. **Attempt any four questions :-**   (2.5 x 4 = 10)

(a) What is many terminal network?

(b) What is Arbitrary Cartesian product of sets ?

(c) What do you mean by Binary operation ?

(d) What is the meaning of graph theory?

(e) Define Binary tree.

Q4. **Attempt any four of the following questions :-**   (10 X4 = 40)

(a) What is Logic Gate. Describe different types of logic gates?

(b) Prove that De Morgan's law ?

(c) Brief 'Trees' and their properties.

(d) What is Injective , Surjective and Bijective ?

(e) Answer the following:

(i) What is Boolean expression with example?

(ii) What is Partition of a set? Give example.

(f) (i) What is a Cartesian product in sets?

(ii) What do you mean by four-terminal network?

(g) What is meant by Boolean Algebra? Write Truth Tables for the Laws of Boolean.

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