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RA-399

M.Sc. Ist Semester (New/ATKT)

Examination, 2019

Computer Science

Paper - MSCS-101

Discrete Mathematics Structure

Time : 3 Hours]   [Maximum Marks : 85

Note :- Attempt all the questions.

SECTION - 'A'

Objective Type Questions

1. Choose the correct answer :   15×1=15

(i)   Converse of $P \Rightarrow q$ is $\sim P \Rightarrow \sim q$

        True / False

(ii) $P \vee \sim P$ is a tautology

        True / False

(iii) $\exists$ is called as :

        (a)   Universwal quantifier

        (b)   Existential quantifier

        (c)   Perfect quantifier

        (d)   None

(iv)   If A and B are two sets, and $A \cap B = \phi$ then A and B

        are called joint sets

        True / False

(v)   A relation is called equivalence relation, if it holds :

        (a)   Reflexitivity

        (b)   Transitivity

        (c)   Symmetry

        (d)   All of the above

(vi)   Every relation is not a function.

        True / False

(vii) Commutative group is also called as abelian group.

True / False

(viii) If (G, o) is a group, then .... is : called as associative law.

(a) $a \, o \, b \in G \, \forall \, a, b \in G$

(b) $e \, o \, a = a \, \forall \, a \in G$

(c) $a \, o \, b = b \, o \, a \, \forall \, a \in G$

(d) $a \, o \, (b \, o \, c) = (a \, o \, b) \, o \, c \, \forall \, a, b, c \in G$

(ix) The identity element in a group is unique.

True / False

(x) For each $A \in S$, we have $A \subseteq A$. then relation $\subseteq$ is anti - symmetric.

True / False

(xi) For any elements a,b,c

$\in L, a \vee (b \wedge c) = (a \vee b) \wedge (a \vee c)$ is

(a) Idempotent law

(b) Distributive law

(c) Absorption law

(d) Commutative law

(xii) A lattice is said to be complete if every subset has g.l.b. and .....

(a) s.l.b

(b) b.l.g

(c) l.u.b.

(d) None of the above

(xiii) If there is a circuit in graph G that traverses every edge of the graph exactly once, it is called .... ciruit.

(a) Euler

(b) Hamitonian

(c) bipartite

(d) Weighted

(xiv) In a graph G, if there is an edge between Adjacency Matrix is o.

Ture / False

(xv) Two or more edges in E of the form (V_i, V_j) and (V_a, V_b) are parallel if and only if $V_i = V_a$ and $V_j = V_b$

Ture / False

SECTION - 'B'

Short Answer Type Questions   5×5=25

2. If P and q are two statements. Prove that $P \wedge q \to P \vee q$ is a tautology.

OR

Write the predicate :

"Every rational number is a real number" into symbols. Also, write its negative in symbols.

3. A is the set of first ten natural nos. 1 to 10. A relation R is defined as follows :

$xRy \leftrightarrow x + 2y = 10$ where $x, y \in A$ then, evaluate domain & range of R.

OR

Show that relation is a divisor of in the set of positive integers is reflexive and transitive, but not symmetric.

4. State whether algebraic structure (I, -) is a semigroup or not. Explain reason.

OR

Is the set of all odd integers with addition of integers form a group ? Explain.

5. Explain hasse diagram with example ?

OR

In a lattice $(L, \wedge, V)$ for each $a \in L$, prove that : $a \wedge a = a$

6. Differentiate between isomorphic and homeomorphic graph. Explain with example.

OR

Prove that the sum of the degrees of all vertices in a graph is equal to twice the no. of edges.

SECTION - 'C'

Long Answer Type Questions   9×5=45

7. If A,B,C are three sets, prove that :

$(A - B) - C = A - (B \cup C)$

OR

Show that the relation :

$R = \{(a, b) : a - b = \text{even integer and } a, b \in I\}$ in the set I of integers is an equivalence relation. https://www.onlinebu.com

8. Prove the distributive law :

$$p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$$

use truth - table for proving.

OR

Show that the arguement $P, P \to q, q \to r \vdash r$ is valid.

9. Show that the set I of all integers is an infinite abelian group with respect to the operation of addition of integers.

OR

Explain the general properties of groups for a group (G;) consisting of non - empty set G with multiplication operation.

10. If N is a set of positive integers. Prove that the relation $\leq$, where $\leq$ has it usual meaning, is a partial order relation on N.

OR

Prove that in a distributive lattice, if an element has a complement, then this complement is unique.

11. Write the adjacency matrix of the graph :
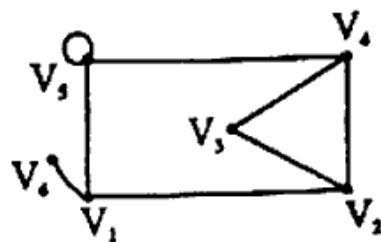
OR

Write short note on any three :

(a) Parallel edges

(b) Degree of a vertex

(c) Closed walk

(d) Weighted graph

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