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Reg. No. :

Code No. : 41403 E Sub. Code : SACS 11/
SASE 11

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2019.

First Semester

Computer Science / Software Engineering – Allied

DISCRETE MATHEMATICS

(For those who joined in July 2017 Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. _____, R in a set A is said to be identity relation, generally denoted by I_A if $I_A = \{(x, x) : (x \in A)\}$
- (a) Inverse Relation
(b) Identity Relation
(c) Reflexive Relation
(d) Irreflexive Relation

2. A relation is _____ if no two distinct points in the digraph have an edge going between them in both direction.
- (a) Transitive (b) Selective
(c) Antisymmetric (d) Symmetric
3. _____ function is also called as one to one correspondence
- (a) Into (b) Onto
(c) Bijective (d) Objective
4. _____ function is very useful coding theory.
- (a) Big-Omega (b) Hamming distance
(c) Omega (d) Distance
5. A proposition consisting of only a single propositional variable is called _____ proposition.
- (a) Composite (b) Molecular
(c) Atomic (d) Compound
6. A _____ is a declarative sentence that is either true or false.
- (a) Sentence (b) Value
(c) Domain (d) Propostion

7. A matrix of any order whose all elements are zero is called _____.

- (a) Unit (b) Scalar
(c) Row (d) Null

8. In a matrix if $a_{ij}=0$ for all $i \neq j$ is called as _____

- (a) Zero (b) Diagonal
(c) Scalar (d) Unit

9. Any pair of nodes that is connected by an edge in a graph is called _____ nodes.

- (a) Incident (b) Adjacent
(c) Isolated (d) Order

10. An _____ graph consists of set of vertices and a set of edges such that each edge is associated with an unordered pair of vertices.

- (a) Directed (b) Undirected
(c) Unidirected (d) Bidirected

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Draw the directed graph that represents the relation

$$R = \{(1, 1), (2, 2), (1, 2), (2, 3), (3, 2), (3, 1), (3, 3)\}$$

$$X = \{1, 2, 3\}$$

Or

(b) Let $R = \{(1, 1), (2, 1)(3, 2)\}$. Compute R^2 .

12. (a) Define functions and its terms.

Or

(b) Show that the mapping $f : R \rightarrow R$ be define by $f(x) = ax + b$, where $a, b, x \in R$, $a \neq 0$ is invertible. Define its inverse.

13. (a) Construct a truth table for each compound propositions.

(i) $p \wedge (\sim q \vee q)$

(ii) $\sim(p \vee q) \vee (\sim p \wedge \sim q)$

Or

(b) Prove that the following propositions are tautology

(i) $p \vee \sim p$

(ii) $p \Rightarrow (p \vee q)$.

14. (a) List out the properties of matrix addition.

Or

(b) Find the value of
$$\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix}$$

15. (a) Differentiate undirected graph with directed graph.

Or

(b) Define cycles and wheels.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Consider a relation R defined in $A = \{1, 2, 3\}$ whose matrix representation is given below. Determine its inverse R^{-1} and compute the complement R^c

Or

(b) Let $R = \{(1, 2) (2, 3)(3,1)\}$ and $A = \{1, 2, 3\}$ find the reflexive, symmetric and transitive closure of R_1 using

(i) Composition of relation R

(ii) Composition of matrix relation R

(iii) Graphical representation of R .

17. (a) Prove the Associative law of function composition.

Or

(b) Discuss about Inverse of a function.

18. (a) Discuss about Drived connectives.

Or

(b) Obtain the conjunctive normal form of the following

(i) $p \wedge (p \Rightarrow q)$

(ii) $[q \vee (p \wedge q)] \wedge \sim [(p \vee r) \wedge q]$.

19. (a) Solve with help of matrices.

$$x + 2y + 3z = 4$$

$$x + 4y + 9z = 6$$

$$x + y + z = 3.$$

Or

(b) Explain the properties of Inverse of matrix.

20. (a) Draw all the non isomorphic graphs of order four.

Or

- (b) Write detail notes on types of graphs.
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