(6 pages) **Reg. No. :** .....

Code No. : 8782 **Sub. Code : KCSM 11**

M.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2016.

First Semester

Computer Science

MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

(For those who joined in July 2016 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A ———— is an assertion that can be determined to be true or false.

   (a) Statement (b) Contradiction

   (c) Tautology (d) Negation

2. If $A \cap B = \phi$ then A and B are said to be ————

   (a) Conjunctive clause (b) Disjoint set

   (c) Negation (d) Contradiction

3. A ———— is a schematic representation of a set by a set of points.

   (a) Reflexive (b) Irreflexive

   (c) Negation (d) Ven diagram

4. A set of ordered pairs defines a ————

   (a) binary relation (b) universal relation

   (c) void relation (d) none of the above

5. A ———— is a rectangle array of numbers

   (a) set (b) matrix

   (c) inference (d) notation

6. A ———— is a matrix with the same number of rows as columns.

   (a) identity matrix (b) transpose matrix

   (c) square matrix (d) none of the above

7. A graph in which every edge is directed is called a ————

   (a) digraph (b) connected graph

   (c) multigraph (d) none of the above

8. A simple digraph which does not have any cycles is called ————.

(a) reachable set (b) circuit

(c) acyclic (d) none of the above

9. In a directed tree, any node which has out degree 0, is called a ————

(a) leaf (b) circuit

(c) acyclic (d) none of the above

10. A set of disjoint tree is called a ————

(a) leaf (b) acyclic

(c) forest (d) none of the above

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Demonstrate that R is a valid inference from the premises $P \to Q$, $Q \to R$ and P.

Or

(b) Symbolize the expression.

(i) "All the world loves a lover"

(ii) "All men are giants".

12. (a) Write down the equations for distributive laws of union and intersection also draw the ven diagram.

Or

(b) Write about classification of functions.

13. (a) Define a matrix and explain with example.

Or

(b) Find the Eigen values of the matrix $\begin{bmatrix} 1 & 2 & 2 \\ 0 & 2 & 1 \\ -1 & 2 & 2 \end{bmatrix}$.

14. (a) Prove that every graph is an intersection graph of some family of subsets.

Or

(b) Write about Hamiltanian graph.

15. (a) Prove that A tree with n vertices has $n-1$ edges.

Or

(b) Prove that A graph is a tree if and only if it is minimally connected.

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Show $I_{12} : \neg Q, P \to Q \Rightarrow \neg P$.

Or

(b) Show that

(i) $A \subseteq B \Leftrightarrow A \cap B = A$

(ii) If $S = \{a, b, p, q\}$ and $Q = \{a, p, t\}$ then what are $S \cup Q$ and $S \cap Q$.

17. (a) Let $A \neq B$ be any two sets. The symmetric difference of A and B is the set $A + B$.

Or

(b) Let $X = \{1, 2, 3, 4\}$ and $R = \{\langle x, y\rangle | x > y\}$. Draw the graph of R and also give its matrix.

18. (a) Explain the concept of Rank of matrix with example.

Or

(b) How will you find inverse of matrix? Explain with example.

19. (a) Prove that in a complete graph with n vertices there are $(n-1)/2$ edge disjoint Hamiltonian circuit, if n is an odd number ≥ 3.

Or

(b) Prove that A given connected graph g is an Euler graph if and only if all vertices of G are of even degree.

20. (a) Prove that the distance between vertices of a connected graph is a matrix.

Or

(b) Prove that every tree has either one or two centres.

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