LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.C.A. DEGREE EXAMINATION – **COMPUTER APPLICATIONS**

FIRST SEMESTER – **NOVEMBER 2019**

18PCA1MC01 – DISCRETE STRUCTURES

Date: 08-11-2019   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART-A

ANSWER **ALL** QUESTIONS: -   **(10 X 2 = 20)**

1. Write the truth table for $p \longrightarrow q$

2. What do you mean by logical equivalence of prepositions?

3. What is Binary Relation? Give an example.

4. Define Lattice.

5. Define Combination. Give an Example.

6. Define the Sum rule.

7. What is a Bipartite Graph? Give an Example.

8. Define a Subgraph. Give an example.

9. Define the Closure property of an Algebraic System. Give an Example.

10. Define the Finite State Machines.

PART-B

(5 X 8 = 40)

ANSWER ANY **FIVE** QUESTIONS:-

11. (a) Let A,B,C and D be four sets. Suppose R is a relation from A to B, S is a relation from
        B to C and T is a relation from C to D. Then, show that (R.S).T = R.(S.T)

                                    (OR)
    (b) Show that   p v (q ^ r) and (p v q) ^ (p v r) are logically equivalent.

12. (a) Explain Transitive Relation and Antisymmetric Relation with an example for each.

                                    (OR)
    (b) If I is the set of integers, then show that there is a relation R in I such that a R b iff
        a – b is divisible by m (positive integer) is an Equivalence Relation.

13. (a) David has 9 children. He takes 4 of them to a zoo at a time as often as he can, but he
        does not take the same 4 children to the zoo more than once. How many times David
        will be required to go to the zoo? How many times a particular child will go?

                                    (OR)
    (b) There are 4 oranges, 5 apricots and 6 alphonso in a fruit basket. When 7 fruits are
        randomly chosen from this basket, what is the probability that 2 of them are orange,
        2 of them are apricots and 3 of them are alphonsos.

14. (a) What is an Adjacency matrix? Write the Adjacency matrix for a triangle.

(OR)

(b) Define the following with suitable example: (i) Hamiltonian path (ii) Connected Graph.

15. (a) Explain Semi groups and Monoids with an example for each.

(OR)

(b) Explain Groups and Cyclic Groups with one example for each.

PART-C

ANSWER ANY **TWO** QUESTIONS:-   **(2 X 20 = 40)**

16.(a) Verify DeMorgan's laws by using truth table.

(b) Prove that the relation defined by "is perpendicular to" in the set of straight lines in a plane is symmetric but neither reflexive nor transitive.

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17.(a) Explain Universal Quantifiers and Existential Quantifiers with suitable examples.

(b) Explain the Bipartite Graph and Isomorphic Graph with suitable examples.

18. (a) Explain preorder, inorder and postorder traversals with a suitable example.

(b) Explain Grammar and Language of a Grammar with a suitable example.

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