LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2018**

16/17/18PCA1MC01 – DISCRETE STRUCTURES

Date: 25-10-2018   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART-A

Answer all Questions: -   **10 X 2 = 20**

1. What is a Prepositional Variable? Give an example.
2. Write the truth table for $p \longrightarrow q$
3. What is a Binary Relation? Give an example.
4. What is an Equivalence Class?
5. Define Permutation. Give an Example.
6. Define the Sum Rule.
7. What is a Bipartite Graph? Give an Example.
8. Define Euler Circuit.
9. Define the Closure property of an Algebraic System. Give an Example.
10. Define the Formal Languages.

PART-B

                                                        5 X 8 = 40

Answer all 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 (¬p ^ q)) and ¬ p ^ ¬ q are logically equivalent without using truth tables.

12. (a) Explain Reflexive Relation and Symmetric 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) How many 3-digit numbers can be found by using the digits 1,2,3,4,5 when (i) repetition is not allowed (ii) repetition is allowed.

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

(OR)

(b) Define the following with suitable example: (i) Euler path (ii) Complete graph

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

(OR)

(b) What is a Grammar? Briefly explain four types of Grammar.

PART-C

Answer any TWO Questions:-   **2 X 20 = 40**

16.(a) Explain posets and lattices with an example for each.

(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.

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

(b) Explain the Disjunctive Normal Form and Conjunctive Normal Form with suitable examples.

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

(b) What is a Group? Explain its Properties.

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