

B. Sc. (Part-III) Examination, 2016
Mathematics- Fourth Paper (Optional)

(E) Discrete Mathematics

Note :- Answer any five questions in all. Question No. 1 is compulsory. Answer one question from each unit. Marks allotted to each question are indicated in the right hand margin.

1. (a) Define following : 3.5 × 10 = 35
 (i) Tautology
 (ii) Contradiction
 (b) What are the applications of predicate logic?
 (c) Give an example of equivalence relation.
 (d) What are the properties of lattices?
 (e) How is a multigraph different from a simple graph?
 (f) What is graph coloring? Define isomorphism.
 (g) Show that the number of odd vertices in a graph is even.
 (h) Solve following recurrence relation :

$$T_n = T_{n-1} + T_{n-2} \quad n \geq 2$$
 with

$$T_0 = 0 \text{ and } T_1 = 1$$
 (i) Write about Mealy Machine.
 (j) What is the need of minimization in finite automata.

Unit-I

2. Use induction to show that $11^n - 4^n$ is divisible by 7 for $n \geq 1$. 10 Or
 3. Check the validity of the following argument :
 "If I try and I have a talent, then I will become scientist, then I will be happy.
 Therefore If I will not be happy then I did not try hard or I do not have talent." 10

Unit-II

4. Show that the union of two subgroups of a group G is a subgroup of G if and only if one is contained in the other. 10 Or
 5. Simplify the following Boolean function using K-Map method :

$$F(w,x,y,z) = \sum (0,1,2,5,8,9,11,14)$$

Unit-III

6. Define following : MGKVPonline.com 10
- (a) Euler Tour
 - (b) Hamiltonian Tour
 - (c) Planar Graph
 - (d) Bipartite Graph
 - (e) Binary Search Tree
7. Explain Preorder and Inorder traversal techniques for binary trees with suitable examples. Or 10

Unit-IV

8. Solve following recurrence relation by characteristics root method : 10
 $T_n - 4T_{n-1} + 4T_{n-2} = (n+1)^2$, given $T_0 = 0$ & $T_1 = 1$. Or
9. Construct the finite automaton for following expression : $(0+1)^*111(0+1)^*$ 10

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