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M-72/2110 M.Sc-[IT] 10842N

MS-114: Mathematical Foundation of Computer Science

Time: -3hrs **M. M. 70**

Note: -(a) The question paper consists of three sections: A, B and C. Candidates are required to attempt FIVE questions in all selecting two from each sections A and B and compulsory question of section C.

(b) Use of non-programmable scientific calculator is allowed.

Section-A **2*10.5=21**

Q1:- (a) Test the validity of: If Ram gets good marks then he will go to London. If he goes to London he will get Swiss watch. Thus Ram has Swiss watch.

(b) Prove that $p\wedge(q\vee r) = (p\wedge q)\vee(p\wedge r)$.

Q2:- (a) Prove: $n_{C_r} + n_{C_{r-1}} = n + 1_{C_r}$.

(b)Use Mathematical induction to show that $1 + 2 + \cdots \ldots\ldots\ldots\ldots + n = n(n + 1)/2$.

Q3:- Let A, B, C are the subsets of a universal set U. Find all min-sets generated by $A, B\ and\ C$. Draw the Venn diagram representing all minsets obtained.

Q4:- Explain in detail the aspects required for the efficiency of algorithm.

Section-B **2*10.5=21**

Q5:- Solve: $S(n) - 6S(n-1) + 9S(n-2) = (n+1)3^n$.

Q6:- (a) Prove that an undirected graph possesses an Eulerian circuit iff it is connected and its vertices are all of even degree.

(b) Define planner graph. State and prove the properties of planner graph.

Q7:- (a) Find generating function of $S(n) - 4S(n-1) + 4S(n-2) = 0, S(0) = S(1) = 1$.

(b) Let $R = (a, b), (b, c), (c, a) and\ A = [a, b, c]$. Find the reflexive, symmetric and transitive closure of R using (a) Composition of relation R. (b) Composition of Matrix relation.

Q8:- Explain the representation of graphs and also give example.

Section-C **28 marks**

Q9: (a) Prove the $A \cup B = B \cup A$. (4)

(b) In how many ways 4 colors can be selected from 7 colors. (2)

(c) The number of diagonals of a polygon is 10.Find the number of its sides. (3)

Contd ——

(d) Let $A = \{2,4,6\}$, $B = \{4,8,10\}$, $Find\ A \cup B, A \cap B\ and\ A - B.$ (3)

(e) Under what condition a constant function can be one-one and onto. (3)

(f) Prove that in a graph the number of vertices of odd degree is even. (3)

(g) Define union and compliment graph. (3)

(h) Define Isomorphic graphs. Give an example of two graphs which are not isomorphic. (4)

(i) Define Big-Omega and Big theta function. (3)

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