[4957] - 201

S.E. (Computer & IT)
DISCRETE STRUCTURS
(2008 Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

  1) *Section I : Attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6.*
  2) *Section II : Attempt Q. No. 7 or Q. No. 8 Q. No. 9 or Q. No. 10 , Q. No. 11 or Q. No.12.*
  3) *Answers to the two Sections should be written in separate answer books.*
  4) *Neat diagrams must be drawn wherever necessary.*
  5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Write the truth table for the following statements :   **[8]**

   i) $(\sim p \vee q) \rightarrow q$

   ii) $\sim (p \wedge q) \vee (p \text{ X } q)$

   b) Define disjuctive and conjunctive Normal forms with examples and applications of Discrete Structures.   **[8]**

OR

Q2) a) Among the integrs 1 to 1000 :   **[8]**

   i)   How many of them are not divisible by 3,nor by 5, nor by 7?

   ii) How many are not divisible by 5 and 7 but divisible by 3?

   b) Obtain the CNF and DNF of the following formulae given below:**[8]**

   i) $p \wedge (p \rightarrow q)$

   ii) $\sim (p \vee q) \rightarrow (p \wedge q)$

Q3) a) Define each of the following with examples :   **[8]**
   i)   Semi Group
   ii) Group
   iii) Abelian Group
   iv) Cyclic Group

   b) For the following, determine whether the binary operation * is commutative or associative: on N, where a * b = max(a,b)   **[8]**

OR

Q4) a) Define each of the following with examples :   **[8]**
   i)   Rings
   ii) Cosets
   iii) Subrings
   iv) Homomorphism of Groups

   b) Show that {1, 2, 3} under multiplication modulo 4 is not a group but that {1, 2, 3, 4} under multiplication modulo 5 is group.   **[8]**

Q5) a) Let A = (1,2,3,4) and R = ((1 ,2),(2,4),(1,3),(3 ,2)}. Find the transitive closure of R by Warshall's algorithm.   **[8]**

   b) Let A = {a,b,c}. show that (P(A),c) is a poset and draw its Hasse diagram.   **[8]**

   c) Define Chains and Antichains.   **[2]**

OR

Q6) a) Let R be a binary relation on the set of all positive integers such that
        R = { (a,b) | a- b is an odd positive integer }
   Is R reflexive, symmetric, antisymmetric, transitive?
   Is R an equivalence relation? A partial ordering relation.   **[8]**

   b) Function f, g, h are defined on a set   **[8]**
        X = (1, 2, 3) as
        f = ((1, 2), (2, 3), (3, 1)}
        g = {(1,2),(2,1),(3,1)}
        h = ((1,1), (2,2),(3,1)}
   i)   Find fog, gof. Are they equal?
   ii) Find fogoh and fohog.

   c) Define partial function.   **[2]**

SECTION - II

Q7) a) Define Following with examples : **[8]**

   i)   Graph

   ii) Self loop and parallel edges

   iii) Multiple Graphs

   iv) Weighted Graph

b) Prove that the number of vertices od odd degree in a graph is always even. **[8]**

OR

Q8) a) Determine the number of edges in a graph with 6 nodes, 2 of degree 4 and 4 of degree 2. Draw two such graphs. **[8]**

b) Define Isomorphism in graphs and sub graph with example. Find whether k_6 and $K_{3,3}$ are isomorphic or not? **[8]**

Q9) a) Show that it is possible to draw a tree with 10 vertices which has vertices either of degree 1 or of degree 3. Draw the tree. Is it possible to draw the same type of tree with 11 vertices **[8]**

b) Define tree and its properties. Is it possible to draw a tree with five vertices having degree 1, 1, 2, 2, 4? **[8]**

OR

*Q10)*a) Construct an optimal tree for the weight 8, 9, 10, 11, 13, 15, 22. Find the weight of the optimal tree. **[8]**

b) Suppose data items A, B, C, D, E, F, G occur with the following probability distribution :

Data Item	A	B	C	D	E	F	G
Probability	10	30	05	15	20	15	05

Construct a Huffiman code for the data. What is the minimum weighted path length? **[8]**

*Q11)*a) Find the permutation of the set A = {1, 2, 3, 4} taking the elements two at a times. **[2]**

b) Suppose repetitions are not possible. **[8]**

   i)   How many three digit numbers can be formed from six digits 2, 3, 4, 5, 7, 9?

   ii) How many of these numbers less than 400?

   iii) How many even?

   iv) How many are multiples of 5?

c) Given a binary communication channel when A = input and B = output. Let P(A) = 0.4, P (B/A) = 0.9, P(B/A) = 0.6. Find the mutual information (i) between A and B, (ii) between A and B. **[8]**

OR

*Q12)*a) Four persons enter a bus in which there are six vacant seats. In how many ways can they take their places? **[2]**

b) Given that a students had prepared, the probability of passing a certain entrance exam 0.99. Given that a student did not prepare, the probability of passing the entrance exam is 0.05. Assume that the probability of preparing is 0.7. The student fails in the exam. What is the probability that he or she did not prepare? **[8]**

c) In a test an examinee either guesses or copies or knows the answer to multiple Choice questions with 4 choices, only one answer being correct. The probability that he makes a guess is 1/3, the probability that he copies the answer is 1/6. The probability that his answer is correct, given that he copies it is 1/8. Find the probability that he knew the answer to that question, given that he correctly answers it. **[8]**

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