Duration :- 2.30 Hrs | Y321NDM19 | Maximum Marks : 75

Note : 1) All Questions are compulsory.
2) Figures to right indicate full marks.

Q.1. Attempt All (Each of 5 Marks) **15**

a. Select correct answers from the following :

1. The value of p (3,2) = ______________
   a. 6　b. 9　c. 8　d. 5

2. Diagrammatic representation of relation R defined on set is called ______.
   a. Diagraph　b. Multigraph　c. Hasse diagram　d. None

3. In how many ways 2 students can be chosen from class of 20 students?
   a. 190　b. 180　c. 240　d. 390

4. A graph without loops and parallel edges is called as __________.
   a. Simple graph　b. Compound graph　c. Multigraph　d. None

5. The set { 1,2,3} is not equal to
   a. { 2, 1, 3 }　b. { 3, 2, 1 }　c. { 1, 2, 3, 4 }　d. { 1, 2, 3, 1 }

b) Fill in the Blanks.

(Warshall's, 45, onto, POSET, closed)

1. A __________ path has the same first and last vertices.
2. A set together with partial order relation is called __________.
3. The value of c (10,8) = __________
4. A function f: A → B is said to be _______ function if each element of B is image of some element of A
5. _________ Algorithm use to find shortest path.

c) Define the following

1. Simple Graph
2. Equivalence Relation
3. Degree of vertex
4. POSET
5. Inclusion & Exclusion Principle

Q.2. Attempt any three of the following : **15**

a. Determine whether the relation R on set A is equivalence Relation A = {1, 2, 3 }
   R = { (1,1), (1,2), (2,1), (3,3) }

b. Find the solution of recurrence relation.
   $a_n = a_{n-1} + 20_{n-2}$ with $a_0 = 2$ and $a_1 = 7$

c. Determine whether the function F : R → R given by f(x) = -3x +4 is a bijection.

d. Explain tower of Hanoi and solve the puzzle.

e. Let A = { 1, 2, 3, 4, 12 }. Let R be a partial order relation defined on A as a & b if and only if a/b. Draw hasse diagram of partial order relation.

f. Define the followings
   1. Domain　2. Co-Domain　3. Range

Q.3. Attempt any three of the following : **15**

a. How may integers between 1 and 600 (both inclusive) are divisible by 3 or 5?

b. Show that at a party of 20 people, there are two people who have some no. of friends.

c. Let L = { a, ab, a^2 } & M = { b^2, aba } be languages over A = { a, b }
   Find i. LM　ii. MM

d. Define a language L over an alphabet A. Let A = { a, b, c }.
Find L^* where L = { a, b, c^3 }

e. State & prove Pascal Identity.

f. How may distinguishable permutation of the letters in the world RADAR are there?

Q.4. Attempt any three of the following : **15**

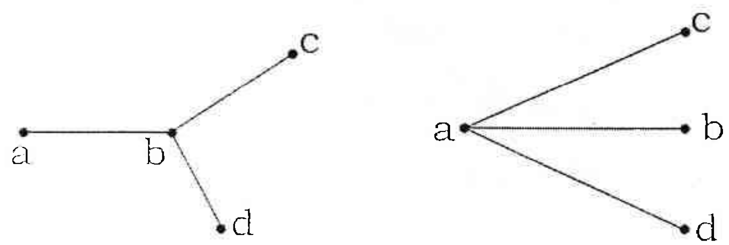
a. Construct a preorder sequence for inorder : 1 2 4 7 3 5 6 8 9

b. Represent the following expression using binary tree
i. $(x + xy) + (x/y)$ ii. $x + ((xy + x) / y)$

c. Draw the graph G corresponding to adjacency matrix

$$\begin{bmatrix} 1 & 1 & 1 & 2 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 2 \\ 2 & 0 & 2 & 2 \end{bmatrix}$$

d. Explain operation on graph. also find Union and Intersection of the given graph.



e. Draw all possible simple graph with 3 vertices.

f. Explain operation on binary search tree.

Q.5. Attempt any three of the following: **15**

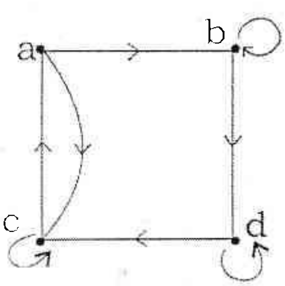
a. Draw the Hasse diagram for divisibility on the set { 1,2,3,5,7,11,13 }

b. What is coefficient of $x^{16} y^{14}$ in the expression $(x+y)^{30}$

c. What is complete graph. Draw a regular graph with 5 vertices.

d. How many solution does the equation x+y+z=11

e. Find In-degree & Out-degree of each vertex in the graph given below.



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