114 SYIT LDMS - Sem III 2014

VCD S.Y.IT LDMS – SEM III – 75 MARKS – 2 ½ HRS

- Right indicates full marks
- All questions are compulsory

Q.1. Solve the following (Any Two) (10)

a) Find solution of R. R

$$a_n = -3a_{n-1} - 3a_{n-2} - a_{n-3} \quad a_0 = 1;\ a_1 = -2;\ a_2 = -1$$

b) Find solution of R.R and define Non- homogeneous R.R if

$$a_n = 8a_{n-2} - 16a_{n-4} + 2(2)^n$$

c) Solve R. R by using generating function if

$$a_n = 3a_{n-1} + 4 \quad a_0 = 5$$

d) Find explicit formula for $a_n = a_{n-1} + n \quad a_0 = 1$ and define explicit formula.

Q.2. Solve the following (Any Two) (10)

a) Let R is relation on set A but $A = \{a_1, a_2, a_3, \ldots\ldots a_n\}$ then prove that

$M_R^2 = M_R \odot M_R \odot M_R$

b) If $R = \{(1,1)(1,2)(1,3)(1,4)(1,5)(2,2)(2,3)(2,4)(2,5)(3,3)(3,4)(3,5)(4,4)(4,5)(5,5)\}$ then draw digraph, check equivvalence relation and give reasons and write inverse of R & draw Hasse's digraph.

c) Let (A, R) is poset then show that (A, R^{-1}) is poset.

d) Show that $(D_{24},/)$ is lattice and find LUB and GLB.

Q.3. Solve the following (Any Two) (10)

a) Define Bijective and every where define function and prove that $f(x) = \frac{4x+3}{5x-2}$ is bijective function and find f^{-1}.

b) Let $f: A \to B, g: B \to C$ be function such that $gof = I_A$ $fog = I_B$ F is one to one correspondence between B and A & each is inverse of other.

c) Show that $(gof)^{-1} = f^{-1}og^{-1}$ if $f(a) = 2a + 1$ & $f(b) = b/3$.

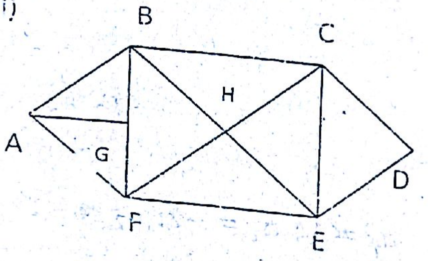
d) Define characteistic function and prove any two properties.

Q.4. Solve the following (Any Two) (10)

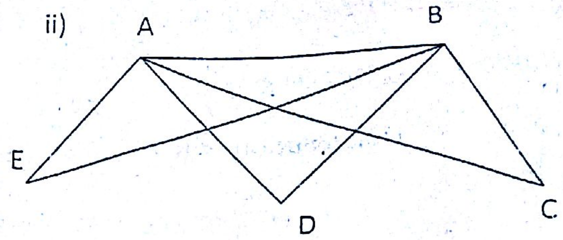
a) Prove that the number of vertices of odd degree in a graph is always even.

b) Define Euler graph, path and circuit and check given digraphs are path,circuit & graph with explanation if

i)

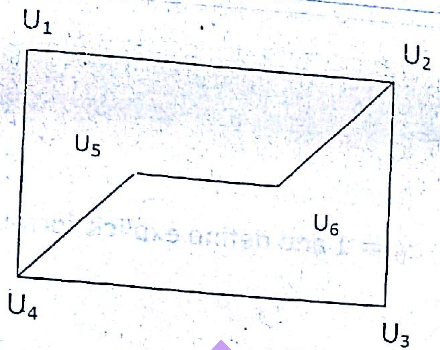


ii)

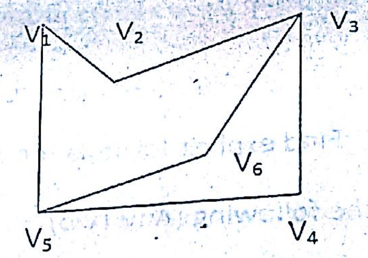


c) Show that graphs are Isomorphic graph and Define Isomorphic graph.

i)

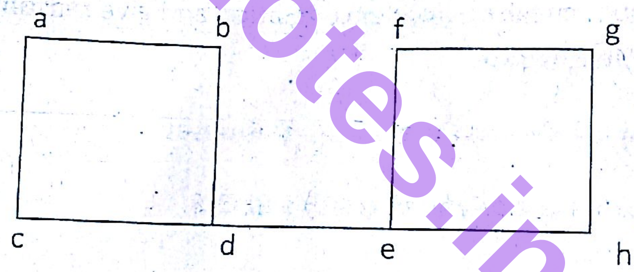


ii)



d) Construct tree diagram with the help of algebraic structure and find its value and draw spanning tree of following.

$$[(2+x)\times(3-(4+x))]+[x-(3\times 11)]$$



Q.5. Solve the following (Any Two) (10)

a) Show that the set of all positive rational number forms an abelian group under comp defined by as $a * b = {ab}/{2}$

b) Define Semi Group and prove that (Z+) and (T+) is an Isomorphism.

c) Define integral Domain & prove that every field is an integral Domain but Converse is not true.

d) Show that $e: B^2 \rightarrow B^4$ define is group with the help of following code

$e(0,0) = 0000$

$e(0,1) = 0011$

$e(1,0) = 1101$

$e(1,1) = 1110$

Q.6. Solve the following (Any Two) (10)

a) using mathematical Induction show that $1^2 + 2^2 + \cdots \ldots \ldots n^2 = \frac{n(n+1)(2n+1)}{6}$

b) Show that $\sim(p \vee (\sim p \vee q)) \equiv (p \wedge \sim q)$ with truth table and define conditonal and biconditonal.

c) Prove that A and B are sets then $A \setminus B = A \cap B^c$ and define powerset with example.

d) Define Sets and its types with suitable example and explain set identities.

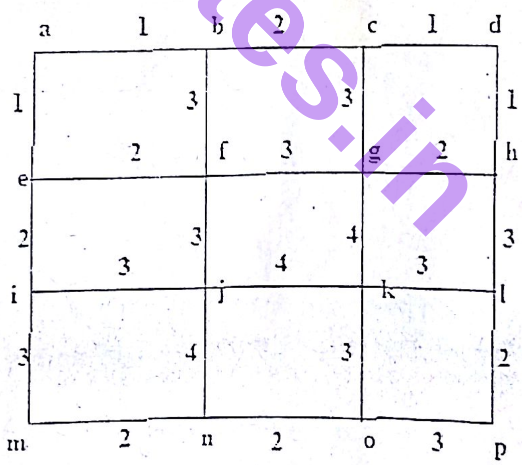
Q.7. Solve the following (Any Two) (15)

a) Solve by R.R using generating function method if $a_{n+2} - 2a_{n+1} + a_n = 2^n$, $a_0 = 2$ and $a_1 = 1$.

b) Show that R is an equivalence relation on set A iff $(a, b) \in R$ & $(a, c) \in R$.

c) List the ordered pairs in the relation R from $A = \{0,1,2,3,4,5\}$ to $B = \{0,1,2,3\}$ where $(a, b) \in R$.

d) Solve the following min spanning of tree by Prims algorithm and Krushical algorithm.



e) i) Define Cyclic group and prove that $(a + b\sqrt{2})$ is a ring w.r.t addition.

ii) Let G & G′ be isomorphic group if G is abelian then G′ is abelian.

f) state and prove additon principle with example.