Instruction: **1) All questions are compulsory.**
2) Each question carry equal marks.

Q 1) Solve the following (any 4) [20]

a) Define transitive closure.Let A={1,2,3,4,5}.
Find transitive closure by Warshall's algorithm for R whose matrix is given by

1 0 0 0 0
0 1 1 1 1
0 1 1 0 0
0 0 0 1 1
0 0 0 1 1

b) Write a note on Tower of Hanoi.

c) Define Hasse diagram. Draw Hasse diagram of poset A={1,2,3,4,5}and relation R on A defined by R={(1,1),(2,2),(3,3),(4,4),(5,5),(5,3),(3,1),(5,1),(4,3),(4,2),(4,1),(2,1)}.

d) Solve the recurrence relation $dn= -3d_{n-1}-3d_{n-2}-d_{n-3}$, with $d_1= d_2=d_3=7$.

e) Determine whether the relation R is an equivalence relation on A={1,2,3,4} where R={(1,1),(1,2),(2,1),(2,2),(3,4),(4,3),(3,3),(4,4)}.

f) Solve the non-homogenous recurrence relation $a_n= 5a_{n-1}+6a_{n-2}+7^n$.

g) Let (A, R) be a Poset then show that(A,R^{-1}) is also a Poset.

h) Define the terms i) Relation ii) Least upper bound iii) cycle
iv) minimal element v) antisymmetric relation.

Q 2) Solve the following (any 4) [20]

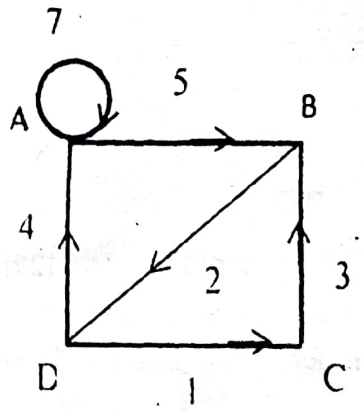
a) Explain Binary operations on graph with an example.

b) Define the term i) Binary tree ii) Complete binary tree iii) Extended binary tree.

c) Construct a tree of the algebraic expression ((2*X) + (3-(4*X))) + (X-(3*11)). Also find it's value.

d) i)Using Binomial theorem prove that$\sum_{k=o}^{n}\binom{n}{k}=2^n$ for non-negative integer n.
ii)In an Urn contains 15 balls out of which 8 are white and 7 are black. In how many ways can 5 balls be selected so that atleast 2 are white.

e) Use Shortest-Path algorithm to find shortest path between the vertices of the following graph.

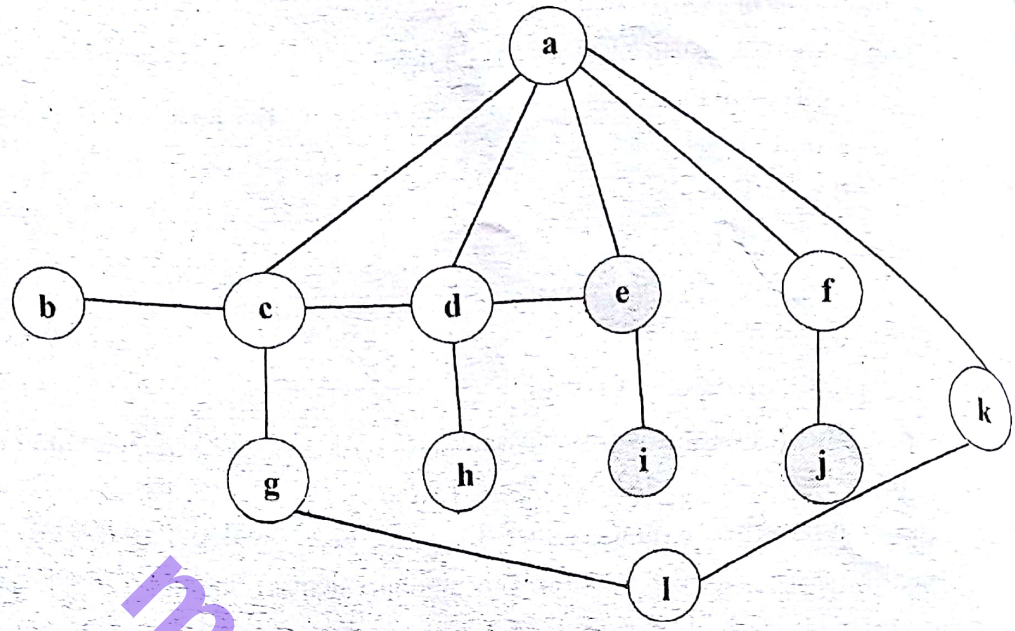


(P.T.O.)

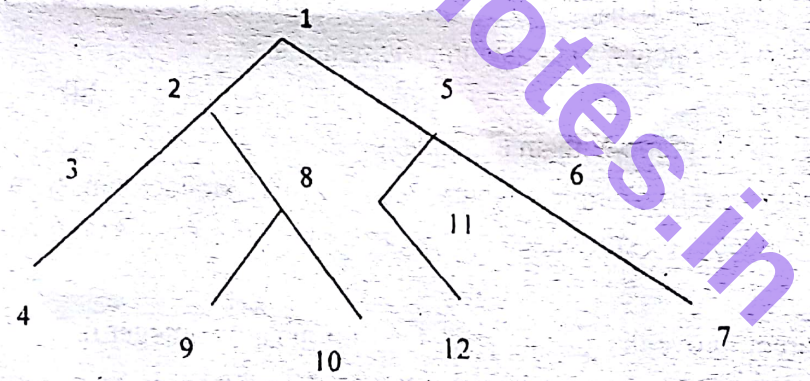
munotes.in

Scanned by CamScanner

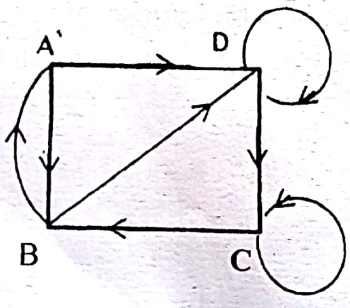
f) Write the Breadth First Search algorithm. Apply it on the following graph starting with vertex 'a'.



g) Perform a preorder search on the following tree using preorder search algorithm.



h) Find the Path matrix for the following graph using Warshall's algorithm



Q 3) Solve the following (any 4) [20]

a) Write a note on types of grammer.

b) Explain the term Regular expression and regular grammer.

munotes.in

Scanned by CamScanner

c) Consider the FSA defined by following state table.

	Input	
f	a	b
→So	So	S1
S1	So	S2
ΘS2	So	S2

find i) states ii)input letters iii)initial state
iv)accepting state v)state diagram.

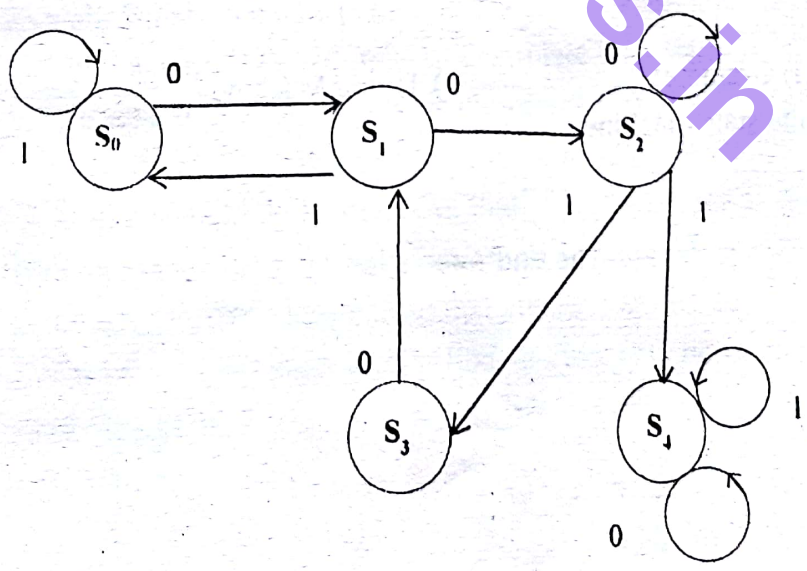
d) Let M be the FSM with following state table.

	a	b
So	S1,X	S2,Y
S1	S3,Y	S1,Z
S2	S1,Z	So,X
S3	So,Z	S2,X

Find i) input set I, state S, output set O
ii)draw the state diagram
iii)suppose u=aababaabbab is an input word find the sequence v and output word w.

e) Let G be a grammer whrer T={a,b,c} and N={S,A) with starting symbol S. Let P={S→aSb, aS→Aa, Aab→c}. Find L(G).

f) Consider the following finite state automaton M.



Determine which of the following words are accepted by M.
i)00 ii)0010 iii)10101 iv)000011.

g) Explain finite state automata.

h) Write a note on Universal turing machine.

(P.T.O.)

munotes.in

Scanned by CamScanner

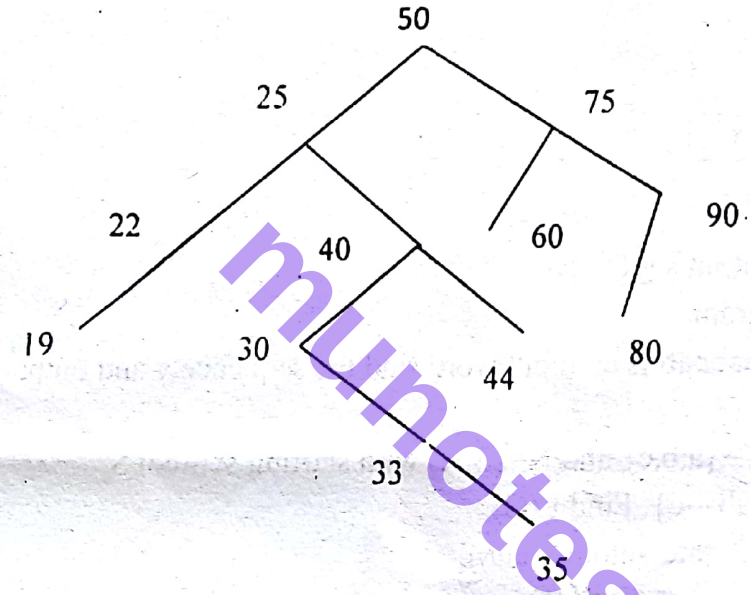
Q 4) Solve the following (any 3) [15]

a) Define the Composite relation.
Let A={1.2,3}, B={a,b,c}, C={x,y,z}. Let R={(1,b),(2,a),(2.c)} from A to B and S={(a,y),(b,x),(c,y),(c,z)} from B to C. Find SoR, M_{SoR}. Also verify $M_{SoR}=M_R O M_S$.

b) Solve the recurrence relation $a_n=7a_{n-1}$, with $a_0=5$,using generating function.

c) Write a note on Unary operation on the graph.

d) Write an algorithm on searching the value in binary search tree. Use it to search V=35.



e) Define the terms i) Grammer ii) Turing Machine.

f) Write a note on finite state machine.

—— The End ——

munotes.in

Scanned by CamScanner