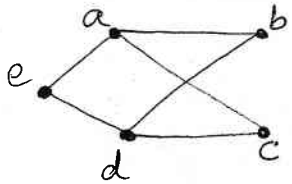
D.M. 1

Seat No. _____

DURATION: - 2½ hrs 815011223 MARKS:- 75

Note: - (1) All questions are compulsory.
(2) All questions carry equal marks.
(3) Figures to the right indicates full marks

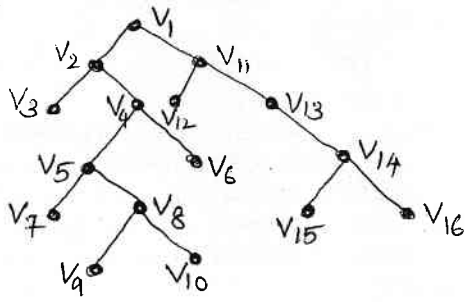
Q.1)	**Attempt any '4' of the following:-**		20M
1)	Draw the diagraph of relation, $R = \{(1,2)(3,4)(3,2)(4,5)(1,4)\}$ and write down its adjacency matrix.	CO1-A	
2)	If the function $f: R \to R$ Defined as $f(x) = \frac{2x-3}{7}$ $\forall x \in R$ then show that f is bijective. Hence Find f^{-1}.	CO1-A	
3)	State and explain domain, co-domain and range of a function.	CO1-U	
4)	If $f(x) = 9 - 4x$ *and* $g(x) = 2x - 7$. Find the composite function defined by $fog(x)$*and* $gof(x)$. Verify whether $fog(x) = gof(x)$.	CO1-A	
5)	Let $A = \{1,2,3,4,5\}$. Define a relation R *on* A *by* xRy if and only if $x + 1 = y$. Find the relation R and write down its adjacency matrix Also draw diagraph of R	CO1-A	
6)	Let $R = \{(1,1)(1,3)(2,2)(2,4)(3,3)(3,1)(4,4)(4,2)\}$ be the relation on $A = \{1,2,3,4\}$. Show that R is an equivalence relation on A. Also write down the equivalence classes with respect to relation R	CO1-A	
Q.2)	**Attempt any '4' of the following:-**		20M
1)	Using combinatorial argument prove that $C(n,r) + C(n,r-1) = C(n+1,r)$	CO2-E	
2)	How many different license plates are there, that involve 1,2, *or* 3 letters followed by 4 digits?	CO2-A	
3)	Among 100, students, 55 students got distinction in first year, 30 got distinction in second year, 15 got distinction in both years. Then how many students got distinction in i) At least one year ii) Only in first year iii) Only in second year.	CO2-A	
4)	In how many ways can 10 boys and 5 girls stand, so that two girls are next to each other if they are standing, i) Along a straight line ii) Around to circle	CO2-A	
5)	State and define Turning Machine.	CO2-R	
6)	State and explain Regular Languages.	CO2-U	
Q.3)	**Attempt any '4' of the following**		20M
1)	Find adjacency matrix of graph G given below	CO3-A	



2) Define the term Tree, Explain with example CO3-U

3) Draw all non-isomorphic trees on 6 vertices. CO3-

4) Find the level of each vertex of binary tree hence find the height of following tree CO3-



5) Draw all possible graph with 3 vertices CO3-C

6) What is graph? Explain adjacency and incidence. CO3-U

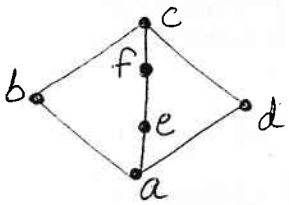
Q.4) **Attempt any '4' of the following** **15M**

1) What is the prefix form for the expression $((x+y) \uparrow 2) + ((x-4)/3)$? CO3-U

2) Let $f: A \to B$ *and* $A \equiv B \equiv R, f(x) = x^4 + 1$, find f^{-1} CO2-A

3) Define height of binary tree and explain. CO3-R

4) Determine if the following is distributive lattice, justify CO2-E



5) Show that, at a party of 20 people, there are two people who have the same number of friends. CO1-A

6) In how many ways can 10 persons be seated in a row? If 3 of these are woman, how many ways can 10 people be arranged so that no two women sit side by side? CO1-A

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