16/5/24 AFCT

DURATION: - 2½ hrs FYCS- 815011223- DM.(06) 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) State and explain domain, co-domain and range of a function: CO1-R

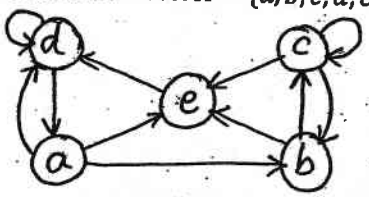
2) If $f: R \to R$ is defined by $f(x) = 2x + 3$; then show that f is bijection and hebce find f^{-1} CO1-A

3) If $f(x) = 2x + 3$ *and* $g(x) = 1 - x^2$ Find the composite function defined by $fog(x)$ *and* $gof(x)$. Verify whether $fog(x) = gof(x)$ CO1-A

4) Let $A = \{1,2,3,4\}$ *let* $R = \{(1,2)(1,3)(1,4)(2,3)(3,1)(3,3)(4,2)\}$ and $S = \{(1,3)(2,2)(3,2)(4,2)\}$ find (a) $Ro(SoS)$ $(b) RoS = SoR?$ (c) $RoRoR$ CO1-A

5) Let $A = \{1,2,3,4\}$ and R be a partical order relation whose M_R is given by, $M_R = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 \end{bmatrix}$ Draw the Hasse diagram of R. CO1-C

6) The diagraph of relation R on set $A = \{a, b, c, d, e\}$ is as Follows: CO1-A



Find relation R and also obtain matrix of Relation R.

Q.2) **Attempt any '4' of the following:-** **20M**

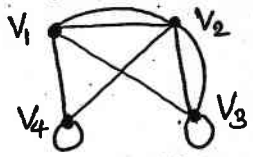
1) Using combinatorial argument prove that CO2-E
$C(2n, 2) = 2 \times C(n, 2) + n^2$

2) How many ways are there to distribute hand of 6 cards to each of four players from the standard deck of 52 cards? CO2-E

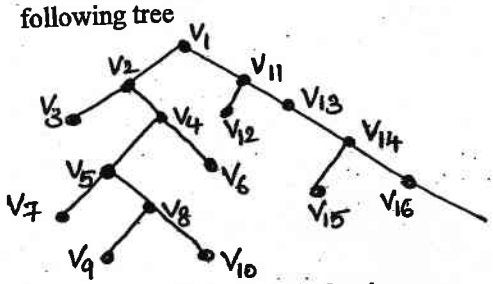
3) The Student in a hostel were asked whether they had a TV set or a computer in their rooms. The result showed that 650 students had a TV set; 150 student did not have a TV set 175 students had a computer and 50 students had neither a TV set nor a computer. Find the number of students who, CO2-A
(a) live in the hostel
(b) have only a computer

4) How many 3 digit number can be formed by using the 6 numbers 2,3,4,5,6 and 8 if CO2-A
i) Repetition allowed
ii) Number must contain the digit 5 and repetition are allowed.

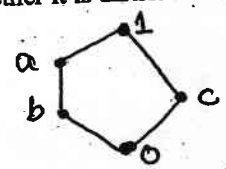
5)	State and explain Godel numbers.	CO2-U
6)	State and define Regular expressions.	CO2-R
Q.3)	**Attempt any '4' of the following**	**20M**
1)	Define Graph. Explain adjacency and incidence in it.	CO3-U CO3-C
2)	Draw all possible graphs with 3 vertices.	CO3-A
3)	Find adjacency matrix of following graph.	



4)	Explain the term tree with examples.	CO3-U
5)	What are the properties of tree graph?	CO3-R
6)	Find the level of each vertex of binary tree hence find the height of following tree	CO3-A



Q.4)	**Attempt any '4' of the following**	**15M**
1)	Define height of binary tree and explain.	CO3-R CO3-U
2)	What is the prefix form for the expression: $((x+y)\uparrow 2)+((x-4)/3)$?	CO2-A
3)	Let $f: A \to B$ *and* $A \equiv B \equiv R, f(x) = x^4 + 1$, find f^{-1}	CO2-E
4)	Consider the lattice representation by following Hasse diagram and determine whether it is distributive or not with justification.	



5)	State and define pigeon hole principle.	CO1-R
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 two women sit side by side?	CO1-A

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