CLDS

Seat No. _____

DURATION: - 2½ hrs 714051223 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 '3' of the following :-** 15M

1) If X and Y are two sets such that $X \cup Y$ has 50 elements, X has 28 elements and Y has 32 elements, how many elements does $X \cap Y$ have? CO1-A

2) In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. How many speak at least one of these two languages? CO1-A

3) Prove that for any 3 set $A = \{1,2,3\}, B = \{2,4,6\}$ *and* $C = \{1,5\}$ $A \times (B \cap C) = (AXB) \cap (AXC)$ CO1-E

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 (i) $Ro(SoS)$ (ii) *Is* $RoS = SoR$? (iii) $RoRoR$ CO1-A

5) Let R be a relation on Z, Defined by xRy if and only if $5x + 6y$ is divisible by 11, for $x, y \in z$. Show that R is an equivalence relation on Z. CO1-A

6) Let $A = \{1,2,3,4,5\}$ and R be a partial order relation defined as $R = \{(1,1)(2,2)(3,3)(4,4)(5,5)(5,3)(3,1)(4,3)(4,2)(4,1)(2,1)\}$ Find Hasse's diagram of poset A CO1-A

Q.2) **Attempt Any '3' of the following :-** 15M

1) Determine whether the following function is onto or not, if $f: R \rightarrow R$ *defined by* $f(x) = x + 1$. CO2-A

2) Find the inverse for the function $f(x) = \frac{(3x+2)}{(x-1)}$ CO2-A

3) Determine the value of ceiling function
(i) $[3.5]$ (ii) $[-2.4]$ (iii) $[3.143]$ CO2-A

4) If 4,9,14,19, ... Is a sequence find
(i) Common difference (ii) n^{th} term (iii) 21^{st} term CO2-A

5) A pair of due is tossed twice. Find the Probability of scoring 8 points
(a) at least once (a) Twice CO2-A

6) What can be the cases one can expect 4 heads and 2 tails in 16 sets of 6 tosses of a coin? CO2-A

Q.3) **Attempt Any '3' of the following :-** 15M

1) The students in the 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 students 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: a) Live in a hostel b) Have both c) TV set and a computer CO3-A

2) A group of 30 people have been trained as astronauts to go on the first mission to mars. How many ways are there to select a crew of six people to go on this mission? CO3-A

3) Find the coefficient and number of terms of $x^3y^3z^3 \; in \; (2x - 3y + 5z)^8$. CO3-A

4) Find first four terms of a_n where, $a_n = a_{n-1} + 3a_{n-2}$, and $a_0 = 1$, $a_1 = 2$ CO3-A

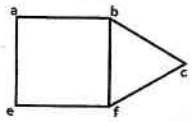
5) Solve, $a_{r+2} - a_{r-2} = 0$ CO3-C

6) Using back tracking method solve the following recurrence relation, $t_n = 1, n = 0 = 2t_{n-1}$ where $nZ1$ CO3-A

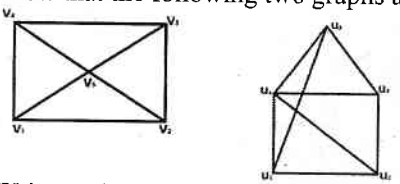
Q.4) Attempt Any '3' of the following :- **15M**

1) How many nodes are necessary to construct a graph with exactly 6 edges in which each node is of degree 2. CO4-U

2) Determine whether the given graph has a Hamilton circuit or Eulerian circuit. If it does, find such a circuit CO4-U

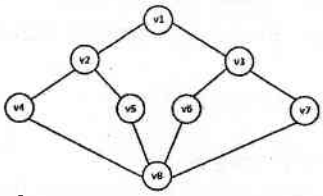


3) Show that the following two graphs are isomorphic. CO4-E



4) Write an the algorithm for depth first search CO4-A

5) For the graph given below give the DFS spanning tree and the BFS spanning tree. CO4-U



6) Write an algorithm for topological sorting CO4-A

Q.5) Attempt Any '3' of the following :- **15M**

1) Explain Binary search tree with suitable example. CO5-U

2) Determine the Hasse diagram of the relation R where CO5-A
$A = \{1,2,3,4\}$
$R = \{(1,1)(1,2)(2,2)(2,4)(1,3)(3,3)(3,4)(1,4)(4,4)(5,5)\}$

3) Determine the Hasse's diagram of the relation on $A = \{1,2,3,4,5\}$ CO5-A

whose matrix is $M_R = \begin{matrix} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix} \begin{matrix} \begin{matrix} 1 & 2 & 3 & 4 & 5 \end{matrix} \\ \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \end{matrix}$

4) Draw the Hasse's diagram of the following sets under partial ordering relation "divides" and indicate those which are chains $\{1,3,9,18\}$ CO5-U

5) What is Greatest element and least element? Explain CO5-R

6) Show that in a bounded distribution lattice, if a complement exists, it is unique. CO5-E

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