

**Day and Date: Wednesday , 19 /01/2022**

**Time: 11.00 am to 12.30 pm**

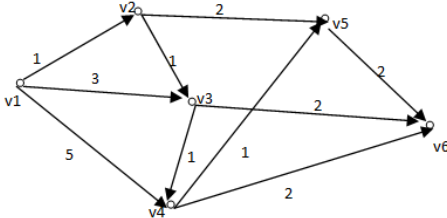
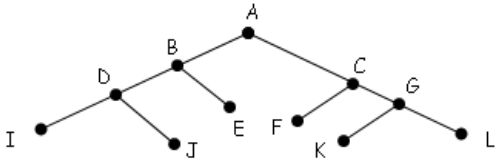
Seat No :

**Max. Marks- 50**

**Instructions:**

- i. All Questions solve neat and carefully.
- ii. Figure to the right indicate full marks.

BT	CO's	Q. No.		Marks
		<b>Q.1</b>	<b>Attempt the following</b>	<b>20</b>
3	CO1	<b>a</b>	Show the following equivalences, i. $A \rightarrow (P \vee C) \Leftrightarrow (A \wedge \neg P) \rightarrow C$ ii. $(P \rightarrow C) \wedge (Q \rightarrow C) \Leftrightarrow (P \vee Q) \rightarrow C$ iii. $(P \rightarrow (Q \rightarrow R)) \Leftrightarrow (P \wedge Q) \rightarrow R$	<b>07</b>
4	CO2, CO4	<b>b</b>	Given the relation matrices $M_R$ and $M_S$ find $M_{R \circ S}$ , $M_{\bar{R}}$ , $M_{\bar{S}}$ , $M_{R \circ \bar{S}}$ Show that $M_{R \circ \bar{S}} = M_{\bar{S} \circ \bar{R}}$  $M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \quad M_S = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix}$	<b>07</b>
2	CO3	<b>c</b>	Let $G = \{1, 2, 3, 4, 5\}$ and the operation addition congruence modulo 6 is denoted by $+_6$ prepare composition table and show that set G is Monoid.	<b>06</b>
		<b>Q.2</b>	<b>Attempt the following</b>	<b>15</b>
4	CO3	<b>a</b>	For function $x'y'z' + x'yz' + xy'z$ give: i. Circuit Diagram representation. ii. Truth Table representation.      iii. K-map representation.	<b>07</b>
			<b>OR</b>	
6	CO3	<b>a</b>	i. Let the sets $S_0, S_1, \dots, S_7$ be given by $S_0 = \{a, b, c, d, e, f\}$ , $S_1 = \{a, b, c, d, e\}$ , $S_2 = \{a, b, c, e, f\}$ , $S_3 = \{a, b, c, e\}$ , $S_4 = \{a, b, c\}$ , $S_5 = \{a, b\}$ , $S_6 = \{a, c\}$ and $S_7 = \{a\}$ . Draw the digram of $(L, \subseteq)$ where $L = \{S_0, S_1, \dots, S_7\}$ . ii. Prove the following Boolean identities, a) $a + (a * b) = a + b$ b) $a * (a + b) = a * b$ .	<b>03</b>  <b>04</b>
2	CO4	<b>b</b>	i. Show that the sum of indegrees of all the nodes of a simple diagraph is equal to the sum of out degree of all its nodes and	<b>04</b>

			that this sum is equal to the number of edges of the graph.	
2	CO5		ii. A couple has 2 children . Find probability both are boys . Given 1. One of children is boy 2. Older Child is boy.	04
		Q.3	Attempt the following	15
2	CO3	a	Write the following Boolean expressions in an equivalent sum of product canonical form for $x_1, x_2, x_3$ : i. $x_1 + x_2$ ii. $x_1 + (x_2 * x_3')$	07
			OR	
4	CO4	a	<p>Compute the earliest completion times and latest allowable completion times for the nodes in the PERT network given in figure. What is the time it will take to complete the project? What is the critical paths?</p> 	07
2	CO4	b	<p>i. Traverse the following with three techniques: inorder, preorder and post order.</p> 	08
5	CO5		ii. 6 men and 5 women are there. A committee should be form, find the combination so that the 5 people in a committee ? Also find combination to form committee of 5 member you should have 2 women.	

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