

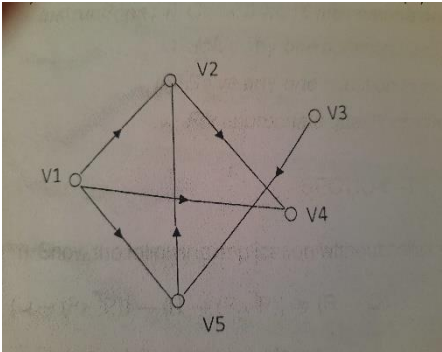
**Day and Date: Wednesday, 19/01/2022**

**Time: 11.00 to 12.30 pm**

**Max. Marks- 50**

**Instructions:**

- All Questions are compulsory.
- Figure to the right indicate full marks.

BT	CO's	Q. No.	Marks
		<b>Q.1</b>	<b>Attempt the following 20 Marks</b>
<b>3</b>	<b>CO1</b>	<b>a</b>	<p>i) Define Duality Law and Obtain dual of <math>1(P \wedge Q) \vee (P \rightarrow R) \wedge F</math></p> <p>ii) Express <math>P \rightarrow (1P \rightarrow Q)</math> in terms of Nand only.</p> <p><b>3</b></p> <p><b>4</b></p>
<b>3</b>	<b>CO2</b>	<b>b</b>	<p>i) What are the ranges of the relations <math>S = \{ \langle x, x^2 \rangle \mid x \in \mathbb{N} \}</math> and <math>T = \{ \langle x, 2x \rangle \mid x \in \mathbb{N} \}</math> where <math>\mathbb{N} = \{0, 1, 2, 3, 4, 5, 6, \dots\}</math> Find <math>S \cup T</math>, <math>S \cap T</math>. Identify the properties of relations <math>S</math> and <math>T</math>.</p> <p>ii) Define Function and what are the types of functions. For the function <math>f: \mathbb{N} \rightarrow \mathbb{N}</math> where <math>f(j) = j \pmod{3}</math>, identify the type of function.</p> <p><b>3</b></p> <p><b>4</b></p>
<b>3</b>	<b>CO3</b>	<b>c</b>	<p>Let the sets <math>S_0, S_1, \dots, S_7</math> be given by <math>S_0 = \{a, b, c, d, e, f\}</math> <math>S_1 = \{a, b, c, d, e\}</math> <math>S_2 = \{a, b, c, e, f\}</math> <math>S_3 = \{a, b, c, e\}</math> <math>S_4 = \{a, b, c\}</math> <math>S_5 = \{a, b\}</math> <math>S_6 = \{a, c\}</math> <math>S_7 = \{a\}</math></p> <p>Draw the diagram of <math>\langle L, \subseteq \rangle</math> where <math>L = \{S_0, S_1, S_2, \dots, S_7\}</math>. Also find the Lower bounds of <math>(S_1, S_2)</math></p> <p><math>GLB(S_1, S_2)</math></p> <p>Also find 0 and 1 of the lattice.</p> <p><b>6</b></p>
		<b>Q.2</b>	<b>Attempt the following 15 Marks</b>
<b>3</b>	<b>CO4</b>	<b>a</b>	<p>Find the adjacency matrix (A) and the path matrix (P) of the given graph</p>  <p><b>7</b></p>

