



# United International University (UIU)

## Dept. of Computer Science & Engineering (CSE)

**Final Exam : Trimester: Fall 2020**

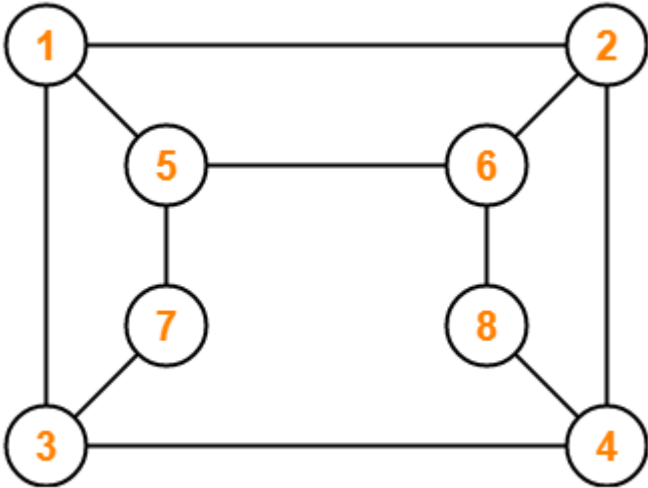
**Course Code: CSE 2213, Course Title: DISCRETE MATHEMATICS**

**Time: 1 hour 15 min Total Marks: 25**

**Answer all the questions. Figures are in the right-hand margin indicate full marks.**

**“Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules.”**

Question 1.																																																														
a)	Draw the undirected graph from the following incidence matrix.								[3]																																																					
<table><tr><td></td><td>E<sub>1</sub></td><td>E<sub>2</sub></td><td>E<sub>3</sub></td><td>E<sub>4</sub></td><td>E<sub>5</sub></td><td>E<sub>6</sub></td><td>E<sub>7</sub></td><td>E<sub>8</sub></td></tr><tr><td>V<sub>1</sub></td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>V<sub>2</sub></td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>V<sub>3</sub></td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>V<sub>4</sub></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>V<sub>5</sub></td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td></tr></table>										E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	E <sub>5</sub>	E <sub>6</sub>	E <sub>7</sub>	E <sub>8</sub>	V <sub>1</sub>	1	1	1	0	0	0	0	0	V <sub>2</sub>	0	1	1	1	0	1	1	0	V <sub>3</sub>	0	0	0	1	1	0	0	0	V <sub>4</sub>	0	0	0	0	0	0	1	1	V <sub>5</sub>	0	0	0	0	1	1	0	0
	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	E <sub>5</sub>	E <sub>6</sub>	E <sub>7</sub>	E <sub>8</sub>																																																						
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b)	The adjacency list of an undirected Graph G = (V, E) is provided as follows.								[2]																																																					
<table><tr><th><u>Vertex</u></th><th><u>Adjacent vertices</u></th></tr><tr><td>0</td><td>2, 4, 5, 6</td></tr><tr><td>1</td><td>5, 4, 2</td></tr><tr><td>2</td><td>1, 0, 3</td></tr><tr><td>3</td><td>2, 4, 5, 6</td></tr><tr><td>4</td><td>3, 0, 1</td></tr><tr><td>5</td><td>1, 0, 3</td></tr><tr><td>6</td><td>0, 3</td></tr></table> <p>i. Find the degree of each vertex from the graph.</p> <p>ii. Show that the total degree is twice the number of the total edges for this undirected graph.</p>									<u>Vertex</u>	<u>Adjacent vertices</u>	0	2, 4, 5, 6	1	5, 4, 2	2	1, 0, 3	3	2, 4, 5, 6	4	3, 0, 1	5	1, 0, 3	6	0, 3																																						
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Question 2.																																																														
a)	What is the total number of vertices and edges in an undirected connected graph with a total degree of 40, 5 vertices of degree 4, 4 vertices of degree 3 and x vertices of degree 4?								[2]																																																					

b)	Use two coloring method to determine whether the following graph is bipartite or not.	[3]
		
Question 3:		
a)	A tree has 11 vertices, namely a,b,c,d,e,f,g,h,i,j and k. Here are some information about the vertices: i. a is the root ii. The ancestors of k are (in the decreasing order of level) g,f,b and a iii. i and j are children of c iv. d and e are siblings of f v. f is the parent of h vi. c is in level 1 Draw the rooted tree.	[3]
b)	A full m-ary tree has 53 internal vertices and 319 leaves. Find out the value of m.	[2]
Question 4:		
a)	Draw a binary search tree using the following words. Consider dictionary order of the words. Job, Five, Suffer, Smooth, Remarkable, Bird, Carry, Design.	[2]
b)	Show the postfix notation for the following expression: $(a + b * c) / 7 + (3 \uparrow 2 * (d - e)) + (f + 8)$	[3]
Question 5:		
a)	A company stores its products in a warehouse. Storage bins in this warehouse are specified by their aisle, location in the aisle, and shelf. There are 80 aisles, 120 horizontal locations in each aisle, and 6 shelves throughout the warehouse. At least how many products must there be in the warehouse so that at least two products must be stored in the same bin?	[2]
b)	The Marvelous chocolate company makes 16 different flavors of chocolates, each of three different sizes – large, medium and small. The company makes gift boxes on special occasions which contain eight chocolates – all of different flavors. The boxes also contain chocolates of different sizes – three small chocolates, three medium ones, and two large ones. How many ways can the chocolate boxes made?	[3]