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]

	E_1	E_2	E_3	E_4	E_5	E_6	E_7	E_8
V_1	1	1	1	0	0	0	0	0
V_2	0	1	1	1	0	1	1	0
V_3	0	0	0	1	1	0	0	0
V_4	0	0	0	0	0	0	1	1
V_5	0	0	0	0	1	1	0	0

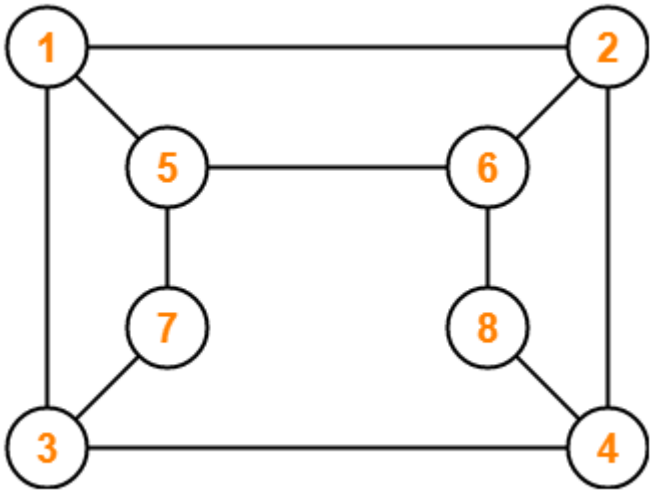
b) The adjacency list of an undirected Graph G = (V, E) is provided as follows. [2]

Vertex	**Adjacent vertices**
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

i. Find the degree of each vertex from the graph.
ii. Show that the total degree is twice the number of the total edges for this undirected graph.

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: $(a + b * c) \,/\, 7 + \big(3 \uparrow 2 * (d - e)\big) + (f + 8)$	[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]