Department of Computer Science

**Take Home - Mid Term Assessment**

Class/Section: 2A & 2B

**(Spring 2020 Semester)**

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| Course: Discrete Maths |  | Date Assigned: **15-05-20** |
| Course Code: GSC-221 |  | Submission Date: **28-05-20** |
| Faculty’s Name: Alyia Amir |  | Max Mars: 20 |
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**INSTRUCTIONS:**

1. All copied work will be given 0 marks
2. Show all work done
3. All questions are compulsory.
4. There are total six questions.
5. The paper is open book.
6. Calculators are allowed. Programmable Calculators are NOT allowed.
7. Use blue, black or blue-black ink only. Do NOT use lead pencil especially.

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| **Student Name:** |  | **Enrollment No.** |  |

**Question # 1**

1. A graph has total n **edges**. What is the total number of **degrees**?
2. What is the total degree of the **complete graph** Kn?
3. What is the total degree of the graph **n-regular**?

(3 marks)

**Question # 2**

Check if the following graphs are isomorphic. If yes, then give the 1-1 mapping.

a.

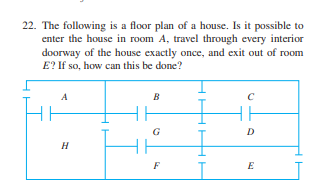


b.



(3 marks)

**Question # 3**



1. The above is a floor plan of a house. Draw the **diagram** showing the mentioned rooms as vertices and interior doorway as edges.
2. Is it possible to **enter the house in room A, travel through every interior doorway of the house exactly once, and exit out of room E**? If so, how can this be done?

c. What fact about graph theory solves this problem? (Euler path, Euler circuit, Hamiltonian, Minimum spanning tree).

d. Is it possible to **enter the house in room A, travel through every room exactly once, and exit out of room E**? If so, how can this be done?

e. What fact about graph theory solves this problem? (Euler path, Euler circuit, Hamiltonian, Minimum spanning tree).

f. You own an Internet company and you wish to **lay a wire** between all rooms. List the edges you will use. E.g. B-C, D-G.

(5 marks)

**Question #4**

Either draw a graph or explain why no graph exists

1. Full binary tree, height 3, four terminal vertices.
2. Binary tree, height 3, five terminal vertices.
3. Full binary tree, twenty internal vertices, nineteen terminal vertices.
4. Full binary tree, total degree 6
5. What can you deduce about the height of a binary tree if you know it has hundred terminal vertices?

(5 marks)

**Question #5**

Of 21 lecturers in a university, 4 use all **MS teams(M),** **Zoom(Z)** and **Google classroom(G)**.

6 use M and Z, 7 use Z and G, 5 use M and G, but no one uses G only.

1. Represent the information in a Venn diagram.
2. If the same number of people use **MS Teams** as use **Zoom** then find how many use **MS Teams** only.

(2 marks)

**Question # 6**

Tell whether the following relations are reflexive, symmetric or transitive on the given set:

1. R1={x = y}
2. R2={x is a friend of y}

(2 marks)

**The End of Question Sheet**