Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Make Up Examinations – December 2025

Date: 26 – 12- 2025 **Time:** 1.00pm to 04.00pm

School: SOIS	**Program:** BCA-AIML	
Course Code : MAT2028	**Course Name :** Graph Theory	
Semester: MK	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks					

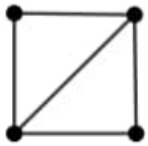
Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

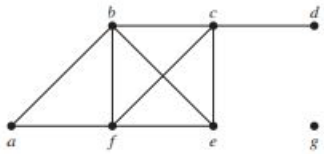
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1	Define a graph with an example.	**2 Marks**	**L1**	**CO1**
2	Find the order and size of the graph given below 	**2 Marks**	**L1**	**CO1**
3	Can a graph with 4 vertices in which the degree of one vertex is 2 and the degree of the remaining vertices is 3 exist?	**2 Marks**	**L1**	**CO1**
4	Draw a complete bipartite graph with partition (4, 5).	**2 Marks**	**L1**	**CO2**
5	Define a planar graph.	**2 Marks**	**L1**	**CO2**
6	Define the chromatic number of a graph.	**2 Marks**	**L1**	**CO2**
7	Define a tree with an example.	**2 Marks**	**L1**	**CO3**

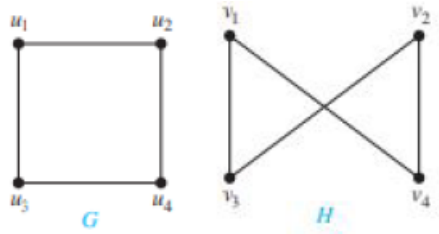
8	Consider a tree with 2022 vertices, and find the sum of the degree of vertices.	**2 Marks**	**L1**	**CO3**
9	Define a rooted tree with an example.	**2 Marks**	**L1**	**CO3**
10	Define a weighted graph with an example.	**2 Marks**	**L1**	**CO4**

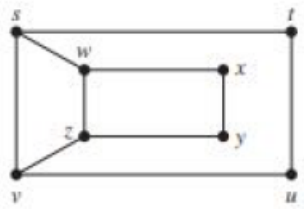
Part B

Answer the Questions **Total 80 Marks**

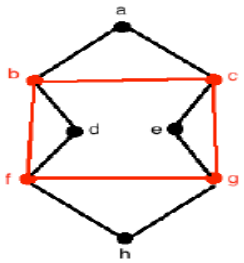
11.		Find the degree and neighborhood of all the vertices for the following graph. 	**10 Marks**	**L2**	**CO1**

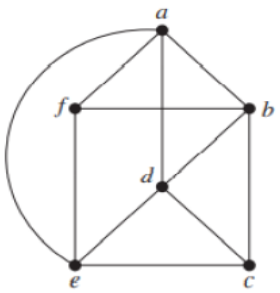
Or

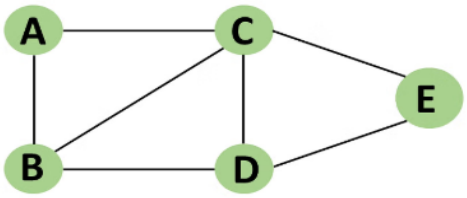
12.		Verify if the given graphs are isomorphic or not. 	**10 Marks**	**L2**	**CO1**

13.		Find adjacent and incidence matrices of the given graph. 	**10 Marks**	**L2**	**CO1**

Or

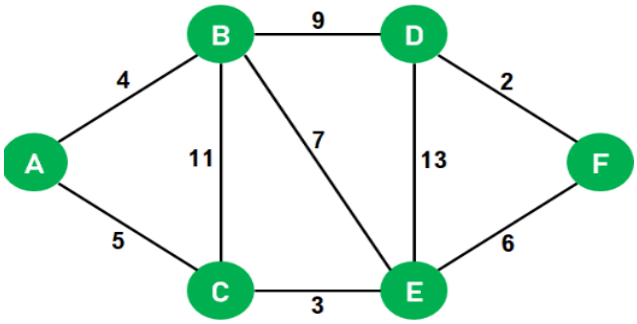
14.		Find the number of different paths of length 2 for the following graph. 	**10 Marks**	**L2**	**CO1**

15.		Justify whether the given graph is an Euler and/ or a Hamilton graph with an explanation. 	**10 Marks**	**L2**	**CO2**
		Or			
16.		Suppose there are 3 houses and 3 utility points (electricity, water, sewerage) which are such that each utility point is joined to each house. Can the lines of joining be such that no two lines intersect?	**10 Marks**	**L2**	**CO2**
17.		Explain the Konigsberg bridge problem in detail.	**10 Marks**	**L2**	**CO2**
		Or			
18.		Suppose there are seven finals to be scheduled and the courses are numbered 1 through 7. Suppose that the following pairs of courses have common students 1&2, 1&3, 1&4, 1&5, 1&7, 2&3, 2&4, 2&5, 2&6, 2&7,3&4, 3&6, 3&7, 4&5, 4&6, 5&6, 5&7, 6&7. How can the final exams at a university be scheduled so that no student has two exams at the same time?	**10 Marks**	**L2**	**CO2**
19.		Define the binary search tree with an example. Form a binary search tree for the following names: Mathematics, physics, geography, zoology, meteorology, geology, psychology, chemistry, and oceanography using the alphabetical order**.**	**10 Marks**	**L3**	**CO3**
		Or			
20.	**a.**	Suppose that a tree T has 2 vertices of degree 2, 3 vertices of degree 3, and 4 vertices of degree 4. Find the number of pendant vertices in T.	**5 Marks**	**L3**	**CO3**
	b.	Find five spanning trees for the following graph. 	**5 Marks**	**L3**	**CO3**

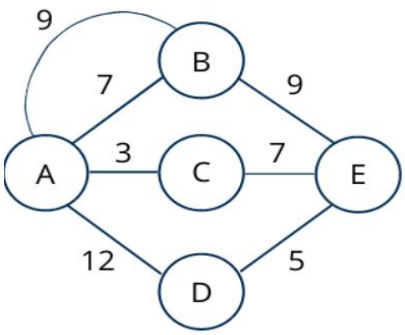
21.		Explain the DFS algorithm and apply it to find a spanning tree. 	**10 Marks**	**L3**	**CO3**

Or

22.		A manufacturing company must decide whether to manufacture a component part or to purchase the component part from a supplier. The resulting profit is dependent upon the demand for the product. When the component part is manufactured and the demand is low, medium, and high, then the profit is projected to be -$20,000, $40,000, $100,000 respectively. Also, when the component part is purchased and the demand of the product is low, medium, and high, then the profit is projected to be $10,000, $45,000, $70,000. Assuming that P(low demand) is 0.35, P(Medium demand) is 0.35 and P(High demand) is 0.30. What decision must the company make in order to get maximum profit?	**10 Marks**	**L3**	**CO3**

23.		Explain and apply Dijkstra's algorithm to find the shortest path between all vertices. 	**20 Marks**	**L3**	**CO4**

Or

24.		Explain and apply Krushkal's algorithm to find a minimum spanning tree. 	**20 Marks**	**L3**	**CO4**