PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF INFORMATION SCIENCE
END TERM EXAMINATION - MAY/JUNE 2024

Semester : Semester IV - 2023 - 24
Course Code : MAT2028
Course Name : Graph Theory
Program : BCA

Date : JUNE 21, 2024
Time : 9:30 AM - 12:30 PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.
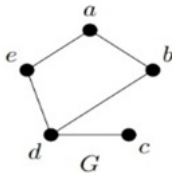
PART A

Answer any FIVE questions   **5Q X 4M =20 M**

1. Define degree of a vertex in a graph and give an example by drawing a graph.

   (CO1) [Knowledge]

2. List the neighborhoods of each vertex in the following graph G

   (CO1) [Knowledge]

3. Describe when the graph is said to be planar with an example.

   (CO2) [Knowledge]

4. Draw a labeled 4-regular graph with 5 vertices and complete graph with 6 vertices.

   (CO2) [Knowledge]

5. Define a rooted tree with an example.

   (CO3) [Knowledge]

6. Draw complete binary tree and define m-ary tree.

   (CO3) [Knowledge]

7. Draw a graph by assigning weights to the edges and define minimal spanning tree.
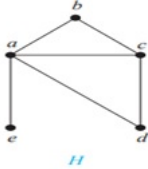
   (CO4) [Knowledge]

Answer any FOUR questions
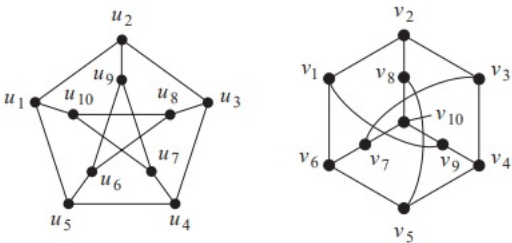
8. Represent the following graph H with an adjacency matrix and an incidence matrix.
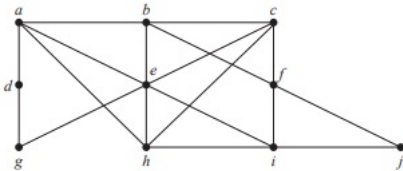

(CO1) [Comprehension]

9. Verify the Isomorphism of the following graphs.

(CO1) [Comprehension]

10. Determine the chromatic number of the following graph by assigning colors to the vertices. Also, define chromatic number of a graph.
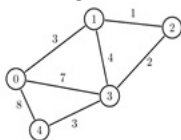

(CO2) [Comprehension]

11. Explain family tree with an example. Suppose that a tree T has two vertices of degree 2, four vertices of degree 3 and three vertices of degree 4. Find the number of pendant vertices in T. Also, find the total number of vertices in T.
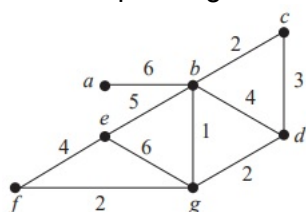
(CO3) [Comprehension]

12. Use Prim's algorithm and find a minimal spanning tree for the graph shown below.

(CO4) [Comprehension]

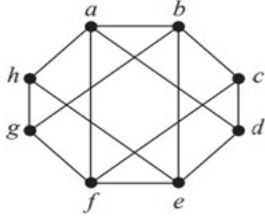13. Find a minimal spanning tree for the weighted graph shown below using Kruskal's algorithm.

(CO4) [Comprehension]

PART C

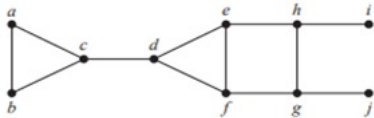**Answer any TWO questions**   **2Q X 20M =40 M**

14. Explain planarity of a graph with an example. Hence verify the planarity of the following graph.
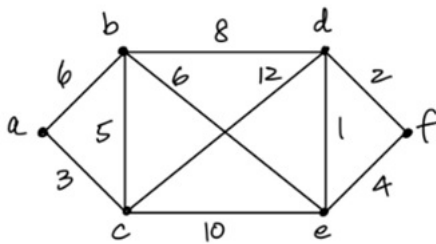

(CO2) [Application]

15. Find a spanning tree for the graph given below starting from the vertex a, using Depth First Search algorithm.

(CO3) [Application]

16. Explain the Prim's algorithm and find the shortest path from the vertex a to vertex f for the graph given below using Dijkstra's algorithm.

(CO4) [Application]