

2022

Computer Science

[P.G.]

(CBCS)

(M.Sc. Third Semester End Examination-2022)

PAPER-303

Graph Theory

Full Marks: 50

Time: 02 Hrs

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

1. Answer any FIVE questions of the following: 5x2= 10

- a) Define path and cycle with proper example.
- b) Define Cut set and Cut vertex with a suitable example.
- c) How many perfect matchings are there in a complete graph of a 6 vertices?
- d) Define clique of a graph with example.
- e) Is K_6 a planar graph? Justify.
- f) Define complete graph with proper example.
- g) Define chromatic number of a graph. Find the chromatic number of a cycle of odd length.
- h) Prove that if in a graph G there is one and only one path between every pair of vertices, G is a tree.

(2)

2. Answer any FOUR questions of the following: 5x4 = 20

- a) Show that $K_{3,3}$ is a non planner graph.
- b) Draw atleast 3 non-isomorphic graph of 4 vertices.
- c) What do you mean by complement of a graph? Find the complement of C_5 graph. Define independent set.
- d) Show that any simple connected planner graph satisfy the inequality $e \leq 3n - 6$ where n and e are the number of vertices and edges of the graph respectively.
- e) Show that a simple graph with n vertices and k components can have atmost $\frac{(n-k)(n-k+1)}{2}$ edges.
- f) Let $G = (V,E)$ be a simple graph, where $|V| = n \geq 3$. If for every pair of nonadjacent vertices $u, v \in V$, $\deg(u) + \deg(v) \geq n$ holds, then the graph G is Hamiltonian.

3. Answer any one question of the following: 1x10 = 10

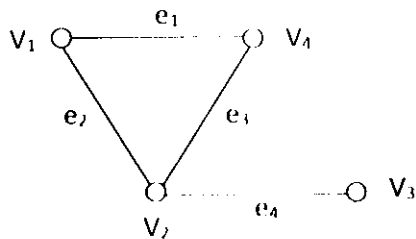
- a) i) Show that the number of pendent vertices in a binary tree is

$$\frac{n+1}{2}$$

where n is the number of vertices in the tree.

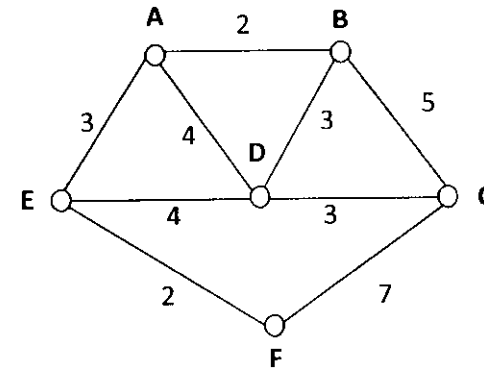
- ii) Find incidence and adjacency matrix of the following graph:

5+5



(3)

- b) Find the MST for the following graph using Prim's algorithm. Explain it.



How will you find minimal independent set? Explain.

6+4

Internal Assessment :10
