AU–194

B.C.A. (Part-I) Semester-II Examination

DISCRETE MATHEMATICS

Paper—2ST5

Time : Three Hours] [Maximum Marks : 60

Note :— (1) **ALL** questions carry equal marks.

(2) Attempt **ONE** question from each unit.

UNIT—I

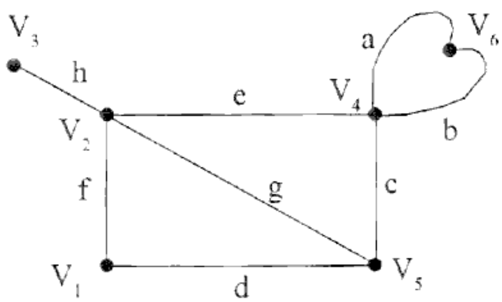
1. (a) Define with suitable example each of the following :

(i) Complete graph,

(ii) Regular graph,

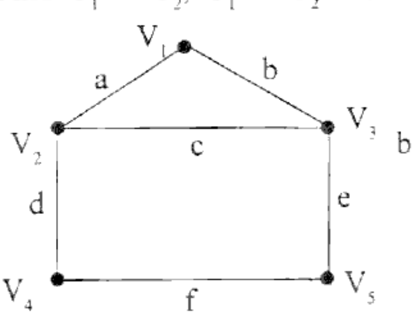
(iii) Weighted graph. 6

(b) Find the incidence matrix of the following graph and write observations. 6

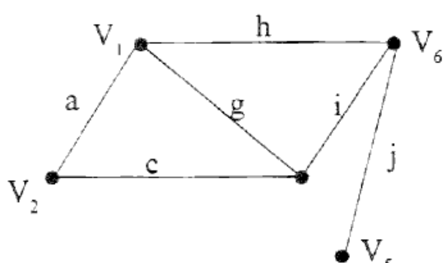


2. (p) Verify Havel Hakimi theorem for degree sequence (2, 2, 4, 3, 1). 6

(q) Find $G_1 \cup G_2$, $G_1 \cap G_2$ and $G_1 \oplus G_2$ of the graph G_1 and G_2. 6



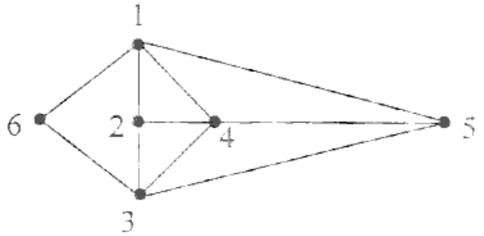
G_1



G_2

UNIT—II

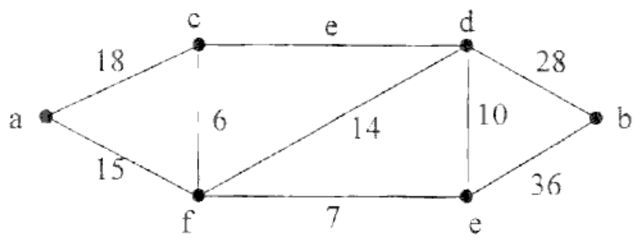
3. (a) Find all possible paths between vertices 5 to 6. 6



(b) Define edge and vertex connectivity of the graph. Also find edge and vertex connectivity of the following graphs. 6

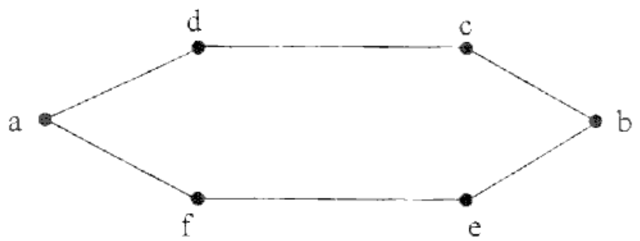
4. (p) Show that the vertex connectivity of a graph G can not exceed the edge connectivity of G i.e. $K(G) \leq \lambda(G)$. 6

(q) By using Dijkstra's algorithm find shortest path from vertex a to b. 6



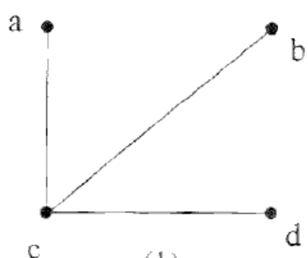
UNIT—III

5. (a) Show that following graph is Eulerian and trace Eulerian circuit by using Fluery's algorithm. 6

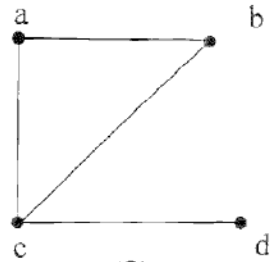


(b) Define Hamiltonian graph. Prove that there can be no path longer than a Hamiltonian path. 6

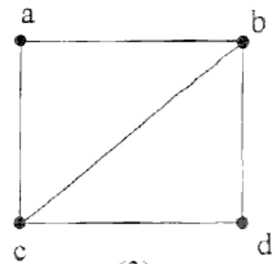
6. (p) Find Hamiltonian path and cycle in the following graphs. 6



(1)



(2)



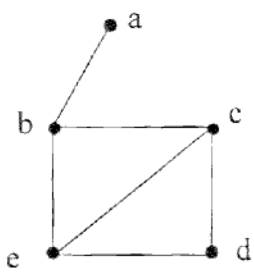
(3)

(q) If a graph G has more than two vertices of odd degree, then prove that there can be no Euler Path in G. 6

UNIT—IV

7. (a) Define centre, radius and eccentricity of a tree with example. 6

(b) Find all the spanning trees of the following graph. 6



8. (p) Define binary tree and prove that binary tree has odd number of vertices. 6

(q) Prove that, a tree with two or more vertices has at least two pendant vertices. 6

UNIT—V

9. (a) Define :

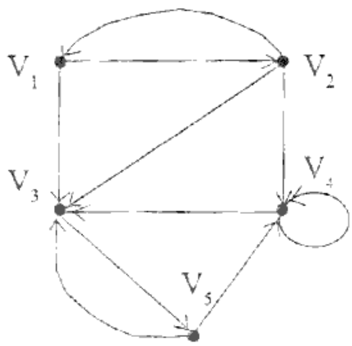
(i) Diagraph

(ii) Network

(iii) Arborescense. 6

(b) Define Shortest Spanning Tree. Write the Kruskal's algorithm to find the shortest spanning tree. 6

10. (p) Find the in-degree and out-degree of each vertex of G. 6



(q) Prove that an arborescense is a tree in which every vertex other than the root has an in-degree of exactly one. 6