AT–433

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

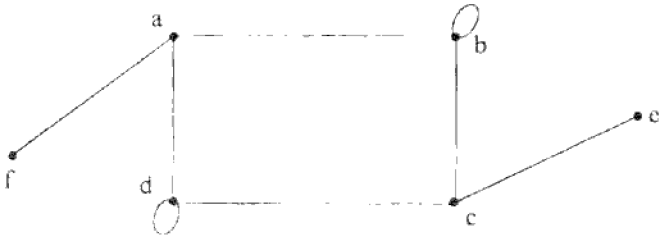
1. (a) Define :

(i) Degree of a Graph

(ii) Degree of Vertex

(iii) Isolated Vertex or Node. 6

(b) Define adjacency matrix and find adjacency matrix from the following graph and write observations : 6



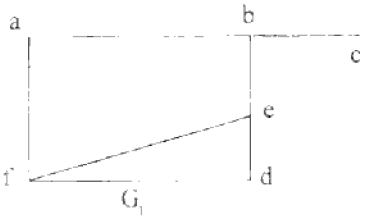
2. (p) Show that the maximum degree of any vertex in a simple graph with n vertices is n – 1. 6

(q) Prove that if graph G is disconnected then its complement G^1 is connected. 6

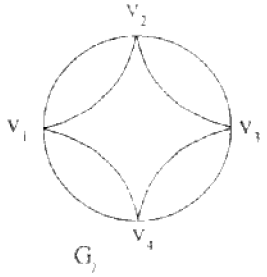
UNIT—II

3. (a) Define isthmus and prove that an edge e of a graph G is isthmus iff it does not belong to any circuit. 6

(b) Find edge connectivity, vertex connectivity, cut edge and cut vertex of the following graphs : 6

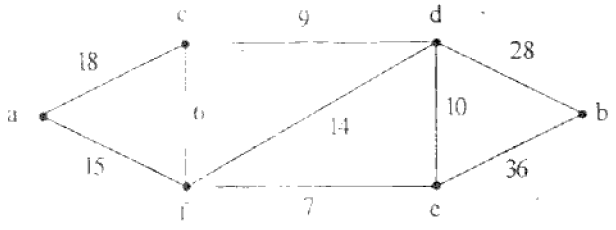


G_1



G_2

4. (p) Find shortest path from vertex a to b by using Dijkstra's algorithm. 6



(q) 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

UNIT—III

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

(b) Give an example of a graph which is :

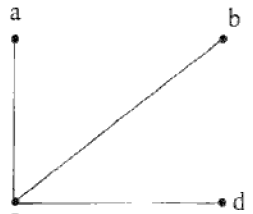
(i) Eulerian and Hamiltonian

(ii) Neither Hamiltonian nor Eulerian

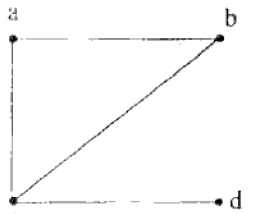
(iii) Eulerian but not Hamiltonian. 6

6. (p) Prove that an Eulerian graph G is arbitrarily traceable from vertex v in G if and only if it belongs to every circuit in G. 6

(q) Find Hamiltonian path and cycle in the following graphs : 6



(1)



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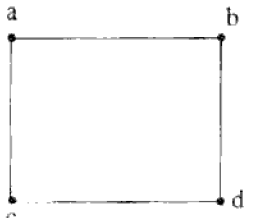
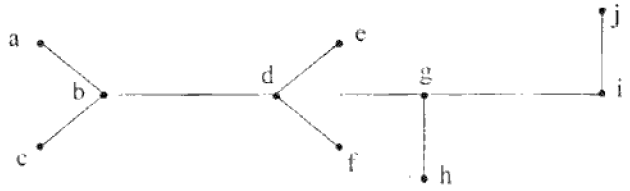


(3)

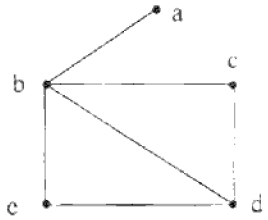
UNIT—IV

7. (a) Prove that in a binary tree of n-vertices has $\frac{(n+1)}{2}$ pendant vertices. 6

(b) Find the centre, radius and diameter of a following tree. 6



8. (p) Find all spanning tree of the following graph : 6



(q) Define tree and prove that a graph is tree if and only if there exist only one path between every pair of vertices. 6

UNIT—V

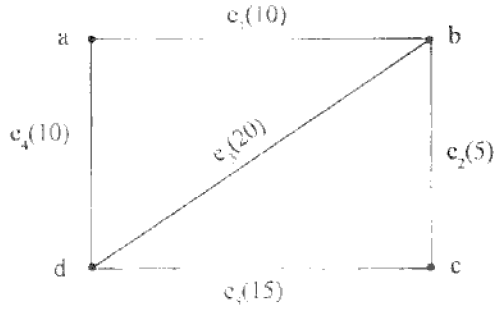
9. (a) Define :

(i) Diagraph

(ii) Network

(iii) Arborescence. 6

(b) Find shortest spanning tree by using Krushkal's algorithm : 6



10. (p) Draw the figure of a directed graph given formally as V(G) = {A, B, C, D} E(G) = {(A, D), (B, A), (D, B), (B, C), (D, C), (B, B)} and find in-degree and out-degree of each of the vertex. 6

(q) Determine maximum flow between a through z, if capacity (weight) are given on the following graph : 6