

AM - 230

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

Paper - 2 ST 5

DISCRETE MATHEMATICS - II

P. Pages : 7

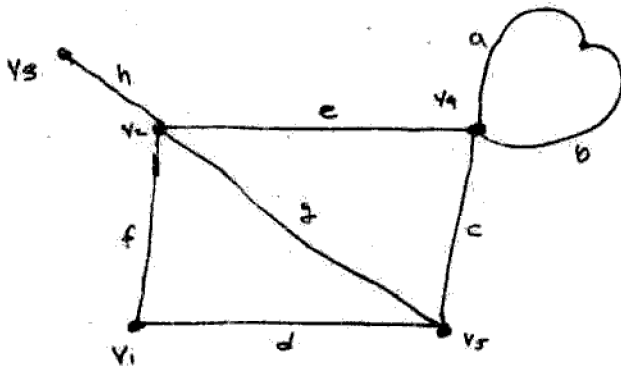
Time : Three Hours]

[Max. Marks : 60

- Note :** (1) All questions carry equal marks.
 (2) Attempt **One** question from each unit.

UNIT I

1. (a) Show that the maximum degree of any vertex in a simple graph with n vertices is $(n - 1)$.
 6
- (b) Draw the incident matrix of the following graph, also write observations.



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2. (c) Draw a graph from following data :—

$$V = \{a, b, c, d, e, f\}$$

$$E = \{(a, b) (b, c) (c, d) (a, e) (b, b)\}$$

Find the degree of each vertex and verify Handshaking Lemma. 6

- (d) Define a connected and disconnected graph. Draw a connected graph that becomes disconnected when any edge is removed from it. 6

10. (c) Define :—

(i) Symmetric diagraph.

(ii) Balanced diagraph.

(iii) Regular diagraph with example. 6

- (d) Prove that an arborescence is a tree in which every vertex other than the root has an indegree of exactly one. 6



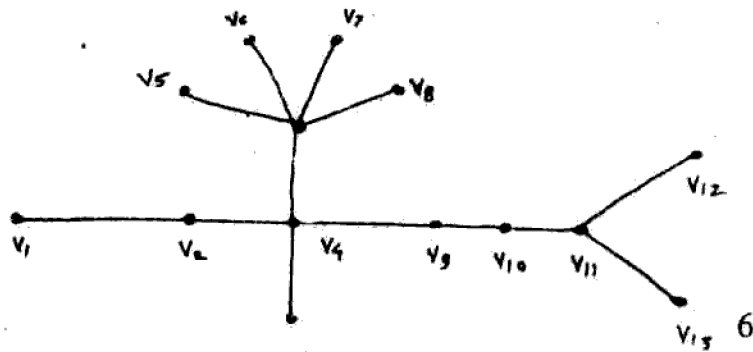
UNIT II

3. (a) Prove that an edge e of graph G is isthmus or bridge if and only if it does not belonging to any circuit. 6

- (b) State Menger's theorem in vertex form and edge form. 6

4. (c) Using the Diskstres's shortest path algorithm find the minimum distance between 'a' and 'z' and the shortest path from 'a' to 'z' for the following weighted graph.

(Figure on page No. 3)



UNIT V

9. (a) Define :—

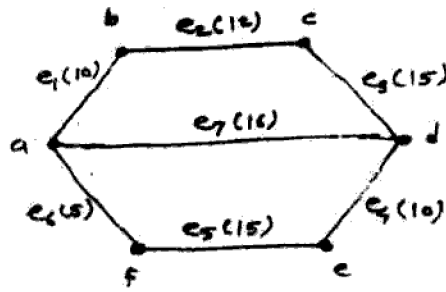
(i) Arborescence

(ii) Network

(iii) Cutset

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(b) Find shortest spanning tree by using Kruskal's algorithm.

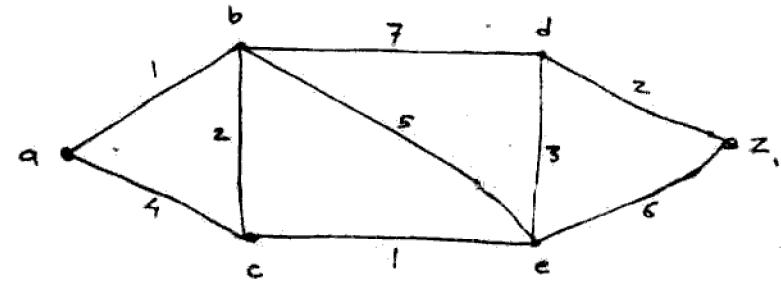


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(d) Let G_1 and G_2 be isomorphic graphs. Then prove that G_1 has a circuit of length k iff G_2 has a circuit of length k .

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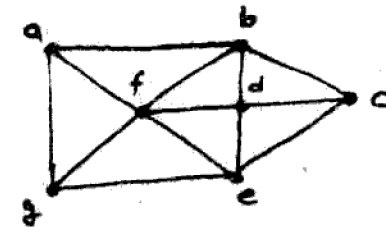
UNIT III

5. (a) Prove that graph is Eulerian if and only if degree of each vertex is even.

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(b) Determine whether the given graphs are Eulerian or Hamiltonian ?

(1)

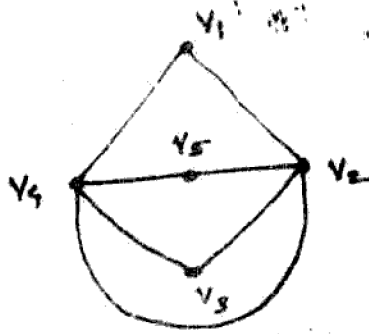


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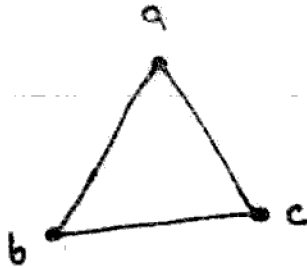
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(2)



(3)



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6. (c) Give an example of a graph :—

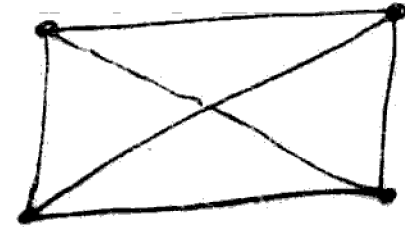
- (i) Eulerian and Hamiltonian.
- (ii) Hamiltonian and not Eulerian.
- (iii) Arbitrarily traceable from one vertex only.

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- (d) Prove that graph is arbitrarily traceable from vertex V if and only if it belongs to all the circuit of graph. 6

UNIT IV

7. (a) Define binary tree and prove that binary tree has odd number of vertices. 6
- (b) Find all possible spanning trees for this graph.



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8. (c) Define spanning tree and prove that every connected graph has at least one spanning tree. 6
- (d) Find center and diameter of a tree with diagram.

(Figure on page No. 6)