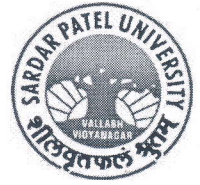


Sample Paper for B.Sc.



A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE

(AUTONOMOUS) (Grant-in-Aid)
Affiliated to Sardar Patel University
VALLABH VIDYANAGAR-388120



Bachelor of Science (Semester - III) External Examination - 2025
Subject Code: US03IDMTH01 Subject Name: Graph theory

Date: 08-10-2025, (Wednesday)

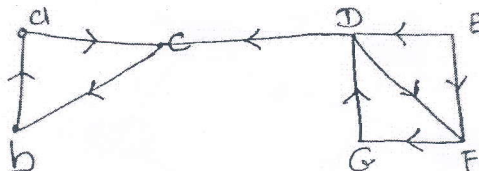
Time: 02:00 PM to 03:30 PM (1.5 HRS.)

Total marks: 25

Q-1 Write the most appropriate answer from the following multiple-choice questions. [05]

1. A cycle (or circuit) in a graph is: _____
a) A path that starts and ends at the same vertex b) A subgraph of degree 2
c) A path without edges d) A connected tree
2. A graph is Eulerian if: _____
a) All vertices have even degree b) All vertices have odd degree
c) It contains a Hamiltonian cycle d) It has no isolated vertices
3. The operation of *union* of two graphs G_1 and G_2 means:
a) Vertices and edges common to both graphs
b) All vertices and edges present in G_1 or G_2 or both
c) Product of vertices and edges
d) Addition of degree of corresponding vertices
4. In-order traversal of a binary tree visits nodes in the order:
a) Root $\rightarrow$ Left $\rightarrow$ Right b) Right $\rightarrow$ Root $\rightarrow$ Left
c) Left $\rightarrow$ Right $\rightarrow$ Root d) Left $\rightarrow$ Root $\rightarrow$ Right
5. Warshall's algorithm is used for:
a) Constructing adjacency matrix b) Constructing incidence matrix
c) Constructing path matrix d) Counting Hamiltonian cycles

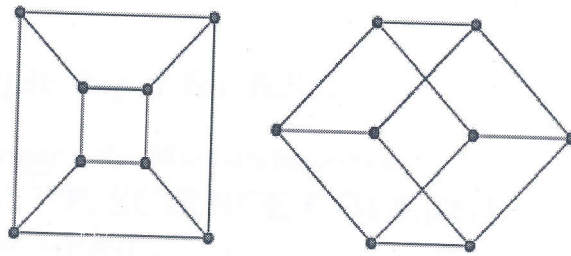
Q-2 (a) Find Strong, weak, and unilateral components of the given graph. [05]



(b) A simple graph contains 35 edges, four vertices of degree 5, five vertices of degree 4 and four vertices of degree 3. Find the number of vertices with degree 2. [05]

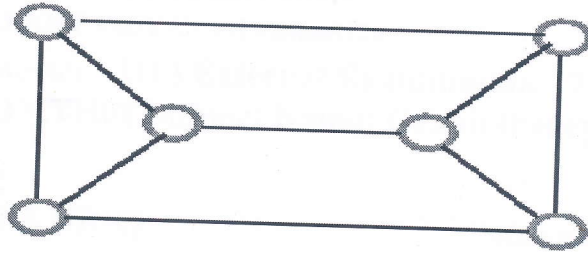
OR

- Q-2** (a) Explain Isomorphism between two graphs. Examine whether given pair of graphs are isomorphic or not.

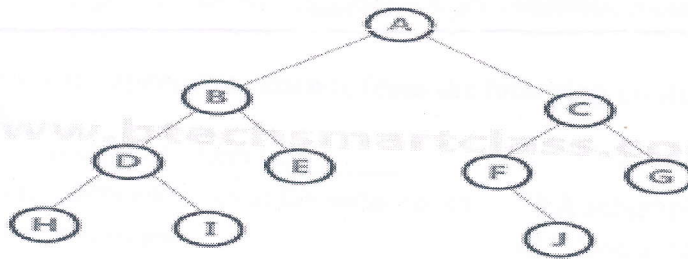


[10]

- (b) Define Euler graph and Hamiltonian graph. Does the given graph form Eulerian and Hamiltonian cycle?



- Q-3** (a) Write the pre-order, in-order, and post-order traversals of a binary tree. [10]



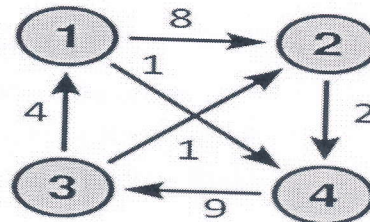
- (b) Draw the tree using inorder and pre order.

In order : 5, 15, 18, 20, 25, 30, 35, 40, 45, 50, 60

Pre order : 30, 20, 15, 5, 18, 25, 40, 35, 50, 45, 60

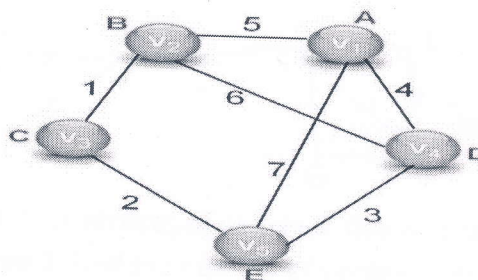
OR

- Q-3** (a) Apply the Warshal algorithm step by step to a given directed graph



[6]

- (b) Draw the Adjacency matrix and incidence matrix of given graphs.



[4]