Bachelor of Science (B.Sc.) Information Technology (I.T.) Semester—V Examination

GRAPH THEORY

Paper—6

Time : Three Hours] [Maximum Marks : 50

Note :— (1) **All** questions are compulsory and carry equal marks.

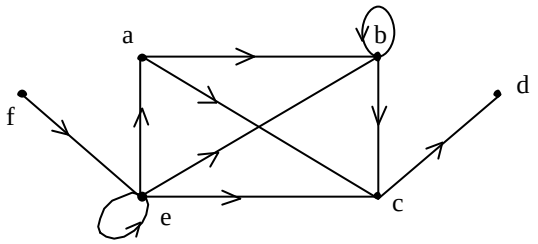
(2) Assume suitable data wherever necessary.

(3) Draw neat and labelled diagram wherever necessary.

EITHER

1. (a) Define graph. Also explain different types of graphs. 5

(b) Find adjacency matrix from the following graph :



5

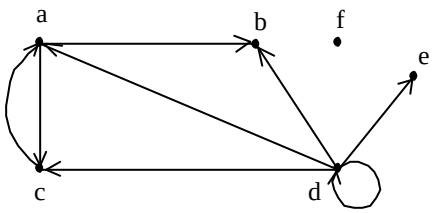
OR

(c) Define following terms with suitable example :

(i) Complement of graph

(ii) Intersection of graph. 5

(d) For the following graph, find :



(i) Pendent vertex

(ii) Isolated vertex

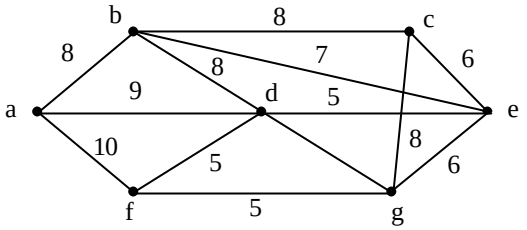
(iii) Vertex set

(iv) Indegree of vertices

(v) Outdegree of vertices. 5

EITHER

2. (a) Find shortest path for following graph by Dijkstra's Algorithm :



5

(b) Define the following terms related to graph :

(i) Walk

(ii) Trail

(iii) Tour

(iv) Path

(v) Circuit. 5

OR

(c) Prove that a simple graph with n vertices must be connected if it has more than $\frac{(n-1)(n-2)}{2}$ edges. 5

(d) Define following terms with suitable example :

(i) Cut vertex

(ii) Connected graph

(iii) Bridge

(iv) Strongly connected graph

(v) Weakly connected graph. 5

EITHER

3. (a) Prove that a tree with n vertices has n – 1 edges. 5

(b) Define the following terms :

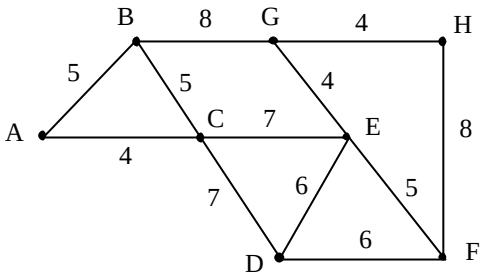
(i) Centre of tree

(ii) Spanning tree

(iii) Binary tree. 5

OR

(c) Use Kruskal's algorithm to find minimal spanning tree from following connected weighted graph :



5

(d) Prove that a graph G is a tree if and only if it is minimally connected. 5

EITHER

4. (a) Define directed graph. Also define different types of directed graph. 5

(b) Define following terms :

(i) Euler diagraph

(ii) Arborescence

(iii) Isomorphism of diagram. 5

OR

(c) Convert the following infix expressions into Polish notation :

(i) A + B * C

(ii) (A + B) / (C – D)

(iii) A + (B * C – (D/F + F) * G) * H. 5

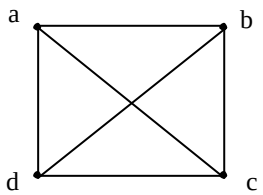
(d) What is flow in graph ? Explain. Also explain maximal flow algorithm. 5

5. Attempt **all** :

(a) Define union and intersection of graph with the help of suitable example. 2½

(b) What is connectivity in graph ? Explain. Also explain vertex connectivity. 2½

(c) Find all possible spanning trees for the following graph :



2½

(d) Define following terms :

(i) Polish notation

(ii) Connectedness in diagraph. 2½