

B. TECH.
(SEM. VI) EVEN SEMESTER THEORY EXAMINATION 2017-18
GRAPH THEORY

Time: 3 Hours

Total Marks: 100

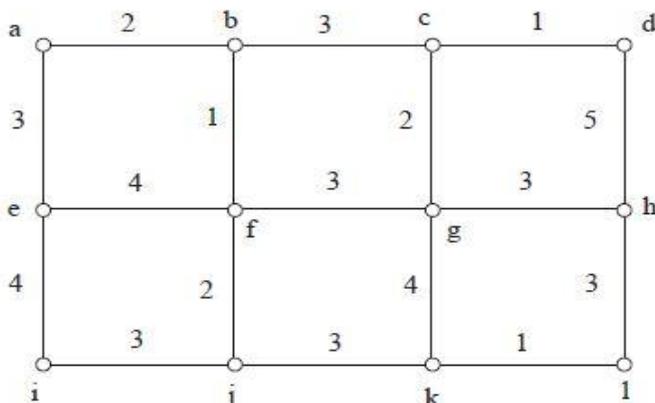
Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

- 1. Attempt *all* questions in brief. 2 x 10 = 20**
- a. Define Euler graph.
 - b. Can there is a path longer than Hamiltonian path (if any) in simple connected undirected graph? Why?
 - c. Define walk and path in a graph.
 - d. What is an edge covering?
 - e. What are the applications of a planer graph?
 - f. Find the chromatic number of a complete graph of n vertices.
 - g. Define recurrence relation.
 - h. What is spanning tree?
 - i. Define 1-isomorphic and 2-isomorphic.
 - j. What is proper coloring?

SECTION B

- 2. Attempt any *three* of the following: 10 x 3 = 30**
- a. Define the Hamiltonian graph. Give two example of Hamiltonian graph.
 - b. Discuss about some types of digraph with suitable example.
 - c. Define the thickness and cross number of a graph. Show, by sketching, that the thickness of the eight vertex complete graph is two, whereas that of the nine vertex complete graph is three.
 - d. What is it meant by the basis Vectors of a graph? Explain with an example.
 - e. Use the algorithm of Prim's or Kruskal's, to find a minimum spanning tree of the following graph :



SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Describe the steps to find adjacency matrix and incidence matrix for a directed graph with a suitable example.
- (b) Write a note on chromatic polynomial and their applications.

4. Attempt any *one* part of the following: 10 x 1 = 10

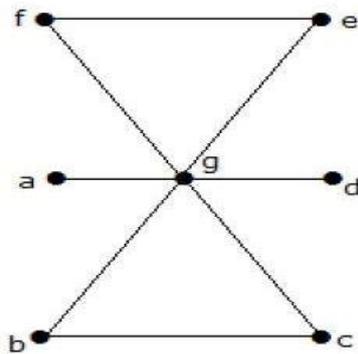
- (a) What do you mean by the rank and nullity of a graph? Discuss the rank and nullity of a complete graph of n vertices.
- (b) Prove that in a binary tree having n vertices the minimum height is $\lceil \log_2(n+1) \rceil - 1$.

5. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Define the edge-connectivity and vertex connectivity of a graph. Prove that the vertex connectivity of any graph G never exceed the edge connectivity of G .
- (b) What is a geometrical dual and combinational dual graph? Show that a graph has a dual if and only if it is a planar.

6. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Suppose G and G' are two graphs having n vertices. For what values of n is it possible for G to have more components and edges than G' ?
- (b) Define the chromatic number and chromatic polynomial of a graph. Find the line covering number for the following graph?



7. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Explain the diameter and radius of a tree with example. Find the condition under which the diameter of a tree is equal to twice the radius.
- (b) Define :
 - (i) Cut-set matrix
 - (ii) Fundamental cut-set matrix.
 Give example of each.