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Sub Code: ECS 505
Roll No.

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

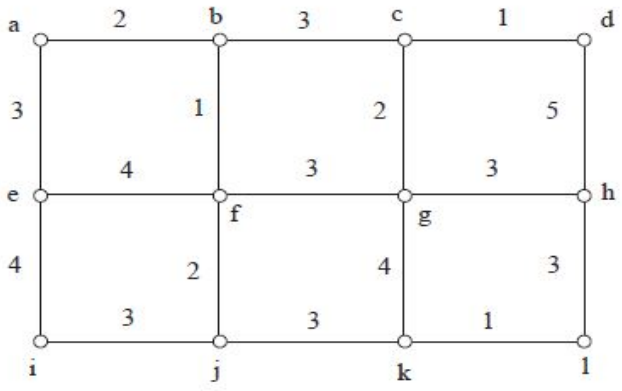
1. Attempt *all* questions in brief. 2 x 10 = 20

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 [log2 (n+1)-1].

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

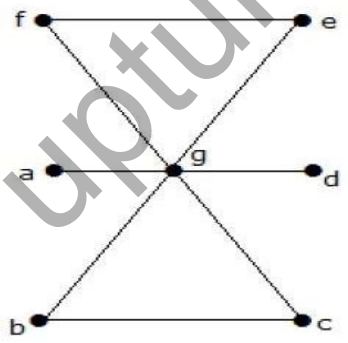
(a) Define the edge-connectivity and vertex connectivity of a graph. Prove that the vertex connectivity of any graph G never exceed the edge connectivity of G.

(b) What is a geometrical dual and combinational dual graph? Show that a graph has a dual if and only if it is a planner.

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.