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Printed Pages—3 ECS505

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2168 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VI) EVEN THEORY EXAMINATION 2012-13

GRAPH THEORY

Time : 2 Hours *Total Marks : 50*

Note :– (1) Attempt **all** questions.

(2) Make suitable assumptions wherever necessary.

1. Attempt any **four** parts of the following : **(4×3=12)**

(a) What is a bipartite graph ? How can you determine whether an undirected graph is bipartite ?

(b) What does it mean by degree of a vertex ? Can a simple graph exist with 15 vertices each of degree five ? Explain your answer.

(c) Determine which pair of graphs below are isomorphic :

(i) (ii) (iii)

(d) What do you mean by connectedness of graphs ? Show that there is a simple path between every pair of distinct vertices of a connected undirected graph.

(e) Define Hamiltonian path in a simple graph. Draw a graph that has a Hamiltonian path but does not have a Hamiltonian circuit.

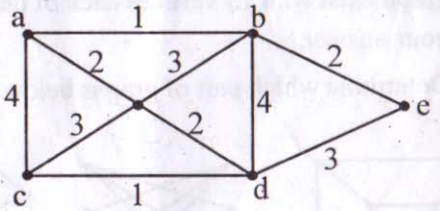
(f) Show that a given connected graph G is an Euler graph if and only if all vertices of G are of even degree.

2. Attempt any **two** parts of the following : **(2×6=12)**

(a) Show that a simple graph is a tree if and only if it contains no simple circuits and the addition of an edge connecting two non adjacent vertices produce a new graph that has exactly one simple circuit (where circuits that contain the same edges are not considered different).

(b) Define the terms distance, centre and eccentricity in a tree. Show that the distance between two spanning trees is a metric.

(c) What do you mean by minimum spanning tree of a weighted graph ? Using the Prim's algorithm find the minimum spanning tree of the following graph.



3. Attempt any **two** parts of the following : **(2×6=12)**

(a) Define the cut set of a graph. What is the significance of fundamental cut set ? Show that ring sum of any two cut sets of a graph is either a third cut set or an edge disjoint union of cut sets.

(b) State the Kuratowski's theorem on the planarity of graphs and explain how it characterizes which graphs are planar.

(c) Explain the following with suitable examples :

(i) Combinatorial dual of a graph

(ii) Homeomorphic graphs.

4. Attempt any **four** parts of the following : **(3.5×4=14)**

(a) Express the relationship of dualism between two planar, simple graphs in terms of appropriate matrices.

(b) Show that W_G satisfies all the four conditions for being a vector space.

(c) If a graph G is tree, show that the cut set subspace W_S fills the entire vector space W_G of G.

(d) Define chromatic number of a graph. What is the chromatic number of the graph $K_{m,n}$? Where m and n are positive integers.

(e) Define incidence matrix A_f, the fundamental circuit matrix, B_f and fundamental cut set matrix, C_f of a connected graph. Give the relationship among them.

(f) Define the matching. What is the complete matching ? Are all bipartite graphs having complete matching.