1023

M.Sc. IV Semester Examination 2020
Subject : Mathematics
Paper : II – Advanced Graph Theory

Max.Marks : 85   Min.Marks: 29

Note: **Attempt all questions.**

1.   Attempt any five parts: 5x5=25

    (i)   Explain graph isomorphism.

    (ii)   Define Eulerian path.

    (iii)   Explain rooted and binary trees.

    (iv)   Explain fundamental cut set of a graph.

    (v)   Define abstract and planar graph.

    (vi)   Explain geometric and combinational duals.

    (vii)   Write a short note on chromatic partitioning of a graph.

    (viii) Explain Dimmer problem.

    (ix)   Explain Eulerian digraph.

    (x)   Define adjacency matrix of a digraph.

Unit - I

2.(a) Explain Konigsberg bridge problem.   06

  (b) Explain travelling salesman problem.   06

OR

Prove that a connected graph is an Euler graph if and only if it can be decomposed into circuits.

Unit - II

3.   Write short notes on the following:

  (a)   Distance and center in a tree   06

  (b)   Graph as a metric space   06

OR

(a) Show that every circuit has an even number of edges in common with any cut set. 06

(b) Show that the number of vertices in a binary tree is odd. 06

Unit - III

4. Define edge and vertex connectivities of a graph G, and prove that the vertex connectivity of any graph G can never exceed the edge connectivity of G. 12

OR

Define regions in a graph and prove that a connected planner graph with n vertices and l edges has $l-n+2$ regions.

Unit - IV

5. Prove that every tree with two or more vertices is 2-chromatic. 12

OR

Prove that the vertices of every planar graph can be properly colored with five colors.

Unit - V

6. Explain different types of digraphs. 12

OR

Write short notes on the following:

(i) Kruskal algorithm

(ii) Prism algorithm