

V.P. & R.P.T.P. Science College, V.V.Nagar

Internal Test: 2013-14

T.Y.B.Sc. : Semester - 6 (CBCS)

Subject : Mathematics

US06CMTH05

Max. Marks : 30

Graph Theory

Date: 14/03/2014

Timing: 3.30 pm - 5.00pm

Q: 1. Answer any THREE of the following.

[1] Define with example : (i) Finite graph (ii) Pendant Vertex

[2] State necessary conditions for isomorphism of two graphs.

[3] Draw all possible Labeled trees with four vertices.

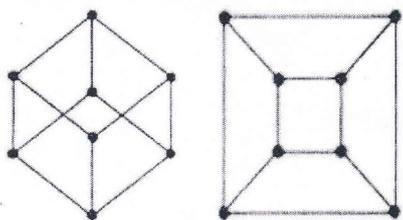
[4] Does the Königsberg's Seven Bridges problem have a solution? Why?

[5] What is a Cut-Set? Give an example.

[6] Define Rank and Nullity of a graph.

Q: 2 [A] If a graph has exactly two vertices with odd degrees then prove that there must be a path joining these vertices.

[B] Define isomorphism and examine whether the following graphs are isomorphic?



OR

Q: 2 [A] Prove that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$.

[B] Explain : (i) Königsberg Bridges Problem (ii) Seating Problem

Q: 3 [A] Prove that a connected graph is an Euler Graph *iff* it can be decomposed into circuits.

[B] Define Minimally connected graph and prove that a graph is a tree *iff* it is minimally connected.

OR



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Q: 3 [A] Define a complete graph and prove that in a complete graph with n vertices there are $\frac{n-1}{2}$ edge disjoint Hamiltonian circuits, if n is odd and $n \geq 3$ 4

[B] Prove that the distance between vertices of a connected graph is a metric. 4

Q: 4. Define Fundamental Circuit and Fundamental Cut-Set. Also prove that with respect to a given spanning tree T , a chord c_i , that determines a fundamental circuit γ , occurs in every fundamental cut-sets associated with the branches in γ and no other cut-sets. 8

OR

Q: 4 [A] Define Spanning Tree and show that every connected graph has a spanning tree. 4

[B] Prove that every Cut-Set in a connected graph G must contain atleast one branch of every spanning tree of G 4

