

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

Internal Test: 2017-18

Subject : Mathematics

US06CMTH05

Max. Marks : 25

Graph Theory

Date: 14/03/2018

Timing: 11:00 am - 12:30 pm

Q: 1. Answer the following by choosing correct answers from given choices. 3

[1] If the number of edges, none of them is a self-loop, connected with a vertex is 4 then its degree is

[A] 1 [B] 2 [C] 4 [D] 8

[2] An operation of vertex deletion on a graph removes corresponding

[A] edges only [B] vertices only [C] vertices and edges both [D] none

[3] Rank of a graph with 4 vertices, 6 edges and 2 components is

[A] 1 [B] 2 [C] 3 [D] 4

Q: 2. Answer any TWO of the following. 4

[1] Define : (i) Subgraph (ii) Closed walk

[2] Is graph representation of Königsberg bridge problem an Euler graph?

[3] Define a Fundamental Circuit and give an example of it.

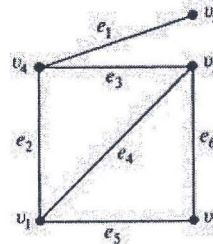
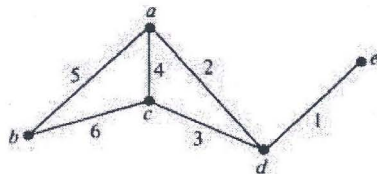
Q: 3 [A] Explain Isomorphism between two graphs. 3

[B] Write a short note on Königsberg bridge problem 3

OR

Q: 3 [A] Prove that a graph G is disconnected *iff* its vertex set V can be partitioned into two non-empty disjoint subsets V_1 and V_2 such that there exists no edge in G whose one end vertex is in subset V_1 and other in subset V_2 3

[B] Examine whether following pair of graphs is isomorphic or not.



3

Q: 4 [A] Prove that a graph G with n -vertices and $n - 1$ edges and no circuits is connected. 3

[B] If in a graph G there is one and only one path between every pair of vertices then prove that G is a tree. 3

OR

Q: 4. Prove that a connected graph G is an Euler graph *iff* all vertices of G are of even degree. 6

Q: 5 [A] Prove that every cut-set in a connected graph G must contain atleast one branch of every spanning tree. 3

[B] Prove that the edge connectivity of a graph G can not exceed the degree of a vertex with the smallest degree in G . 3

OR

Q: 5. Prove that the ring sum of any two cut-sets is either a cut-set or an edge disjoint union of cut-sets. 6

