

TCS-604

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Even Semester Examination - 2017

B.TECH. (VI SEMESTER)

GRAPH THEORY

Time: 02:00 Hours

Max Marks : 50

Note: Attempt **all** questions.

1. Attempt any four parts of the following: (4x2.5=10)
 - (a) Explain with the help of example 1. Balanced digraph 2. Regular Diagraph.
 - (b) Show that the maximum number of edges in a simple graph with n vertices is $n(n-1)/2$.
 - (c) Prove that every edge in a digraph belongs either to a directed circuit or a directed cut set.
 - (d) Prove that the number of vertices of odd degree in a graph is always even.

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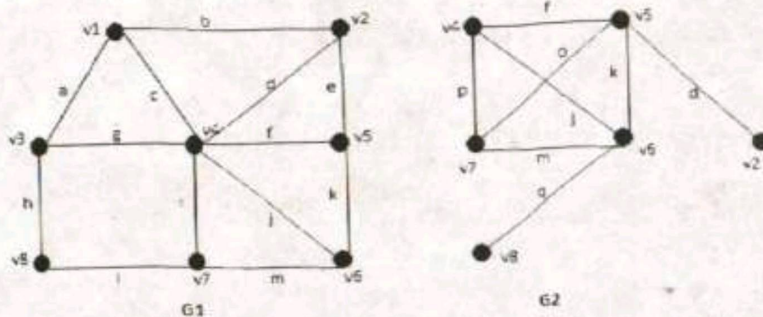
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- (e) Draw graph representing problems of Konigsberg bridge problem.
- (f) Explain Hamiltonian path and circuit with example.
2. Attempt any four parts of the following: (4x2.5=10)
- (a) Give an example of a graph with six vertices that has no cut points.
- (b) Explain Isomorphic graph with example.
- (c) Explain sub graphs and its properties.
- (d) Explain edge disjoint and vertex disjoint sub graphs with proper example.
- (e) Prove that any two simple connected graphs with n vertices, all of degree two, are isomorphic.
- (f) Prove that each spanning tree of a connected graph G , contains all the pendant edges of G .
3. Attempt any two parts of the following: (5x2=10)
- (a) Prove that in a complete graph with n vertices there are $(n-1)/2$ edge disjoint Hamiltonian circuits, if n is an odd number ≥ 3 .

- (b) Prove that the distance between vertices of a connected graph is a metric.
- (c) Explain Edge connectivity, Vertex connectivity and separable graph with the help of example.

4. Attempt any two parts of the following: (5x2=10)

- (a) Prove that a simple graph with n vertices and k components can have at most $(n-k)(n-k+1)/2$ edges.
- (b) Find the Union and ring sum of G_1 and G_2 :



- (c) Explain Prim's and Dijkstra's with the help of example.

5. Attempt any two parts of the following: (5x2=10)

- (a) Find the Geometric Dual of G_1 given in question no. 4(b).

- (b) Give Fundamental Circuit matrix & Fundamental Cut-set matrix of the graph G2 given in question no. 4(b).
- (c) Explain with example 1. Directed Graph 2.. Indegree & Outdegree.
