

B. TECH.
(SEM-V) THEORY EXAMINATION 2019-20
GRAPH THEORY

Time: 3 Hours**Total Marks: 100****Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A**

- 1. Attempt all questions in brief. 2 x 10 = 20**
- Calculate the number of edges in the graph G with 16 vertices, each of degree 2.
 - What do you mean by orthogonal vectors?
 - Can there is a path longer than Hamiltonian path (if any) in simple connected undirected graph? Why?
 - What is an edge covering
 - Differentiate between rooted and binary trees.
 - Find the chromatic number of a complete graph of n vertices.
 - What are the applications of a planer graph?
 - Define recurrence relation.
 - Define 1-isomorphic and 2-isomorphic.
 - Explain the radius and diameter of a graph with examples.

SECTION B

- 2. Attempt any three of the following: 10x 3 = 30**
- When is a graph said to be regular? Show that the number of vertices in a k-regular graph is even if k is odd. Find all non isomorphic simple graphs of order 4
 - Describe radius and pendent vertices. Explain rooted and binary trees in detail with diagram.
 - Prove that in a binary tree having n vertices the minimum height is $\lceil \log_2(n+1) - 1 \rceil$
 - Explain geometrical dual and combinational dual graphs
 - Define edge connectivity and vertex connectivity of a graph. Construct a graph G with edge connectivity 4, vertex connectivity 3 and degree of each vertex of $G \geq 3$.

SECTION C

- 3. Attempt any one part of the following: 10x 1 = 10**
- Discuss (i) Konigsberg Bridge Problem (ii) Travelling Salesman Problem
 - Write the Kruskal's algorithm for finding the minimum spanning tree of a graph, Illustrate the algorithm using an example.
- 4. Attempt any one part of the following: 10x 1 = 10**
- Describe the steps to find adjacency matrix and incidence matrix for a directed graph with a suitable example.
 - Suppose G and G' are two graphs having n vertices. For what values of n is it possible for G to have more components and edges than G'?
- 5. Attempt any one part of the following: 10 x 1 = 10**
- Explain thickness, crossing and covering with example. Define five color problems are there any graphs that cannot be colored with four colors?
 - Use the algorithm of Prim's to find a minimum spanning tree of any graph.
- 6. Attempt any one part of the following: 10x 1 = 10**
- Explain the operations on the graphs union, intersection and ring sum
 - Define connectivity and separability. Explain with diagram network flows Planer graphs,
- 7. Attempt any one part of the following: 10x 1 = 10**
- What are chromatic polynomials? Explain the concept of chromatic partition.
 - Show that every planar graph is S-colorable.