

[14]



Q.1 Choose the correct option for each of the following.

[10]

- (1) If there are 4 edges in a simple graph then total degrees of vertices of the graph is
- (a) 6 (b) 8 (c) 10 (d) None of these
- (2) degree of isolated vertex is
- (a) 2 (b) 1 (c) 0 (d) None of these
- (3) An Edge whose end points are the same vertex is called
- (a) trivial graph (b) multigraph (c) loop (d) None of these
- (4) A graph with each vertices has even degree is called
- (a) Universal graph (b) Euler graph (c) Subgraph (d) None of these
- (5) An operation of edge deletion on a graph removes corresponding...
- (a) edge only (b) vertices (c) vertices and edges both (d) None of these
- (6) A Hamiltonian Path in a graph traverses through
- (a) all vertices (b) all edges (c) all vertices and edges (d) None of these
- (7) A spanning tree T of graph G contains all the of G.
- (a) edges (b) faces (c) vertices (d) regions
- (8) Vertex connectivity Edge connectivity
- (a) \geq (b) \leq (c) $>$ (d) $<$
- (9) If graphs G_1 and G_2 are isomorphic and nullity of G_1 is 7 then nullity of G_2 is
- (a) 7 (b) 14 (c) 21 (d) 49
- (10) A simple planar graph with 10 edges and 7 vertices has faces
- (a) 5 (b) 7 (c) 9 (d) 10

Q.2 Do as directed.

[8]

- (1) True or False :The Null graph has at least one edge.
- (2) True or False : The degree of a pendant vertex is one.
- (3) True or False : A connected graph must have exactly one spanning tree.
- (4) The ring sum of two graphs does not include
- (5) A collection of trees in a graph is called
- (6) Rank of a graph G is given by $r =$
- (7) True or False : The geometric dual of a graph exists if it is Planar.
- (8) $K_{3,3}$ is graph.

Q.3 Attempt any Ten.

[20]

- (1) Define : A graph .
- (2) Discuss : Konigsberg bridge Problem.
- (3) Define : Length of path.
- (4) Draw all labeled trees with four vertices.
- (5) Define : A Complete graph with an example.
- (6) Define : Arbitrary traceable graph with an example.
- (7) Explain Spanning Tree with an example.
- (8) Define : Vertex connectivity.
- (9) Define : Fundamental circuit of a graph.
- (10) Define: Homeomorphic Graphs.
- (11) Define : Circuit correspondence.
- (12) Discuss Kuratowski's First graph.

Q.4 Attempt any Four.

[32]

- (1) 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 .
- (2) If a graph has two vertices of odd degree then prove that there must be a path between them.
- (3) Prove that a graph is a tree if and only if it is minimally connected.
- (4) Prove that there is one and only one path between every pair of vertices in a tree.
- (5) Describe a method to finding all spanning trees of a graph.
- (6) Prove that every cut-set has in a connected graph G must contain atleast one branch of every spanning tree.
- (7) State and Prove Euler's theorem for planar graphs .
- (8) Prove that a graph has a dual iff it is planar.

—X—
(2)