**Unit-5**

**Graphs**

1. For a given graph G having v vertices and e edges which is connected and has no cycles, which of the following statements is true?  
   a) v=e b) v = e+1 c) v + 1 = e d) v = e-1
2. Which of the following ways can be used to represent a graph?  
   a) Adjacency List and Adjacency Matrix b) Incidence Matrix  
   c) Adjacency List, Adjacency Matrix as well as Incidence Matrix d) No way to represent
3. The number of elements in the adjacency matrix of a graph having 7 vertices is \_\_\_\_\_\_\_\_\_\_  
   a) 7 b) 14 c) 36 d) 49
4. Adjacency matrix of all graphs are symmetric.  
   a) False b) True
5. The time complexity to calculate the number of edges in a graph whose information in stored in form of an adjacency matrix is \_\_\_\_\_\_\_\_\_\_\_\_  
   a) O(V) b) O(E2) c) O(E) d) O(V2)
6. For the adjacency matrix of a directed graph the row sum is the \_\_\_\_\_\_\_\_\_ degree and the column sum is the \_\_\_\_\_\_\_\_ degree.  
   a) in, out b) out, in c) in, total d) total, out
7. What is the maximum number of possible non zero values in an adjacency matrix of a simple graph with n vertices?  
   a) (n\*(n-1))/2 b) (n\*(n+1))/2 c) n\*(n-1) d) n\*(n+1)
8. Given an adjacency matrix A = [ [0, 1, 1], [1, 0, 1], [1, 1, 0] ], The total no. of ways in which every vertex can walk to itself using 2 edges is \_\_\_\_\_\_\_\_  
   a) 2 b) 4 c) 6 d) 8

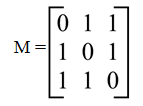
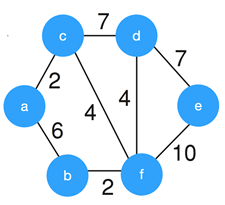
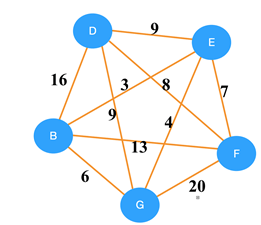
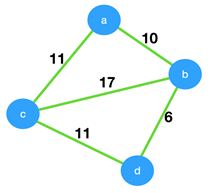
Explanation: A2 = [ [2, 1, 1], [1, 2, 1], [1, 1, 2] ], all the 3 vertices can reach to themselves in 2 ways, hence a total of 3\*2, 6 ways.

1. What is the number of vertices of degree 2 in a path graph having n vertices, here n>2.  
   a) n-2 b) n c) 2 d) 0
2. All trees with n vertices consist of n-1 edges.  
   a) True b) False
3. Dijkstra’s Algorithm will work for both negative and positive weights?  
   a) True b) False
4. Floyd Warshall’s Algorithm used to solve the shortest path problem has a time complexity of \_\_\_\_\_\_\_\_\_\_  
   a) O(V\*V) b) O(V\*V\*V) c) O(E\*V) d) O(E\*E)
5. What is the maximum possible number of edges in a directed graph with no self-loops having 8 vertices?  
   a) 28 b) 64 c) 256 d) 56

Explanation: If a graph has V vertices than every vertex can be connected to a possible of V-1 vertices.

1. What is the maximum number of edges present in a simple directed graph with 7 vertices if there exists no cycles in the graph?  
   a) 21 b) 7 c) 6 d) 49
2. Which of the following is false in the case of a spanning tree of a graph G?  
   a) It is tree that spans G b) It is a subgraph of the G  
   c) It includes every vertex of the G d) It can be either cyclic or acyclic
3. Every graph has only one minimum spanning tree.  
   a) True b) False
4. Consider a complete graph G with 4 vertices. The graph G has \_\_\_\_ spanning trees.  
   a) 15 b) 8 c) 16 d) 13

Explanation: A graph can have many spanning trees. And a complete graph with n vertices has n(n-2) spanning trees. So, the complete graph with 4 vertices has 4(4-2) = 16 spanning trees.

1. The travelling salesman problem can be solved using \_\_\_\_\_\_\_\_\_  
   a) A spanning tree b) A minimum spanning tree  
   c) Bellman – Ford algorithm d) DFS traversal
2. Consider the graph M with 3 vertices. Its adjacency matrix is shown below. Which of the following is true?  
   [](https://www.sanfoundry.com/wp-content/uploads/2018/07/minimum-spanning-tree-questions-answers-q5.png)  
   a) Graph M has no minimum spanning tree  
   b) Graph M has a unique minimum spanning trees of cost 2  
   c) Graph M has 3 distinct minimum spanning trees, each of cost 2  
   d) Graph M has 3 spanning trees of different costs
3. Which of the following is false?  
   a) The spanning trees do not have any cycles  
   b) MST have n – 1 edges if the graph has n edges  
   c) Edge e belonging to a cut of the graph if has the weight smaller than any other edge in the same cut, then the edge e is present in all the MSTs of the graph  
   d) Removing one edge from the spanning tree will not make the graph disconnected
4. Kruskal’s algorithm is used to \_\_\_\_\_\_  
   a) find minimum spanning tree b) find single source shortest path  
   c) find all pair shortest path algorithm d) traverse the graph
5. Consider the given graph.  
   [](https://www.sanfoundry.com/wp-content/uploads/2018/07/kruskals-algorithm-questions-answers-q3.png)  
   What is the weight of the minimum spanning tree using the Kruskal’s algorithm?  
   a) 24 b) 23 c) 15 d) 19
6. What is the time complexity of Kruskal’s algorithm?  
   a) O(log V) b) O(E log V) c) O(E2) d) O(V log E)
7. Consider the following graph. Using Kruskal’s algorithm, which edge will be selected first?  
   [](https://www.sanfoundry.com/wp-content/uploads/2018/07/kruskals-algorithm-questions-answers-q5.png)  
   a) GF b) DE c) BE d) BG
8. Which of the following is true?  
   a) Prim’s algorithm initializes with a vertex  
   b) Prim’s algorithm initializes with a edge  
   c) Prim’s algorithm initializes with a vertex which has smallest edge  
   d) Prim’s algorithm initializes with a forest
9. Consider the given graph.  
   [](https://www.sanfoundry.com/wp-content/uploads/2018/07/prims-algorithm-questions-answers-q2.png)  
   What is the weight of the minimum spanning tree using the Prim’s algorithm, starting from vertex a?  
   a) 23 b) 28 c) 27 d) 11
10. Worst case is the worst case time complexity of Prim’s algorithm if adjacency matrix is used?  
    a) O(log V) b) O(V2) c) O(E2) d) O(V log E)
11. Depth First Search is equivalent to which of the traversal in the Binary Trees?  
    a) Pre-order Traversal b) Post-order Traversal  
    c) Level-order Traversal d) In-order Traversal
12. Time Complexity of DFS is? (V – number of vertices, E – number of edges)  
    a) O(V + E) b) O(V) c) O(E) d) O(V\*E)
13. The Data structure used in standard implementation of Depth First Search is?  
    a) Stack b) Queue c) Linked List d) Tree
14. The Depth First Search traversal of a graph will result into?  
    a) Linked List b) Tree c) Graph with back edges d) Array
15. A person wants to visit some places. He starts from a vertex and then wants to visit every vertex till it finishes from one vertex, backtracks and then explore other vertex from same vertex. What algorithm he should use?  
    a) Depth First Search b) Breadth First Search

c) Trim’s algorithm d) Kruskal’s Algorithm

1. In Depth First Search, how many times a node is visited?  
   a) Once b) Twice

c) Equivalent to number of indegree of the node d) Thrice

1. Breadth First Search is equivalent to which of the traversal in the Binary Trees?  
   a) Pre-order Traversal b) Post-order Traversal  
   c) Level-order Traversal d) In-order Traversal
2. Time Complexity of Breadth First Search is? (V – number of vertices, E – number of edges)  
   a) O(V + E) b) O(V) c) O(E) d) O(V\*E)
3. The Data structure used in standard implementation of Breadth First Search is?  
   a) Stack b) Queue c) Linked List d) Tree
4. The Breadth First Search traversal of a graph will result into?  
   a) Linked List b) Tree c) Graph with back edges d) Arrays
5. A person wants to visit some places. He starts from a vertex and then wants to visit every place connected to this vertex and so on. What algorithm he should use?  
   a) Depth First Search b) Breadth First Search

c) Trim’s algorithm d) Kruskal’s algorithm

1. In BFS, how many times a node is visited?  
   a) Once b) Twice

c) Equivalent to number of indegree of the node d) Thrice

1. Dijkstra’s Algorithm is used to solve \_\_\_\_\_\_\_\_\_\_\_\_\_ problems.

a) All pair shortest path b) Single source shortest path

c) Network flow d) Sorting

1. Which of the following is the most commonly used data structure for implementing Dijkstra’s Algorithm?

a) Max priority queue b) Stack c) Circular queue d) Min priority queue

1. What is the time complexity of Dijikstra’s algorithm?

a) O(N) b) O(N3) c) O(N2) d) O(logN)

1. Dijkstra’s Algorithm cannot be applied on \_\_\_\_\_\_\_\_\_\_\_\_\_\_

a) Directed and weighted graphs b) Graphs having negative weight function

c) Unweighted graphs d) Undirected and unweighted graphs

1. A graph in which all vertices have equal degree is known as \_\_\_\_

(A) Complete graph (B) Regular graph

(C) Multi graph (D) Simple graph