Practical 2

1. How many vertices are there in a complete graph with n vertices?

   a) (n*(n-1))/2

   b) (n*(n+1))/2

   c) n+1

   d) None of these

2. following is the sum of degrees of each vertex for undirected graph G if it has n vertices and e edges?

   a) ne

   b) 2ne

   c) 2e

   d) None of these

3. following is the method is used in a queue for sorting data

   a) FIFO

   b) LIFO

   c) both

   d) None of these

4. following one is the minimum number of spanning tree in a connected graph?

   a) 0

   b) 1

   c) 2

   d) None of these

5. Below are the means of calculating the reachability of all the vertices?

   a) minimum distance

   b) safest path

c)transitive hull

d) the average distance

6. A certain tree has two vertices of degree 4, one vertex of degree 3, and one vertex of degree 2. If the other vertices have degree 1, how many vertices are there in the graph

   (a) 5
   (b) n – 3
   (C) 11
   (d) 20

7. If a graph requires k different colors for its proper coloring, then the chromatic number of the graph is

   (a) 1
   (b) k
   (C) k-1
   (d) k/2

8. following diagonals can be drawn by joining the angular points of an octagon?
   (a) 14
   (b) 20
   (C) 21
   (d) 28

9. G is an undirected connected graph with distinct edge weight. Let Emax be the edge with maximum weight and Emin the edge with minimum weight. Which of the following statements is false?

   (a) Every minimum spanning tree of G must contain Emin.
   (b) If Emax is in the minimum spanning tree, then its removal must disconnect G.
   (C) G has a unique minimum spanning tree.
   (d) No minimum spanning tree contains Emax

10. An undirected graph G (V, E) contains n (n > 2) nodes named v1 , v2 ,…,vn. Two nodes vi and vj are connected if and only if $0 < |\,i - j\,| \leq 2$. Each edge (vi , vj) is assigned a weight i+j. The cost of the minimum spanning tree of such a graph with 10 nodes is:
    (A) 91
    (B) 88
    (C) 49
    (D) 21

11. find the maximum number of edges in a n-node undirected graph without self-loops is
    (a) n2
    (b) n(n-1)/2
    (C) n-1
    (d) n(n+1)/2

12. How many perfect matchings are there in a complete graph of 6 vertices?
    (a) 15
    (b) 24
    (C) 30
    (d) 60

13. Let G=(V, E) be a directed graph where V is the set of vertices and E the set of edges. Then which one of the following graphs has the same strongly connected components as G?

    (A) $G_1 = (V, E_1)$ where $E_1 = \{(u, v)|(u, v) \notin E\}$
    (B) $G_2 = (V, E_2)$ where $E_2 = \{(u, v)|(v, u) \in E\}$
    (C) $G_3 = (V, E_3)$ where $E_3 = \{(u, v)|there\ is\ a\ path\ of\ length \leq 2\ from\ u\ to\ v\ in\ E\}$
    (D) $G_4 = (V_4, E)$ where V_4 is the set of vertices in G which are not isolated

    (a) A

    (b) B

    (C) C

    (d) D

14. What is the maximum number of edges in a bipartite graph having 10 vertices?

    (a)21

    (b)24

    (c)25

    (d)16

15. 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 and Incidence Matrix

    (d)None of the above

16. On which of the following statements does the time complexity of inspection if an edge exists between two particular vertices is not, depends?

    a) Depends on the number of edges

    b) Depends on the number of vertices

    c) Is independent of both the number of edges and vertices

    d) It depends on both the number of edges and vertices

17. The degree sequence of a simple graph is the sequence of the degrees of the nodes in the graph in decreasing order. Which of the following sequences cannot be the degree sequence of any graph?

I. 7, 6, 5, 4, 4, 3, 2, 1

II. 6, 6, 6, 6, 3, 3, 2, 2

III. 7, 6, 6, 4, 4, 3, 2, 2

IV. 8, 7, 7, 6, 4, 2, 1, 1

    a) I and II

    b) III and IV

    c) IV only

    d) II and IV

18. Graphs are represented using ....

    a) Adjacency tree

    b) Adjacency linked list

    c) Adjacency graph

    d) Adjacency queue

19. If the locality is a concern, you can use .... to traverse the graph.

    a) BFS

    b) DFS

    c) Either BFS or DFS

    d) None of these

20. The least number of colors wanted to color a graph having n (>3) vertices and 2 edges are

a) 1

b) 2

c) 3

d) 4

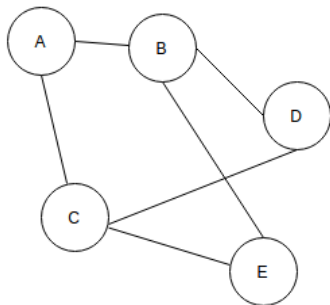21. following is useful in traversing a given graph by breadth-first search?

    a) set

    b) List

    c) stacks

    d) Queue

22. The minimum number of edges in a connected cyclic graph on n vertices is

    a) n

    b) n+1

    c) n-1

    d) none of the above

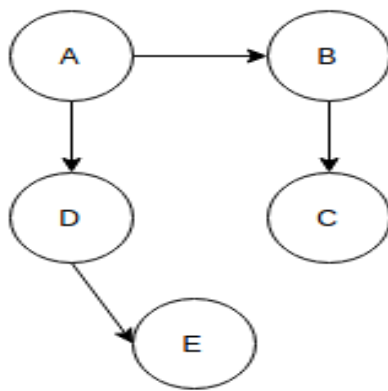23. For the given graph(G), which of the following statements is true?

    a) G is a complete graph

    b) G is not a connected graph

    c) The vertex connectivity of the graph is 2

    d) The edge connectivity of the graph is 1

24. Following the graph which edge must be removed to make it a Bipartite Graph?
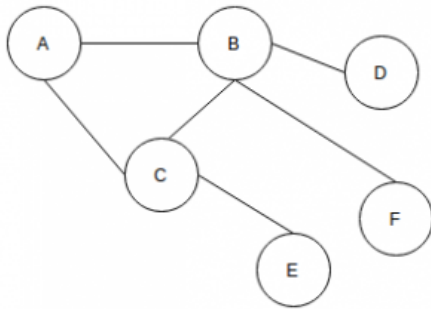
a) C-D

b) B-E

c) A-C

d) D-E

25. Following one is the DFS traversal of the given Graph?

a) ABCED

b) AEDCB

c) EDCBA

d) ADECB

26. Which of the following one is true about the graphs?

a) A graph may contain no edges and many vertices

b) A graph may contain many edges and no vertices

c) A graph may contain no edges and no vertices

d) None of the mentioned

27. What would be the number of zeros in the adjacency matrix of the given graph?

    a) 0

    b) 6

    c) 10

    d) 16

28. Following one 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)

29. Following is the adjacency matrices represents a simple graph?

    a) [[1, 0, 0], [0, 1, 0], [0, 1, 1]]

    b) [[1, 1, 1], [1, 1, 1], [1, 1, 1]]

    c) [[0, 0, 1], [0, 0, 0], [0, 0, 1]]

    d) [[0, 0, 1], [1, 0, 1], [1, 0, 0]]

30. The column sum in an incidence matrix for a simple graph is _____

    a) depends on number of edges

    b) always greater than 2

    c) equal to 2

    d) equal to the number of edges

31. A Graph Structured Stack is a _____

    a) Undirected Graph

    b) Directed Graph

    c) Directed Acyclic Graph

    d) Regular Graph

32. All paths and cyclic graphs are bipartite graphs.

    a) True

b) False

c) May be

d) None of the above

33. How many vertices of degree 2 in a path graph having n vertices, here n>2.

    a) n-2

    b) n

    c) 2

    d) 1

34. What is the highest amount of edges present in a simple directed graph with 7 vertices if there exist no cycles in the graph?

    a) 21

    b) 7

    c) 6

    d) 49

35. In-Depth First Search, how many times a node is visited?

    a) Once

    b) Twice

    c) Equivalent to number of in degree of the node

    d) None of the mentioned

36. 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) None of the mentioned

37. A graph with n vertices will have a parallel edge or self-loop if the total number of edges is

    a) greater than n–1

    b) less than n(n–1)

c) greater than n(n–1)/2

d) less than n2/2

38. Consider a weighted undirected graph with positive edge weights and let (u, v) be an edge in the graph. It is known that the shortest path from source vertex s to u has weight 53 and the shortest path from s to v has weight 65. Which statement is always true?

a) Weight (u, v) <= 12

b) Weight (u, v) = 12

c) Weight (u, v) >= 12

d) Weight (u, v) > 12

39. Let G be a simple undirected planar graph on 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to

a) 3

b) 4

c) 5

d) 6

40. What is not an application of BFS?

a) The shortest path between two nodes

b) Finding bipartiteness of a graph

c) GPS navigation

d) Path Finding

41. What is the time complexity of Breadth-First Search?

a) O(V + E)

b) O(V)

c) O(E)

d) O(V*E)

42. The Data structure used in the standard implementation of Breadth-First Search is?

a) Linked List

b) Tree

c) Stack

d) Queue

43. Which of the following is not an application of Depth First Search?

    a) For generating topological sort of a graph

    b) For making Strongly Connected Components of a directed graph

    c) Detecting cycles in the graph

    d) Peer to Peer Networks

44. What is the shortest path from node A to node F?
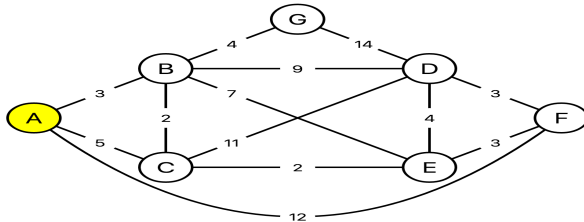
    a) A -> B -> D -> F

    b) A -> C -> B -> E -> F

    c) A -> F

    d) A -> C -> E -> F

45. To implement Dijkstra's shortest path algorithm on unweighted graphs so that it runs in linear time, the data structure to be used is:

    a) Stack

    b) Heap

    c) Queue

    d) Binary Tree

46. In a weighted, undirected graph if we apply Dijkstra's algorithm to find the shortest path between two nodes. If we add 1 to all the edge weights, does the shortest path remain the same?

    a) Yes

    b) No

47. If all edges have the same weight in an undirected graph, which algorithm will find the shortest path between two nodes more efficiently?

    a) Dijkstra

    b) Bellman-Ford

c) Depth-First Search

d) Breadth-First Search

48. A graph in which all vertices have an equal degree is known as _____

a) Complete graph

b) Regular graph

c) Multigraph

d) Simple graph

49. A graph is a tree if and only if a graph is

a) Directed graph

b) Contains no cycles

c) Planar

d) Completely connected

50. How many times the insert and extract min operations are invoked per vertex?

a) 0

b) 1

c) 2

d) 3