SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF MATHEMATICS

Cycle Test 3

Subject Code: 18MAB302T
Subject: Discrete Mathematics for Engineers
Max. Mark:25

PART-A ($25 \times 1 = 25$ Marks)

Answer **all** questions

1. A graph in which loops and parallel edges are allowed is called a .....
   (A) weighted graph
   (B) simple graph
   (C) multigraph
   (D) pseudograph
   ANSWER:(D)

2. Which of the following statement for a graph is correct?
   (A) Simple path in a graph crosses the vertex any number of times.
   (B) A graph can exists without edges.
   (C) An edge in a graph is incident on more than two vertices.
   (D) Total degree of the vertices is odd.
   ANSWER:(B)

3. Let G be a simple connected graph such that every vertex in G has degree 4. If number of edges ($|E|$) = 16, then the number of vertices ($|V|$)=
   (A) 4
   (B) 8
   (C) 9
   (D) 16
   ANSWER: (B)

4. How many edges are there in a complete bipartite graph $K_{5,7}$?
   (A) 35
   (B) 12
   (C) 42
   (D) 49
   ANSWER: (A)

5. A graph is called a ..... if it is connected and has no circuits.
   (A) Cyclic graph
   (B) Regular graph
   (C) Tree
   (D) Not graph
   ANSWER: (C)

6. A ..... circuit of G is a circuit which includes every edge of G exactly once?
   (A) Euler
   (B) Hamiltonian
   (C) Planar
   (D) Isomorphic
   ANSWER: (A)

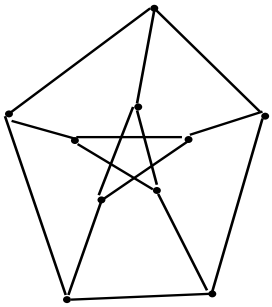
7. Chromatic number of a circuit of length 9 (C_9) is
   (A) 9
   (B) 5
   (C) 2
   (D) 3
   ANSWER: (D)

8. Which of the following statement is false?
   (A) Total degree of a tree with n vertices is $2n - 2$
   (B) There is no circuit in a tree
   (C) There exists a tree with 8 vertices and 8 edges
   (D) A tree with e edges has $e + 1$ vertices
   ANSWER: (C)

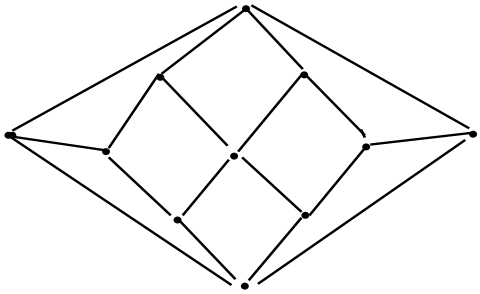
9. The maximum number of edges in a simple disconnected graph with n vertices and k components is
   (A) $\frac{(n+k)(n+k+1)}{2}$
   (B) $\frac{(n+k)(n-k+1)}{2}$
   (C) $\frac{(n-k)(n-k+1)}{2}$
   (D) $\frac{(n-k)(n+k+1)}{2}$
   ANSWER: (C)

10. Which of the following completely bipartite graph is a complete graph?
    (A) $K_{7,5}$
    (B) $K_{1,1}$
    (C) $K_{n,n}$
    (D) $K_{m,n}$
    Answer: (B)

11. Which of the following is true for the graph A and graph B of 10 and 11 vertices respectively?



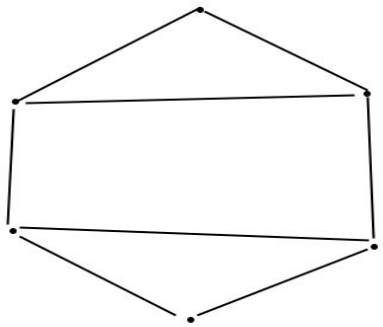
Graph A



Graph B

    (A) Both graphs A and B contain a Hamiltonian circuit
    (B) Neither graph A nor B contains a Hamiltonian circuit
    (C) Graph A contains a Hamiltonian circuit
    (D) Graph B contains a Hamiltonian circuit
    ANSWER: (B)

12. Which of the following is true for the following graph G with 6 vertices?



Graph G

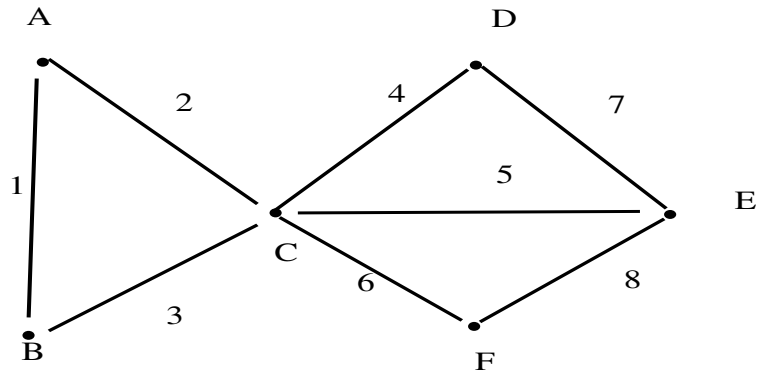
(A) G is Hamiltonian but not Eulerian
(B) G is both Eulerian and Hamiltonian
(C) G is neither Eulerian and Hamiltonian
(D) G is Eulerian but not Hamiltonian
ANSWER: (A)

13. A vertex which is adjacent to exactly one vertex is called
(A) Isolated Vertex
(B) Pendant Vertex
(C) Incident Vertex
(D) Simple Vertex
ANSWER: (B)

14. Every complete graph is
(A) Completely bipartite
(B) Tree
(C) Regular
(D) Bipartite
ANSWER: (C)

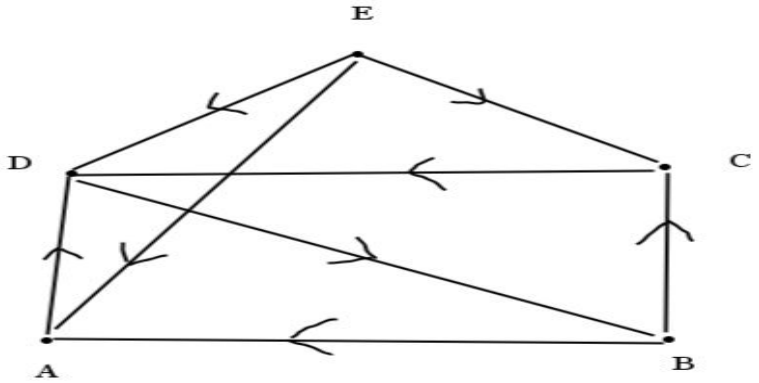
15. The number of edges of a complete graph K_{10} is
(A) 10
(B) 25
(C) 20
(D) 45
ANSWER: (D)

16. Find the total minimum weight for the following weighted graph using Kruskal's Algorithm



(A) 18
(B) 15
(C) 12
(D) 20
ANSWER: (A)

17. The sum of the indegree vertices for the following directed graph is



(A) 8
(B) 9
(C) 10
(D) 11
ANSWER: (A)

18. The adjacency matrix corresponding to a complete graph of 4 vertices (K_4)is

(A) $\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$ (B) $\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$ (C) $\begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix}$ (D) $\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 \end{pmatrix}$

ANSWER: (C)

19. What is the chromatic number of the complete bipartite graph $K_{m,n}$?
(A) 2
(B) 3
(C) 6
(D) 5
ANSWER: (A)

20. A row with all 0 (zero) entries in the incidence matrix corresponds to .....
(A) pendant vertex
(B) an isolated vertex
(C) a vertex of degree 2
(D) a vertex of degree 3
ANSWER: (B)

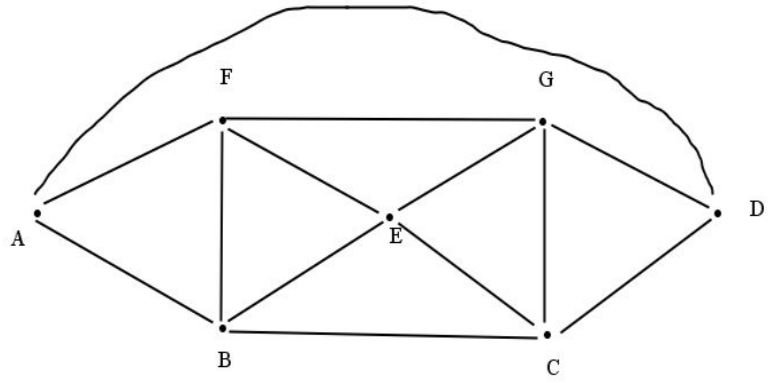
21. If there is a unique path between every pair of vertices then the graph is
(A) Connected circuitless graph
(B) Disconnected graph
(C) Connected Cyclic graph
(D) Complete graph
ANSWER: (A)

22. Length of the path of a graph is the
(A) Number of vertices in the graph
(B) Number of edges in the path
(C) Number of vertices in the path
(D) Number of edges in the graph
ANSWER: (B)

23. If the origin and terminal vertex of the path are same then the path is called
    (A) Euler path
    (B) Tree
    (C) Circuit
    (D) Hamiltonian path
    ANSWER: (C)

24. Which of the following graph is 4-Chromatic?
    (A) Complete bipartite graph of 3,3 vertices ($K_{3,3}$)
    (B) Complete graph of 5 vertices (K_5)
    (C) Complete graph of 4 vertices (K_4)
    (D) Complete bipartite graph of 4,4 vertices ($K_{4,4}$)
    ANSWER: (C)

25. What is the chromatic number of the following graph with 7 vertices?



    (A) 3
    (B) 4
    (C) 1
    (D) 2
    ANSWER: (B)