U.G. 4th Semester Examination - 2022

MATHEMATICS

[HONOURS]

Course Code : BMTMSEHT405

Course Title : Graph Theory

Full Marks : 50 Time : 2 Hours

The figures in the right-hand margin indicate marks.

Notations and Symbols have their usual meanings.

Answer **all** the following questions by choosing the correct alternative out of four options: 2×25=50

1. A graph may contain

   a) No edges and many vertices

   b) Many edges and no vertices

   c) No edges and no vertices

   d) No vertices and many edges

2. A null graph has

   a) No vertices

   b) No edges

   c) No odd vertex

   d) No even vertex

3. In a _____ the vertex set and the edge set are finite sets.

   a) Finite graph

   b) Bipartite graph

   c) Infinite graph

   d) Connected graph

4. A vertex of a graph is called even or odd depending upon

   a) Total number of edges in a graph is even or odd

   b) Total number of vertices in a graph is even or odd

   c) Its degree is even or odd

   d) None of these

5. If G is a graph with seven vertices and six edges, the sum of the degrees of all vertices in G is

   a) 6

   b) 12

   c) 14

   d) 36

6. Which of the following statements is always TRUE?

P: A Regular graph is a Simple graph.

Q: A Complete graph is a Simple graph.

a) P

b) Q

c) Both P and Q

d) Neither P nor Q

7. The maximum degree of any vertex in a simple graph with n vertices is

a) n–1

b) n+1

c) 2n–1

d) n

8. The number of edges in a regular graph of degree 2 and 5 vertices is

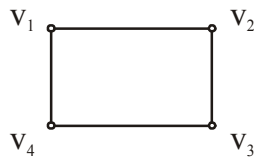
a) 2

b) 5

c) 7

d) 10

9. The following graph G is



a) Both Regular and Complete

b) Regular but not Complete

c) Complete but not Regular

d) Neither Complete nor Regular

10. Which one of the following is TRUE for any simple connected undirected graph with more than two vertices?

a) No two vertices have the same degree

b) At least two vertices have the same degree

c) At least three vertices have the same degree

d) All vertices have the same degree

11. The maximum number of edges in a bipartite graph on twelve vertices is

a) 12

b) 24

c) 36

d) 48

12. A given connected graph is a Euler graph if and only if all vertices are of

a) Same degree

b) Even degree

c) Odd degree

d) Different degree

13. How many vertices are there in a graph with 15 edges if each vertex is of degree 3?

a) 5

b) 10

c) 15

d) 45

14. Let G be a graph with 7 vertices having degrees 4, 1, 2, 2, 3, 5, 5. Then the number of edges of G is

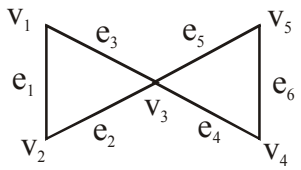
a) 9

b) 11

c) 14

d) 22

15. The following graph is



a) Both Eulerian and Hamiltonian

b) Eulerian but not Hamiltonian

c) Not Eulerian but Hamiltonian

d) Neither Eulerian nor Hamiltonian

16. The length of a Hamiltonian path in a connected graph of n vertices is

a) $\frac{n}{2}$

b) n–1

c) n

d) n+1

17. Let A be the adjacency matrix of a graph G with no self loops. The entries along the principal diagonal of A are

a) All zeros

b) All ones

c) Both zeros and ones

d) Different

18. In a graph G there is one and only one path between every pair of vertices then G is a

a) Path

b) Walk

c) Tree

d) Circuit

19. A tree with 10 vertices contains exactly _____ edges.

a) 10

b) 9

c) 11

d) 20

20. 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

21. Which of the following statements is/are TRUE?

P: Every graph is its own subgraph

Q: The terminal vertex of a graph are of degree 2

a) P only

b) Q only

c) Both P and Q

d) Neither P nor Q

22. A graph with no loops and no parallel edges is called a

a) Isolated graph

b) Simple graph

c) Digraph

d) Multi graph

23. Which of the following graph does not exist?

G_1: Tree, all vertices of degree 2.

G_2: Tree, three vertices having degrees 1,2,2.

a) G_1 only

b) G_2 only

c) Both G_1 and G_2

d) Neither G_1 nor G_2

24. Which of the following statements is TRUE?

P: A tree is a connected graph.

Q: A tree is any graph without cycles.

a) P only

b) Q only

c) Both P and Q

d) Neither P nor Q

25. If a graph has a spanning tree then it must be _____.

a) Connected

b) Disconnected

c) Eulerian

d) A circuit

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