HONOURS

U.G. 4th Semester Examination - 2021

MATHEMATICS

Course Code : BMTMSEHT405

Course Title : Graph Theory

Full Marks : 50 Time : 2 Hours

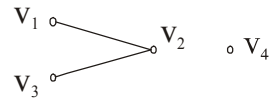
The figures in the right-hand margin indicate marks.

Notations and Symbols have their usual meanings.

Answer **all** the questions by choosing correct alternative: 2×25=50

1. A graph is a collection of _____.
   a) Vertices and edges
   b) Rows and columns
   c) Equations
   d) None of these
2. A graph with one vertex and no edges is:
   a) Multi graph
   b) Digraph
   c) Isolated graph
   d) Trivial graph

3. Consider the following graph:



Which of the following vertex is an isolated vertex?

   a) v_1
   b) v_2
   c) v_3
   d) v_4

4. A graph with no loops and no parallel edges is called a
   a) Digraph
   b) Isolated graph
   c) Simple graph
   d) Complete graph
5. Number of edges incident with the vertex v is called
   a) Degree of a graph
   b) Degree of an edge
   c) Degree of a vertex
   d) None of these

6. If a vertex v is an isolated vertex, then d(v)=?

a) 1

b) 2

c) 0

d) None of these

7. A graph in which all vertices are of equal degree, is known as:

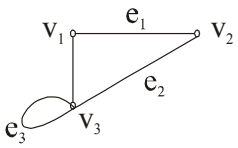
a) Multi graph

b) Regular graph

c) Complete graph

d) Non-regular graph

8. Consider the following graph:



What is the degree of v_3?

a) 1

b) 2

c) 3

d) 4

9. The number of edges in a regular graph of degree d and n vertices is

a) max {d, n}

b) n+d

c) nd

d) $\frac{nd}{2}$

10. If G is a graph with e edges and n vertices, the sum of the degrees of all vertices in G is

a) e

b) e^2

c) 2e

d) $\frac{e}{2}$

11. Which of the following statements is/are TRUE for undirected graphs?

P: Number of odd degree vertices is even

Q: Sum of degrees of all vertices is even

a) P only

b) Q only

c) Both P and Q

d) Neither P nor Q

12. A simple graph in which there is an edge between every pair of distinct vertices is called

a) Multi graph

b) Complete graph

c) Connected graph

d) Regular graph

13. A complete graph of n vertices should have _____ edges.

a) $n-1$

b) $\frac{n(n-1)}{2}$

c) $\frac{n(n+1)}{2}$

d) n

14. How many vertices are there in a graph with 10 edges if each vertex has degree 2?

a) 5

b) 10

c) 15

d) 20

15. Which type of graph has all the vertex of the first set connected to all the vertex of the second set?

a) Regular graph

b) Complete graph

c) Bipartite graph

d) Complete bipartite graph

16. What will be the number of edges in a complete bipartite graph $K_{3,4}$?

a) 12

b) 7

c) 6

d) 4

17. A walk without repeated edges is called a

a) Path

b) Cycle

c) Trail

d) Tree

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

P: All complete graphs are connected graphs.

Q: All connected graphs are complete graphs.

a) P only

b) Q only

c) Both P and Q

d) Neither P nor Q

19. The number of distinct simple graphs with up to three vertices is

a) 15

b) 10

c) 7

d) 9

20. What is the number of edges present in a cycle having n vertices?

a) n+1

b) 2n

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

d) n

21. The graph in which there is a closed trail which includes every edge of the graph, is known as

a) Planar graph

b) Euler graph

c) Hamiltonian graph

d) Directed graph

22. A tree with n vertices contains exactly _____ edges.

a) n

b) n–1

c) n+1

d) 2n

23. Which of the following statement is true?

a) Every graph with n vertices and n-1 edges is a tree.

b) A tree is any graph without cycles.

c) Every bipartite graph is a tree.

d) A tree is a connected graph.

24. A graph with n vertices and n–1 edges that is not a tree, is

a) Connected

b) Disconnected

c) Euler

d) A circuit

25. A spanning tree of a graph is one that includes

a) Only the vertices of odd degree

b) Only the vertices of even degree

c) All the vertices of the graph

d) All the edges of the graph

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