1. Which of the following best defines a network graph?

a) A visual representation of social connections on a social media platform
b) A mathematical representation of interconnected nodes and edges
c) A diagram showing the structure of a computer network
d) A chart displaying the flow of traffic in a city

Answer: b) A mathematical representation of interconnected nodes and edges

Explanation: A network graph is a mathematical structure consisting of nodes (vertices) and edges (links) that represent connections between the nodes. It can be used to model various systems such as transportation networks, social networks, and electrical circuits.

2. In a network graph, what does a ‘tree’ refer to?

a) A graph with cycles
b) A connected graph with no cycles
c) A graph with only one node
d) A disconnected graph

Answer: b) A connected graph with no cycles

Explanation: In graph theory, a tree is a connected graph that contains no cycles. Trees are important in various applications, including computer science, biology, and telecommunications.

3. What is a ‘cut set’ in the context of network graphs?

a) A set of edges that disconnects the graph
b) A set of nodes that disconnects the graph
c) A set of edges that form a cycle
d) A set of nodes that form a cycle

Answer: a) A set of edges that disconnects the graph

Explanation: A cut set is a set of edges in a graph such that their removal disconnects the graph into two or more separate components.

4. Which matrix is used to represent the relationship between nodes and edges in a network graph?

a) Incidence matrix
b) Adjacency matrix
c) Degree matrix
d) Laplacian matrix

Answer: a) Incidence matrix

Explanation: An incidence matrix is a matrix that shows the relationship between the edges and vertices of a graph. Each row represents a vertex, and each column represents an edge, with entries indicating whether the vertex is incident to the edge.

5. What is a ‘tie set’ in the context of network graphs?

a) A set of edges that disconnects the graph
b) A set of nodes that disconnects the graph

c) A set of edges that form a cycle
d) A set of nodes that form a cycle

Answer: b) A set of nodes that disconnects the graph

Explanation: A tie set is a set of nodes in a graph such that their removal disconnects the graph into two or more separate components.

6. Which of the following statements about dual networks is true?

a) Dual networks have the same number of nodes and edges as the original network
b) Dual networks are formed by interchanging nodes and edges of the original network
c) Dual networks have different connectivity properties compared to the original network
d) Dual networks are identical copies of the original network

Answer: b) Dual networks are formed by interchanging nodes and edges of the original network

Explanation: In graph theory, the dual of a network is formed by interchanging the roles of nodes and edges. It preserves certain properties of the original network while changing others.

7. What does a ‘tree branch’ represent in a network graph?

a) A node with no connections
b) An edge connecting two nodes
c) A cycle in the graph
d) A disconnected component

Answer: b) An edge connecting two nodes

Explanation: In the context of network graphs, a tree branch represents an edge that connects two nodes. Trees consist of branches (edges) and nodes (vertices) without any cycles.

8. Which matrix is used to represent the degree of connectivity of nodes in a network graph?

a) Incidence matrix
b) Adjacency matrix
c) Degree matrix
d) Laplacian matrix

Answer: c) Degree matrix

Explanation: A degree matrix is a diagonal matrix where each diagonal entry represents the degree (number of connections) of the corresponding node in the graph.

9. What property distinguishes a tree from other types of graphs?

a) It contains cycles
b) It is disconnected
c) It is fully connected
d) It has no cycles

Answer: d) It has no cycles

Explanation: A tree is a type of graph that is connected and acyclic, meaning it contains no

cycles.

10. How are cut set and tie set matrices related in a network graph?

a) They are inverses of each other
b) They have no relationship
c) They represent the same information
d) They are orthogonal matrices

Answer: c) They represent the same information

Explanation: Cut set and tie set matrices represent different aspects of network connectivity, but they are related in that they both describe the partitioning of the graph into components.