

Department of Computer Science & IT

Mangaldai College (Autonomous)

Sessional Examination – 2026

FYUGP BCA 6th Semester

Sub: Graph Theory

Time: 2 hours

Full Marks: 40

1. Answer to the following questions 1 x 5 = 5
 - a) What is a simple graph?
 - b) What is the degree of a vertex?
 - c) What do we call a sequence of vertices where each pair is linked by an edge?
 - d) Name the matrix that stores edges between pairs of vertices?
 - e) What is a spanning tree in a graph?
2. Answer any three questions from the following 5 x 3 = 15
 - a) Explain directed and undirected graphs with small examples.
 - b) What is a bipartite graph? Write the condition for it. Also draw a diagram.
 - c) Describe the difference between a Hamiltonian path and a Hamiltonian cycle with a small example.
 - d) What is a Hamiltonian path? How is it different from an Eulerian path? Also draw a diagram for each and show their paths.
 - e) Define a walk in a graph. List its types and explain each one. Also state what the length of a walk means with a small example for every type.
3. Answer any two questions from the following 10 x 2 = 20
 - a) State and explain the Handshaking Theorem. Show it with an example.
 - b) Draw a weighted graph of your choice and apply Dijkstra's algorithm to find the shortest path from a chosen source vertex. Show every step of the algorithm, including the updates of distances and the final shortest path.
 - c) Draw a connected graph of your choice and use Fleury's algorithm to find an Euler path or an Euler circuit in that graph. Show each step clearly.

- d) Given the undirected graph shown below, write its adjacency matrix and its adjacency list.

