

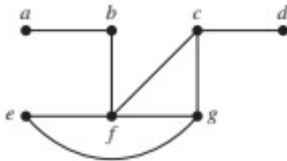
B. Sc. DEGREE END SEMESTER EXAMINATION : MARCH 2023
SEMESTER 6 : COMPUTER APPLICATION
COURSE : 19U6CRCMT07 : GRAPH THEORY AND NUMERICAL ANALYSIS
(For Regular - 2020 Admission and Supplementary - 2019 Admission)

Time : Three Hours

Max. Marks: 75

PART A**Answer any 10 (2 marks each)**

1. Find two spanning trees for the following graph



2. Define with example (a) simple graph
 (b) complete bipartite graph
3. a) Define cut vertex of a graph.
 b) State Whitney's theorem.
4. Can a simple graph exist with 15 vertices each of degree 5 ?
5. Draw two maximum matchings which are not perfect.
6. Define M-augmenting path with an example.
7. Explain the Konigsberg bridge problem.
8. Define maximal non Hamiltonian graph. Give an example.
9. Find a root of the equation $x^3 - 5x - 11 = 0$ correct to 2 decimals using iteration method.
10. Find a root of the equation $x^3 - 3x - 5 = 0$, correct to 2 decimals using bisection method.
11. By the method of triangularisation, decompose the matrix A

$$= \begin{bmatrix} 1 & 2 & -1 \\ 3 & -1 & 2 \\ 2 & -2 & 3 \end{bmatrix}$$
 into $[L] [U]$ form.
12. Solve the system of linear equations $3x + y + 2z = 3$; $2x - 3y - z = -3$; $x - 2y + z = -4$ using Gauss elimination method.

(2 x 10 = 20)**PART B****Answer any 5 (5 marks each)**

13. Prove that any tree T with atleast two vertices has more than one vertex of degree 1.
14. Prove that an edge e in a graph G is a bridge if and only if e is not part of any cycle in G.
15. Prove that a connected graph G has an Euler trail if and only if it has at most two odd vertices.
16. State and Prove Bondy-Chvatal Theorem.
17. Find the real root of the equation $x e^x = 2$ correct to 3 decimals using Newton-Raphson method.

18. Find a root of the equation $x^3 - 4x - 9 = 0$ correct to three decimal places using regula falsi method.
19. Solve the system of equations by Crout's method
 $2x + y + 4z = 12$; $8x - 3y + 2z = 20$; $4x + 11y - z = 33$.
20. Solve the system of linear equations $x + 2y + z = 8$; $2x + 3y + 4z = 20$; $4x + 3y + 2z = 16$ using Gauss Jordan method.

(5 x 5 = 25)

PART C

Answer any 3 (10 marks each)

21. If e is an edge of a graph G and if $G-e$ is the subgraph obtained by deleting e from G then prove that $\omega(G) \leq \omega(G-e) \leq \omega(G) + 1$.
22. State and prove Dirac's theorem for Hamiltonian graphs.
23. Find all roots of the equation $x^3 - 6x^2 + 11x - 6 = 0$ by Graeffe's method squaring thrice.
24. Using Gauss-Seidel iteration method, solve the system of equations
 $8x - 3y + 2z = 20$; $4x - 11y - z = 33$; $6x + 3y + 12z = 35$.

(10 x 3 = 30)