Reg. No .... Name **24U644**

B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2024

SEMESTER 6 : COMPUTER APPLICATION

COURSE : **19U6CRCMT07 - GRAPH THEORY AND NUMERICAL ANALYSIS**

(For Regular 2021 Admission and Supplementary 2020/2019 Admissions)

Time : Three Hours Max. Marks: 75

PART A

Answer any 10 (2 marks each)

1. Let G = (V , E) be a graph such that n(E)= 8 and deg (v) =2 for all v$\in$V, then find the number of vertices of G.
2. Draw a graph that has both an Euler Tour and Euler Trail?
3. Define graph isomorphism.
4. Using Gauss elimination method, solve 6x - y - z = 19; 3x + 4y + z = 26; x + 2y + 6z = 22.
5. Find a negative root of the equation $x^3 - 4x + 9 = 0$, correct to 2 decimals using bisection method.
6. Define a complete graph. Draw K_5 .
7. Differentiate between Perfect matching and Maximum matching in a graph G with an example.
8. Find graphically the real root of the equation $x^3 - 6x - 13 = 0$.
9. Prove that every u-v walk contains a u-v path.
10. Give an example of a graph which has a Hamiltonian path but no Hamiltonian cycle.
11. Is a maximum matching a perfect matching? Justify.
12. By the method of triangularisation, decompose the matrix A = $\begin{bmatrix} 2 & -3 & 10 \\ -1 & 4 & 2 \\ 5 & 2 & 1 \end{bmatrix}$ into $[L]\,[U]$ form.

(2 x 10 = 20)

PART B

Answer any 5 (5 marks each)

13. If T is a tree with n vertices then prove that it has precisely n-1 edges.
14. Prove that a connected graph G with n vertices has atleast n-1 edges.
15. Solve the system of linear equations 3x+4y−z=8, −2x+y+z=3, x+2y-z=2 using Gauss-Jordan method.
16. Find by iterative method , a real root of $2x - \log_{10} x = 7$.correct to 3 decimal places.
17. Using iteration method, solve the equation $x^3 + x^2 - 1 = 0$ on the interval [0 , 1] with an accuracy of 10^{-3} .
18. Solve the following system, by the method of triangularisation:
2x - 3y + 10z = 3, -x + 4y + 2z = 20, 5x + 2y + z = -12.
19. Prove that a connected graph G has an Euler trail if and only if it has at most two odd vertices.
20. If G is a graph in which degree of every vertex is atleast two, then prove that G contains a cycle.

(5 x 5 = 25)

PART C

Answer any 3 (10 marks each)

21. Prove that a connected graph G is Euler if and only if the degree of every vertex is even.
22. 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 ω (G) $\leq \omega$ (G-e) $\leq \omega$ (G) +1.
23. Find all roots of the equation $x^3 - 2x^2 - 5x + 6 = 0$ by Graeffe's method squaring thrice.
24. Using Gauss-Seidel iteration method, solve the system of equations
10x + 7y + 8z + 7w = 32 ; 7x + 5y + 6z + 5w = 23 ; 8x + 6y + 10z + 9w= 33 ; 7x + 5y + 9z + 10w = 31.

(10 x 3 = 30)