K25FY3589 Pages: 2 Reg No:.....
Name:.....

Third Semester FYUGP Degree (Reg) Examination November 2025

KU3DSCMAT213 - GRAPH THEORY, LINEAR PROGRAMMING AND NUMERICAL METHODS

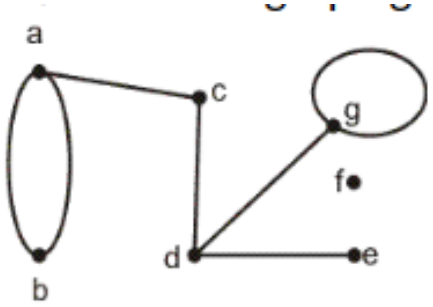
2024 Admission onwards

Time : 2 hours Maximum Marks : 70

Section A

Answer any 6 questions. Each carry 3 marks.

1. Write the charactersitics of canonical form of a Linear Programming Problem.
2. Write the charactersitics of standard form of a Linear Programming Problem.
3. Apply one iteration of Newton–Raphson method to find an approximate root of $f(x) = x^2 - 2$ with initial $x_0 = 1.5$.
4. Approximate $\int_0^1 cosxdx$ using Simpson's 1/3 Rule with 2 subintervals.
5. Evaluate $\int_{-3}^{3} x^2 dx$ using Trapezoidal Rule.
6. Find the degrees of all vertices of the graph given below.



7. What is a self-loop? Give an example.
8. Define the term isolated vertex . Give an example.

Section B

Answer any 4 questions. Each carry 6 marks.

9. Find a root, correct to three decimal places and lying between 0 and 0.5 of the equation $4e^{-x}sinx - 1 = 0$.

10. Find a real root of the equation $f(x) = x^3 - x - 1 = 0$ using bisection method.

11. Evaluate $\int_{-1}^{1} x^3 dx$,using Simpson's 1/3 Rule .

12. Name 3 situations that can be represented by means of graphs. Explain what the vertices and the edges denote.

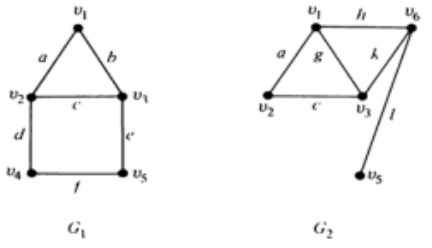
13. Define Graph Isomorphism. Give an example.

14. Draw an edge disjoint subgraphs and vertex disjoint subgraphs of a particular graph.

Section C

Answer any 2 questions. Each carry 14 marks.

15. For the following graphs draw: (a) $G_1 \cup G_2$
(b) $G_1 \cap G_2$
(c) $G_1 \oplus G_2$



16. a) Define component of a graph.
b)Prove that a simple graph with n vertices and k components can have at most (n-k)(n-k+1)/2 edges.

17. Use simplex method to solve the following problem:
Maximize $z = 2x_1 + 5x_2$ subject to $x_1 + 4x_2 \leq 24$
$3x_1 + x_2 \leq 21$
$x_1 + x_2 \leq 9$
$x_1, x_2 \geq 0$