

25900041

Reg.No : .....

Name : .....

**MAHATMA GANDHI UNIVERSITY, KOTTAYAM**  
**MGU-UGP BCA (HONOURS) REGULAR EXAMINATION MARCH 2025**  
**SECOND SEMESTER**  
**Core Course (CC) - MG2CCRBCA100 - MATHEMATICS FOUNDATION TO**  
**COMPUTER SCIENCE**  
(2024 ADMISSION ONWARDS)

**Duration: 2 Hours**

**Maximum Marks: 70**

*Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate(E), Create(C), Skill(S), Interest(I)*  
*and Appreciation(Ap)*

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

**Part A**

Short answer type Questions

Answer any **5** questions

Each question carries **2** marks

1. Write any two characteristics of the spanning tree. [K] / [CO1]
2. If a graph has 8 vertices with degree of all vertices are even, can it have an Euler cycle? Why? [A] / [CO1]
3. Evaluate using Trapezoidal Rule:  $I = \int_1^{1.5} (x^3 + 1) dx$  [A] / [CO2]
4. Name any two methods for finding the solution of a nonlinear equation. [K] / [CO2]
5. Give any two applications of linear programming problems. [U] / [CO3]
6. What is penalty in Big-M method. [K] / [CO3]
7. Write a note on the Lowest Cost Entry Method. [K] / [CO4]
8. Write the steps to find the initial feasible solution using Vogel's approximation method. [U] / [CO4]

**[2x5 = 10]**

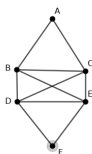
**Part B**

Short Essay Type Questions

Answer any **5** questions

Each question carries 6 marks

9. Define degree of a vertex. What is the degree contributed by a self loop? [A] / [CO1]  
Find the degree of all vertices in the graph.



10. (a) Define a tree. Is every graph a tree? [U] / [CO1]  
(b) Draw all trees with 3 vertices.

11. Solve the second approximation for the positive root of the equation  $x^3 + x^2 - 1 = 0$  by bisection method. [A] / [CO2]

12. Find the number of students getting marks below 25 from the following , by using Newton's forward formula . [K] / [CO2]

Marks (below)	20	30	40
No. of students	45	115	210

13. Solve the following LPP using graphical method [A] / [CO3]

$$\text{Minimize } z = 4x_1 + 5x_2$$

Subject to

$$3x_1 + x_2 \geq 3$$

$$2x_1 + 2x_2 \geq 6$$

$$x_1 \geq 0, x_2 \geq 0$$

14. A tailor makes two types of garments: A and B. Each garment A requires 2 meters of fabric and 1 hour of labor. Each garment B requires 1 meter of fabric and 3 hours of labor. The tailor has 100 meters of fabric and 150 hours of labor available. The profit per garment A is Rs.40, and the profit per garment B is Rs.50. Using graphical method, find the optimal number of garments of each type to maximize profit. [A] / [CO3]

15. Verify whether the given transportation problem is balanced or unbalanced, and then proceed to solve it. [U] / [CO4]

	A	B	C	D	Supply
1	3	2	6	8	12
2	13	6	5	7	7
3	12	6	4	8	10
Demand	6	12	8	9	

16. [A] / [CO4]

Find an optimal solution to the following transportation problem

	I	II	III	Supply
x	24	22	20	25
Y	18	19	17	40
Z	19	20	16	35
Demand	20	30	50	

[6x5 = 30]

### Part C

Essay Type Questions

Answer any 2 questions

Each question carries 15 marks

17. a) Explain the concept of an Euler path in graph theory. State necessary conditions for a graph to have an Euler path [A] / [CO1]  
b) Give an example of a graph having Euler path .Also find an Euler path in it.

18. [A] / [CO2]  
Find the value of  $\phi$  at  $x = 84$  using Newton - Gregory Backward difference formula with the help of following data:

x	40	50	60	70	80	90
$\phi$	184	204	226	250	276	304

19. Solve by simplex method [A] / [CO3]

Maximize  $z = x_1 - x_2 + 3x_3$

Subject to

$$x_1 + x_2 + x_3 \leq 10$$

$$2x_1 - x_3 \leq 2$$

$$2x_1 - 2x_2 - 3x_3 \leq 0$$

$$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$$

20. Find the solution for the transportation problem using North- West corner method. [A] / [CO4]

	D1	D2	D3	Supply
S1	4	8	8	76
S2	16	24	16	82
S3	8	16	24	77
Demand	72	102	41	

[15x2 = 30]