QP Code **Reg.No : .....**

Name : .....

MODEL QUESTION PAPER

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-UGP (HONOURS) EXAMINATION
Semester II
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.

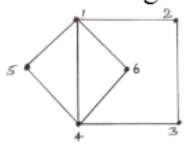
Part A

Short answer type Questions

Answer any **5** questions

Each question carries **2** marks

1. Find the degree of all vertices in the given graph [A] / [CO1]



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2. What is a spanning tree? If a graph has 6 vertices and 10 edges, how many edges will its spanning tree have? [K] / [CO1]

3. Define Transcendental equations. Give one example. [K] / [CO2]

4. Apply Newton's method to find the first improved estimate of x = 3 for the function $x^2-2x-1=0$ [A] / [CO2]

5. Write the standard form of a mathematical model of Linear Programming Problem. [U] / [CO3]

6. How can we identify an infeasible solution while solving LPP using Graphical method? [U] / [CO3]

7. Distinguish between balanced and unbalanced transportation problems. [U] / [CO4]

8. What is the full form of 'MODI' in transportation problems, and what is the primary purpose of this method? [U] / [CO4]

[2x5 = 10]

Part B

Short Essay Type Questions

Answer any **5** questions

Each question carries **6** marks

9. Let G be a graph without isolated vertices and it has an Euler cycle, then prove that G is connected [U] / [CO1]

10. If a graph has an Euler path, then prove that there exist exactly 2 vertices of odd degree. [U] / [CO1]

11. Explain a forward difference table by using an example. [U] / [CO2]

12. Use Newton's Backward formula to find the value of f(x) at x = 9 given the table: [A] / [CO2]

x	2	5	8	11
f(x)	94.8	87.9	81.3	75.1

13. Solve using simplex method [A] / [CO3]
Maximize $z = 3x_1 + 2x_2$
Subject to
$x_1 + x_2 \leq 4$
$x_1 - x_2 \leq 2$
$x_1 \geq 0, x_2 \geq 0$

14. Describe Big M method for solving a linear programming problem. [U] / [CO3]

15. Obtain initial feasible solution by Vogels method. [A] / [CO4]

	A	B	C	Available
X	11	21	16	14
Y	7	17	13	26
Z	12	23	21	31
Required	18	28	25	

16. Obtain initial basic feasible solution to the following transportation problem by Least Cost Method [A] / [CO4]

Factories/Warehouses	*W1*	*W2*	*W3*	*W4*	*Supply*
F1	7	3	5	5	34
F2	5	5	7	6	15
F3	8	6	6	5	12
F4	6	1	6	4	19
Demand	21	25	17	17	

[6x5 = 30]

Part C

Essay Type Questions

Answer any **2** questions

Each question carries **15** marks

17. (a) Define a tree. Is every graph a tree? [A] / [CO1]
(b) Does there exist a tree with 8 vertices, where each vertex has a degree of 1? Justify your answer.
(c) If a graph G has one more vertex than edge, then G is a tree. Prove or disprove.

18. Find using Composite Simpson's 1/3 rule for n=6: $\int_{-3}^{3} x^4 dx$ [A] / [CO2]

19. A toy manufacturing company produces 2 models of plastic dolls. Model A, superior in quality, contributes Rs. 20 per piece, while the other model B contributes Rs.15 per piece. Each piece of model A requires twice as much time to manufacture as each piece of model B does. If the company were to produce model A only, it can as many as 1000 pieces of it per day; but if it were to produce both, it cannot produce more than 800 pieces of the two per day due to limited supply of plastic material. Model A requires silk material also, the quantity of which is sufficient only for 400 pieces of it per day. Model B requires cotton material but the same is available only for 700 pieces of it per day. Formulate the LPP model and solve it graphically. [A] / [CO3]

20. Find the optimal solution of the following transportation problem by the North-West Corner Rule. [A] / [CO4]

	D1	*D2*	*D3*	*D4*	*Supply*
O1	6	4	1	5	14
O2	8	9	2	7	16
O3	4	3	6	2	5
Demand	6	10	15	4	35

[15x2 = 30]