



K23U 1131

Reg. No. :

Name :

IV Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/
Improvement) Examination, April 2023
(2019 Admission Onwards)

COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
4C04 MAT-CS : Mathematics for Computer Science – IV

Time : 3 Hours

Max. Marks : 40

PART – A

Answer **any four** questions. **Each** question carries **1** mark.

(4×1=4)

1. Define a graph.
2. Draw a connected regular graph with 4 vertices.
3. What is meant by a feasible solution of an LPP ?
4. What is a Transportation problem ?
5. What is meant by a boundary value problem ?

PART – B

Answer **any 7** questions. **Each** question carries **2** marks.

(7×2=14)

6. Define graph isomorphism.
7. Which simple graphs have diameter 1 ? Justify.
8. Draw the Peterson graph. Find a path of length 9 in the Peterson graph.
9. Find the radius and diameter of the wheel graph W_n .
10. What are the three components of an LPP ?

P.T.O.



11. Write the standard form of the LPP

$$\text{Max. } Z = 3x_1 + 3x_2 + 5x_3$$

$$\text{Sub. to } x_1 + 2x_2 + 3x_3 \geq 5$$

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

$$x_1 + 2x_3 \leq 2$$

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

12. Explain degeneracy in a transportation problem.

13. Explain Loops in a transportation problem. Give an example.

14. Explain Simpson's $\frac{1}{3}$ rd Rule.

15. Evaluate $\int_0^\pi t \sin t \, dt$ using Trapezoidal rule.

PART – C

Answer **any 4** questions. **Each** question carries **3** marks.

(4×3=12)

16. Let G be a non-empty graph with atleast two vertices. Then prove that G is bipartite if G has no odd cycle.

17. Let G be a graph with n vertices v_1, v_2, \dots, v_n and let A denote the adjacency matrix of G with respect to this listing of the vertices. Let k be any positive integer and let A^k denote the matrix multiplication of k copies of A . Then prove that the $(i, j)^{\text{th}}$ entry of A^k is the number of different $v_i - v_j$ walks in G of length k .

18. Explain the characteristics of canonical form of an LPP.

19. What are the major steps involves in the solution to a transportation problem ?

20. Obtain an initial basic feasible solution to the following transportation problem using the north-west corner rule :

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	



- 21. From the Taylor series for $y(x)$, find $y(0.1)$ correct to four decimal places if $y(x)$ satisfies $y' = x - y^2$ and $y(0) = 1$.
- 22. Use Euler's method to find $y(0.04)$, given the differential equation $y' = -y$ with the condition that $y(0) = 1$.

PART – D

Answer **any 2** questions. **Each** question carries **5** marks.

(2x5=10)

- 23. Use simplex method to solve the LPP

Maximize $Z = 4x_1 + 10x_2$

Sub. to $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$

$x_1, x_2 \geq 0$.

- 24. Use graphical method to solve that LPP

Maximize $Z = 2x_1 + 3x_2$

Sub. to $x_1 + x_2 \leq 30$

$x_1 - x_2 \geq 0$

$x_2 \geq 3$

$0 \leq x_1 \leq 20$

$0 \leq x_2 \leq 12$.

- 25. Find the starting solution in the following transportation problem by Vogel's Approximation Method. Also obtain the optimum solution :

	D₁	D₂	D₃	D₄	Supply
S₁	3	7	6	4	5
S₂	2	4	3	2	2
S₃	4	3	8	5	3
Demand	3	3	2	2	

- 26. Using Runge-Kutta method of both second order and fourth order formula, find $y(0.1)$ and $y(0.2)$ correct to four decimal places, given $\frac{dy}{dx} = y - x$ where $y(0) = 2$, $h = 0.1$.
