K25U 0835

Reg. No. : .....

Name : .....

IV Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, April 2025
(2019 to 2023 Admissions)
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 from this Part. **Each** question carries **1** mark. **(4×1=4)**

1. What is meant by a simple graph ?
2. Let G be a graph in which there is no pair of adjacent edges. What can you say about the degree of the vertices in G ?
3. What is meant by a feasible solution of an LPP ?
4. What is an unbalanced Transportation problem ?
5. What is meant by an initial value problem ?

PART – B

Answer **any 7** questions from this Part. **Each** question carries **2** marks. **(7×2=14)**

6. Draw two isomorphic graphs with 5 vertices.
7. Define complete bipartite graphs. Give an example.
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 necessary basic assumptions for all LP problems ?

P.T.O.

11. Write the canonical form of the LPP

    min $Z = 2x_1 + 3x_2$

    sub to $2x_1 - 4x_2 \leq 4$

    $x_1 + x_2 \geq 3$

    $x_1 \geq 0$

    x_2 unrestricted.

12. State fundamental theorem on Linear Programming.

13. Explain degeneracy in a transportation problem.

14. Evaluate $\int_0^{\frac{\pi}{2}} \frac{1}{x} dx$ using Simpson's rule.

15. Explain the Trapezoidal rule.

PART – C

Answer **any 4** questions from this Part. **Each** question carries **3** marks. **(4×3=12)**

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

17. Explain the characteristics of general LP form.

18. Use graphical method to solve that LPP

    Maximize $z = 4x_1 + 3x_2$

    Sub to $2x_1 + x_2 \leq 1000$

    $x_1 + x_2 \leq 800$

    $0 \leq x_1 \leq 400$ and $0 \leq x_2 \leq 700$.

19. 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	

20. Explain MODI method for solving transportation problem.

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 from this Part. **Each** question carries **5** marks. **(2×5=10)**

23. Let G be a non-empty graph with at least two vertices. Then prove that G is bipartite if and only if G has no odd cycle.

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.

	D_1	D_2	D_3	D_4	Supply
S_1	3	7	6	4	5
S_2	2	4	3	2	2
S_3	4	3	8	5	3
Demand	3	3	2	2	

26. Given $\frac{dy}{dx} = 1 + y^2$ where y(0) = 0, using Runge-Kutta method find y(0.2), y(0.4) and y(0.6).

———————