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

Max. $Z = 3x_1 + 3x_2 + 5x_3$

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 $v_1, v_2, ..., v_n$ 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 $(i, j)^{th}$ 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. **(2×5=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 :

	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. 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.

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