

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN  
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)

Chromepet, Chennai - 600 044.

B.C.A - END SEMESTER EXAMINATIONS - APRIL 2025

SEMESTER - II

**24UCAAT2002 - Mathematics Foundations to Computer Science - II**

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

**Section B**

Answer any **SIX** questions ( $6 \times 5 = 30$  Marks)

1. Define a cyclic group. Prove that every cyclic group is an abelian group.
2. Find the positive real root of  $x \log_e x = 1.2$  using the bisection method.
3. Solve the following equations by Gauss Jordan Method:  $x + y = 2$ ,  $2x + 3y = 5$
4. Find a cubic polynomial which takes the following values:

<b>x</b>	0	1	2	3
<b>f(x)</b>	1	2	1	10

5. Evaluate  $\int_0^{\pi/2} \sin x dx$  by Simpson's  $\frac{1}{3}$  rule dividing the range into six equal parts.
6. Solve the following Linear Programming Problem (LPP) graphically:  
Maximize  $Z = 3x + 5y$   
subject to the constraints  
$$x + 2y \leq 8,$$
$$3x + 2y \leq 12$$
and  $x, y \geq 0.$
7. A company manufactures two types of products, A and B. Each unit of product A requires 2 hours of labor and 3 kg of raw material. Each unit of product B requires 4 hours of labor and 2 kg of raw material. The company has a total of 40 hours of labor and 30 kg of raw material available. The profit per unit is ₹50 for A and ₹40 for B. Formulate the LPP to maximize profit.

Contd...

8. A company needs to transport goods from three warehouses ( $W1, W2, W3$ ) to three retail stores ( $S1, S2, S3$ ). The supply capacities, demands, and transportation costs per unit are given below:

	<b>S1</b>	<b>S2</b>	<b>S3</b>	<b>Supply</b>
<b>W1</b>	4	3	6	20
<b>W2</b>	2	5	7	30
<b>W3</b>	3	4	5	25
<b>Demand</b>	15	35	25	

Find the initial basic feasible solution using the North-West Corner Rule.

### Section C

Answer any **THREE** questions ( $3 \times 10 = 30$  Marks)

9. Explain Lagrange's Theorem and its significance in group theory. Illustrate with an example.
10. Find the real root of  $xe^x - 2 = 0$  correct to three places of decimals using Newton - Raphson Method.
11. Given the values

<b>x</b>	5	7	11	13	17
<b>y</b>	150	392	1452	2366	5202

Evaluate  $y_9$  using

- i) Lagrange's Formula  
 ii) Newton's Divided Differences

12. Solve the following LPP using Simplex Method:

Maximize  $Z = 25x + 20y$

subject to the constraints

$$16x + 12y \leq 100,$$

$$8x + 16y \leq 80$$

$$\text{and } x, y \geq 0$$

13. Solve the following transportation problem using MODI method. Use Vogel's Approximation method to find Initial Solution.

	<b>F1</b>	<b>F2</b>	<b>F3</b>	<b>F4</b>	<b>Requirement</b>
<b>W1</b>	15	51	42	33	23
<b>W2</b>	80	42	26	81	44
<b>W3</b>	90	40	66	60	33
<b>Capacity</b>	23	31	16	30	100

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