SET-2

INDIRA UNIVERSITY, PUNE

SCHOOL OF INFORMATION TECHNOLOGY- BSC DS

Backlog Examination (2025 Pattern) April/ May – 2026 - Semester – I

Subject Name: Computational Mathematics **Max. Marks: 25**
Subject Code: 25BDS109T **Time: 1:30 Hrs.**

Instructions

- All Questions are Compulsory.

CO #	Cognitive Ability	Course Outcome
CO1	**Remember**	Recall Fundamental concepts and terminologies of computational mathematics.
CO2	**Understand**	Explain mathematical principles and relationships used in computational problem solving.
CO3	**Apply**	Apply suitable method to solve computational & mathematical problems.

Q1.	**Attempt any 5 out of 7. (1 mark each)** **(5 Marks)** **a.** Find row echelon form of a matrix $\begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$. **b.** State whether the following statement is True or False: "Identity matrix is a singular Matrix." **c.** Define Rank of a matrix. **d.** Define Function. **e.** Find the eigenvalues of an identity matrix of order 3 x 3. **f.** Define Conjunctive Normal Form (CNF). **g.** State the standard basis vectors for $\mathbb{R}^2$.	CO1
Q2.	**Attempt any 2 out of 4. (5 mark each)** **(10 Marks)** **a.** Find the eigenvalues and eigen vectors of the matrix $A = \begin{bmatrix} 2 & 0 \\ 3 & 1 \end{bmatrix}$. **b.** Reduce the following matrix into row echelon form: $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ -1 & -2 & -3-4 \end{bmatrix}$.	CO2

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c. Use the Gaussian Elimination method to solve the following system of equations:

$$x + 2y = 3$$

$$3x + 4y = 7$$

d. Write down the transitive closure of $R = \{(1,2), (2,2),\ (2,4), (3,2), (3,4), 4,1)\}$, a relation defined on set A = {1, 2, 3, 4}, by using Warshall's Algorithm.

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a. Use the Cramer's Rule to solve the following system of equations: **(5 Marks)**

$$x + y + z = 3$$
$$x + y - z = 1$$
$$x - y - z = 1$$

b. Show that the set $S = \{(1,1,1), (2,2,2), (3,3,4)\}$ is linearly dependent. **(5 Marks)**

OR

Let $V = \mathbb{R}^+$ be the set of all positive real numbers. Define addition and scalar multiplication as follows:

- Addition: For any $x, y \in V$, define $x + y = x \times y$ (usual multiplication).
- Scalar multiplication: For any scalar $k \in \mathbb{R}$ and $x \in V$, define $kx = x^k$.

Show that V is a vector space over $\mathbb{R}$. **(10 Marks)**

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