SET-3

INDIRA UNIVERSITY, PUNE

SCHOOL OF INFORMATION TECHNOLOGY-BSC (DS)

Term End Examination (2025 Pattern) December – 2025 - 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. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 0 & 0 & 6 \end{bmatrix}$. Find determinant of A. b. List the addition properties of a vector space. c. Define Column Space. d. Define the characteristic equation of a matrix. e. If 1, 2, and 3 are the eigen values of matrix A then find eigen values of A^{-1}. f. Define Minterm. g. State the standard basis vectors for $\mathbb{R}^4$.	CO1
Q2.	**Attempt any 2 out of 4. (5 mark each) (10 Marks)** **a.** Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 2 & 0 \\ 0 & -1 \end{bmatrix}$. **b.** Reduce the following matrix into Row Echelon Form: $A = \begin{bmatrix} 2 & 10 & 8 & -26 \\ 3 & -1 & 2 & 5 \\ 2 & 2 & 3 & -4 \end{bmatrix}$ **c.** Use the matrix inverse method to solve the following system of equations: $x + 2y = 3;\ 3x + 4y = 7$ **d.** Write down the transitive closure of $R\{(a,a),\ (a,c),(b,a),\ (b,b),(c,b),\ (c,c),\ (d,c),(d,d)\}$, a relation defined on set A={a,b,c,d}, by using Warshall's Algorithm.	CO2

Q.3.	**a.** Use the Gaussian Elimination method to solve the following system of equations: $x + 2y - 3z = 2;\ 3x + 4y - 5z = 4;\ 2x + 5y - 8z = 5$ **(5 mark)** **b**. Find DNF and CNF for $x \wedge y$. **(5 mark)** **OR** Use the concept of linear independence and spanning to verify that the set $S = \{(1,2,3), (0,4,5), (0,0,6)\}$ forms a basis for $\mathbb{R}^3$. **(10 mark)**	CO3

*****