

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B.Tech.- III Semester (CSE/IT)

COURSE CODE (CREDITS): L- 24B11CI311 (3)

MAX. MARKS: 15

COURSE NAME: COMPUTATIONAL FUNDAMENTALS FOR OPTIMIZATION

COURSE INSTRUCTOR: RBT, ARV, PRI

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculators is not allowed

Q.No	Question	CO	Marks
Q1	a) Determine whether the equation is linear in x_1, x_2, and x_3: i) $4x_1 + x_2^{2/7} - 3x_3$ ii) $\sqrt{17}x_1 - \pi x_2 + 1.4x_3$ b) The accompanying figure shows a network of one-way streets with traffic flowing in the directions indicated. The flow rates along the streets are measured as the average number of vehicles per hour. i) Set up a linear system whose solution provides the unknown flow rates. ii) Solve the system for the unknown flow rates. c) Find the Eigen values of A.	1	1 + 2 + 2 = 5

	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ k^3 & -3k^2 & 3k \end{pmatrix}$		
Q2	Find the QR-Decomposition of a 3 * 3 matrix given below. $\begin{pmatrix} 1 & 1 & 2 \\ 1 & 0 & 1 \\ 1 & -1 & -1 \end{pmatrix}$	1	5
Q3	a) Find an LU decomposition of $\begin{pmatrix} 2 & 4 & 6 \\ 1 & 4 & 7 \\ 1 & 3 & 7 \end{pmatrix}$ OR Compute Cholesky decomposition of $\begin{pmatrix} 4 & 2 & 2 \\ 2 & 5 & 3 \\ 2 & 3 & 6 \end{pmatrix}$ b) Find the function's domain, and range: $f(x, y) = \ln(x^2 + y^2)$ $f(x, y) = \sin^{-1}(y - x)$	2	3 + 2 = 5