

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

B. Tech. -III Semester (CSE-AI&ML, AI&DS)

COURSE CODE (CREDITS): 24B11CI311(3)

MAX. MARKS: 25

COURSE NAME: Computational Fundamentals for Optimization

COURSE INSTRUCTORS: SST

MAX. TIME: 1 Hour 30 Minutes

Note: (a) All questions are compulsory.

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

(c) Use of scientific calculator is allowed.

Q. No	Question	CO	Marks
Q1	Obtain the Cholesky factorization for the matrix $M = \begin{bmatrix} 25 & 15 & -5 \\ 15 & 18 & 0 \\ -5 & 0 & 11 \end{bmatrix}$ and hence evaluate $ M ^2$.	CO-3	3+1
Q2	Find singular value decomposition of the matrix $\begin{bmatrix} 3 & 0 \\ 4 & 5 \end{bmatrix}$.	CO-3	5
Q3	Use Gram-Schmidt orthogonalization process to obtain the orthonormal basis for the basis vectors (1,0,0), (3,7,-2) and (0,4,1).	CO-3	4
Q4	Differentiate matrix $M = \begin{bmatrix} e^{xyz} & yzt \\ \sin zt & \sin xt \end{bmatrix}$ with respect to the matrix $N = \begin{bmatrix} x & y \\ z & t \end{bmatrix}$ and classify the outcome.	CO-4	3+1
Q5	Use Lagrange's method of multipliers to find the extreme values of the function $f(x,y) = xy$ subject to the constraint $g(x,y) = x^2 + y^2 - 10 = 0$.	CO-4	4
Q6	Draw computation graph and using backpropagation method evaluate derivative of $\sqrt{x^3 + \exp(x^3)}$.	CO-4	2+2