

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 3 EXAMINATIONS - 2026

B.Tech - VI Semester (CSE/IT/ECE/CE/M&C)

COURSE CODE (CREDITS): 18B11MA111 (4)

MAX. MARKS: 35

COURSE NAME: MATHEMATICS-I

COURSE INSTRUCTORS: RKB*

MAX. TIME: 2 Hours

Note

Q.No.	Question	CO	Marks
Q1	Suppose a signal is given by $f(t) = \begin{cases} 3t - 1, & t < 1 \\ 2t + 3, & t \geq 1 \end{cases}$. Check the continuity of the function at $t = 1$.	CO1	2
Q2	To model a procedural surface, a computer graphics shader employs a height function $f(x, y) = \sin x \cos y$. Compute the directional derivative of $f(x, y)$ at the point $(\pi/2, 0)$ in the direction $\vec{u} = i + 2j$.	CO2	3
Q3	Using the double integrals, compute the area enclosed between a parabola $y = x^2$ and a straight line $y = 2 - x$.	CO3	3
Q4	Find the work done by the vector field $\vec{F}(x, y, z) = x\hat{i} + 3xy\hat{j} - (x + z)\hat{k}$, on a particle moving along the line segment that goes from $(1, 4, 2)$ to $(0, 5, 1)$.	CO3	3
Q5	A surface is given by $F(x, y, z) = xe^{yz} + y - 4 = 0$. At the point $(1, 0, 4)$ find: (i) The unit normal vector to the surface. (ii) The tangent plane in vector form.	CO3	3
Q6	Solve $(4D^2 + 12D + 9)(D^2 + 4)y = 0$.	CO4	3
Q7	Solve the differential equation $\frac{d^2y}{dx^2} + 4y = e^x + \sin 2x$	CO4	3
Q8	Evaluate $L[t^2 e^t \sin 4t]$	CO4	3
Q9	Evaluate $L^{-1} \left[\frac{s}{s^2 + 4s + 13} \right]$	CO4	3

Q10	Convert the matrix $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 5 & 4 \\ 3 & 8 & 5 \end{bmatrix}$ into row echelon form, and hence find the rank of A .	CO5	2
Q11	Consider a simple linear model (say, $y = ax_1 + bx_2 + c$) trained on three data points, giving three linear equations: $a + b + c = 6$, $2a + b + c = 8$, $a + 2b + c = 9$ Using the Gauss Elimination Method find the values of a, b, c .	CO5	4
Q12	Find the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & 4 \\ 0 & 0 & 5 \end{bmatrix}$	CO5	3
