JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -3 EXAMINATION- 2024
B.Tech-I Semester (CSE/IT/ECE/CE/M&C)

COURSE CODE (CREDITS): 24B11MA111 (4) MAX. MARKS: 35
COURSE NAME: ENGINEERING MATHEMATICS-I
COURSE INSTRUCTORS: PKP*, NKT, RKB, MDS MAX. TIME: 2 Hours

Note: (a) *All questions are compulsory.*
(b) *The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems. Use of Calculator is permitted.*

Q.No.	Question	CO	Marks
Q1	State Caley Hamilton theorem and apply it to find the inverse of the matrix $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$.	CO1	3
Q2	Show that $\lim_{(x,y)\to(0,0)} \frac{x+3\sin^2 y}{3x-y^2}$ does not exist.	CO2	2
Q3	Find the equations for the tangent plane and normal line to the surface $x^2 + y^2 - 2xy - x + 3y - z = -4$ at the point $(2, -3, 18)$.	CO3	3
Q4	Find the work done by the force field $\vec{F} = 3x^2 i + (2xz - y)j$ in moving a particle along the curve $\vec{r} = 2t^2 i + tj$ from $t = 0$ to $t = 1$.	CO3	3
Q5	Evaluate $L\left[\frac{te^t \sin 2t}{4}\right]$.	CO4	3
Q6	Evaluate $L\left[\frac{1-e^{3t}}{t}\right]$.	CO4	3
Q7	Define unit step function, and find the Laplace transformation of $f(t) = (t^2 + t - 2)u(t - 1)$.	CO4	3
Q8	Use the convolution theorem to find $L^{-1}\left[\frac{s}{(s-1)(s^2+1)}\right]$.	CO4	3
9	Using *bisection method*, find an approximate root of the equation $2x - \cos x - 3 = 0$. Carry out the computations up to 4th iteration with at least three decimal places. Given that the root lies in $[1,2]$.	CO5	3
10	Find the positive root of the equation $x^3 - x - 4 = 0$ correct to three decimal places using Newton-Raphson method. Given that the root of the equation lies between 1 and 2.	CO5	3
11	Find the value of $\tan 33^o$ using Lagrange's interpolation formula from the data given below: 	x	30°	32°	35°	38°
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$\tan x$	0.5774	0.6249	0.7002	0.7813		CO5	3
12	Evaluate $\int_0^6 \frac{dx}{1+x}$ using Simpson's one-third rule correct to 3 decimal places by dividing the interval in to 6 equal parts. Also find the exact value of the above integral and then find absolute, relative and percentage error generated due to numerical integration.	CO5	3