PVP 20

Code: 20BS1404

II B.Tech - II Semester – Regular / Supplementary Examinations
MAY – 2024

TRANSFORM TECHNIQUES, NUMERICAL METHODS AND NUMBER THEORY
(INFORMATION TECHNOLOGY)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	Prove that $L\{ t\ cosat \} = \frac{s^2-a^2}{(s^2+a^2)^2}$.	L3	CO2	7 M
	b)	Evaluate $\int_0^\infty e^{-t}\left(\frac{cosat-cosbt}{t}\right)dt$.	L3	CO2	7 M
		OR			
2	a)	Find the Laplace transform of $te^{-t}sin3t$.	L3	CO2	7 M
	b)	Evaluate $L\left\{\int_0^t \frac{e^{-t}\,sint}{t}\ dt\right\}$.	L3	CO2	7 M
		UNIT-II			
3	a)	Find inverse Laplace transform of $\frac{s}{(2s-1)(3s-1)}$.	L3	CO2	7 M
	b)	Solve $\frac{d^2y}{dt^2}+9y = cos2t\ , y(0)=1, y\left(\frac{\pi}{2}\right)=-1.$	L3	CO2	7 M

<table>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">4</td><td>a)</td><td>Apply convolution theorem, to evaluate $L^{-1}\left\{\frac{1}{(s-a)(s-b)}\right\}$.</td><td>L3</td><td>CO2</td><td>7 M</td></tr>
<tr><td>b)</td><td>Solve
$y'' + 4y' + 3y = e^{-t}, y(0) = y'(0) = 1$.</td><td>L3</td><td>CO2</td><td>7 M</td></tr>
<tr><td colspan="6">UNIT-III</td></tr>
<tr><td rowspan="2">5</td><td>a)</td><td>Find a real root of the equation $cos\, x = xe^x$ using regula-falsi method correct to four decimal places.</td><td>L3</td><td>CO3</td><td>7 M</td></tr>
<tr><td>b)</td><td>Estimate the cubic polynomial which takes the following values and hence evaluate f(4)
<table>
<tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>f(x)</td><td>1</td><td>2</td><td>1</td><td>10</td></tr>
</table></td><td>L4</td><td>CO4</td><td>7 M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">6</td><td>a)</td><td>Apply Newton Raphson’s method, find a real root of the equation $3x = cos\, x + 1$.</td><td>L3</td><td>CO3</td><td>7 M</td></tr>
<tr><td>b)</td><td>Estimate the value of f(9) using Lagrange’s formula for the following data.
<table>
<tr><td>x</td><td>5</td><td>7</td><td>11</td><td>13</td><td>17</td></tr>
<tr><td>f(x)</td><td>150</td><td>392</td><td>1492</td><td>2366</td><td>5202</td></tr>
</table></td><td>L4</td><td>CO4</td><td>7 M</td></tr>
<tr><td colspan="6">UNIT-IV</td></tr>
<tr><td>7</td><td>a)</td><td>Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with initial condition y=1 at x=0, find y for x=0.2 by using Euler’s method.</td><td>L4</td><td>CO4</td><td>7 M</td></tr>
</table>

	b)	Apply Runge-Kutta fourth order method to find an approximate value of y when x = 0.2 given that $\frac{dy}{dx} = x + y, y(0) = 1.$	L3	CO3	7 M
OR					
8	a)	Using Euler's method to solve $\frac{dy}{dx} = x + y$, $y(0) = 0$, choosing the step length h=0.2 carry out in 6 steps.	L4	CO4	7 M
	b)	Apply Runge Kutta method to find an approximate value of y for x = 0.2 in the steps of 0.1, if $\frac{dy}{dx} = x + y^2, y(0) = 1.$	L3	CO3	7 M
UNIT-V					
9	a)	State Euclidean Algorithm. Find gcd (748, 224).	L2	CO2	7 M
	b)	State Euler's theorem. Find 3^{302} mod (5005).	L2	CO2	7 M
OR					
10	a)	State Fermat's Theorem. Find the remainder when 4^{532} is divided by 11.	L2	CO2	7 M
	b)	State fundamental theorem of arithmetic. Find out prime factorization of 12351.	L2	CO2	7 M