Code: 20BS1404

II B.Tech - II Semester – Regular / Supplementary Examinations MAY – 2023

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)	Estimate the Laplace transform of the function f(t)=$\lvert t-1\rvert + \lvert t+1\rvert; t \geq 0$.	L2	CO1	7 M
	b)	Calculate the Laplace Transform of $e^{-t}(sin2t - 2tcos2t)$	L3	CO2	7 M
OR					
2	a)	Discover the Laplace Transform of t $sin^2 3t$.	L3	CO2	7 M
	b)	Manipulate the Laplace transform of $\frac{1-cost}{t^2}$.	L3	CO2	7 M
UNIT-II					
3	a)	Calculate $L^{-1}[\frac{s+1}{s^2+s+1}]$	L3	CO2	7 M

	b)	Discover $L^{-1}\left[\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right]$ by using convolution theorem.	L3	CO2	7 M
OR					
4	a)	Calculate $L^{-1}\left[cot^{-1}\left(\frac{s}{2}\right)\right]$	L3	CO2	7 M
	b)	Solve $\frac{d^2x}{dt^2}+9x=cos2t$ if $x(0)=1, x\left(\frac{\pi}{2}\right)=-1$ by Laplace transform method.	L3	CO2	7 M
UNIT-III					
5	a)	Apply Bisection method to find a real root of the equation $x^3-x-11=0.$	L3	CO3	7 M
	b)	The population of a town in the decimal census was given below. Appraise the population for the year 1895. year x: 1891, 1901, 1911, 1921, 1931 Population y (thousands): 46, 66, 81, 93, 101	L4	CO4	7 M
OR					
6	a)	Discover a real root of the equation $2x-log_e x=7$ by regula-falsi method correct to four decimal places.	L3	CO3	7 M
	b)	Apply Lagrange's formula to discriminate the value of f (6) from the following data. *x*: 1, 2, 4, 7, 8 *f(x)*: 22, 30, 82, 106, 206	L4	CO4	7 M

Table for 5 b):

year x	1891	1901	1911	1921	1931
Population y (thousands)	46	66	81	93	101

Table for 6 b):

x	1	2	4	7	8
f(x)	22	30	82	106	206

UNIT-IV					
7	Using Taylor's series method find y at $x = 1.1$ and 1.2 by solving $\frac{dy}{dx} = x^2 + y^2$ given $y(1) = 2.3$		L3	CO3	14 M
OR					
8	Using modified Euler's method calculate an approximate value of y corresponding to $x = 0.3$ given that $\frac{dy}{dx} = x + y, y(0) = 1$.		L3	CO3	14 M
UNIT-V					
9	a)	Estimate gcd (1769,2378) using division algorithm.	L2	CO1	7 M
	b)	Identify the least positive residue of 3^{201} modulo 11.	L2	CO1	7 M
OR					
10	a)	Using Fermat's little theorem, describe the solutions of the linear congruence 7x ≡ 12 $modulo$ 7.	L2	CO1	7 M
	b)	Solve the system of congruence x ≡1 $modulo$ 3 x ≡2 $modulo$ 5 x ≡3 $modulo$ 7 by Chinese remainder theorem.	L2	CO1	7 M