Q.P. Code: 20HS0834

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Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations March-2023

NUMERICAL METHODS AND TRANSFORMS

(Electronics and Communication Engineering)

Time: 3 hours | Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

1	a	Find a positive root of the equation $x^3 - x - 1 = 0$ by Bisection method.	CO2	L3	6M
	b	Apply Newton's forward interpolation formula and the given table of values	CO1	L3	6M

x	1.1	1.3	1.5	1.7	1.9
f(x)	0.21	0.69	1.25	1.89	2.61

Obtain the value of f(x) when x=1.4.

OR

2	a	Estimate a real root of the equation $xe^x - \cos x = 0$ by using Newton-Raphson method.	CO1	L4	6M
	b	Use Newton's backward interpolation formula to find f(32) given f(25)=0.2707, f(30)=0.3027, f(35)=0.3386, f(40)=0.3794.	CO1	L3	6M

UNIT-II

3	a	Solve by Euler's method the equation $y' = y^2 + x$, y(0)=1 for $y(0.1)$ and $y(0.2)$.	CO3	L3	6M
	b	Using Runge–Kutta method of fourth order, compute y(0.2) from $y^1 = xy$, y(0)=1 taking h=0.2.	CO3	L3	6M

OR

4		Evaluate $\int_0^1 \frac{1}{1+x} dx$ by (i) By Trapezoidal rule and Simpson's $\frac{1}{3}$ rule. (ii) Using Simpson's $\frac{3}{8}$ rule and compare the result with actual value.	CO3	L5	12M

UNIT-III

5	a	Find the Laplace transform of $f(t) = \cosh at \sin bt$.	CO4	L3	6M
	b	Find $L^{-1}\left(\frac{s^2}{(s^2+4)(s^2+25)}\right)$ using Convolution theorem.	CO4	L3	6M

OR

6	a	Find the Laplace transform of $\frac{1-\cos at}{t}$	CO4	L3	6M
	b	Find $L^{-1}\left\{s \log\left(\frac{s-1}{s+1}\right)\right\}$	CO4	L3	6M

UNIT-IV

7	a	Using Laplace transform method to solve $y^1 - y = t$, $y(0) = 1$	CO5	L3	6M
	b	Obtain the Fourier series expansion of f(x) $=(x - x^2)$ in the interval $[-\pi, \pi]$. Hence show that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} - - - - = \frac{\pi^2}{12}$.	CO5	L2	6M

OR

8		Use Laplace transform method to solve $y^{11} - 3y^1 + 2y = 4t + e^{3t}$ where $y(0) = 1, y^1(0) = 1$	CO5	L3	12M

UNIT-V

9	a	Applying Fourier integral theorem, show that $e^{-x}\cos x = \frac{2}{\pi}\int_0^\infty \frac{\lambda^2+2}{\lambda^4+4}\cos\lambda x\, d\lambda$.	CO6	L3	6M
	b	Prove that F[x^nf(x)] = $(-i)^n \frac{d^n}{dp^n}[F(p)]$	CO6	L5	6M

OR

10		Find the Fourier sine and cosine transforms of f(x)=$e^{-ax}, a > 0$ and hence deduce the integrals (i) $\int_0^\infty \frac{p\sin px}{a^2+p^2}dp$ (ii) $\int_0^\infty \frac{\cos px}{a^2+p^2}dp$	CO6	L1	12M

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