Q.P. Code: 20HS0834 **R20**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B. Tech II Year I Semester Supplementary Examinations November-2022

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 Find a real root of the equation $x\,e^x - \cos x = 0$ using Newton – Raphson method. **L1 12M**

OR

2 **a** Using Newton's forward interpolation formula and the given table of values **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 $x=1.4$.

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. **L3 6M**

UNIT-II

3 Tabulate y(0.1), y(0.2) and y(0.3) using Taylor's series method given that $y^1 = y^2 + x$ and y(0) = 1 **L6 12M**

OR

4 Evaluate $\int_0^1 \frac{1}{1+x}\,dx$ i) by Trapezoidal rule and Simpson's $\frac{1}{3}$ rule **L5 12M**

ii) Using Simpson's $\frac{3}{8}$ rule

UNIT-III

5 **a** Find the Laplace transform of $e^{4t}\sin 2t\cos t$. **L1 6M**

b Show that $\int_0^\infty t^2 e^{-4t}\sin 2t\,dt = \frac{11}{500}$, using Laplace transform **L2 6M**

OR

6 **a** Find $L^{-1}\left\{\log\left(\frac{s-a}{s-b}\right)\right\}$ **L1 6M**

b Using Convolution theorem, Find $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$ **L3 6M**

UNIT-IV

7 Solve $\frac{d^2x}{dt^2} + 2\frac{dx}{dt} + x = 3te^{-t}$ using Laplace Transform given that $x(0) = 4; \frac{dx}{dt} = 0.at, t = 0$ **L3 12M**

OR

8 **a** Find the half range sine series expansion of $f(x) = x^2$ when $0 < x < 4$. **L1 6M**

b Find the half range cosine series for $f(x) = x$ in the interval $0 \le x \le \pi$. **L1 6M**

UNIT-V

9 Using Fourier integral theorem, **L3 12M**

Show that $e^{-ax}\ e^{-bx} = \frac{2(b^2-a^2)}{\pi}\int_0^\infty \frac{\lambda\sin\lambda x\,d\lambda}{(\lambda^2+a^2)(\lambda^2+b^2)}$, $a, b > 0$

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) $\int_0^\infty \frac{\cos px}{a^2+p^2}dp$ **L1 12M**

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