Q.P. Code: 19HS0834 **R19**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations Feb-2021

NUMERICAL METHODS AND TRANSFORMS

(Electronics & Communication Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1 Find the root of the equation $xe^x = 2$ using Regula-falsi method. **12M**

OR

2 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.* **12M**

UNIT-II

3 Using Taylor's series method find an approximate value of y at x = 0.2 for the D.E $y^1 - 2y = 3e^x$, y(0) = 0. Compare the numerical solution obtained with exact solution. **12M**

OR

4 Using R-K method of 4th order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, y(0)=1. Find y(0.2) and y(0.4) . **12M**

UNIT-III

5 a Find the Laplace transform of $f(t) = \int_0^t e^{-t} \cos t \, dt$. **6M**

b Find the Laplace transform of $f(t) = e^{-4t} \int_0^t \frac{\sin 3t}{t} dt$. **6M**

OR

6 a Find $L^{-1}\left\{\frac{1}{(s^2+5^2)^2}\right\}$, using Convolution theorem. **6M**

b Find $L^{-1}\left\{\frac{s^2}{(s^2+4)(s^2+25)}\right\}$, using Convolution theorem. **6M**

UNIT-IV

7 a Obtain the Fourier series expansion of $f(x) = (\pi - x)^2$ in $0 < x < 2\pi$ and deduce that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} - - - - = \frac{\pi^2}{6}$. **6M**

b Find the Fourier series for the function $f(x) = x$; in $-\pi < x < \pi$. **6M**

OR

8 Find half range Fourier cosine series of $f(x) = (x-1)^2$ in $0 < x < 1$. **12M**

Hence show that *i)* $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} - - - - = \frac{\pi^2}{6}$ *ii)* $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2} = \frac{\pi^2}{12}$.

UNIT-V

9 **12M**

Find the Fourier transform of f(x) $= \begin{Bmatrix} a^2 - x^2, |x| < a \\ 0, |x| > a > 0 \end{Bmatrix}$. Hence show that $\int_0^\infty \frac{\sin x - x\cos x}{x^3} dx = \frac{\pi}{4}$.

OR

10 Find the finite Fourier sine and cosine transform of f(x) defined by $f(x) = 2x \ \ where \ 0 < x < 2\pi$. **12M**

*** END ***