

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 $y' - 2y = 3e^x$, $y(0) = 0$. 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 6M

that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = \frac{\pi^2}{6}$.

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

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

OR

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

*** END ***

UNIT IV

a) Find the I space transform of $f(x) = \begin{cases} x & 0 < x < 2\pi \\ 0 & \text{elsewhere} \end{cases}$ using Convolution theorem.

b) Find the I space transform of $f(x) = \begin{cases} 1 & 0 < x < 2\pi \\ 0 & \text{elsewhere} \end{cases}$ using Convolution theorem.

OR

a) Find the I space transform of $f(x) = \begin{cases} x \sin x & 0 < x < \pi \\ 0 & \text{elsewhere} \end{cases}$.

OR

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

UNIT III

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

UNIT II

Use Newton's backward interpolation formula to find $y(1.2)$ given $y(1.0) = 0.707$, $y(1.1) = 0.707$, $y(1.2) = 0.707$.

UNIT I

1) Find the root of the equation $x^2 = 2$ using Regula-Falsi method.

OR

2) Find the root of the equation $x^2 = 2$ using Regula-Falsi method.

Time: 3 hours

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

Max. Marks: 60

NUMERICAL METHODS AND TRANSFORMS

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

(AUTONOMOUS)

ADDITIONAL INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR

Reg. No:

--	--	--	--	--	--	--	--