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

SNS College of Technology, Coimbatore-35.

(An Autonomous Institution)

Internal Assessment -I

Academic Year 2023-2024 (Odd)

Third Semester

19MAT201– TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

(REGULATION 2019)

A

Time: 1.30 Hours **Maximum Marks: 50**

		PART – A (5 x 2 = 10 MARKS) ANSWER ALL QUESTIONS	**CO**	**Blooms**
1.		Write the Dirichlet's conditions for the existence of a Fourier series.	CO1	(Rem)
2.		Obtain the Fourier sine series for $f(x)=1$ in $(0,\pi)$.	CO1	(Und)
3.		Define the RMS value of a function f(x) over the interval (a, b).	CO1	(Und)
4.		Write the Fourier transform pair.	CO2	(Rem)
5.		Prove that $F[f(ax)]=\frac{1}{a}F\left(\frac{s}{a}\right), a>0$	CO2	(Und)
		PART –B (13+13+14 = 40 MARKS) ANSWER ALL QUESTIONS		
6.	a) i)	Expand the Fourier series for the function $f(x)=x(2l-x)$ in $0\le x\le 2l$	CO1	(App) (7)
	ii)	Obtain the half range Fourier Sine series for $f(x)=\frac{\pi-x}{2}$ in $0\le x\le\pi$	CO1	(App) (6)
		(OR)		
	b)	Construct the Fourier series for $f(x)=x^2$ in $-\pi\le x\le\pi$ and hence deduce that (i) $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+.....\infty=\frac{\pi^2}{6}$ (ii) $\frac{1}{1^4}+\frac{1}{2^4}+\frac{1}{3^4}+.....\infty=\frac{\pi^4}{90}$	CO1	(App) (13)

7.	a)	Develop the Fourier transform of $f(x)=\begin{cases} a-\lvert x\rvert & ,\lvert x\rvert < a \\ 0 & ,\lvert x\rvert > a > 0 \end{cases}$ and hence deduce that (i) $\int_0^\infty \left(\frac{\sin t}{t}\right)^2 dt = \frac{\pi}{2}$ (ii) $\int_0^\infty \left(\frac{\sin t}{t}\right)^4 dt = \frac{\pi}{3}$.	CO2	(App) (13)
		(OR)		
	b) i)	Expand the Fourier series for the function $f(x)=2x-x^2$ in $0 \le x \le 2$	CO1	(App) (7)
	ii)	Obtain the half range Fourier cosine series for $f(x)=l-x$ in $0 \le x \le l$	CO1	(App) (6)
8.	a)	Determine the Fourier transform of $f(x)=\begin{cases} 1 & ,\lvert x\rvert < a \\ 0 & ,\lvert x\rvert > a > 0 \end{cases}$ and hence deduce that (i) $\int_0^\infty \frac{\sin t}{t} dt = \frac{\pi}{2}$ (ii) $\int_0^\infty \left(\frac{\sin t}{t}\right)^2 dt = \frac{\pi}{2}$.	CO2	(App) (14)
		(OR)		
	b)	The following table gives the variations of periodic current over a period:	CO1	(Ana) (14)

t sec	0	T/6	T/3	T/2	2T/3	5T/6	T
A amp	1.98	1.3	1.05	1.3	-0.88	-0.25	1.98

Show that there is a direct current part of 0.75 amplitude in the variation current and express the Fourier series upto second harmonic.

Rem/Und: Remember/ Understand **App:** Apply **Ana:** Analyze **Eva:** Evaluate

Cre: Create

Prepared by **Verified by** **Dean(S&H)**