SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE – 35

23MAT201 –PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS

UNIT – II

FOURIER SERIES

PART B

1. Expand the Fourier series for $f(x) = (\pi - x)$ in $0 < x < 2\pi$
2. Expand the Fourier series for $f(x) = (\pi - x)^2$ in $0 < x < 2\pi$
3. Obtain the Fourier series for $f(x) = x^2$ in $0 < x < 2\pi$
4. Obtain the Fourier series for $f(x) = x$ in $0 < x < 2\pi$
5. Expand the Fourier series for $f(x) = (l - x)$ in $0 < x < 2l$
6. Expand the Fourier series for $f(x) = (l - x)^2$ in $0 < x < 2l$
7. Obtain Fourier series for f(x) of period 2 and defined as follows $f(x) = 2x - x^2, 0 < x < 2$.
8. Obtain Fourier series for f(x) of period 2l and defined as follows
$$f(x) = \begin{cases} (l - x), & 0 < x \le l \\ 0, & l \le x < 2l \end{cases}$$
9. Obtain the Fourier series of $f(x) = x + x^2$ in $-\pi < x < \pi$ a and hence deduce that $\frac{1}{1^2} + \frac{1}{2^2} + \ldots.$
10. Expand the Fourier series to represent the function $f(x) = |x|, -\pi < x < \pi$
11. Find the Fourier series of $f(x) = x^2$ in $-\pi < x < \pi$ and simplify the value to
$$\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots = \frac{\pi^2}{6}$$
$$\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \cdots = \frac{\pi^4}{90}$$
12.. Determine the Fourier series for the function
$$\begin{cases} 1 + \frac{2x}{\pi}, & -\pi < x < 0 \\ 1 - \frac{2x}{\pi}, & 0 < x < \pi \end{cases}$$

13. Determine the Fourier series for the function

$$\begin{cases} L + x\,, & -L < x < 0 \\ L - x, & 0 < x < L \end{cases}$$

14. Express $f(x) = x(\pi - x), 0 < x < \pi$ as a Half range Fourier sine Series of periodicity 2π.

15.. Express $f(x) = x, 0 < x < l$ as a Half range Fourier Sine Series of periodicity 2l.

16. Apply Harmonic Analysis to find the Fourier series up to second harmonic of Period T for y = f(x) defined in (0,T) by means of the table values given below

T sec	0	T/6	T/3	T/2	2T/3	5T/6	T
A temp	1.98	1.30	1.05	1.30	-0.88	-0.25	1.98

17. Obtain the Fourier Series for the function f(x) = x in $-\pi < x < \pi$.

18. Express $f(x) = x, 0 < x < l$ as a Half range Fourier Sine Series of periodicity 2l.