SRM Institute of Science and Technology
DEPARTMENT OF MATHEMATICS
18MAB201T: Transforms and Boundary Value Problems
ACADEMIC YEAR 2021-2022 (ODD)
Tutorial-2 (Unit-2)

1. Find the half range sine series of $f(x) = e^{ax}$ in $(0, \pi)$.
2. Find the half range sine series of $f(x) = x \sin x$ in $(0, \pi)$.
3. Find the half range cosine series of $f(x) = 6x^2 - 6x + 1$ in $0 < x < 1$. Deduce the sum of the series $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} ... \infty$.
4. Find the half range sine series of $f(x) = x \cos \pi x$ in $(0, 1)$. Deduce the sum of the series $\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} - ... \infty$.
5. Find the half range cosine series of $f(x) = (x+2)^2$ in $-2 < x < 0$. Hence find the value of $\sum_{n=1}^{\infty} \frac{1}{n^2}$.
6. Find the half range sine series of $f(x) = l - x$ in $(l, 2l)$. Deduce the sum of the series $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + ... \infty$.
7. Obtain the half-range cosine series of $f(x) = \pi^2 - x^2$ in $(0, \pi)$. Deduce the sum of the series $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} + ... \infty$.
8. Expand $f(x) = (x-1)^2$ in $(0, 1)$ in a Fourier series of sine series only.
9. Find the half-range cosine series of $f(x) = 1 + x$ in $(0, 1)$. Deduce that the sum of the series $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^4}$.
10. Find the half-range sine series of $f(x) = \frac{\pi}{2} - x$ in $(0, \pi)$. Deduce that the sum of the series $\sum_{n=1}^{\infty} \frac{1}{n^2}$.