

LUKHDHIRJI ENGINEERING COLLEGE, MORBI

Subject: MATHEMTICS-1

Tutorial- 3

Sem-1

Branch: All

Fourier series

Ex-1 Obtained Fourier series for $f(x) = e^{-x}$ in the interval $0 < x < 2\pi$

Ex-2 Obtained Fourier series for $f(x) = \begin{cases} \pi + x & -\pi < x < 0 \\ \pi - x & 0 < x < \pi \end{cases}$

Ex-3 Find the Fourier series for $f(x) = |x|$ in the interval $[-\pi, \pi]$ and hence deduce that

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$$

Ex-4 Find the Fourier series for $f(x) = x^3$ in the interval $[-\pi, \pi]$

Ex-5 Find the Fourier series of $f(x) = e^{ax}$ in the interval $(-\pi, \pi)$

Ex-6 Find the Fourier series for $f(x) = \begin{cases} \pi & 0 \leq x \leq 1 \\ \pi(2-x) & 1 \leq x \leq 2 \end{cases}$

Ex-7 Find the Fourier series of $f(x) = x^2, 0 < x < 2$ where $f(x+2) = f(x)$.

Ex-8 Find the Fourier series of $f(x) = x - x^3$ in $-1 < x < 1$

Ex-9 Find the Fourier sine series of $f(x) = e^x$ in $0 < x < \pi$

Ex-10 Find the half-range cosine series of $f(x) = \sin x$ in the interval $(0, \pi)$ and hence deduce that

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$$

Ex-11 Find the half-range sine series of $f(x) = \begin{cases} x & 0 < x < 1 \\ 2-x & 1 < x < 2 \end{cases}$ and hence deduce that

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$$

Ex-12 Find the Fourier series of $f(x) = \sqrt{1 - \cos x}$ in $-\pi < x < \pi$