

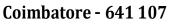
SNS COLLEGE OF ENGINEERING Coimbatore - 641 107



TOPIC : 3 – PROBLEMS BASED ON FULL RANGE SERIES (0, 2L)

Formula for fourier series in (0,20) $f(x) = \frac{a_0}{2} + \frac{z}{h_{=1}} a_n \cosh \frac{\pi x}{\lambda} + \frac{z}{h_{=1}} b_n \sin \frac{\pi x}{\lambda}$ where $a_0 = \frac{2}{b \cdot a} \int_{0}^{b} f(x) dx$ $a_n = \frac{2}{b-a} \int_{a}^{b} f(x) \cos \frac{m\pi}{2} dx$ $b_n = \frac{2}{b-a} \int_{a}^{b} f(x) \sin \frac{m\pi x}{2} dx.$ Problems based on (0,21). 1. Expand fix = { l-x, 0 < 2 ≤ l 4 nence deduce that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots = \frac{7}{4}$ Sol: $a_{0} = \frac{2}{2l} \int (l - x) dx$ $= \frac{1}{l} \left(l \varkappa - \frac{\chi^{\varrho}}{2} \right)_{0}^{l}$ $= \frac{1}{l} \left(l^2 - \frac{l^2}{2} \right)$ $=\frac{l^2}{2L}$







an= 2 / fra) cosnTra da $= \frac{2}{2l} \int_{0}^{l} \alpha c \left(l - \alpha \right) \cos \frac{n \pi \alpha}{l} dr$ $= \frac{1}{k} \int (l-x) \cos \frac{n\pi x}{k} dx.$ $u = l - \alpha$ $\int dv = \int \cos n \pi \alpha d\alpha$ $u_{1} = -1 \qquad V = \underbrace{\underbrace{\underset{l}{\mathcal{I}}}_{\mathcal{I}}^{\mathcal{I}}}_{\mathcal{I}}$ $= \frac{1}{2} \left[-\frac{(-1)^n l^2}{n^2 \pi^2} + \frac{l^2}{n^2 \pi^2} \right]$ $= \frac{l^{k}}{d \cdot n^{2} \pi^{2}} \left[1 - (-1)^{n} \right]$ an = $\int \frac{2l}{n^{2} \pi^{2}} \quad \text{if } n \text{ isodd}$



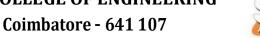




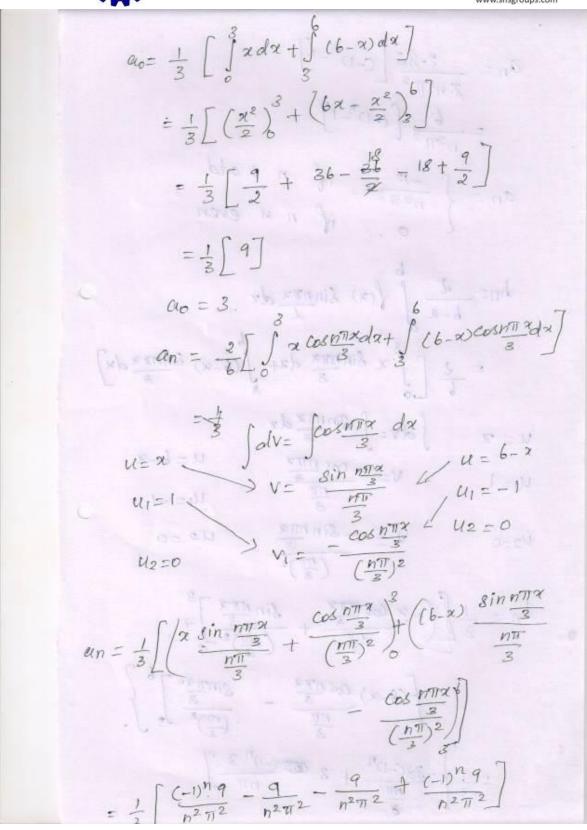


 $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{71^2}{8}$ Put $\chi = \frac{l}{2}$ Ceontinuous) $\lambda - \frac{l}{2} = \frac{l}{4} + \frac{z}{n=odd} \frac{2l}{n^2 \pi^2} \cos \frac{n\pi l}{2l} + \frac{d}{h=1}$ + 2 d Sin nTT.l $\frac{l}{2} - \frac{l}{4} = \frac{2l}{11^2} \xrightarrow{p}_{n=cold} \frac{\cos n\pi}{2} + \frac{2}{n=1} \frac{d}{n\pi} \frac{dnn\pi}{2}$ $\frac{l^{\circ}}{4} = \sum_{n=1}^{\infty} \frac{l}{n\pi} \frac{s_{nn}}{2}.$ $\frac{1}{\sqrt{\pi}} = \frac{\sin \pi / 2}{1} + \frac{3n}{\sqrt{2}} + \frac{3n \frac{3\pi}{2}}{3} + \frac{3n \frac{4\pi}{2}}{7}$ $\frac{\overline{T}}{\frac{4}{4}} = (+ o + \frac{\sin(\overline{T} + \frac{\pi}{2})}{3} + o + \frac{\sin(\overline{T} + \frac{\pi}{2})}{\frac{\pi}{2}} + \cdots$ $\frac{\overline{T}}{\frac{4}{4}} = 1 - \frac{1}{3} + \frac{\frac{3n\frac{\pi}{2}}{5}}{5} + \cdots$ $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{5} +$ $() f(x) = \begin{cases} x, & 0 \le x \le 3 \\ 6-x, & 3 \le x \le 6 \end{cases}$ $\frac{\text{sol:}}{2l=b} \Rightarrow l = \frac{b}{2} = 3.$ ao = 2 | fixedo













$$\begin{aligned} a_{n} &= \frac{2 \cdot 93}{\pi} \left[\frac{(-1)^{n} - 1}{1} \right] \\ &= \frac{6}{n^{2} \pi^{2}} \left[\frac{(-1)^{n} - 1}{1} \right] \\ a_{n} &= \int \frac{-12}{n^{2} \pi^{2}} \quad i \int n \text{ is odd} \\ a_{n} &= \int \frac{-12}{n^{2} \pi^{2}} \quad i \int n \text{ is even} \\ b_{n} &= \int \frac{1}{b^{-a}} \int_{a}^{b} f(x) \int \sin \frac{n\pi x}{2} dx \\ &= \frac{2}{b} \int_{a}^{b} x \int \sin \frac{n\pi x}{3} dx + \int_{a}^{b} (b - x) \int \sin \frac{n\pi x}{3} dx \right] \\ u &= x \int dv = \int \int \sin \frac{n\pi x}{3} dx \\ u_{1} &= 1 \quad v = -\frac{\cos n\pi x}{m^{2}} \quad u_{2} = 0 \\ u_{1} &= 1 \quad v = -\frac{\sin n\pi x}{m^{2}} \quad u_{2} = 0 \\ \int \int_{a}^{b} \int \int \int \int \int \frac{1}{2} \int \int \int \int \int \frac{1}{2} \int \int \int \int \int \frac{1}{m^{2}} \int \int \int \frac{1}{\pi^{2}} \int \int \frac{1}{\pi^{2}} \int \int \frac{1}{\pi^{2}} \int \frac{1}{\pi^{2}} \int \int \frac{1}{\pi^{2}} \int \frac{1}{\pi^{2}}$$





 $= \frac{1}{3} \begin{bmatrix} 0 \end{bmatrix}$ bn = 0. $\int (51) = \frac{3}{2} + \sum_{n=0}^{\infty} \frac{-12}{n^2 \pi^2} \cos \frac{n\pi x}{3}$