

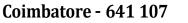
SNS COLLEGE OF ENGINEERING Coimbatore - 641 107



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

Formula for fourier series in (0,21) $f(x) = \frac{a_0}{2} + \frac{z}{n_{=1}} a_n \cosh \frac{\pi x}{2} + \frac{z}{n_{=1}} b_n \frac{\sin n\pi x}{2}$ 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 (0,22). 1. Expand fix = { l-x , 0 < 2 ≤ l 4 nence deduce that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots = \frac{\pi}{4}$. Sol: $a_0 = \frac{2}{2l} \int (l - x) dx$ $= \frac{1}{l} \left(lx - \frac{x^2}{2} \right)_0^l$ $= \frac{1}{l} \left(l^2 - \frac{l^2}{2} \right)$ $=\frac{l^2}{2L}$







an= 2 / fra) cosmin da $= \frac{2}{2l} \int \alpha \, d\alpha \, (l-\alpha) \, \cos n \pi \, \alpha \, d\alpha \, d\alpha$ $= \frac{1}{\ell} \int (l-x) \cos \frac{n\pi x}{\ell} dx.$ $u = l - \chi \qquad \int dv = \int \cos n \frac{\pi \chi}{L} d\chi$ $u_1 = -1 \qquad V = \underbrace{\frac{\sin n \pi \chi}{L}}_{\frac{\pi \pi}{L}}$ $u_{2=0} \qquad \underbrace{\frac{\pi \pi}{L}}_{\frac{\pi \pi}{L}}$ $V_{1} = -\frac{\cos(1\pi)^{2}}{(1\pi)^{2}}$ $\alpha_n = \frac{1}{l} \left(l \cdot x \right) \frac{\sin \frac{m\pi x}{t}}{\frac{m\pi}{t}} = \frac{1}{t} \left(\frac{\cos \frac{\pi\pi x}{t}}{\frac{m\pi}{t}} \right)^{-1}$ $= \frac{1}{1} \left[-\frac{\cos n\pi l}{(n\pi)^2} + \frac{\cos n\pi}{(n\pi)^2} \right]^2$ $= \frac{1}{2} \left[-\frac{(-1)^{n} l^{2}}{n^{2} \pi^{2}} + \frac{l^{2}}{n^{2} \pi^{2}} \right]$ $= \frac{l^{k}}{d \cdot n^{2} \pi^{2}} \left[1 - (-1)^{n} \right]$ an = $\int \frac{2l}{n^{2} \pi^{2}} \quad \text{if } n \text{ is even}$





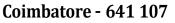
$$\begin{split} h_{n} &= \frac{\lambda}{2R} \int_{0}^{h} C(L-x) \frac{Gnn\pi x}{L} dx \\ u &= Lx \qquad \int dv = \int \frac{gin n\pi x}{L} dx \\ u &= Lx \qquad \int dv = \int \frac{gin n\pi x}{L} dx \\ u_{1} &= -1 \qquad v = -\cos n\pi x \left[n\pi / L \right] \\ v_{1} &= -\frac{gin n\pi x}{(\pi x)^{2}} \\ h_{n} &= \frac{1}{L} \left[- \frac{(L-x)}{n\pi} \frac{\cos n\pi x}{n\pi} - \frac{gin n\pi x}{(\pi x)^{2}} \right]_{0}^{L} \\ &= \frac{1}{L} \left[L \frac{Goso}{n\pi x}}{n\pi} - \frac{gin n\pi x}{(\pi x)^{2}} \right]_{0}^{L} \\ &= \frac{1}{L} \left[L \frac{Goso}{n\pi x}}{n\pi} - \frac{gin n\pi x}{L} \right]_{0}^{L} \\ h_{n} &= \frac{1}{\pi \pi} \\ h_{n} &= \frac{1}{\pi \pi} \\ f_{1}(x) &= \frac{1}{L} + \frac{s}{s} - \frac{\lambda L}{n^{2}\pi^{2}} - \frac{gin n\pi x}{L} + \frac{gin n\pi x}{n\pi} \\ h_{n} &= \frac{1}{\pi \pi} \\ h_{n} &= \frac{1}{\pi \pi} \\ f_{2}(x) &= \frac{1}{L} + \frac{s}{s} - \frac{\lambda L}{n^{2}\pi^{2}} - \frac{gin n\pi x}{L} + \frac{gin n\pi x}{n\pi} \\ h_{n} &= \frac{1}{\pi \pi} \\ f_{n} &= \frac{1}{\pi \pi} \\ f_{n} &= \frac{1}{\pi \pi} \\ f_{n} &= \frac{1}{\pi \pi} \\ h_{n} &= \frac{1}{\pi \pi^{2}} \\ h_{n} &= \frac{1}{\pi \pi^{2}} \\ h_{n} &= \frac{1}{\pi^{2}} \\ h_{$$



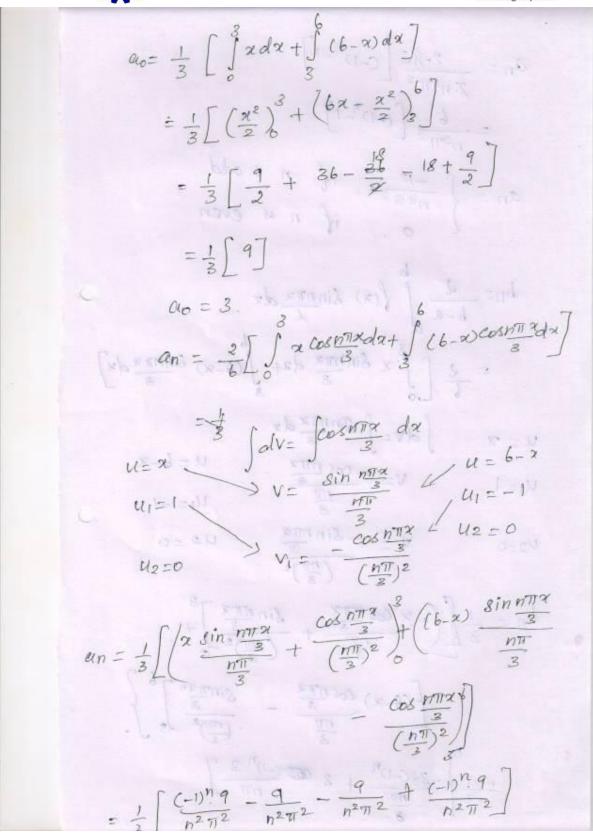


 $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$ put $x = \frac{l}{2}$ Ceontinuous) $l = \frac{l}{2} = \frac{l}{4} + \frac{z}{n^2 \sigma^2} = \frac{2l}{n^2 \pi^2} \cos \frac{\pi \pi l}{2l} + \frac{q}{h_{max}}$ t ne not sin not 22 $\frac{1}{2} - \frac{1}{4} = \frac{2l}{\pi^2} \sum_{n=cold}^{\infty} \frac{\cos n\pi}{2} + \frac{2}{n=1} \frac{d}{n\pi} \frac{d \sin n\pi}{2}$ $\begin{array}{rcl}
\lambda &=& \sum_{n=1}^{\infty} & \frac{1}{n\pi} & \frac{s_{nn} n\pi}{2} \\
\lambda &=& \sum_{n=1}^{\infty} & \frac{1}{n\pi} & \frac{s_{nn} n\pi}{2} \\
\frac{1}{4} &=& \frac{s_{nn} \pi}{12} + \frac{s_{nn} 2\pi}{2} + \frac{s_{nn} \frac{3\pi}{2}}{2} + \frac{s_{nn} \frac{4\pi}{2}}{3} + \frac{\pi}{4}
\end{array}$ $\frac{\overline{m}}{4} = (+ o + \frac{\sin(\overline{m} + \frac{\overline{m}}{2})}{3} + o + \frac{\sin(\overline{m} + \frac{\overline{m}}{2})}{\frac{\overline{m}}{4}} + \cdots$ $\frac{\overline{m}}{4} = 1 - \frac{1}{3} + \frac{\frac{3n\overline{m}}{2}}{5} + \cdots$ $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots = \frac{1}{4} - 1$ $(2) f(x) = \begin{cases} x, & 0 \le x \le 3 \\ 6-x, & 3 \le x \le 6 \end{cases}$ $\underbrace{sol:}_{2} 2l = b \implies l = \frac{b}{2} = 3$ ao = 2 | fix)dx













$$\begin{aligned} G_{n} &= \frac{2 \cdot 93}{7 \cdot n^{2} \pi r^{2}} \left[\begin{pmatrix} c - 10^{n} - 1 \\ - 1 \end{pmatrix} \right] \\ &= \frac{6}{n^{2} \pi r^{2}} \left[\begin{pmatrix} c - 10^{n} - 1 \\ - 1 \end{pmatrix} \right] \\ G_{n} &= \int \frac{-12}{n^{2} \pi r^{2}} & \text{if } n \text{ is odd} \\ g_{n} &= \int \frac{-12}{n^{2} \pi r^{2}} & \text{if } n \text{ is even} \\ g_{n} &= \int \frac{1}{n^{2} \pi r^{2}} & \text{if } n \text{ is even} \\ g_{n} &= \int \frac{1}{n^{2} \pi r^{2}} & \text{if } n \text{ is even} \\ g_{n} &= \int \frac{1}{n^{2} \pi r^{2}} & \text{if } n \text{ is even} \\ g_{n} &= \int \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \text{dat} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} & \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi r^{2}} \int \frac{1}{n^{2} \pi r^{2}} \\ g_{n} &= \frac{1}{n^{2} \pi$$





