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DEPARTMENT OF MATHEMATICS **UNIT-I FOURIER SERIES ODD AND EVEN FUNCTION**

fland the Fourier series for
$$f(\alpha) = \begin{cases} 51 + \frac{2x}{\pi}, & -\pi < x < 0 \\ 1 - \frac{2x}{\pi}, & 0 < x < \pi ... \end{cases}$$

$$\varphi_{1}(-\infty) = 1 + \frac{2(-\infty)}{7}$$

$$=\phi(a)$$

$$= \phi(2)$$

$$\phi_{2}(-x) = 1 - \frac{2(-x)}{7}$$

$$= 1 + 2 = 0$$

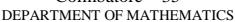
$$= \phi_1(\infty)$$

$$=\phi,(\infty)$$



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UNIT- I FOURIER SERIES

ODD AND EVEN FUNCTION



$$= \frac{\alpha}{\pi} \left[x - \frac{\alpha^{2}}{\pi} \right]_{0}^{\pi}$$

$$= \frac{\alpha}{\pi} \left[\pi - \frac{\pi^{2}}{\pi} \right]$$

$$= \frac{\alpha}{\pi} \left(\pi - \pi \right)$$

$$= \frac{\alpha}{\pi} \left(\pi - \pi \right)$$

$$= \frac{\alpha}{\pi} \left[\pi - \frac{\pi^{2}}{\pi} \right]$$

$$= \frac{\alpha}{\pi} \left[\pi - \frac{\pi^{2}}{\pi} \right]$$

$$= \frac{\alpha}{\pi} \int_{0}^{\pi} (1 - \frac{2\alpha}{\pi}) \cos n\alpha \, d\alpha$$

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$$= \frac{\alpha}{\pi} \int_{0}^{\pi} (1$$



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$$= \frac{2}{\pi} \left[(1 - \frac{2\pi}{\pi}) \frac{2\omega n \pi}{n} - \left(\frac{2}{\pi} \right) \left(\frac{\cos n \pi}{n^2} \right) - \frac{2}{\pi} \frac{\cos n \pi}{n^2} \right]$$

$$= \frac{2}{\pi} \left[0 - \frac{2}{\pi} \frac{\cos n \pi}{n^2} - 0 + \frac{2}{\pi} \frac{\cos n \pi}{n^2} \right]$$

$$= \frac{2}{\pi} \left[-\frac{2(-1)^n}{\pi n^2} + \frac{2}{\pi n^2} \right]$$

$$= \frac{2}{\pi} \left(\frac{2}{\pi n^2} \right) \left[-(-1)^n + 1 \right]$$

$$= \frac{4}{\pi^2 n^2} \left[1 - (-1)^n \right]$$

$$\therefore \text{ The Fourier Series is}$$

$$= \frac{4}{\pi^2 n^2} \left[1 - (-1)^n \right] \cos n \pi$$

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UNIT- I FOURIER SERIES
ODD AND EVEN FUNCTION

$$\phi_1(x) = L + \alpha$$

$$\phi_1(-\alpha) = L - \alpha$$

$$= \phi_2(\alpha)$$

$$\phi_{2}(-\alpha) = 1 - \alpha$$

$$\phi_{2}(-\alpha) = 1 + \alpha$$

$$= \phi_{1}(\alpha)$$

.. fræs is even Function.

$$f(x) = \frac{ao}{a} + \frac{so}{so} an cos \left(\frac{n\pi sc}{l}\right)$$

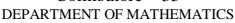
$$Q_0 = \frac{1}{4\pi} \int_{-L}^{L} f(x) dx$$

$$= \frac{2}{4\pi} \int_{-L}^{L} f(x) dx$$



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$$= \frac{2}{L} \left[\frac{1}{2} - \frac{\pi^{2}}{2} \right]^{L}$$

$$= \frac{2}{L} \left[\frac{1}{2} - \frac{1}{2} \right]^{L}$$

$$= \frac{2}{L} \left(\frac{1}{2} - \frac{1}{2} \right)$$

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$$= \frac{2}{L} \left(\frac{1}{2} - \frac{1}{2} \right)$$

$$= \frac{2}{L} \int_{0}^{L} f(\alpha) \cos \left(\frac{n\pi x}{L} \right) d\alpha$$

$$= \frac{2}{L} \int_{0}^{L} (L - x) \cos \left(\frac{n\pi x}{L} \right) d\alpha$$

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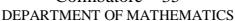
$$= \frac{2}{L} \int_{0}^{L} (L - x) \cos \left(\frac{n\pi x}{L} \right) d\alpha$$

$$= \frac{2}{L} \int_{0}^{L} (L - x) \cos \left(\frac{$$



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UNIT- I FOURIER SERIES

ODD AND EVEN FUNCTION



$$=\frac{2}{L}\left[(1-\alpha)\frac{\sin\left(\frac{n\pi\alpha}{L}\right)}{\frac{n\pi}{L}}-(-1)\left(-\frac{\cos\left(\frac{n\pi\alpha}{L}\right)}{\frac{n^2\pi^2}{L^2}}\right)\right]$$

$$= \frac{2}{L} \left[0 - \frac{\cos(n\pi t)}{L} - 0 + \frac{\cos 0}{n^2 \pi^2} \right]$$

$$=\frac{2}{4}\frac{1}{n^2\pi^2}\left[-(0.9n\pi+1)\right]$$

$$a_n = \frac{2L}{n^2\pi^2} \left[-(-1)^n + 1 \right]$$

$$f(a) = \frac{1}{2} + \sum_{n=1}^{\infty} \frac{2L}{n^2 \pi^2} \left[1 - (-1)^n \right]$$
(0.9) $(0.9) \pi x$

$$= \frac{L}{2} + \frac{2L}{\pi^2} = \frac{0}{(1-(-1)^n)} \cos(\frac{n\pi x}{L})$$