Date : 9/8/19

SE (EXTC)/AM III / Tut 3 : Fourier Series (odd Roll nos) / 20 marks

(1) $f(x) = 1 + \frac{2x}{\pi} \qquad -\pi < x < 0$

$= 1 - \frac{2x}{\pi} \qquad 0 < x < \pi$

& $f(x + 2\pi) = f(x)$

(8 M)

Obtain fourier series expansion for f(x).

(2) Find fourier series for $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in $(0, 2\pi)$. Hence deduce that :

(12 M)

(i) $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\ldots = \frac{\pi^2}{6}$

(ii) $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2}\ldots\ldots = \frac{\pi^2}{12}$

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SE (EXTC)/AM III / Tut 3 : Fourier Series (Even Roll nos) / 20 marks

(1) Find fourier series for : $f(x) = \begin{cases} 0 & -\pi < x \leq 0 \\ x & 0 \leq x < \pi \end{cases}$

(12 M)

Hence deduce that :

(i) $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots = \frac{\pi^2}{8}$

(ii) $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots\ldots = \frac{\pi}{4}$

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

(8 M)