Assignment – 4
(Maths – 3)

Que.1. Obtain Fourier's series of $f(x) = x\sin x$ in the interval $(-\pi, \pi)$. Hence deduce that :

(i) $\frac{\pi}{4} = \frac{1}{2} + \frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \cdots$

(ii) $\frac{\pi-2}{4} = \frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \frac{1}{7.9} + \cdots$

Que.2

Find Fourier series for function $f(x)$ in interval $(-1, 1)$ where

$$f(x) = \begin{cases} x+1 & ; -1 < x < 0 \\ x-1 & ; 0 < x < 1 \end{cases}$$

Hence deduce that ; $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$

Que.3 Find half-range sine series expansion of function $\pi x - x^2$ in the interval $(0, \pi)$.

Que.4 Obtain Fourier series for the function $f(x)$ given by

$$f(x) = \begin{cases} 1 + \frac{2x}{\pi} & , -\pi < x < 0 \\ 1 - \frac{2x}{\pi} & , 0 < x < \pi \end{cases}$$

Que.5 Expand $f(x) = x$ as half range

(i) Sine series in $0 < x < 2$.

(ii) Cosine series in $0 < x < 2$.