

Dr KHUSHBOO VERMA

AS-203

ENGINEERING MATHEMATICS-II

ASSIGNMENT: FOURIER SERIES

1. DEFINE EULER'S FORMULA AND DIRICHLET'S CONDITION
2. DEFINE HALF RANGE SINE AND COSINE SERIES
3. OBTAIN FOURIER SERIES TO REPRESENTATION  $e^{-ax}$  from  $x = -\pi$  to  $x = \pi$ .
- 4.

Find the Fourier series to represent the function  $f(x)$  given by

$$f(x) = x \text{ for } 0 \leq x \leq \pi, \text{ and } = 2\pi - x \text{ for } \pi \leq x \leq 2\pi.$$

Deduce that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots \infty = \frac{\pi^2}{8}$ .

5. Find the Fourier series expansion of  $f(x) = 2x - x^2$  in  $(0, 3)$  and hence deduce that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots - \infty = \frac{\pi}{12}.$$

- 6.

Obtain the Fourier series expansion of  $f(x) = x^2$  in  $(0, \alpha)$ . Hence show that

$$\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots$$

- 7.

Obtain cosine and sine series for  $f(x) = x$  in the interval  $0 \leq x \leq \pi$ . Hence show that

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}.$$

8. Find the half range sine series for  $f(x) = x \cos x$  in  $(0, \pi)$ .

9. Obtain the half-range sine series for  $e^x$  in  $0 < x < 1$ .