

Tutorial: 01

Subject Code: 3110015

Year: **2020- 2021**

Fourier Integral

- 1 The student is supposed to complete the assignment and get it assessed by concerned faculty, after which the work has to be submitted in scan - pdf form to the concern faculty within the stipulated time.
- 2 This tutorial to be submitted on or before prescribed date in MST
- 3 This tutorial carries maximum 10 marks.
- 4 Those who failed to submit during prescribed time limit, will be given zero.
- 5 Reference Book: Advanced Engineering Mathematics by Erwin Kreyszig

Show that the given integrals represent the indicated function.

1.

$$\int_0^{\infty} \frac{\cos x\omega + \omega \sin x\omega}{1 + \omega^2} d\omega = \begin{cases} 0 & \text{if } x < 0 \\ \pi/2 & \text{if } x = 0 \\ \pi e^{-x} & \text{if } x > 0 \end{cases}$$

2.

$$\int_0^{\infty} \frac{\sin \omega \cos x\omega}{\omega} d\omega = \begin{cases} \pi/2 & \text{if } 0 \leq x < 1 \\ \pi/4 & \text{if } x = 1 \\ 0 & \text{if } x > 1 \end{cases}$$

3.

$$\int_0^{\infty} \frac{1 - \cos \pi\omega}{\omega} \sin x\omega d\omega = \begin{cases} \pi/2 & \text{if } 0 < x < \pi \\ 0 & \text{if } x > \pi \end{cases}$$

4.

$$\int_0^\infty \frac{\cos x\omega}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} \quad \text{if } x > 0.$$

Represent the following functions as fourier cosine integral.

5.

$$f(x) = \begin{cases} 1 & \text{if } 0 < x < 1 \\ 0 & \text{if } x > 1 \end{cases}$$

6.

$$f(x) = \begin{cases} x & \text{if } 0 < x < a \\ 0 & \text{if } x > a \end{cases}$$

7.

$$f(x) = \frac{1}{1+x^2} \quad \text{if } x > 0$$

Represent the following functions as fourier sine integral.

8.

$$f(x) = \begin{cases} x & \text{if } 0 < x < a \\ 0 & \text{if } x > a \end{cases}$$

9.

$$f(x) = \begin{cases} \sin x & \text{if } 0 < x < \pi \\ 0 & \text{if } x > \pi \end{cases}$$

10.

$$f(x) = \begin{cases} e^x & \text{if } 0 < x < 1 \\ 0 & \text{if } x > 1 \end{cases}$$