Teacher's Name: Dr. RAVINDRA SINGH

Assignment/ October, 2023

B.Sc. (Hons.) Physics

Semester-III

MATHEMATICAL PHYSICS-III

Maximum Marks:25

(Attempt all the questions. Marks are indicated against each questions).

Q1. Find the Fourier transform of the function defined by $f(x) = \begin{cases} 1\ ;\ |x| < a \\ 0\ ;\ |x| > a \end{cases}$

and hence show that $\int_o^\infty \frac{sin^2\, xa}{x^2}\, dx = \frac{\pi}{2}\, a$ (8)

Q2. Find the Fourier transform of $f(x) = \begin{cases} 1 - x^2\ ;\ |x| < 1 \\ 0\ ;\ |x| > 1 \end{cases}$

and hence show that $\int_0^\infty \frac{x\, cos\, x - sin\, x}{x^3}\, cos\, \frac{x}{2}\, dx = -\frac{3\pi}{16}$ (9)

Q3. Find the steady state temperature u(x,y) of a rectangular plate $0 < x < 1$**;** $0 < y < 2$ subject to the boundary conditions:

u(x, 0) = 0

u(0, y) = 0

u(1, y) = 0 and

u(x, 2) = x/2 (8)