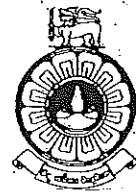


THE OPEN UNIVERSITY OF SRI LANKA
 B.Sc/B.Ed., Continuing Education Degree Programme
 Applied Mathematics – Level 05
 ADU5302/ADE5302 – Mathematical Methods
 Open Book Test (OBT) – 2023/2024



DURATION: ONE (01)-HOUR

Date: 23.07.2023.

Time: 10.30a.m.-11.30 a.m.

ANSWER ALL QUESTIONS.

1. Obtain the Laplace transform of each of the functions $f(t)$:

(i) $f(t) = L\{t^2 \sin at\}$

(ii) $f(t) = L\left\{e^{-at} \frac{\sin 3t}{t}\right\}$

2. Find the inverse Laplace of each of the following:

(i) $\frac{s^2 + 3}{s(s^2 + 9)}$

(ii) $\frac{1}{9s^2 + 6s + 1}$

3. Use the convolution theorem to find $\frac{1}{(s^2 + a^2)^2}$

4. Using Laplace Transform solve the following boundary value problem:

$$\frac{d^2 y}{dt^2} + 2 \frac{dy}{dt} + 2y = 5 \sin t, \text{ where } y(0) = y'(0) = 0$$

5. Find the Fourier series for $f(x)$, if

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

