

Advanced Mathematical techniques in Chemical Engineering

Module XIV : Solution of PDEs by Laplace transformation

Exercises

1. Solve the following equation using Laplace transform

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} . \text{ At } t=0, u=1 \text{ and at } x=0, u=0 \text{ and at } x=1, u=2$$

2. Solve the following equation using Laplace transform

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} . \text{ At } t=0, u=0 \text{ and at } x=0, u=0 \text{ and at } x=L, u=2t$$

3. Solve the following equation using Laplace transform

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} . \text{ At } t=0, u=1 \text{ and at } x=0, u=0 \text{ and at } x=1, \frac{\partial u}{\partial x} = 2$$

4. Solve the following equation using Laplace transform

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} . \text{ At } t=0, u=1 \text{ and at } x=0, u=0 \text{ and at } x=1, \frac{\partial u}{\partial x} + u = 1$$

5. Solve the following equation using Laplace transform

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} . \text{ At } t=0, u=1 \text{ and at } x=0, u=1 \text{ and at } x=1, \frac{\partial u}{\partial x} + u = 1$$