SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF MATHEMATICS
18MAB201T/Transforms and Boundary value problems
UNIT III - APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

TUTORIAL SHEET -2

PART-B QUESTIONS

1. Write the possible solutions and correct solution of the one dimensional wave equations.

2. A string is tightly stretched and its ends are fastened at two points $x = 0$ and $x = l$. The mid point of the string is displaced transversely through a small distance $'b'$ and the string is released from rest in that position. Write down the initial and boundary conditions.

3. A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is set vibrating giving each point a velocity $3x(l - x)$, write down the initial and boundary conditions.

PART-C QUESTIONS

4. If a string of length $'l'$ is initially at rest in its equilibrium position and each point of it is given the velocity $\left(\dfrac{\partial y}{\partial t}\right)_{t=0} = v_0 \sin^3 \dfrac{\pi x}{l}, 0 < x < l$. Determine the transverse displacement $y(x, t)$.

5. A tightly stretched string has its ends fixed at $x = 0$ and $x = l$. Initially the string is in the form $y = kx^2(l - x)$, where k is a constant, and then released from rest. Find the displacement at any point x and any time $t > 0$.

6. A string is stretched between two fixed points at a distance $2l$ apart and the points of the string are given initial velocities

$$v = \begin{cases} \dfrac{cx}{l}, & \text{in } 0 < x < l \\ \dfrac{c}{l}(2l - x), & \text{in } l < x < 2l \end{cases}$$

x being the distance form an end point. Find the displacement of the string at any subsequent time.