

Course Code & Title: 18MAB201T-Transforms and Boundary Value Problems

Year & Sem: II/III

Tutorial 2
Part A

Q. No	Questions
1	Write down the appropriate solution of the vibration of string equation. How is it chosen?
2	Write down the form of the general solution of the vibration of string equation, if the string is fixed at its ends.
3	What does a^2 represent in the equation $u_{tt} = a^2 u_{xx}$?
4.	What does α^2 represent in the equation $u_t = \alpha^2 u_{xx}$?
5.	A tightly stretched string of length $2l$ is fastened at both ends. The midpoint of the string is displaced by a distance b transversely and the string is released from the rest in this position. Write down the corresponding partial differential equation, initial and boundary conditions.

Part B

6.	Derive all the possible solutions for one dimensional heat equation.
7.	<p>Solve the heat equation:</p> $u_t = 16u_{xx}, \quad 0 < x < 1, t > 0,$ $u(0, t) = 0 = u(1, t), \quad t \geq 0,$ $u(x, 0) = (1 - x)x, \quad 0 \leq x \leq 1.$
8.	<p>Solve the heat equation:</p> $u_t = u_{xx}, \quad 0 < x < 1, t > 0,$ $u(0, t) = 0 = u(1, t), \quad t \geq 0,$ $u(x, 0) = \sin^3 \pi x, \quad 0 \leq x \leq 1.$
9.	<p>Solve the wave equation:</p> $u_t = 3u_{xx}, \quad 0 < x < \pi, t > 0,$ $u(0, t) = 0 = u(\pi, t), \quad t \geq 0,$ $u(x, 0) = 3 \sin 2x - 6 \sin 5x, \quad 0 \leq x \leq \pi.$
10.	<p>A string is stretched between two fixed points at a distance of 60 cm and the points of the string are given initial velocities v, where</p> $v = \frac{\lambda x}{30}, \quad 0 < x < 30$ $= \frac{\lambda}{30} (60 - x), \quad 30 < x < 60$ <p>x being the distance from an end point. Find the displacement of the string at any time.</p>