NAME: S.No.   ID:
Maximum Marks: 8   Section:04   Time Allowed: 40 minutes

1 (04points) Use Laplace transform to solve the problem

$$2\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}, \ x > 0, \ t > 0,$$

subject to the boundary and initial conditions

$$u(0, t) = \sin(\pi t), \ \lim_{x \to \infty} u(x, t) = 0, \ t > 0,$$

$$u(x, 0) = 0, \ \left.\frac{\partial u}{\partial t}\right|_{t=0} = 0, \ x > 0.$$

2 (04 points) Solve the problem using the Fourier **cosine** transform

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0, \ \ 0 < x < \pi, \ \ y > 0,$$

$$u(0, y) = 0, \ \ u(\pi, y) = e^{-y}, \ \ \ \ y > 0,$$

$$\frac{\partial u}{\partial y}\bigg|_{y=0} = 0, \ \ 0 < x < \pi.$$