Assignment 5

Q.1)

Solve completely the equation

$$\frac{d^2y}{dt^2} = c^2 \left(\frac{d^2y}{dx^2} \right)$$

Representing the vibration of a string of length l fixed at both the sides

Given,

y(0,t)=0

y(l,t)=0

y(x,0)=f(x) and,

$\left(\frac{\partial y}{\partial t} \right)_{t=0} = 0$

Q.2)

The vibrations of an elastic strings are governed by the

Partial Differential Equation

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

The length of the string is π and the ends are fixed, the initial velocity is 0 and the initial deflection is

u(x,0)=2(sin x+ sin3x)

Find the deflection u(x,t) of the vibrating string for t>0.

Q.3)

Using the method of separation of variables,

Solve:

$\frac{\partial u}{\partial x} = \left(2\frac{\partial u}{\partial t} \right) + u$

Where u(x,0)= 6e^-3x

Q.4)

A tightly stretched string with fixed end points x=0 and x=l is initially at rest in its equilibrium position. It is set vibrating by given each point a velocity

λx(l-x)

Find the displacement of string y(x,f)

Q.5)

Solve

∂u / ∂t = a²(∂²u / ∂x²)

Given that,

- u=0 when x=0
- u=0 when x=l
- u = 3sin(πx/j) when t=0

Q.6)

Solve the equation

Uxx + Uyy = 0   when,

- u(0,y)=0
- u(π,y)=0
- u(x,0)=K
- Lim $_{y->∞}$ u(x,y)=0

Q.7)

Find the solution of laplace's equation

ʊΨ=0

in cartesian coordinates in the region 0≤x≤a, 0≤y≤b∘

To satisfy the condition

y=0 on x=0, y=b and Ψ=a(a-x),0≤x≤a