**M.Sc Semester –III**

**Assignment**

**Subject- Mathematics**

**Course –Partial Differential Equations**

**Subject Course No.-DEMATH3SCORE3**

**Total Marks-25**

## *Group-A*

**Answer any one of the following questions (15 marks)**

1. Find the solution of the one-dimensional diffusion equation $u_t(x, t) = ku_{xx}$ satisfying the following boundary condition
   (i)    $u$ is bounded as $t \to \infty$
   (ii)    $u_x(0, t) = 0$ (iii) $u_x(a, t) = 0$

   (iv) $u(x, 0) = x(a - x),\ 0 < x < a.$

2. Solve the initial value problem, described by the inhomogeneous wave equation
$$u_{tt} - a^2 u_{xx} = 6x + t, \qquad -\infty < x < \infty, t \geq 0$$

   Subject to             $u(x, 0) = 0, \quad u_t(x, 0) = \cosh bx.$

## *Group-B*

**Answer any one of the following questions (10marks)**

1. Reduce the following equation to canonical form and hence solve it.
   $$(1 + x^2)u_{xx} + (1 + y^2)u_{yy} + xu_x + yu_y = 0.$$

2. Find the deflection $u(x, t)$ of a taut string which was at rest at time $t = 0$, if it is fastened at the end point $x = l$ and subjected at the other end point $x = 0$ to a motion represented by $u(0, t) = f(t)$.