



Q.1. Solve the following: (6x5=30)

- (i) Find the general solution of partial differential equation  $p+3q=5z+\tan(y-3x)$
- (ii) Show that  $u(x,t)=\sin(x+ct)$  is the solution of  $u_t-cu_x=0$
- (iii) Find PDE by eliminating arbitrary function from the following relation:  $z= f(x^2-y^2)$
- (iv) Solve  $(D_x^2 - D_y^2)z = x-y$
- (v) Find canonical form for PDE:  $4u_{xx}+5u_{xy}+ u_{yy} + u_x + u_y=2$
- (vi) Find the steady state solution following problem and discuss uniqueness of the solution

$$k (\partial^2 u / \partial x^2) = \partial u / \partial t \quad 0 < x < a, \quad t > 0$$
$$u_x(0,t)=0, \quad u_x(a,t)=0, \quad u(x,0)=f(x)$$

Solve the following: (3x10=30)

Q(2) Solve the Cauchy's problem  $\partial^2 u / \partial x \partial y = x^2 y$  subject to conditions

$$u(x, 0)=x, \quad u(1, y)=\cos y$$

Q(3) Derive laplace equation in spherical coordinates.

Q(4). If a string of length 'a' is fixed at its ends and is lifted up in the middle and then released from rest through a short distance 'h'. Formulate and solve the problem.