Differential Eqn of B.Sc. Part (II.)
Topic: CLAIRAUT'S EQUATION

By Dr. Ram Anek Yadav
Deptt. of Mathematics, Marwari College Darbhanga.

Question: Define Clairaut's Equation and discuss the method of solution of clairaut's Equation.

Solution: Definition:- The equation of the form $y = px + f(p)$ (1)
where $p = \frac{dy}{dx}$ and $f(p)$ is any function of $p$ is called a Clairaut's Equation.

In order to solve differential Equation (1) we differentiate (1) with respect to $x$ and we obtain

$$\frac{dy}{dx} = p + \frac{x\,dp}{dx} + f(p)\frac{dp}{dx}$$

$$\Rightarrow p = p + \{x + f(p)\}\frac{dp}{dx}$$

$$\Rightarrow \{x + f'(p)\}\frac{dp}{dx} = 0$$

Therefore either $\frac{dp}{dx} = 0$ (2)

or, $x + f'\left(\frac{dp}{dx}\right) = 0$ (3)

(2) gives us $p = c$ on integration.