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SEM-IV, MSc PHYSICS
UNIT-V / Paper-05

SINGULAR POINTS OF A SECOND ORDER DIFFERENTIAL EQUATION

A second order linear differential equation can be written as :-

$$\frac{d^2y}{dx^2} + P(x)\frac{dy}{dx} + Q(x)y = 0$$

Ordinary and singular points

→ Ordinary point :- A point x_0 is called an Ordinary point if both $P(x)$ and $Q(x)$ are analytic (i.e. have a convergent Taylor series) at x_0.

→ Singular point :- A point x_0 is called Singular point if ~~both~~ either $P(x)$ or $Q(x)$ is not analytic at x_0.

Singular points are further classified as :-

→ Regular Singular point → If $(x-x_0)P(x)$

and $(x - x_0)^2 Q(x)$ are analytic at x_0.

IRREGULAR SINGULAR POINT → If the above condition is not satisfied.