Summary

Linear differential equations with constant co-efficients shall be obtained from reduction of certain differential equations.

A linear differential equation of the form

$$a_0 x^n \frac{d^n y}{dx^n} + a_1 x^{n-1} \frac{d^{n-1} y}{dx^{n-1}} + a_2 x^{n-2} \frac{d^{n-2} y}{dx^{n-2}} + ... + a_n y = F(x) \ldots\ldots\ldots\ldots\ldots\ldots\ldots.(1)$$

Where a_1, a_2………. $a_n$are constants and ‘f’ is either a constant or a function of x only is called Cauchy-Euler homogeneous linear differential equation.

A linear differential equation of the form
$[(ax+b)^n a_0 D^n + (ax+b)^{n-1} a_1 D^{n-1} + (ax+b)^{n-2} a_2 D^{n-2} \ldots\ldots\ldots.. + a_n]y = F(x)$
where a, b, a_1, a_2, …….a_n are constants and F is either a constant or a function of x only is called Legendre’s homogeneous linear differential equation.

Here the index of (a+bx) and the order of derivative is same in each term of such equation.