Differential Equations

S.No	Chapter	Concepts/Formulae	
1	**Differential Equations**	**1.1**	**Differential Equations** An equation involving derivatives of dependent variable with respect to independent variable(s) ▪ Order of a differential equation is the order of the highest order derivative occurring in the differential equation. ▪ Degree of a differential equation is the highest power (exponent) of the highest order derivative in it.
		1.2	**Solution of a Differential equation** A function which satisfies the given differential equation is called its solution. ▪ The solution which contains as many arbitrary constants as the order of the differential equation is called a **general solution**. ▪ The solution which is free from arbitrary constants is called **particular solution**.
		1.3	**Variable separable** This method is used to solve equations in which variables can be separated i.e terms containing y should remain with dy & terms containing x should remain with dx.
		1.4	**Homogeneous Differential Equation** A differential equation which can be expressed in the form $\frac{dy}{dx} = f(x,y)$ or $\frac{dx}{dy} = g(x,y)$ where, f (x, y) & g(x, y) are homogenous functions Steps to solve a differential equation of type: $\frac{dy}{dx} = F(x,y) = g\left(\frac{y}{x}\right)$ .....(1) ▪ Substitute y=v.x .....(2) ▪ Differentiate (2) wrt to x $\frac{dy}{dx} = v + x\frac{dv}{dx}$ .....(3) ▪ Substitute & separate the variables

			$\frac{dv}{g(v)-v}=\frac{dx}{x}$ ▪ Integrate, $\int\frac{dv}{g(v)-v}=\int\frac{dx}{x}+C$
		1.5	**Linear Differential Equation** ▪ $\frac{dy}{dx}+Py=Q$ where, P and Q are constants or functions of x only Integrating factor (I.F)= $e^{\int Pdx}$ Solution: y (I.F) = $\int$ (Q × I.F)dx + C ▪ $\frac{dx}{dy}+P_1y=Q_1$ where,P_1 & Q_1 are constants or functions of y only Integrating factor (I.F)= $e^{\int P1dy}$ Solution: x (I.F) = $\int$ (Q × I.F)dy + C