

Q.1

$$1. (y'')^2 - 3yy' + xy = 0$$

O(2), D(2), U.f. (y), I.V. (x).

$$2. h^4 w^{(4)} + h w''' = e^h$$

O(4), D(1), U.f. (w), I.V. (h).

Q.2 Form the differential equation for

$$y = C_1 e^{3x} + C_2 e^x \quad \text{--- (1)}$$

$$y' = 3C_1 e^{3x} + C_2 e^x \quad \text{--- (2)}$$

$$y'' = 9C_1 e^{3x} + C_2 e^x \quad \text{--- (3)}$$

$$\text{eq. (3)} - \text{eq. (2)} \Rightarrow y'' - y' = 6C_1 e^{3x}$$

$$C_1 = \frac{y'' - y'}{6e^{3x}} \quad \text{--- (*)}$$

$$3[\text{eq. (1)}] - \text{eq. (2)} \Rightarrow y' - 3y = -2C_2 e^x$$

$$C_2 = \frac{y' - 3y}{-2e^x} \quad \text{--- (**)}$$

Substitute (\*) & (\*\*) in eq. (1)

$$\Rightarrow y = \frac{y'' - y'}{6e^{3x}} e^{3x} + \frac{y' - 3y}{-2e^x} e^x$$

$$\Rightarrow y'' - 4y' + 3y = 0$$