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COMPUTER ENGINEERING

$$\textcircled{1} \quad \frac{dy}{dx} = -4A e^{-4x} - 6B e^{-6x} \dots \textcircled{1}$$

$$\frac{d^2y}{dx^2} = 16A e^{-4x} + 36B e^{-6x} \dots \textcircled{2}$$

Solving eqn (1) and (2) simultaneously
multiply eqn (1) by 6

$$6 \frac{dy}{dx} = -24A e^{-4x} - 36B e^{-6x} \dots \textcircled{3}$$

$$\frac{d^2y}{dx^2} = 16A e^{-4x} + 36B e^{-6x} \dots \textcircled{4}$$

eqn (3) + (4)

$$6 \frac{dy}{dx} + \frac{d^2y}{dx^2} = -8A e^{-4x}$$

$$\therefore A = \frac{6 \frac{dy}{dx} + \frac{d^2y}{dx^2}}{-8e^{-4x}} \dots \textcircled{5}$$

Substitute eqn (5) into eqn (1)

$$\frac{dy}{dx} = 4 \left(\frac{6 \frac{dy}{dx} + \frac{d^2y}{dx^2}}{-8e^{-4x}} \right) e^{-4x} - 6B e^{-6x}$$

$$= \frac{6 \frac{dy}{dx} + \frac{d^2y}{dx^2}}{2} - 6B e^{-6x}$$

$$\frac{2 \frac{dy}{dx}}{2} = 6 \frac{dy}{dx} + \frac{d^2y}{dx^2} - 12B e^{-6x}$$

$$\frac{2 \frac{dy}{dx}}{2} - 6 \frac{dy}{dx} = \frac{d^2y}{dx^2} - 12B e^{-6x}$$

$$-4 \frac{dy}{dx} - \frac{d^2y}{dx^2} = -12B e^{-6x}$$

$$\frac{-4 \frac{dy}{dx} - \frac{d^2y}{dx^2}}{-12 e^{-6x}} = B \cdot \frac{4 \frac{dy}{dx} + \frac{d^2y}{dx^2}}{12 e^{-6x}} = B$$

Subst A and B into the degenerate equation

$$y = \frac{6 \frac{dy}{dx} + \frac{d^2y}{dx^2}}{-8 e^{-4x}} + e^{-4x} + \frac{4 \frac{dy}{dx} + \frac{d^2y}{dx^2}}{12 e^{-6x}} + e^{-6x}$$

$$y = 6 \frac{dy}{dx} + \frac{d^2y}{dx^2} + 4 \frac{dy}{dx} + \frac{d^2y}{dx^2}$$

$$y = -72 \frac{dy}{dx} - 12 \frac{d^2y}{dx^2} + 32 \frac{dy}{dx} + 8 \frac{d^2y}{dx^2}$$

$$y = -40 \frac{dy}{dx} - 4 \frac{d^2y}{dx^2}$$

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$$96y = -40 \frac{dy}{dx} - 4 \frac{d^2y}{dx^2}$$

$$24y = -10 \frac{dy}{dx} - \frac{d^2y}{dx^2}$$

$$\therefore \frac{d^2y}{dx^2} + 10 \frac{dy}{dx} + 24y = 0$$