

$$\textcircled{8} \quad \frac{dy}{dx} = \frac{6xy}{x^2} + 8y = 8xy$$

$$m' - 6m + 10 = 0$$

$$m' - 11m + 12 = 0$$

$$m(6m - 11) - 2(6m - 11)$$

$$\text{with } m_1 = 2$$

$$\text{So } y = A e^{2x} + B e^{-2x}$$

$$y = C_1 e^{2x}$$

$$\frac{dy}{dx} = C_1 (2e^{2x}) + e^{2x} \cdot C$$

$$2x = C_1 e^{2x} + 2C_1 e^{2x}$$

$$\frac{dy}{dx} = 4C_1 e^{2x} + [2A_1 (4e^{2x}) + 2B_1 (e^{-2x})]$$

$$= 4C_1 e^{2x} + 8A_1 e^{2x} + 2B_1 e^{-2x}$$

$$= 16C_1 e^{2x} + 8B_1 e^{-2x}$$

So

$$16C_1 e^{2x} + 8B_1 e^{-2x} - 6(C_1 e^{2x} + 2B_1 e^{-2x}) + 18(C_1 e^{2x}) = 8e^{2x}$$

$$16C_1 e^{2x} + 18C_1 e^{2x} - 6C_1 e^{2x} + 12B_1 e^{-2x} + 8C_1 e^{2x} = 8e^{2x}$$

$$16C_1 + 18C_1 - 6C_1 + 12B_1 + 8C_1 = 8$$

$$26C_1 = 8$$

$$C_1 = \frac{4}{13} \quad \text{g.P.I.} \Rightarrow y = \frac{4}{13} e^{2x}$$

∴ C.S

$$y = A e^{2x} + B e^{-2x} + \frac{4}{13} e^{2x}$$

$$\textcircled{4} \quad 3x^2 - 2x - 1 = 0$$

for  $x$

$$a = 3, b = -2, c = -1$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{2 \pm \sqrt{4 - 4(3)(-1)}}{2(3)}$$

$$x = \frac{2 \pm \sqrt{16}}{6}$$

$$x = \frac{2 \pm 4}{6}$$

$$x_1 = \frac{2 + 4}{6} = 1$$

$$x_2 = \frac{2 - 4}{6} = -\frac{1}{3}$$

$$x = 1, -\frac{1}{3}$$

$$x = 1, -\frac{1}{3}$$

$$x = 1, -\frac{1}{3}$$

$$x = 1, -\frac{1}{3}$$

$$x = 1, -\frac{1}{3}$$

$$x = 1, -\frac{1}{3}$$

$$x = 1, -\frac{1}{3}$$

$c_1$

$$y = Ae^{x} + Be^{-3x}$$

(6)  $\frac{d^2y}{dx^2} + 4y = 2e^{2x}$

at  $x=0$   $y=1$   $\frac{dy}{dx} = -2$

with  $x=0$   $y=0$

with  $x=0$

$-4 \int \sqrt{x^2 - 4x} dx$

is

$-4 \int \sqrt{x^2 - 4x} dx$

$-\frac{4}{2} \left( \frac{x^2 - 4x}{2} - \frac{4x^2 - 16x}{2} \right)$

$-\frac{4}{2} \left( \frac{x^2 - 4x}{2} - \frac{4x^2 - 16x}{2} \right)$

$-2x^2 - 2x^2$

$y = e^{2x} (A \cos 2x + B \sin 2x)$

$y = C_1 e^{2x}$

$\frac{dy}{dx} = 2C_1 e^{2x} + C_2 e^{2x}$

$2x = 2C_1 e^{2x} + C_2 e^{2x}$

$2x = 2C_1 e^{2x} + C_2 e^{2x} + C_3 e^{-2x} + 2C_4 e^{-2x}$

$2x = 4C_1 e^{2x} + 2C_2 e^{2x} - 2C_3 e^{-2x} - 2C_4 e^{-2x}$

$4C_1 e^{2x} + 2C_2 e^{2x} - 2C_3 e^{-2x} - 2C_4 e^{-2x}$

$4C_1 e^{2x} + 2C_2 e^{2x} + 4C_3 e^{-2x} + 4C_4 e^{-2x} = 2x$

$4C_1 e^{2x} + 2C_2 e^{2x} + 4C_3 e^{-2x} + 4C_4 e^{-2x} = 2x$

$4C_1 + 2C_2 + 4C_3 + 4C_4 = 0$

$C_1 = 2$

$y = 2e^{-2x}$

$y = e^{2x} (A \cos 2x + B \sin 2x) + 2e^{2x}$

$x=0, y=1$

$1 = e^{2(0)} (A \cos 0 + B \sin 0) + 2e^{2(0)}$

$1 = A + 2$   $A = -1$

$\frac{dy}{dx} = e^{2x} (-2A \sin 2x + 2B \cos 2x) + 4e^{2x}$

$1 = e^{2(0)} (-2A \sin 0 + 2B \cos 0) + 4e^{2(0)}$

$1 = 2B + 4$   $B = -\frac{3}{2}$

$-1 = B + A \cos 0 + 2$

$-1 = B + 2A + 2$   $-3 = B + 2A$

$-2 = B - 2A - 2A$   $-2 = B - 4A$

$2 = B - 2A$

$B = 2 + 2A = 2 + 2(-1) = 0$

$2 - 2 = 0$

$B = 0$

$y = e^{2x} (-\cos 2x + 0) + 2e^{2x}$

$y = e^{2x} (2 - \cos 2x)$

$$\textcircled{E} \quad \frac{d^2 y}{dx^2} - 2\lambda \frac{dy}{dx} + y = 4 \sin x$$

$$m^2 - 2\lambda m + 1 = 0$$

$$m = 2\lambda \pm \sqrt{4\lambda^2 - 4}$$

$$m = 1$$

$$y = e^x (A + Bx)$$

$$y = 4 \sin x$$

$$y = C \cos x + D \sin x$$

$$\frac{dy}{dx} = -C \sin x + D \cos x$$

or

$$\frac{d^2 y}{dx^2} = -(-C \sin x + D \cos x)$$

$$-C \cos x - D \sin x = -2(C \sin x + D \cos x) + C \cos x + D \sin x$$

$$-C \cos x - D \sin x + 2C \sin x + 2D \cos x = C \cos x + D \sin x$$

$$-C \cos x - D \sin x + 2C \sin x + 2D \cos x - C \cos x - D \sin x = 4 \sin x$$

$$C \cos x (-2) + D \sin x (2) = 4 \sin x$$

$$C \cos x (-2) + D \sin x (2) = 4 \sin x$$

$$-2D = 0 \quad \therefore D = 0$$

$$2C = 4 \quad C = 2$$

$$\text{P.I. } y = 2 \cos x$$

$$\therefore \text{Ans. } y = e^x (A + Bx) + 2 \cos x$$

Dimensional Analysis  
14/10/2016

$$\frac{D \cdot \Delta T}{k} = \frac{h_a \cdot \Delta T}{k} \cdot y_p$$

W/D  $\Delta T$   $\frac{h_a \cdot \Delta T}{k}$   $y_p$

h<sub>a</sub>

h<sub>a</sub> = 10 W/m<sup>2</sup>°C

h<sub>a</sub> = 10

h<sub>a</sub> = 10 W/m<sup>2</sup>°C

h<sub>a</sub> = 10 W/m<sup>2</sup>°C

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h<sub>a</sub> = 10 W/m<sup>2</sup>°C

$$\textcircled{3} \frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} - 1y = e^{-2x}$$

$$m^2 + 2m - 1 = 0$$

$$m^2 + 2m + 1 = 0$$

$$(m+1)(m+1) = 0$$

$$m_1 = -1 \quad m_2 = -1$$

$$y = e^{-2x} (A + Bx).$$

$$y = Ce^{-2x}$$

$$\frac{dy}{dx} = -2C e^{-2x}$$

dx

$$\frac{d^2 y}{dx^2} = 4C e^{-2x}$$

dx

$$H(C e^{-2x} + 2(-2C e^{-2x})) + C e^{-2x} = e^{-2x}$$

$$HC - 4HC + C = 1$$

$$\therefore C = 1$$

$$y = e^{-2x}$$

$$Ans \Rightarrow y = e^{-2x} (A + Bx) + e^{-2x}$$



# Congratulations on your Retirement

HON. JUSTICE  
GABRIEL ADAMU SHA

President of the Customary Court of Appeal, Freetown, Sierra Leone

$$\frac{d^2y}{dx^2} - 4y = 16e^{2x}$$

$$m^2 - 4 = 16e^{2x}$$

$$m^2 = 4$$

$$m = \pm 2$$

$$m = 2$$

$$y = Ae^{2x} + Be^{-2x}$$

$$y = Ce^{2x}$$

$$2y = 3Ce^{2x}$$

$$dx$$

$$\frac{dy}{dx} = 2Ce^{2x}$$

$$dx$$

$$9Ce^{2x} - 4Ce^{2x} = 16e^{2x}$$

$$9C - 4C = 16$$

$$5C = 16$$

$$C = \frac{16}{5}$$

$$y = \frac{16}{5}e^{2x}$$

$$S.S \Rightarrow y = Ae^{2x} + Be^{-2x} + \frac{16}{5}e^{2x}$$



# Congratulations on your Retirement

HON. JUSTICE  
GANNAN KODAHU SIVA  
President of the Karnataka State Bar Association

Dharmaraj Narayan Sharma  
18/Emerson/1016

①  $A^1A^2 = b_1 + 2y_1 + 8$   
 $A^2 = b_2$

Remaining remaining equations

$$2x_1 + 3x_2 + 4x_3 = 6$$

$$x_1 + x_2 + x_3 = 0$$

$$x_1 + 2x_2 + 3x_3 = 0$$

$$x_1 + 3x_2 + 4x_3 = 0$$

$$2x_1 + 3x_2 + 4x_3 = 0$$

PT part

$$2x_1 = 0$$

$$2x_2 = 0$$

$$2x_3 = 0$$

$$2x_1 + 3x_2 + 4x_3 = 0$$

$$2x_2 = 0$$

$$2x_3 = 0$$

$$2x_1 = 0$$

$$2x_1 + 3x_2 + 4x_3 = 0$$