$CF: y = Ae^{-1/3x} + Be^{ax} - 2x - 7$

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

$y = ce^{4x}$

$\frac{dy}{dx} = 4ce^{4x}$

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

$16ce^{4x} - 6(4ce^{4x}) + 8(ce^{4x}) = 8e^{4x}$

$16ce^{4x} - 24ce^{4x} + 8ce^{4x} = 8e^{4x}$

$e^{4x}(16c - 24c + 8c) = 8e^{4x}$

$0c = 8$

$c = \frac{8}{0}$ which is undefined

$m^2 - 6m + 8 = 0$

$m_1 = 2; \; m_2 = 4$

$\therefore y = Ae^{2x} + Be^{4x}$

$-2 = -2(B) - 4$

$-2 = -2B - 4$

$-2+4 = -2B$

$\frac{2}{-2} = \frac{-2B}{-2}$ $\quad B = 0$

$y = e^{-2x}(-1\cos x - (0)\sin 0)$

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

(7) $3\frac{d^2y}{dx^2} - 2\frac{dy}{dx} - y = 2x - 3$

$\frac{dy}{dx} = C \qquad y = Cx + D$

$\frac{d^2y}{dx^2} = 0$

$3(0) - 2(C) - (Cx + D) = 2x - 3$

$\therefore 0 - 2C - Cx + D = 2x - 3$

$-2C - Cx + D = 2x - 3$

$-Cx = 2x$ $\qquad -2C + D = -3$

$-C = 2$ $\qquad -2(-2) + D = -3$

$\therefore C = -2$ $\qquad 4 + D = -3$

$\therefore D = -7$

$P.I \Rightarrow y = -2x - 7$

$3m^2 - 2m - 1 = 0$

$m_2 = 1, \; m_1 = -1/3$

$CF = y = Ae^{-1/3x} + Be^{x}$ //

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

$4ce^{-2x} + 4(-2ce^{-2x}) + 5(ce^{-2x}) = 2e^{-2x}$

$4ce^{-2x} - 8ce^{-2x} + 5ce^{-2x} = 2e^{-2x}$

$e^{-2x}(4c - 8c + 5c) = 2e^{-2x}$

$\frac{1c}{1} = \frac{2}{1}$

$c = 2$

$P \cdot I = 2e^{-2x}$

$m^2 + 4m + 5 = 0$

$m = \alpha \pm j\beta$

$m = -2 \pm j$

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

$x = 0 \quad dy/dx = -2$

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

$1 = 1 \cdot A \cdot 1 + 2$

$1 = 1A + 2$

$1 - 2 = 1A$

$\frac{-1}{1} = \frac{1A}{1}$ $A = -1$

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

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

(5) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 4\sin x$

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

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

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

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

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

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

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

$2C = 4 \qquad -2D = 0$

$2C = 4 \qquad -2D = 0$

$C = \frac{4}{2} = 2 \qquad D = 0$

$P.I = 2\cos x$

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

$\therefore y = e^x(A + Bx) + 2\cos x$

$\therefore y = e^x(A + Bx) + 2\cos x$

(6) $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 5y = 2e^{-2x}$

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

$m = -1$

$y = e^{-x}(A + Bx) + 1e^{-2x}$

(4) $\frac{d^2y}{dx^2} + 25y = 5x^2 + x$

$m^2 + 25 = 0$

$m^2 = -25$

$m = \pm j\sqrt{-25}$

$m = \pm j5$

CF : $y = A\cos 5x + B\sin 5x$

$f(x) = 5x^2 + x$ $\qquad y = Cx^2 + Dx + E$

$\frac{dy}{dx} = 2Cx + D$ $\qquad \frac{d^2y}{dx} = 2C$

$2C + 25((Cx^2 + Dx + E) = 5x^2 + x$

$2C + 25Cx^2 + 25Dx + 25E = 5x^2 + x$

$25Cx = 5x^2$ $\qquad 25Dx = 1$ $\qquad 2C + 25E = 0$

$C = \frac{1}{25}$ $\qquad D = \frac{1}{25}$ $\qquad 2C(\frac{1}{5}) + 25E = 0$

$E = -\frac{2}{5} \times \frac{1}{25} = \frac{-2}{125}$

$PI = \left(\frac{x^2}{5} + \frac{x}{25} - \frac{2}{125}\right)$

$CF = y = A\cos 5x + B\sin 5x + \left(\frac{x^2}{5} + \frac{x}{25} - \frac{2}{125}\right)$

$y = A\cosh 2x + B\sinh 2x$

$y = ce^{3x}$

$\frac{dy}{dx} = 3ce^{3x}$ $\quad \frac{d^2y}{dx^2} = 9ce^{3x}$

$9ce^{3x} - 4(ce^{3x}) = 10e^{3x}$

$9ce^{3x} - 4ce^{3x} = 10e^{3x}$

$e^{3x}(9c - 4c) = 10e^{3x}$

$\frac{5c}{5} = \frac{10}{5}$

$c = 2$ $\quad \therefore PI = 2e^{3x}$

$y = A\cosh 2x + B\sinh 2x + 2e^{3x}$

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

$y = ce^{-2x}$

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

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

$4ce^{-2x} + 2(-2ce^{-2x}) + ce^{-2x} = 1e^{-2x}$

$4ce^{-2x} - 4ce^{-2x} + ce^{-2x} = 1e^{-2x}$

$e^{-2x}(4c - 4c + 1c) = 1e^{-2x}$

$4c - 4c + 1c = 1$

$\frac{1c}{1} = \frac{1}{1}$ $\quad PI = 1e^{-2x}$

$c = 1$

OHAJI JUDE-THADDEUS
15/ENG02/040
COMPUTER ENG

ENG 301

ASSIGNMENT 1

(1) $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 8$

$m^2 - m - 2 = 0$

$m_1 = -1 \quad m_2 = 2$

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

$y = C$

$\frac{dy}{dx} = 0 \qquad \frac{d^2y}{dx^2} = 0$

$= (0-0) - 2(C) = 8$

$\frac{-2C}{-2} = \frac{8}{-2} = -4$

$C = -4$

$\therefore y = Ae^{-x} + Be^{2x} - 4$

(2) $\frac{d^2y}{dx^2} - 4y = 10e^{3x}$

$m^2 - 4 = 0$

$m^2 = 4$

$m = \pm\sqrt{4}$

$m = \pm 2$