EDO(2) L cc H.

CASO 2 $\quad m^2 + a_1 m + a_2 = 0$

$$m_1 = m_2$$

$$e^{mx} \xrightarrow{m = m_1} e^{m_1 x} \qquad y_g = C_1 e^{m_1 x} + C_2 e^{m_1 x}$$

$$m^2 + a_1 m + a_2 = 0 \qquad m_1 \neq m_2$$

$$(m - m_1)(m - m_2) = 0$$

$$\frac{d}{dm}$$

$$2m + a_1 = 0$$

$$(m - m_1) + (m - m_2) = 0 \qquad \not\equiv 0$$

$$m^2 + a_1 m + a_2 = 0 \qquad m_1 = m_2$$

$$(m - m_1)^2 = 0$$

$$\frac{d}{dm}$$

$$2m + a_1 = 0$$

$$2(m - m_1) = 0 \qquad 0 \equiv 0$$

CASO 2. $m_1 = m_2$

$$m^2 + a_1 m + a_2 = 0$$

$\frac{d}{dm}$

$\frac{d}{dm}$

$$e^{mx} \xrightarrow{m=m_1} e^{m_1 x}$$

$$x e^{mx} \xrightarrow{m=m_1} x e^{m_1 x}$$

$$x^2 e^{mx} \xrightarrow{m=m_1} x^2 e^{m_1 x}$$

$$y_g = C_1 e^{m_1 x} + C_2 x e^{m_1 x} + C_3 x^2 e^{m_1 x}$$

EDO (2) LCCH. $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 0$

E(A)C. $m^2 - 4m + 4 = 0$

$(m-2)^2 = 0 \quad m_1 = m_2 = 2$

$e^{mx} \xrightarrow{m_1=2} e^{2x}$

$\frac{d}{dm}$

$xe^{mx} \xrightarrow{m=2} xe^{2x}$

$$\boxed{y_g = c_1 e^{2x} + c_2 x e^{2x}}$$

EDO(4) LCCH. $\frac{d^4y}{dx^4} = 0$

$m^4 = 0 \qquad m_1 = m_2 = m_3 = m_4 = 0$

$$\frac{d}{dm}\left(e^{mx} \xrightarrow{m=0} 1 \right.$$

$$\frac{d}{dm}\left(xe^{mx} \xrightarrow{m=0} x \right.$$

$$\frac{d}{dm}\left(x^2e^{mx} \xrightarrow{m=0} x^2 \right.$$

$$x^3e^{mx} \xrightarrow{m=0} x^3.$$

$$y_g = C_1 + C_2x + C_3x^2 + C_4x^3$$

$$y_g' = C_2 + 2C_3x + 3C_4x^2$$

$$y'' = 2C_3 + 6C_4x$$

$$y''' = 6C_4$$

$$\boxed{y^{IV} = 0.}$$

$$y_g = c_1 e^{2x} + c_2 x e^{2x} + c_3 e^{3x} + c_4 x e^{3x}$$

$$E(AC) = (m-2)^2 (m-3)^2 = 0$$

$$(m^2-4m+4)(m^2-6m+9) = 0$$

$$\begin{array}{r} m^2-4m+4 \\ \times \quad m^2-6m+9 \\ \hline m^4-10m^3+37m^2-60m+36=0 \end{array}$$

$$\frac{d^4y}{dx^4} - 10\frac{d^3y}{dx^3} + 37\frac{d^2y}{dx^2} - 60\frac{dy}{dx} + 36y = 0$$

EDO(4)LCCH.

$$y = C_1\cos(4x) + C_2 x\cos(4x) + C_3 \operatorname{sen}(4x) + C_4 x \operatorname{sen}(4x).$$

$\underline{E}(A)C \Rightarrow (m^2+16)^2 = 0 \qquad m^2 = -16 \qquad m_{1,2} = \pm 4i$

$$m^4 + 32m^2 + 256 = 0$$

$$\frac{d^4y}{dx^4} + 32\frac{d^2y}{dx^2} + 256y = 0$$

$$y_g = C_1 e^{2x} + C_2 \cos(2x) + C_3 \operatorname{sen}(2x).$$

$$(m-2)(m^2+4) = 0$$

$$y_g = C_1 e^{3x} \cos(5x) + C_2 e^{3x} \operatorname{sen}(5x)$$

$$m_1 = (a+bi)$$

$$m_2 = a - bi$$

$$(m-a-bi)(m-a+bi) = 0$$

$$(\cancel{m^2} - \cancel{am} + \cancel{bi}m - \cancel{am} + \cancel{a^2} - \cancel{abi} - \cancel{bi}m + \cancel{abi} - b^2 i^2$$

$$((m^2 - 2am + a^2) + \cancel{bim} - \cancel{bim} + \cancel{abi} - \cancel{abi} + b^2)$$

$$((m-a)^2 + b^2)$$

$$(m-3)^2 + (5)^2 = 0$$

$$m^2 - 6m + 34 = 0$$

$$\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 34y = 0$$

EDO(2)L cc NH.

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

$P(D)$	$f(x)$
D	1
D^2	x
D^3	x^2
D^n	x^{n-1}
$(D-m)$	e^{mx}
$(D-m)^2$	xe^{mx}
$(D-m)^n$	$x^{n-1}e^{mx}$
(D^2+b^2)	$\cos(bx)$ $\operatorname{sen}(bx)$
$(D^2+b^2)^2$	$x\cos(bx)$ $x\operatorname{sen}(bx)$
$(D^2+b^2)^n$	$x^{n-1}\cos(bx)$ $x^{n-1}\operatorname{sen}(bx)$
$((D-a)^2+b^2)$	$e^{ax}\cos(by)$ $e^{ax}\operatorname{sen}(bx)$
$((D-a)^2+b^2)^2$	$xe^{ax}\cos(bx)$ $xe^{ax}\operatorname{sen}(bx)$
$((D-a)^2+b^2)^n$	$x^{n-1}e^{ax}\cos(bx)$ $x^{n-1}e^{ax}\operatorname{sen}(bx)$

$y = c_1(1)$

$y = 1$

$Dy = 0$

$(D-m)[e^{mx}] = 0$

$me^{mx} - me^{mx} = 0$

$0 = 0$

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

$$\boxed{\begin{array}{l}(D^2 - 5D + 6)y = 0 \\ (D-2)(D-3)y = 0 \quad y_{g/H} = C_1e^{2x} + C_2e^{3x}\end{array}}$$

$(D-2)(D-3)y = 6e^{-4x}$ EDO(2)LCC NH.

$$(D-2)(D-3)\underbrace{(D+4)}_{A}y = 0$$

$y = C_1e^{2x} + C_2e^{3x} + C_3e^{-4x}$ EDO(3) LCC H.

$$y_{g/NH} = C_1e^{2x} + C_2e^{3x} + Ae^{-4x}$$

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

$$y = Ae^{-4x}$$

$$\frac{dy}{dx} = -4Ae^{-4x}$$

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

$$\left[16Ae^{-4x}\right] - 5\left[-4Ae^{-4x}\right] + 6\left[Ae^{-4x}\right] = 6e^{-4x}$$

$$(16 + 20 + 6)Ae^{-4x} = 6e^{-4x}$$

$$42Ae^{-4x} = 6e^{-4x}$$

$$42A = 6$$

$$A = \frac{6}{42} \Rightarrow \frac{3}{21} \Rightarrow \frac{1}{7}$$

$$\boxed{\begin{array}{l}\dfrac{d^2y}{dx^2} - 5\dfrac{dy}{dx} + 6y = 6e^{-4x} \\ \qquad y = C_1e^{2x} + C_2e^{3x} + \dfrac{1}{7}e^{-4x}\end{array}}$$