

$$2s^2 - 7s + 7 = A$$

$$2s^2 - 7s + 7 = A(s^2 - 2s + 5) - 1B(s-2)$$

$$A = 2$$

$$-2A + B = -7$$

$$B = -7 + 4 = -3$$

$$= \frac{2}{s-2} - \frac{3}{s-2s+5}$$

$$= 2e^{2t} - \frac{3}{3+s} e^{-2t}$$

$$v.) \frac{d^2y}{dt^2} - 6\frac{dy}{dt} + 8y = e^{3t}$$

$$s^2 - y(s) - sy'(0) - y''(0) - 6sy(s) + 6y(0) + 8y(s) = \frac{1}{s-3}$$

$$[s^2 - 6s + 8]y(s) + (6-3)y(0) - y'(0) = \frac{1}{s-3}$$

$$[s^2 - 6s + 8]y(s) = \frac{1}{s-3} + 2 = \frac{1+2s-6}{s-3} = \frac{2s-5}{s-3}$$

$$y(s) = \frac{2s-5}{(s-3)(s-2)(s-4)} = \frac{A}{s-3} + \frac{B}{s-2} + \frac{C}{s-4}$$

$$2s-5 = A(s-2)(s-4) + B(s-3)(s-4) + C(s-1)(s-2)$$

$$2s-5 = A(s^2-6s+8) + B(s^2-7s+12) + C(s^2-2s+6)$$

$$2(3) - 5 = A(3-2)(3-4) \Rightarrow A = -1$$

$$2(4) - 5 = C(4-3)(4-2) \Rightarrow C = \frac{3}{2}$$

$$-6A - 7B - 5C = 7$$

$$-6[-1] - 7B - 5(\frac{3}{2}) = 7$$

$$-7B = \frac{2+15-12}{2} - 6 = \frac{7}{2} \Rightarrow B = -\frac{1}{2}$$

$$L^{-1} \left[\frac{1}{s-3} - \frac{1}{2(s-2)} + \frac{3}{2(s-4)} \right]$$

$$= e^{3t} - \frac{1}{2}e^{2t} + \frac{3}{2}e^{-t}$$

$$\text{iii)} \frac{dy}{dt} - 4y = 8$$

$$y'(t) - 4y(t) = 8$$

$$sY(s) - y(0) - 4Y(s) = 8/s$$

$$(s-4)Y(s) = \frac{8}{s} + 2 = \frac{8+2s}{s}$$

$$Y(s) = \frac{2s+8}{s(s-4)} = \frac{2s+8}{s(s-4)} = \frac{A}{s} + \frac{B}{s-4}$$

$$2s+8 = A(s-4) + B(s)$$

$$2(0)+8 = A(0-4) \Rightarrow A = -2$$

$$2(4)+8 = A(4-4) + B(4)$$

$$B = 4$$

$$L^{-1} \left[\frac{-2}{s} + \frac{4}{s-4} \right] = -2 + 4e^{4t}$$

$$\text{iv)} \frac{d^2y}{dt^2} - 2\frac{dy}{dt} + 5y = e^{2t}$$

$$y''(t) - 2y'(t) + 5y(t) = e^{2t}$$

$$L\{y''(t)\} = s^2Y(s) - sy(0) - y'(0)$$

$$L\{y'(t)\} = sY(s) - y(0)$$

$$L\{y(t)\} = Y(s)$$

$$s^2Y(s) - sy(0) - y'(0) - (sY(s) - y(0)) - 2(sY(s) - y(0)) + 5Y(s) = \frac{1}{s-2}$$

$$[s^2 - 2s + 5]Y(s) = \frac{1}{s-2} - (2-5)2 + 1$$

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

$$\frac{1 + (2s-3)(s-2)}{(s-2)} = \frac{1 + 2s^2 - 4s - 3s + 6}{s-2}$$

$$Y(s) = \frac{2s^2 - 7s + 7}{(s-2)(s^2 - 2s + 5)}$$

$$2s^2 - 7s + 7 = \frac{A}{s-2} + \frac{B}{s^2 - 2s + 5}$$

Adeniji Abdul-Lateef

Mechanical Engr

151ENG061002

~~1.)~~
1.) $\frac{dy}{dt} + 8y = e^{-3t}$

$$Ls [t] + 3y [t] = e^{-2t}$$

$$L [y'(t)] = 8y [s] \cdot y [s]$$

$$L [y(t)] = y(s) + 3y(s) = \frac{1}{s+2}$$

$$(s-3)y(s) = \frac{1}{s+2} \Rightarrow \frac{1}{(s+2)(s-3)} = \frac{1+23t^{-1}}{s+2} = \frac{2s+2}{s+2}$$

$$y(s) = \frac{2s+2}{(s+2)(s-3)} = \frac{A}{s+2} + \frac{B}{s-3}$$

$$2(-2)+5 = A(-2-3) \Rightarrow A = -1/5$$

$$2(3)+5 = B(3+2) \Rightarrow B = 1/5$$

$$y(s) = \frac{1}{5}(s+2) + \frac{1}{5}(s-3) = \frac{1}{5}e^{-2t} + \frac{1}{5}e^{3t}$$

11.) $3\frac{dy}{dt} - 6y = \sin 2t = 3y'(t) - 6y(t)$

$$L [y'(t)] = sY(s) - y(0)$$

$$L [y(t)] = Y(s)$$

$$L [\sin 2t] = \frac{2}{s^2+2^2} = \frac{2}{s^2+4}$$

$$3s + Y(s) - 3y(0) - 6Y(s) = \frac{2}{s^2+4}$$

$$Y(s) [3s - 6] = \frac{2}{s^2+4} + 3 = \frac{2+3s^2+12}{s^2+4} = \frac{3s^2+14}{s^2+4}$$

$$Y(s) = \frac{3s^2+14}{(3s-6)(s^2+4)} = \frac{A}{3s-6} + \frac{B}{s^2+4}$$

$$3s^2+14 = A(s^2+4) + B(3s-6)$$

$$4A - 6B = 14$$

$$-6B = 14 - 12$$

$$B = \frac{1}{3}$$

$$Ls(s) = \frac{3}{[3][s-2]} - \frac{1}{3(s^2+4)}$$

$$= e^{2t} - \frac{1}{6} \sin 2t$$