

Exercise - 1 (c)

Find the inverse Laplace transform of the following by Partial fraction method.

1. $\frac{86s - 78}{(s+3)(s-4)(5s-1)}$ Ans: $-3e^{-3t} + 2e^{4t} + e^{(\frac{1}{5})t}$
2. $\frac{2-5s}{(s-6)(s^2+11)}$ Ans: $\frac{1}{47} \left(-28e^{+6t} + 28 \cos \cos \sqrt{11}t - \frac{67}{\sqrt{11}} \sin \sqrt{11}t \right)$
3. $\frac{25}{s^3(s^2+4s+5)}$ Ans: $\frac{1}{5} \left(11 - 20t + \frac{25}{2}t^2 - 11e^{-2t} \cos t - 2e^{-2t} \sin t \right)$
4. $\frac{1}{(s+1)(s^2+2s+2)}$ Ans: $e^{-t}(1 - \cos t)$
5. $\frac{1}{(s-1)(s+3)}$ Ans: $\frac{1}{4}(e^t - e^{-3t})$
6. $\frac{1}{(s+1)(s^2+1)}$ Ans: $\frac{1}{2}(\sin t - \cos t + e^{-t})$
7. $\frac{1}{(P+2)^2(P-2)}$ Ans: $\frac{1}{16}(e^{2t} - (4t+1)e^{-2t})$
8. $\frac{1}{s(s+1)^3}$ Ans: $1 - e^{-t} - \left(\frac{t^2}{2} + t + 1 \right)$
9. $\frac{3s+1}{(s-2)(s^2+1)}$ Ans: $\frac{1}{5}(7e^{2t} - 7 \cos t + \sin t)$
10. $\frac{1}{(s+1)^2(s^2+4)}$ Ans: $\frac{e^{-t}}{50}(te^{-t} - 3 \sin 2t - 4 \cos 2t)$
11. $\frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6}$ Ans: $\frac{1}{2}e^t - e^{2t} + \frac{5}{2}e^{3t}$
12. $\frac{19s+37}{(s+1)(s-2)(s+3)}$ Ans: $5e^{2t} - 3e^{-t} - 2e^{-3t}$
13. $\frac{1}{s^2(s^2+1)}$ Ans: $t - \sin t$

$$14. \quad \frac{1}{s^2(s^2+1)(s^2+9)} \quad \text{Ans:} \quad \frac{t}{9} - \frac{\sin t}{8} + \frac{1}{72} \left(\frac{\sin 3t}{3} \right)$$

$$15. \quad \frac{2s^2+5s+4}{s^3+s^2-2s} \quad \text{Ans:} \quad 2 + e^t - e^{2t}$$