Example 2:
$$F(S) = \frac{12}{(S+2)^2(S+4)}$$

① Factor denominator

$$\frac{12}{(S+2)^2(S+4)} = \frac{A}{(S+2)^2} + \frac{B}{S+2} + \frac{C}{S+4}$$

②
$$\frac{A(S+4) + B(S+2)(S+4) + C(S+2)^2}{(S+2)^2(S+4)}$$

$$\frac{A(S+4) + B(S^2+6S+8) + C(S^2+4S+4)}{(S+2)^2(S+4)}$$

③
$$\frac{AS+4A + BS^2+6BS+8B + CS^2+4CS+4C}{(S+2)^2(S+4)} = \frac{12}{(S+2)^2(S+4)}$$

④
$$S^2(B+C) = 0$$
$$S(A+6B+4C) = 0$$
$$4A+8B+4C = 12$$

⑤
$$B+C = 0$$
$$\quad -C$$
$$B = -C$$
$$4A+4C+8B = 12$$
$$\frac{4A}{4} = \frac{12-4C-8B}{4}$$
$$A = 3-C-2B$$

⑥ $A+6B+4C = 0$

$$3-C-2B-6C+4C = 0$$
$$3-C+2C-6C+4C = 0$$
$$3-C = 0$$
$$\boxed{C = 3}$$

$$A = 3-C-2B$$
$$= 3-3+6$$
$$\boxed{A = 6}$$

$$B = -C$$
$$\boxed{B = -3}$$

⑦
$$\frac{A}{(S+2)^2} + \frac{B}{S+2} + \frac{C}{S+4} = \frac{6}{(S+2)^2} - \frac{3}{S+2} + \frac{3}{S+4}$$

⑧
$$6 \cdot \mathcal{L}^{-1}\left\{\frac{1}{(S+2)^2}\right\} - 3\mathcal{L}^{-1}\left\{\frac{1}{S+2}\right\} + 3 \cdot \mathcal{L}^{-1}\left\{\frac{1}{S+4}\right\}$$

$$= \boxed{6te^{-2t}u(t) - 3e^{-2t}u(t) + 3e^{-4t}u(t)}$$