Q. Solve =

$(D^2 - 4)y = \cos^2 x$

$m^2 = 4$

$m = \pm 2$

C.F. = $C_1 e^{2x} + C_2 e^{-2x}$

P.I. = $\frac{1}{D^2-4} \cdot (\cos^2 x + 1)$ $\cos^2 x = \frac{\cos 2x + 1}{2}$

$= \frac{x}{2(2D)} (\cos 2x + 1)$

$= \frac{x}{4D} (\cos 2x + 1)$

$= \frac{1}{D} \cdot \left(-\frac{1}{8}\right)(\cos 2x) + \frac{1}{2}\left(\frac{1}{4}\right) e^{0x}$

$= -\frac{1}{16} \cos 2x + \frac{1}{8}$

$= -\frac{1}{16}(\cos 2x + 2)$

$y = C.F. + P.I.$

Q. Solve

$(D^2 - 4D + 1)y = \cos x \cos 2x + \sin^2 x$

P.I. = $\frac{1}{2} - \frac{1}{8}$

Q. Solve –

$$(D-2)^2 y = 8\left(e^{2x} + \sin 2x + x^2\right)$$

→ If P.I of form –

$$\frac{1}{f(D)} \cdot e^{ax} \cdot V \quad (V \text{ is func. of } x)$$

$$\frac{1 \cdot e^{a}}{f(D+a)}$$

$$= \frac{e^{ax}}{f(D+a)} \cdot V$$

Q. Solve –

$$\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 12y = (x-1)e^{2x}$$

$$\text{P.I.} = \frac{e^{2x}(x-1)}{(D^2+4D-12)} = e^{2x} \cdot \frac{1}{12\left(\frac{D^2}{12}+\frac{4D}{12}\right)}(x-1)$$

$$= \frac{e^{2x}(x-1)}{((D+2)^2+4(D+2)-12)}$$

$$= \frac{e^{2x}\cdot(x-1)}{(D^2+4+4D+4D+8-12)} = \frac{e^{2x}}{(D^2+8D)}(x-1)$$

$$= \frac{e^{2x}}{D(D+8)}(x-1) = \frac{e^{2x}}{8D\left(1+\frac{D}{8}\right)}(x-1)$$

$$= e^{2x}\cdot\frac{1}{D}\left[D+8\right]^{-1}(x-1)$$

$$= \frac{e^{2x}}{8D}\left[1+\frac{D}{8}\right]^{-1}(x-1) = \frac{e^{2x}}{8D}\left[1-\frac{D}{8}\right](x-1)$$

$$= \frac{e^{2x}}{8D}\left[x-1-\frac{1}{8}(1)\right] = \frac{e^{2x}}{8D}\left(x-\frac{9}{8}\right)$$

$$= \frac{e^{2x}}{8}\left(x^2/2 - 9/8 x\right)$$