

RevisionType 5

$$\textcircled{1} (D^2 + 4)y = x^2 \cos x$$

$$\underline{\underline{\text{Sol}}}$$
 A.E  $m^2 + 4 = 0$

$$m = \pm 2i$$

$$C.F = A \cos 2x + B \sin 2x$$

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

Type 5

$$= \text{R.P of } \frac{1}{D^2 + 4} x^2 e^{ix}$$

Type 4

D by D+i

$$= \text{R.P of } e^{ix} \left( \frac{1}{(D+i)^2 + 4} x^2 \right)$$

Type 3

$$= \text{R.P of } e^{ix} \left( \frac{1}{D^2 + 2Di + 3} x^2 \right)$$

$$= \text{R.P of } \frac{e^{ix}}{3} \left( \frac{1}{1 + \frac{D^2 + 2Di}{3}} \right) x^2$$

$$= \text{R.P of } \frac{e^{ix}}{3} \left[ 1 + \left( \frac{D^2 + 2Di}{3} \right)^{-1} \right] x^2$$

$$= \text{R.P of } \frac{e^{ix}}{3} \left[ 1 - \frac{D^2}{3} - \frac{2Di}{3} + \frac{D^4}{9} - \frac{4D^2}{9} + \frac{4D^3i}{3} \right] x^2$$

$$D(x^2) = 2x$$

$$D^2(x^2) = 2$$

$$= \text{R.P of } \frac{e^{ix}}{3} \left[ x^2 - \frac{2}{3} - \frac{2xi}{3} - \frac{8}{9} \right]$$

$$= \text{R.P of } \frac{1}{3} (\cos x + i \sin x) \left( x^2 - \frac{14}{9} - \frac{2xi}{3} \right)$$

$$P.I = \frac{1}{3} \left[ \left( x^2 - \frac{14}{9} \right) \cos x + \frac{2x}{3} \sin x \right]$$

$$\boxed{y = C.F + P.I}$$