



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

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Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

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COIMBATORE-641 035, TAMIL NADU



DEPARTMENT OF MATHEMATICS

Type II : $R(x) = \sin ax$ (or) $\cos ax$

Replace $D^2 \rightarrow -a^2$

Solve : $(D^2 + 4)y = \sin 3x$

Soln: The A.E is,

$$m^2 + 4 = 0$$

$$m^2 = -4$$

$$m = \pm 2i = 0 \pm 2i$$

$$\alpha = 0, \beta = 2$$

$$C.F = e^{\alpha x} (A \cos \beta x + B \sin \beta x)$$

$$= e^{0x} (A \cos 2x + B \sin 2x)$$

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

$$P.I = \frac{\sin 3x}{D^2 + 4}$$

$$= \frac{\sin 3x}{-9 + 4}$$

$$P.I = \frac{\sin 3x}{-5}$$

Hence the solution is

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

$$y = A \cos 2x + B \sin 2x - \frac{\sin 3x}{5}$$

$$\sin ax = \sin 3x$$

$$a = 3$$

$$D^2 \rightarrow -a^2 \rightarrow -3^2 = -9$$



DEPARTMENT OF MATHEMATICS

② Find the P.I of $(D^2+1)^2 y = \sin 2x$

Soln:

$$\begin{aligned} \text{P.I} &= \frac{\sin 2x}{(D^2+1)^2} \\ &= \frac{\sin 2x}{(-4+1)^2} \end{aligned}$$

$$\boxed{\text{P.I} = \frac{\sin 2x}{9}}$$

$$\begin{aligned} \sin ax &= \sin 2x \\ a &= 2 \\ D^2 &\rightarrow -a^2 \rightarrow -2^2 \\ &= -4 \end{aligned}$$

③ Find the P.I of $(D^2+4)y = \cos 2x$

Soln:

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

$$= \frac{\cos 2x}{-4+4}$$

$$= \frac{\cos 2x}{0} \quad (\text{failure})$$

$$= \frac{x \cos 2x}{2D}$$

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

$$= \frac{x}{2} \cdot \frac{\sin 2x}{2}$$

$$\boxed{\text{P.I} = \frac{x \sin 2x}{4}}$$

$$\begin{aligned} \cos ax &= \cos 2x \\ a &= 2 \\ D^2 &\rightarrow -a^2 \rightarrow -2^2 \\ &= -4 \end{aligned}$$