



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

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

Accredited by NBA (B.E - CSE, EEE, ECE, Mech & B.Tech.IT)



$$3) (D+1)y = \cot x$$

sol: The auxiliary equation is $m^2 + 1 = 0$

$$m^2 = -1$$

$$m = \pm i$$

The roots are imaginary.

$$C.F = e^{0x} [A \cos x + B \sin x]$$

$$= A \cos x + B \sin x$$

$$f_1 = \cos x$$

$$f_2 = \sin x$$

$$f_1' = -\sin x$$

$$f_2' = \cos x$$

$$W = \begin{vmatrix} f_1 & f_2 \\ f_1' & f_2' \end{vmatrix}$$

$$= \cos^2 x + \sin^2 x$$

$$= 1$$

$$P.I = P f_1 + Q f_2$$

$$P = - \int \frac{f_2 x}{W} dx$$

$$= - \int \frac{\sin x \cot x}{1} dx$$

$$= - \int \sin x \times \frac{\cos x}{\sin x} dx$$

$$= - \int \cos x dx$$

$$= -\sin x$$

$$P = -\sin x$$

$$Q = \int \frac{f_1 x}{W} dx$$

$$= \int \frac{\cos x \cot x}{1} dx$$

$$= \int \frac{\cos^2 x}{\sin x} dx$$

$$= \int \frac{1 - \sin^2 x}{\sin x} dx$$

$$= \int \left(\frac{1}{\sin x} - \frac{\sin^2 x}{\sin x} \right) dx$$

$$= \int \operatorname{cosec} x dx - \int \sin x dx$$

$$= -\log (\operatorname{cosec} x + \cot x) - (-\cos x)$$



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$$P.I = -\sin x \cos x + [-\log (\operatorname{cosec} x + \cot x) + \cos x] \sin x$$

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

$$y = A \cos x + B \sin x - \sin x \cos x + [-\log (\operatorname{cosec} x + \cot x) + \cos x] \sin x$$

$$4) \text{ Solve: } (D^2 + 4)y = \tan 2x.$$

Sol: The auxiliary equation is

$$m^2 + 4 = 0$$

$$m^2 = -4$$

$$m = \pm 2i$$

$$C.F = e^{0x} [A \cos 2x + B \sin 2x]$$

$$= A \cos 2x + B \sin 2x$$

$$f_1 = \cos 2x$$

$$f_2 = -\sin x$$

$$f_1' = -2 \sin 2x$$

$$f_2' = 2 \cos 2x$$

$$W = \begin{vmatrix} f_1 & f_2 \\ f_1' & f_2' \end{vmatrix}$$

$$= \begin{vmatrix} \cos 2x & -\sin x \\ -2 \sin 2x & 2 \cos 2x \end{vmatrix}$$

$$= 2 \cos^2 2x + 2 \sin^2 2x$$

$$= 2 (\cos^2 2x + \sin^2 2x)$$

$$= 2(1)$$

$$W = 2$$



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$$P.I = P.f_1 + Q.f_2$$

$$P = - \int \frac{f_2 x}{w} dx$$

$$= - \int \frac{\sin 2x \tan 2x}{2} dx$$

$$= - \frac{1}{2} \int \frac{\sin^2 2x}{\cos 2x} dx$$

$$= - \frac{1}{2} \int \frac{1 - \cos^2 2x}{\cos 2x} dx$$

$$= - \frac{1}{2} \int \frac{1}{\cos 2x} dx - \frac{\cos^2 2x}{\cos 2x} dx$$

$$= - \frac{1}{2} \int \sec 2x dx - \cos 2x dx$$

$$= - \frac{1}{2} \left[\frac{\log (\sec 2x + \tan 2x)}{2} - \frac{\sin 2x}{2} \right]$$

$$P.I = P.f_1 + Q.f_2$$

$$= - \frac{1}{2} \left[\frac{\log (\sec 2x + \tan 2x)}{2} - \frac{\sin 2x}{2} \right] \cos 2x - \frac{\cos 2x \sin 2x}{2}$$

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

$$y = A \cos 2x + B \sin 2x - \frac{1}{2} \left[\frac{\log (\sec 2x + \tan 2x)}{2} - \frac{\sin 2x}{2} \right] \cos 2x - \frac{\cos 2x \sin 2x}{2}$$