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DPP - 12 Maths - IV Unit - 1

Topic - Complementary Function (CF)

Q-1 : Solve $2s + t - 3q = 0$

Sol : $2\frac{\delta^2 z}{\delta x \delta y} + \frac{\delta^2 z}{\delta y^2} - 3\frac{\delta z}{\delta y} = 0$

$(2DD' + D'^2 - 3D')z = 0$

$D'\left(D + \frac{1}{2}D' - \frac{3}{2}\right)z = 0$

CF corresponding to $D' = f_1(x)$

CF corresponding to $\left(D + \frac{1}{2}D' - \frac{3}{2}\right) = e^{3x/2} f_2\left(y - \frac{x}{2}\right)$

$PI = 0$

Complete solution $\Rightarrow z = CF + PI$

$$\boxed{z = f_1(x) + e^{3x/2} f_2\left(y - \frac{x}{2}\right)}$$

Q-2 : Solve $DD'(2D + D' + 11)^2 z = 0$

$DD'\left(D + \frac{D'}{2} + \frac{11}{2}\right)^2 z = 0$

CF corresponding to $D = f_1(y)$

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CF corresponding to $D' = f_2(x)$

CF corresponding to $\left(D + \frac{D'}{2} + \frac{11}{2}\right)^2 = e^{-11x/2} f_3\left(y - \frac{x}{2}\right) + x e^{-11x/2} f_4\left(y - \frac{x}{2}\right)$

$PI = 0$

Complete solution $\Rightarrow$ $Z = CF + PI$

$$Z = f_1(y) + f_2(x) + e^{-11x/2} f_3\left(y - \frac{x}{2}\right) + x e^{-11x/2} f_4\left(y - \frac{x}{2}\right)$$

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