GATEWAY CLASSES
Empowering learners, transforming futures

Maths - IV

DPP - 9

Topic - Particular Integral (PI) Case-1

Q-1 : $\frac{\delta^2 z}{\delta x^2} + 3\frac{\delta^2 z}{\delta x \delta y} + 2\frac{\delta^2 z}{\delta y^2} = x+y$

$(D^2 + 3DD' + 2D'^2)z = x+y$

Put $D = m$, $D' = 1$

$(m^2 + 3m + 2)z = x+y$

Auxiliary Equation : $m^2+3m+2 = 0$

$m^2+2m+m+2 = 0$

$m(m+2)+1(m+2) = 0$

$(m+1)(m+2) = 0$

$m = -1, -2$

$$\boxed{CF = f_1(y-x) + f_2(y-2x)}$$

$$PI = \frac{1}{D^2+3DD'+2D'^2}(x+y)$$

Put $D = 1$, $D' = 1$, $x+y = u$

$$PI = \frac{1}{1+3+2}\iint u\,du\,du$$

Gateway Classes

Download Our App from Google PlayStore
Helpline Number : 7455961284
PDF Notes | PYQs Solution | Recorded Lectures

$$PI = \frac{1}{6} \iint u\, du\, du$$

$$PI = \frac{1}{6} \int \frac{u^2}{2}\, du$$

$$PI = \frac{1}{6} \frac{u^3}{2 \times 3}$$

$$PI = \frac{u^3}{36}$$

$$PI = \frac{(x+y)^3}{36}$$

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

$$z = f_1(y-x) + f_2(y-2x) + \frac{(x+y)^3}{36}$$

Ans

Q-2- Solve $\frac{\delta^2 z}{\delta x^2} - 2\frac{\delta^2 z}{\delta x \delta y} + \frac{\delta^2 z}{\delta y^2} = \sin x$

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

$$(D^2 - 2DD' + D'^2)z = \sin x$$

Put $D = m$, $D' = 1$

$$(m^2 - 2m + 1)z = \sin x$$

Auxiliary Equation -

$$m^2 - 2m + 1 = 0$$

Gateway Classes

GATEWAY CLASSES
Empowering learners, transforming futures

$(m-1)^2 = 0$

$m = 1, 1$

$$\boxed{C.F. = f_1(y+x) + x f_2(y+x)}$$

$$PI = \frac{1}{D^2 - 2DD' + D'^2} \sin x$$

$$PI = \frac{1}{D^2 - 2DD' + D'^2} \sin(x + 0y)$$

Put $D = 1$, $D' = 0$, $x + 0y = u$

$$PI = \frac{1}{1} \iint \sin u \, du$$

$$PI = \int -\cos u \, du$$

$$PI = -\sin u$$

$$PI = -\sin(x + 0y)$$

$$PI = -\sin x$$

Complete Solution :- $z = CF + PI$

$$z = f_1(y+x) + x f_2(y+x) - \sin x$$

Ans.

Gatway Classes

Download Our App from Google PlayStore