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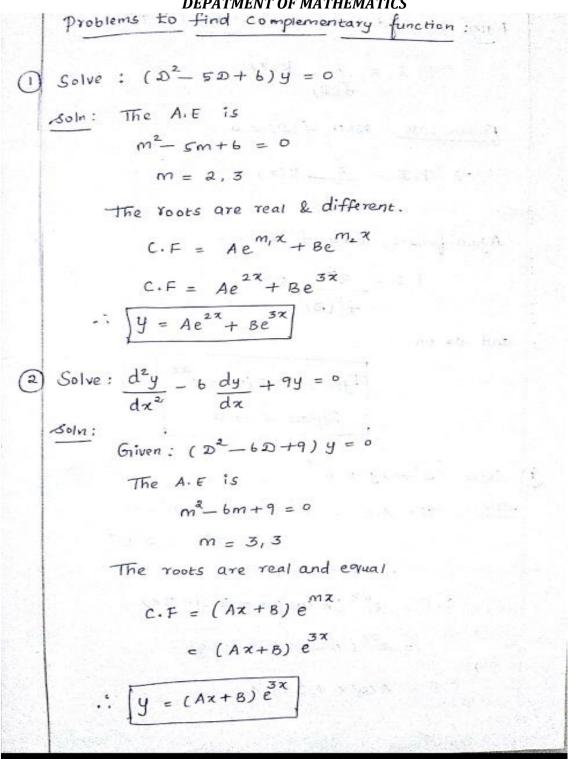
	OF MATHEMATICS
UNIT	$=\overline{\Sigma}$
SECOND ORDER L	INEAR ORDINARY
D)	IFFERENTIAL EQUATIONS
and region 4	
Second order linear dit	fferential equation with
Constant Coefficients	
Consider a secon	nd order linear differential
equation is,	
$(a_0 D^2 + a_1 D + a_2)$	) y = R(n)
To find complementary fu	inction:
The auxiliary ear	The state of the s
$a_0 m^2 + a_1 m + a_2$	
Nature of waste	(E) 110 110 1
Nature of roots	Complementary function
1 m, & m, are real and different	C. F = Aem, x + Be m2 x
Sid different	(10518)
(2) m, and ma are real	$C \cdot F = (Ax + B)e^{mx}$
and equal	
3 m, and m2 are complex,	K Z
let m, = x + ip	C.F = e XX (A cos Bx +
$m_2 = \alpha - i\beta$	B sin px)
*	Production of the sales
5-4-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5	E CONTRACTOR OF THE CONTRACTOR





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Rules to find particular integral (P.I):

$$P.I = \frac{1}{f(D)} R(x)$$

$$Failure Case: Nhen  $f(D) = 0$ .

$$\Rightarrow P.I = \frac{x}{f'(D)}$$
Again failure, When  $f'(D) = 0$ 

$$P.I = \frac{x^2}{f''(D)}$$
and so on.

$$Type I: R(x) = e^{ax}$$

$$Replace D \rightarrow a$$

$$Solve (D^2+1)y = e^{-x}$$

$$Soln: The A.E is  $m^2+1 = 0 \Rightarrow m^2=-1$ 

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

$$x = 0, \beta = 1$$

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

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

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





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$$P.T = \frac{e^{-x}}{D^{2}+1}$$

$$= \frac{e^{-x}}{(-1)^{2}+1} = \frac{e^{-x}}{2}$$

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

$$y = A \cos x + B \sin x + \frac{e^{-x}}{2}$$

$$Solve: (D^{2} + 4D + 4)y = 11e^{-2x}$$

$$Soln: The A.E is$$

$$m^{2} + 4m + 4 = 0$$

$$(m+2)^{2} = 0$$

$$m = -2, -2$$

$$The voots are real and equal.$$

$$c.F = (Ax + B)e^{mx}$$

$$c.F = (Ax + B)e^{-2x}$$

$$P.T = \frac{11e^{-2x}}{D^{2} + 4D + 4}$$

$$= \frac{11e^{-2x}}{(-2)^{2} + 4(-2) + 4}$$

$$= \frac{11e}{4 - 8 + 4} = \frac{-2x}{0}$$
(foilume case)





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$$= \frac{11 \times e^{2x}}{2D + y}$$

$$= \frac{11 \times e^{2x}}{2(-2) + y} = \frac{11 \times e^{-2x}}{-y + y} = \frac{11 \times e^{-2x}}{-y + y} = \frac{11 \times e^{-2x}}{-y + y}$$

$$P \cdot I = \frac{11 \times e^{-2x}}{2}$$

$$y = c \cdot F + P \cdot I$$

$$y = (Ax + B)e^{-2x} + \frac{11 \times e^{-2x}}{2}$$

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$$y = y$$

$$y = (Ax + B)e^{-2x} + \frac{11 \times e^{-2x}}{2}$$

$$y = y$$

$$y$$