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Non- Homofeneous linear diff. Equation With Constant Confficients
   If D is a differential operator, then its inverse D^{\prime} is an integral operator. St D^{\prime} D(f(x)) = f(x)
             ie. _ on 5' (f) = ff(x)dx.
            from (1); y = (F(D)) Q(x) = Q(x)
    If Q(x) = exx
         Then Substitute D=d. .. Soi is y(x) = Q(x) Provided

F(a) F(a) +0.
   y"-2y'-3y= 3e2x
      General solution of mon-homogeneous diff Equation

= General solution of hom. diff Equation to Particular Integral

= Complementory fun & P.I.
                                    les GF+P.I
     # (D-20-3)y=0
          Aux Epr is m2-2m-3-0
                       -) (m-3) (m+1)=0
                           =) m=3,-1
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P.I is 
$$y_p(x) = 3e^{9x} = 3e^{9x}$$
  
F(D)  $D^2 = 3D - 3$ 

$$= \frac{3e^{3x}}{4-4-3} = -e^{3x}$$

Que  $y'' + y' - 6y = 5e^{-3x}$   $(D^2 + D - 6)y = -5e^{-3x}$ Chav. Equ is

$$m^2 + m - 6 = 0$$

$$\Rightarrow$$
  $(m+3)(m-2)=0$ 

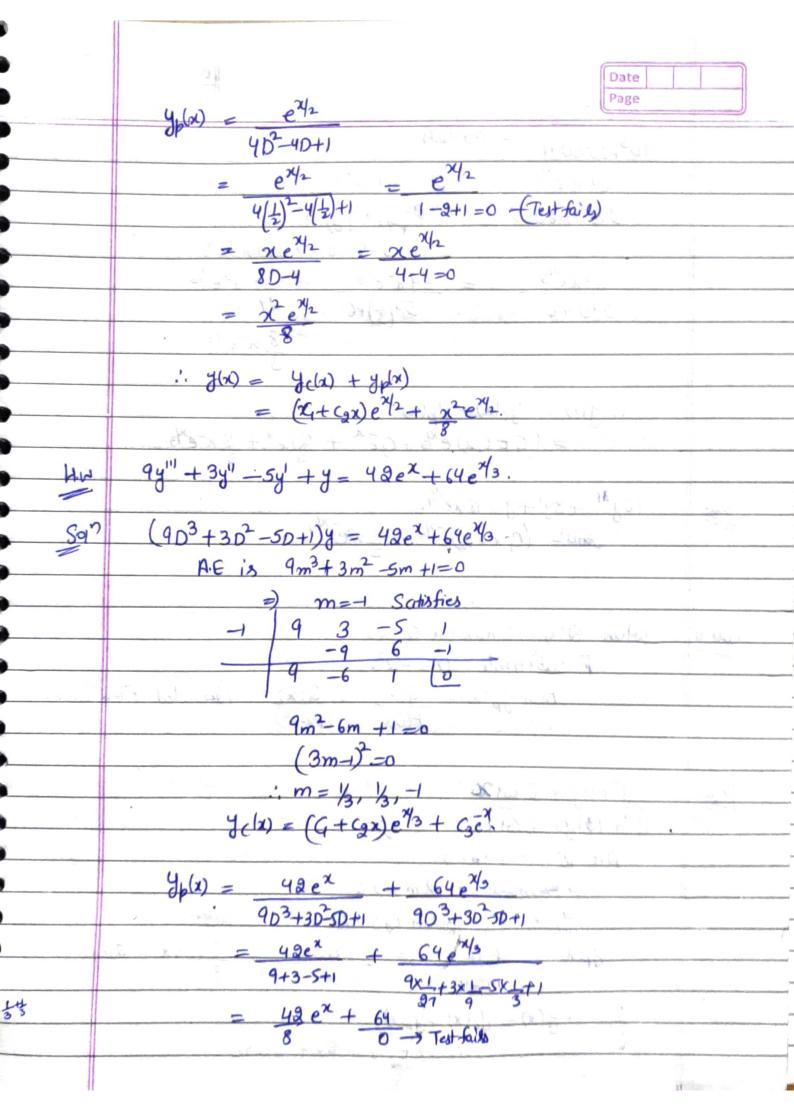
$$\Rightarrow m=2,-3$$

 $\frac{3. \text{ ye}(x) = \text{Ge}^{3x} + \text{Ge}^{3x}}{\text{y(x)}} = \frac{5e^{3x}}{5e^{3x}} = \frac{5e^{3x}}{5e^{3x}} = \frac{5e^{3x}}{5e^{3x}} = \frac{5e^{3x}}{5e^{3x}}$ 

$$\frac{20+1}{30+1} = \frac{5xe^{3x}}{-15} = -xe^{3x}$$

: Gen Sol" is  $y(x) = y_c(x) + y_p(x)$  $\Rightarrow y(x) = Ge^{2x} + Ge^{3x} - xe^{3x}$ 

Que  $4y''-4y'+y=e^{x/2}$   $\Rightarrow (40^2+0+1)y=e^{x/2}$ Sol Chau Equ' is  $4m^2-4m+1=0$   $\Rightarrow (2m+1)^2=0 \Rightarrow m=y_2/y_2$  $y_c(x)=qe^{x/2}+q_{2me}^{2m}=q_{2me}^{2m}=q_{2me}^{2m}=q_{2me}^{2m}$ 



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: 
$$y(x) = y(x) + y_p(x)$$
  
=  $(G + Gx) e^{x} + Ge^{x} + 31e^{x} + 8x^{2}e^{x}$ .

Que

Cose II

When 
$$Q(x) = Sindx$$
 on  $Cosax$ .

P Substitute  $D = -d^2$ .

Then  $Y_p(x) = Q(x) = Q(x)$  Pswvided  $F(-a^2) \neq 0$ .

 $F(D) = F(-a^2)$ 

Que Sol?

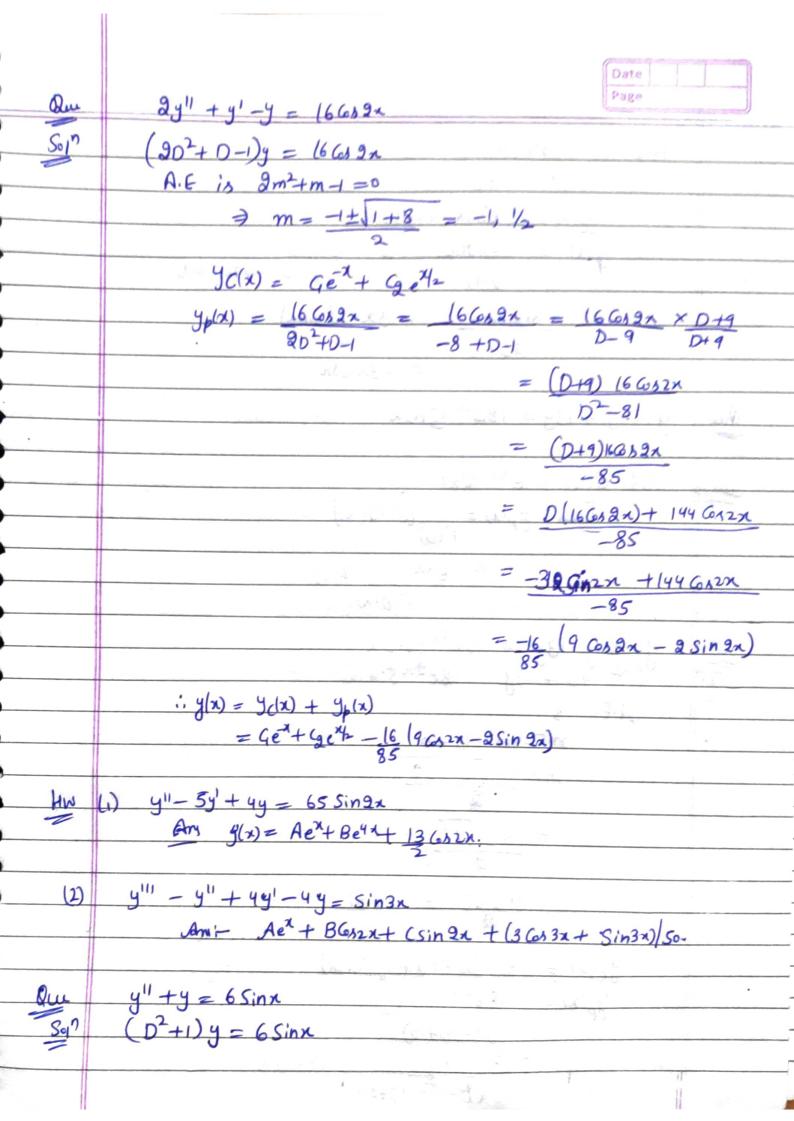
$$y'' + 4y = 6 \text{ God } x$$
  
 $(D^2 + 40)y = 6 \text{ God } x$   
 $A \cdot E \cdot is \quad m^2 + 400 = 0$ 

7 m=0, 4 7 m=±2i

$$\mathcal{G}(x) = \mathcal{G}(x) + \mathcal{G}(x)$$

$$y_p(x) = 6 God x = 6 God x = 6 God x = 2 God x = 2 God x = 3 God x = 2 God x = 3 God$$

$$y(x) = y_c(x) + y_b(x)$$



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A.E is m3+1=0 > m=±i yelro = GCOSX + GSinx y(x) = 65inx = 65inx  $-1+1=0 \rightarrow \text{ Test-foils}$ x.65inn = 3x 1(Sinn)20 = -3x G3x

y"-4y'+13y = 182x 5:n3x

If  $Q(x) = e^{dx} h(x)$ Then  $yp(x) = \int [e^{dx} h(x)]$ 

= edx / h(x)
F(0+d)

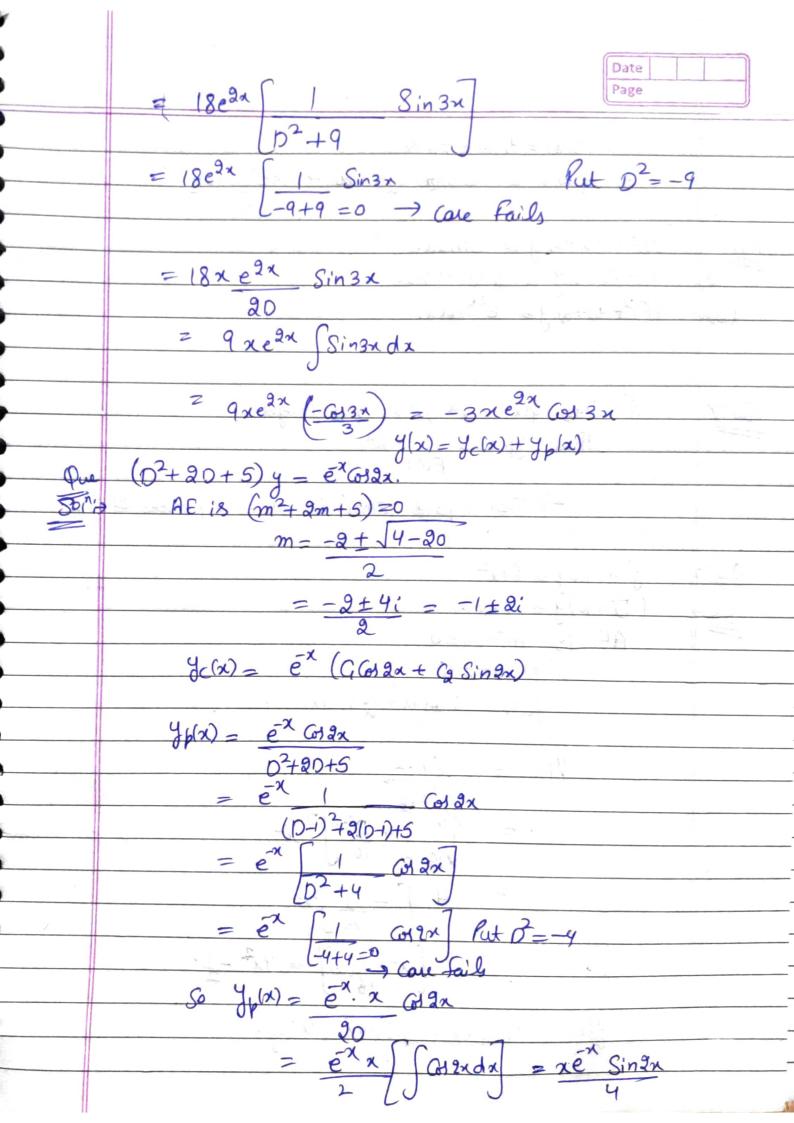
y"- 491 +13 y = 18e<sup>2x</sup> Sin3x (D-4D+13)y = 18e<sup>2x</sup> Sin3x A.E. is m<sup>2</sup>-4m+13=0

 $m = \frac{4 + \sqrt{16 - 52}}{2}$ = 4± 36

= 4±61 = 2±3;

 $y_{c(x)} = e^{2x} (G_{col3x} + G_{sin3x})$ 

 $\frac{y_{p}(x) = 18e^{2x} \sin 3x}{(D^{2}-4D+13)}$ = 18e<sup>2x</sup> 1 Sin3x  $(D^{2}-4D+13)$ 



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$$\frac{1}{2} \frac{y(x) = y_{c}(x) + y_{p}(x)}{y(x) = e^{x}(x) + y_{p}(x)} + xe^{x}x^{2} + xe^{x}x^{2}$$

 $\begin{array}{ccc} \mu_{M} & (\partial (90^{2}-70+3)y = Sin 3x. \\ & (3) & (0)^{2}-40+5)y = 34e^{3x} Sinx. \\ & (3) & (0)^{2}+40+3)y = e^{2x} Gx. \end{array}$ 

Gon  $\overline{y}$  If  $\overline{F(x)} = x^{\alpha}$ ,  $\alpha \neq 0$  and Integer.

Then  $y_{\beta}(x) = 1 \cdot x^{\alpha}$ . F(0)

-> Then Expand (F(D)) in arending powers of D.

 $\frac{g_{m+1}}{g_{m+1}} = \frac{g_{m+2}}{g_{m+1}}$   $= \frac{g_{m+1}}{g_{m+1}} = \frac{g_{m+2}}{g_{m+1}}$   $= \frac{g_{m+1}}{g_{m+1}} = \frac{g_{m+1}}{g_{m+1}}$   $= \frac{g_{m+1}}{g_{m+1}} = \frac{g_{m+1}}{g_{m+1}}$ 

yda) = GGHX+GSin4x.

 $\frac{36(x) = 64 x^{2}}{0^{2} + 16}$   $= 64 \left[ 1 + 16^{2} \right]^{-7} x^{2}$   $= 64 \left[ 1 + 16^{2} \right]^{-7} x^{2}$ 

 $= 4 \left[ 1 - \frac{0^2}{16} \right] x^2$ 

 $= 4 \left[ x^2 - \frac{1}{16} \left( 9 \right) \right] = 4x^2 - \frac{1}{2}.$ 

y(x) = Gayx + GSingx +4x2-1.

