Assignment 2 Mathematical Methods

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19MA 20050

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1) i)
$$2y'' + 18y = 6 \tan (3t)$$
 $\Rightarrow y'' + 8 = 3 \tan (3t)$

Characteristic eq 2: $\chi^2 + g = 0 \implies \lambda = \pm 3i$

So,
$$y_1 = e^{0.t} \sin(3t) = \sin 3t$$
 ? LE soles of $y_2 = e^{0.t} \cos 3Ct$ = $\cos 3t$] $y'' + 9y = 0$

Gen. sol= $\int_{-\infty}^{\infty} h_{DM} \cos \mu \cos t dt$

Gen. sol= of homogeneous past

yc= cy, +czyz= cy sin(8t)+ cz & cos (3t)

Particular integral, yp = u(t).y.(t) + v(t)y.(t)

yp = u(t) sin(3t) + v(t) ws(3t)

By method of variation of parameters, $u'y_1 + v'y_2 = 0 \Rightarrow u'\sin(3t) + v'(\cos(3t)) = 0 \rightarrow 0$ Ex $u'y_1' + v'y_2' = 3\tan(3Ct) \Rightarrow 3u'\cos(3t) - 3v'\sin(3t)$ $= 3\tan(3t)$

 $\Rightarrow u'\cos(3t)-v'\sin(3t)=\tan(3t)$ $\downarrow \rightarrow (2)$

vire-ul tan C3t)

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$$\Rightarrow u' = \sin(3t) \Rightarrow u = \int \sin(3t)dt = -\cos(3t)$$

$$\frac{1}{10} \cdot \frac{1}{10} = \frac{10}{10} = \frac{10}{10} \cdot \frac{1}{10} = \frac{10}{10}$$

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(88)	General $80 2 \Rightarrow y = yc + yp$ $\Rightarrow y = G \sin(3t) + C_2 \cos(3t)$
4	- wsst) in sec (3t) + tan (3t)

19MA 20059 ty"- $(t+1)y'+y=t^2$ $\Rightarrow y''-(t+1)y'+y=t$ Solutions of the homogeneous part: $-y_1=me$ $y_2=t^4$ Particular integral: y = u(t) y(t) + v(t) y(t) $\Rightarrow yp = u(t) e^{t} + v(t) (t+1)$ By method of variation of parameters $u'y + v'y = 0 \Rightarrow u'e^{t} + v'(t+1) = 0 \qquad \rightarrow 0$ $u'y + v'y = t \Rightarrow u'e^{t} + v' = t \Rightarrow v' = t - u'e^{t}$ $u'y + v'y = t \Rightarrow u'e^{t} + v' = t \Rightarrow v' = t - u'e^{t}$

using v'= t-u'et in 1 u'et + (t-u'et)(++1)=0 => u= ((t+1)e-t dt = -(t+1)e-t + (e-t dt = -(t+2)e-t now, v'= = + (EAD) (C-1) = 24+2 => V = J2++2 dt = 212+2t = +2t = +2+2t Using u'et = t-v' in \$(1) Particular integral: - 45 2-86-82 yp = - (t+2) - t (t+1) = -t2-2t-2 Gen. Sol= :- y = yc+yp = y= cie+c2 (t+1) - t2-2t-2 y"+a(x) y"+ b(x)y'+((x)y= r(x) et the above eq = be considered Suppose the corresponding homogeneous ODE

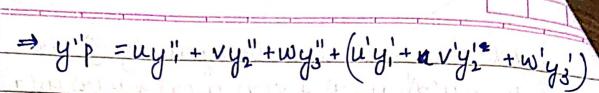
of 1 has 3 L.I soles y.(x), y2(x) & y3(x)

El M. "113 " 11 19MA 20059 2 min 25 mille (miller Let the particular integral of (1) be

yp = u(x) y,(x) + v(x) y,(x) + w(x) y,(x) ypi= uy + vyz+ wyz (+) d + "n(x)nx" () (N+ y'p = uy' + vy' + wy's + (u'y, + v'y2 + w'y3) u'y, +v'y, +w'y3=0

hen,

y'p = uy', +vy', +wy',



Again we set $u'y'_1 + v'y'_2 + w'y'_3 = 0 \longrightarrow 3$

we get y" + vy" + wy,"

> y"p = uy" + vy" + wy3" + u'y" + v'y," + w'y"

Putting expressions & yp, yp", yp" in 1 we

u(y,"+ a(x) y,"+ b(x) y,+ c(x)y,)+ v(y,"+a(x)y,"+b(x)y, +b(x)y, +b(x)

 $+w(y''+a(x)y''+b(x)y'+c(x)y_3)+u'.y''+v'.y_2''+w'y''=k(x)$

Now, as y, y2 & ys are solos of homogeneous

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 $y_i^{"} + a(x)y_i^{"} + b(x)y_i^{'} + c(x)y_i^{'} = 0$, for c = 1, 2, 3

Thuis $G \Rightarrow u'.y''+v'y''+w'y''=\kappa(x) \rightarrow G$ becomes

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	solving for u'(2), v'(2) & w'(2)	using 3.8
		$V' = W_2$, $w' = W_3$
	where W = determinant of coefficient = W(y, y2, y3) i.e wro	ent matria onskian d y, y2, y3
	\mathcal{E}_{i} = determinat obtained f_{i} by replacing i^{th} column [0 0 $h(x)$] ; for $i = 1$.	
	Then, $u = \int \frac{W_1}{W(y_1, y_2, y_3)} dx$, $v = \int \frac{w}{W}$	
Marie	W= JW one W(y,y2,y3) Pouricular integral & (i)	
The second secon		obtained from
	Hence proved.	grale above