$$x_3' = b_1 x_3 - b_2 x_4, \qquad x_4' = b_1 x_4 + b_2 x_3$$

$$x_1 = 1, \quad x_2 = t, \quad x_3 = e^{b_1 t} \cos b_2 t, \quad x_4 = e^{b_1 t} \sin b_2 t,$$

$$x_5 = e^{b_3 t} \cos b_4 t, \quad x_6 = e^{b_3 t} \sin b_4 t$$

$$x(t) = \sum_{i=1}^{6} a_i x_i(t)$$

$$x_5' = b_3 x_5 - b_4 x_6$$
$$x_6' = b_3 x_6 + b_4 x_5$$

$$x'(t) = \sum a_i x_i'(t)$$

$$x''(t) = \sum a_i x_i''(t)$$

$x(0) = 0:$ $\boxed{a_1 + a_3 + a_5 = 0}$

$x(1) = 20:$ $a_1 + a_2 + a_3 \underbrace{(e^{b_1} \cos b_2)}_{C_1} + a_4 \underbrace{(e^{b_1} \sin b_2)}_{C_2}$

$$+ a_5 \underbrace{(e^{b_3} \cos b_4)}_{C_3} + a_6 \underbrace{(e^{b_4} \sin b_4)}_{C_4} = \boxed{20}$$

$x'(0) = 0:$ $a_2 + a_3($

$$x_1'' = 0, \quad x_2'' = 0, \quad x_3'' = (b_1 x_3 - b_2 x_4)' = b_1 x_3' - b_2 x_4' =$$

$$\Rightarrow x_3'' = b_1 (b_1 x_3 - b_2 x_4) - b_2 (b_1 x_4 + b_2 x_3)$$

$$\Rightarrow \boxed{x_3'' = (b_1^2 - b_2 b_2) x_3 - 2 b_1 b_2 \cancel{b_2} x_4}$$

$$x_4'' = (b_1 x_4 + b_2 x_3)' = b_2 x_3' + b_1 x_4' =$$

$$\Rightarrow x_4'' = b_2 (b_1 x_3 - b_2 x_4) + b_1 (b_1 x_4 + b_2 x_3)$$

$$\Rightarrow \boxed{x_4'' = 2 b_1 b_2 x_3 + (b_1^2 - b_2^2) x_4}$$

$$x_5'' = (b_3 x_5 - b_4 x_6)' = b_3 x_5' - b_4 x_6' =$$

$$x_5'' = b_3 (b_3 x_5 - b_4 x_6) - b_4 (b_3 x_6 + b_4 x_5)$$

$$\Rightarrow \boxed{x_5'' = (b_3^2 - b_4^2) x_5 - 2 b_3 b_4 x_6}$$

$$x_6'' = (b_3 x_6 + b_4 x_5)' = b_3 (b_3 x_6 + b_4 x_5) + b_4 (b_3 x_5 = b_4 x_6)$$

$$\Rightarrow x_6'' = 2 b_3 b_4 x_5 + (b_3^2 - b_4^2) x_6$$

$$x'(0) \Rightarrow a_2 + a_3 \boxed{x_3'(0)} + a_4 x_4'(0) + a_5 x_5'(0) + a_6 x_6'(0) = 0$$

$$0 = a_2 + a_3 (b_1 x_3(0) - b_2 x_4(0)) + a_4 (b_1 x_4(0) + b_2 x_3(0)) +$$

$$+ a_5 (b_3 x_5(0) - b_4 x_6(0)) + a_6 (b_3 x_6(0) + b_4 x_5(0))$$

$$\boxed{0 = a_2 + a_3 (b_1) + a_4 b_2 + a_5 b_3 + a_6 b_4}$$

$$x'(1) = 0 \Rightarrow a_2 + a_3 (\widehat{x_3'(1)}) + a_4 x_4'(1) + a_5 x_5'(1) + a_6 x_6'(1) = 0$$

$$\Rightarrow 0 = a_2 + a_3 (b_1 x_3(1) - b_2 x_4(1)) + a_4 (b_1 x_4(1) + b_2 x_3(1))$$

$$+ a_5 (b_3 x_5(1) - b_4 x_6(1)) + a_6 (b_3 x_6(1) + b_4 x_5(1))$$

$$\Rightarrow 0 = a_2 + a_3 (b_1 e^{b_1} \cos b_2 + b_2 e^{b_1} \sin b_2)$$
$$+ a_4 (b_1 e^{b_1} \sin b_2 + b_2 e^{b_1} \cos b_2)$$
$$+ a_5 (b_3 e^{b_3} \cos b_4 - b_4 e^{b_3} \sin b_4)$$
$$+ a_6 (b_3 e^{b_3} \sin b_4 + b_4 e^{b_3} \cos b_4)$$

$$x''(0) = 0 \Rightarrow a_3 (\widehat{x_3''(0)}) + a_4 x_4''(0) + a_5 x_5''(0) + a_6 x_6''(0) = 0$$

$$\Rightarrow 0 = a_3 [(b_1^2 - b_2^2) x_3(0) - 2 b_1 b_2 x_4(0)] +$$
$$+ a_4 [2 b_1 b_2 x_3(0) + (b_1^2 - b_2^2) x_4(0)]$$
$$+ a_5 [(b_3^2 - b_4^2) x_5(0) - 2 b_3 b_4 x_6(0)] + \qquad \Rightarrow$$

(3)

$\Rightarrow$ $\quad + a_6 \left[2b_3 b_4 X_5(0) + (b_3^2 - b_4^2) X_6(0) \right]$

$\Rightarrow$ $0 = a_3 (b_1^2 - b_2^2) e^{b_1} \cos b_2 + a_4 \, 2b_1 b_2 \, e^{b_1} \cos b_2$
$\quad + a_5 (b_3^2 - b_4^2) e^{b_3} \cos b_4 +$
$\quad + a_6 \, 2b_3 b_4 \, e^{b_3} \cos b_4 \}$

$X''(1) = 0 \Rightarrow a_3 \left[(b_1^2 - b_2^2) X_3(1) - 2b_1 b_2 X_4(1) \right] +$
$\quad + a_4 \left[2b_1 b_2 X_3(1) + (b_1^2 - b_2^2) X_4(1) \right] +$
$\quad + a_5 \left[(b_3^2 - b_4^2) X_5(1) - 2b_3 b_4 X_6(1) \right]$
$\quad + a_6 \left[2b_3 b_4 X_5(1) + (b_3^2 - b_4^2) X_6(1) \right] = 0$

where $\quad X_3(1) = e^{b_1} \cos b_2 = c_1$
$\quad\quad X_4(1) = e^{b_1} \sin b_2 = c_2$
$\quad\quad X_5(1) = e^{b_3} \cos b_4 = c_3$
$\quad\quad X_6(1) = e^{b_3} \sin b_4 = c_4$.

$\Rightarrow$ system of six eqns [1]-[6] :

[1] $a_1 + a_3 + a_5$ $\qquad\qquad = 0$

[2] $a_1 + a_2 + a_3 c_1 + a_4 c_2 + a_5 c_3 + a_6 c_4$ $\qquad = 20$

$\quad \cancel{a_3 (b_1^2 - b_2^2) c_1 + a_4 \, 2b_1 b_2 \, c_1}$

[3] $\quad a_2 + a_3 b_1 + a_4 b_2 + a_5 b_3 + a_6 b_1$ $\qquad = 0$.

[4] $a_2 + a_3 (b_1 c_1 - b_2 c_2) + a_4 (b_1 c_2 - b_2 c_1)$
$\quad + a_5 (b_3 c_3 - b_4 c_4) + a_6 (b_3 c_4 + b_4 c_3) = 0$.

[5] $a_3 (b_1^2 - b_2^2) c_1 + a_4 \, 2b_1 b_2 \, c_1 + a_5 (b_3^2 - b_4^2) c_3 +$
$\quad + a_6 (2b_3 b_4 c_3)$

6 $\quad a_3\left[(b_1^2-b_2^2)c_1 - 2b_1 b_2 c_2\right]$

$+ a_4\left[2b_1 b_2 c_1 + (b_1^2-b_2^2)c_2\right]$

$+ a_5\left[(b_3^2-b_4^2)c_3 - 2b_3 b_4 c_4\right]$

$+ a_6\left[2b_3 b_4 c_3 + (b_3^2-b_4^2)c_4\right] \quad = 0$

$$\boxed{x(t) = a_1(1) + a_2(t) + a_3 x_3(t) + a_4 x_4(t) + a_5 x_5(t) + a_6 x_6(t)}$$

$\qquad\qquad\underset{x_1(t)}{} \quad \underset{x_2(t)}{}$

$$\boxed{v(t)=x'(t)} = \quad a_2 + a_3 x_3'(t) + a_4 x_4'(t) + a_5 x_5'(t) + a_6 x_6'(t)$$

$v(t) = a_2 + a_3(b_1 x_3 - b_2 x_4) + a_4(b_1 x_4 + b_2 x_3) +$

$\qquad\qquad + a_5(b_3 x_5 - b_4 x_6) + a_6(b_3 x_6 + b_4 x_5)$