

test 92) dx2 - 2x2 + V2 $\mathring{X} = \begin{bmatrix} -1 & 1 \\ 0 & 2 \end{bmatrix} \times + \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ 4 = X1. a) system @ open loop Shible.

 $A = \begin{bmatrix} -1 & 1 & 5 \\ -1 & 1 & 5 \\ 0 & 5 \end{bmatrix} = \begin{bmatrix} 5+1 & -1 \\ 0 & 5-2 \end{bmatrix}$ (S+1)(S-2)=0

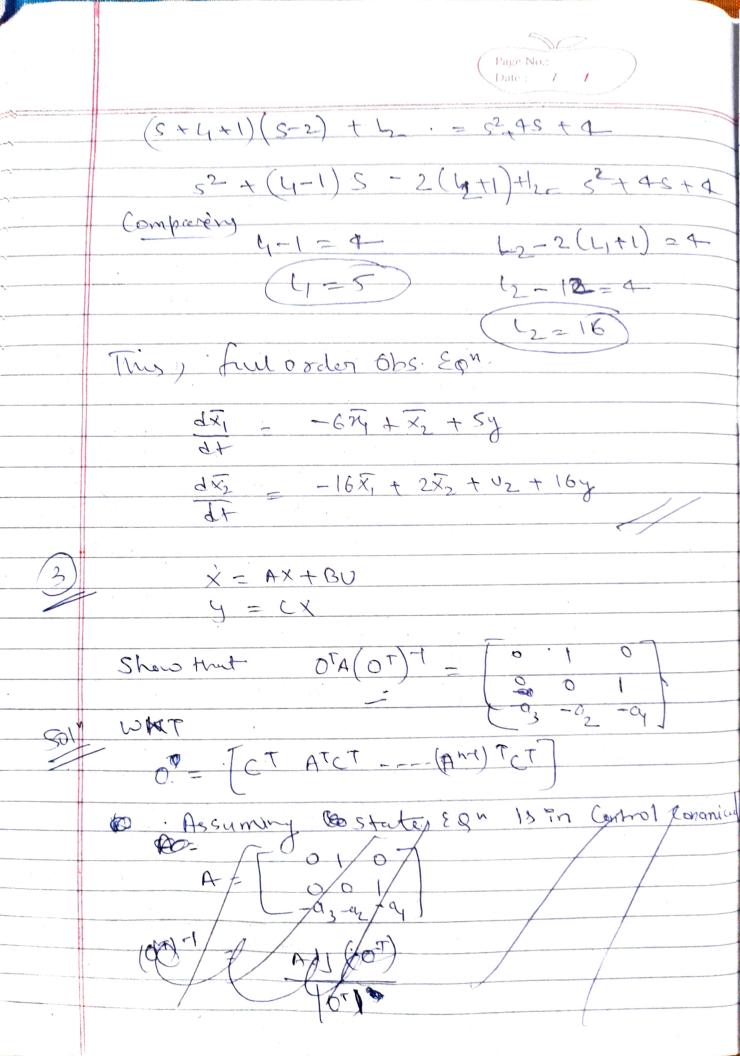
S=(1,2)

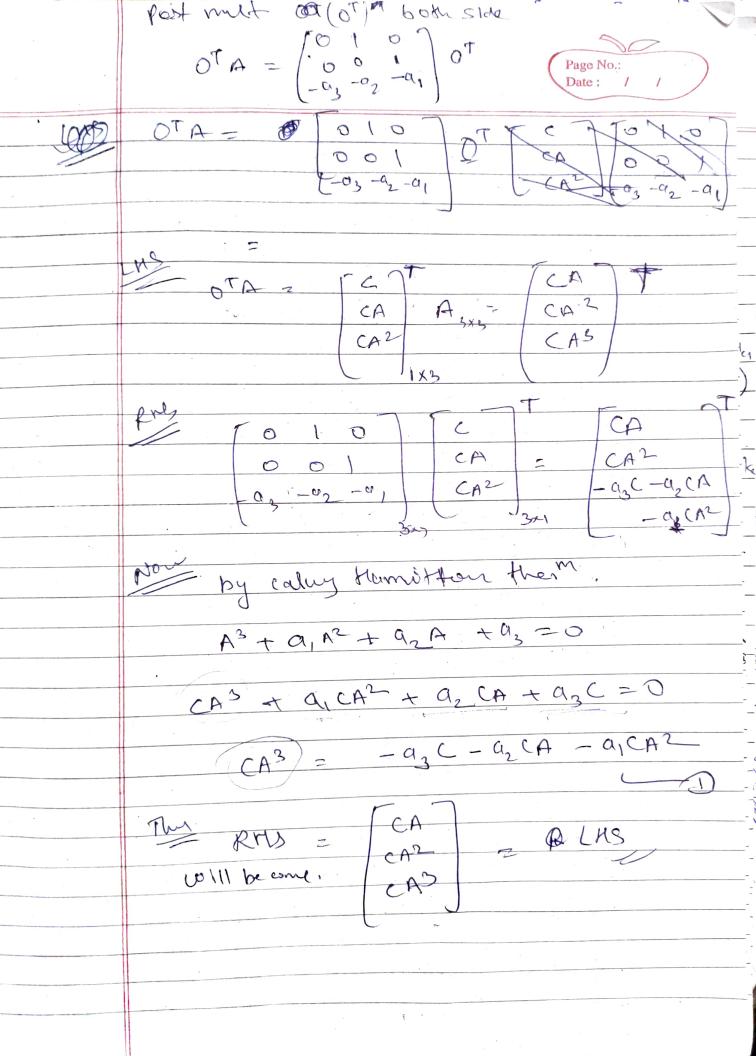
for Stuble, both & must be -ve =) Thus not stable Choosing VI

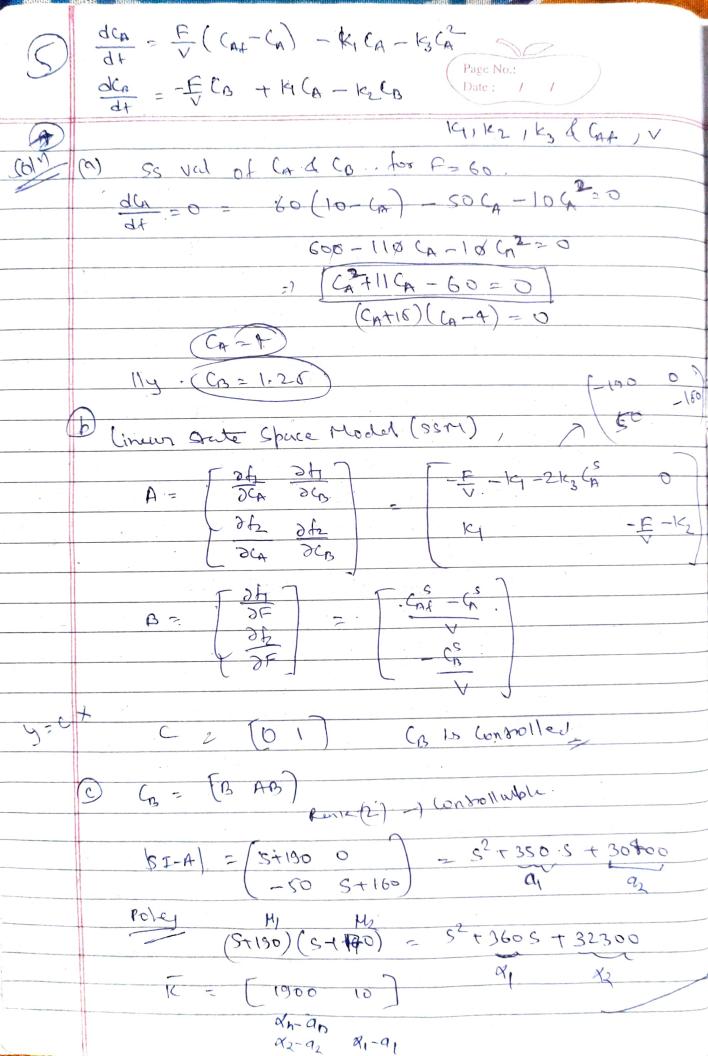
Cn = (B AB) = [1 -1] Remix (Cn) =1 : Systim is not controllable B = [0] G= [2], Renk (.(0) = 2 =) Controllable



full order observer Egy A= [02] 03 1 4 C= [10 Refull order Obs. Egg. (het Dala dx = (A-LC) x + BU + Ly $\frac{dx}{dt} = \left(\begin{bmatrix} -1 & 1 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} -1 & 1 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \end{bmatrix} \right) \overline{x}$ + (0) U2 + (H) y 1x = -1274 + 272 + 12 + 124 To find observer gain, SI-A+LC) - (S+2) (S+2) $\begin{pmatrix} 5 & 0 \\ 0 & S \end{pmatrix} - \begin{pmatrix} -1 & 1 \\ 0 & 2 \end{pmatrix} + \begin{pmatrix} 4 \\ 1_{20} \end{pmatrix} \begin{pmatrix} 1_{20} \end{pmatrix} = S^{2} + 4S + 4$







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Date: / / dry = an n, + a, 2 7, dr2 = a21 24 + a22 2 + bu J= n_ (a) reduced order State oberner & Dynamic & RO Observer. n= (Abb-LAab) n+ [Abb-LAab] + Aba-L Aab) yt B-L& $-=\hat{x}_b-Ly$ error dyramic xn-xn=E=(Abb-LACU) E X = AX+BU Stute Egn. Eg" for measured Kortion. na = Aagna + Aab Nb + Ba AgoXo - Xa - Anang - Bay Satput Egy

Egy for unnecessured portion. Xb = Abella + Agb Xb + BbU Aba na & BbU - one lenown Eg" for full order obser. x = (A-Kec) x + Bu+ Key making proper substitution from table $\overline{X}_{b} = (A_{bb} - k_{e}A_{ab})\overline{X}_{b} + A_{ba}X_{cl} + B_{b}V + k_{e}(\overline{x}_{cl} - A_{ao}N_{cl})$ $\overline{X}_{b} - k_{e}X_{el} = (A_{bb} - k_{e}A_{ab})\overline{X}_{b} + (A_{ba} - k_{e}A_{ac})\overline{Y}_{cl} + (B_{bb} - k_{e}A_{ab})\overline{Y}_{cl}$ $= (A_{bb} - k_{e}A_{ab})\overline{X}_{b} = (A_{bb} - k_{e}A_{ab})\overline{K}_{cl}$ $+ (A_{ba} - k_{e}A_{ac})\overline{Y}_{cl} + (B_{bb} - k_{e}B_{cl})\overline{V}_{cl}$ = (Abb-KeAab) (Xb-Key) + [Abb-KeAab) Ket AbarkeAaa) y + (Bb-keBa) V Now

fake (Xb-Key)=n=(Xb-kexa)

(Xb-key)=n=(\frac{\frac{\frac{\gamma}{10}}{10}-kexa) n = (Abb-ke Aab) n + (Abb-ke Aab) ke +
Abu-ke Aaa) y + (Bb-ke Ba) U reduced Xb = AbbXb + (AbuXa+Baiv) Xb = (Abb-KeAab)Xb + (AbaXa+Bbv)+16 Abb xb-Xb = (Abb-14 Aab)(xb-Xb) = (Abb - Ke Aab) E) dynamic emer