EIC-501

UNIT-4 (Lecture-3)

Routh's Criterion

CONTROL SYSTEM-I



Routh's Criterion

A necessary and sufficient condition for stability:

all the elements of the first column of the Routh' Tabulation are of the same sign.

The number of changes of signs in the elements of the first column equals the number of roots in the right-half s-plane. **CONTROL SYSTEM-I**



Example

$$s^4 + 2s^3 + 3s^2 + 4s + 5 = 0$$



Therefore, the system is **unstable** and has **two** roots in the right-half s-plane.

CONTROL SYSTEM-I

First-order: $a_0 s + a_1 = 0$ If a_0 and a_1 have the same sign, the system is stable. **Second-order:** $a_0 s^2 + a_1 s + a_2 = 0$ If a_0 , a_1 and a 2 have the same sign, the system is stable. $a_0s^3 + a_1s^2 + a_2s + a_3 = 0$ Third-order: s^3 a_0 a_2 s^2 a_3 a_1 If a0,a1,a2,a3 are all positive and $a_0a_3 - a_1a_2$ s^1 a_1 a1a2>a3a0,the system is stable. s^{0} a_3

EIC-501