Ministry of Higher Education
& Scientific Research
Tikrit University
College of Engineering
Mechanical Engineering Dept.

جامعة تكريت

Final Exam
2015-2016

Class : 4th year
Subject: *Engineering Control*
Time:3Hours.
Date : 22 / 5 / 2016
Form: (1)

Q.2 - For the position control system shown in figure (2). [10 marks]

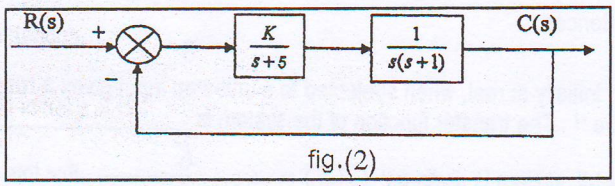
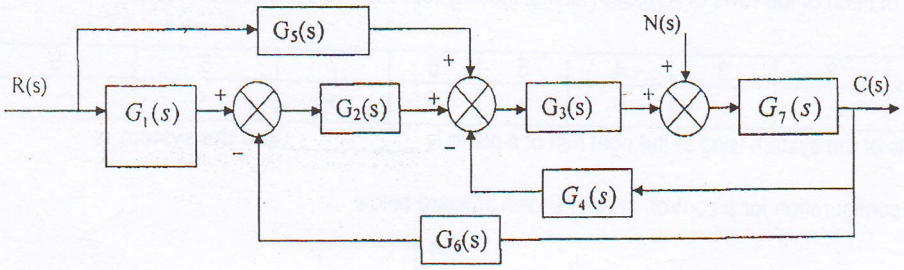


fig.(2)

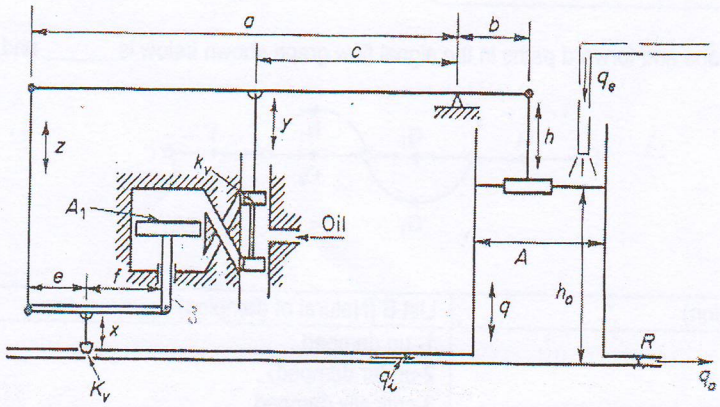
(a) Draw the root locus .
(b) Find the value of K for closed loop step response when the damping ratio (ζ= 0.707) .
(c)Find the range of K for damped ratio 0 t0 1.

Q.3 – (A) - By applying the *block diagram reduction procedure*, determine the overall transfer function of a multiple - loop feedback control system shown in figure below (Note: write all the steps of your procedure) [6 marks]



(B) - A unity feedback control system has $G(s) = K(S^2 + 30S + 200)/S^2(S + 2)$. [4 marks]
Use Routh -Hurwitz criterion to determine the range of K for which the closed loop control system is stable .Find also the number of roots of the characteristic equation that are in the left half of s-plan for K=1.5 and draw all roots on s-plan diagram.

Q. 4 –(A) Solve and plot overall block diagram and by using block diagram simplification determined transfer function for the servo-hydraulic mechanical system shown in figure below . [6 marks]



(B) .A unity feedback control system has its open loop transfer function given by $G(S) = \dfrac{\alpha}{S(1+\beta S)}$,For this system overshoot reduces from 0.6 to 0.2 due to change in α only .show that $\dfrac{\beta\alpha_1 - 1}{\beta\alpha_2 - 1)} = 43$

Where α_1 and α_2 *are values of α for 0.6 and 0.2 overshoot respectively* [4 marks]

Lecturer
Asst. Prof. Adel Al-Bash

جامعة تكريت – كلية الهندسة
قسم الهندسة الميكانيكية
– أيار ٢٠١٦

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