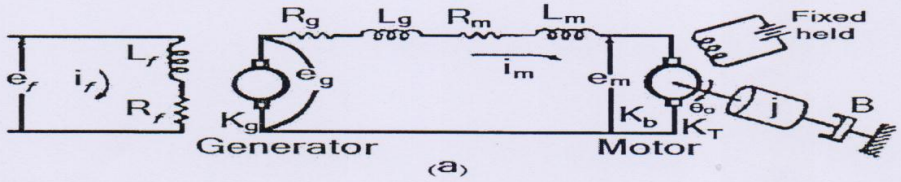
Mansoura University
Faculty of Engineering
Level: 200

Course: Control Engineering
Total : 50 Marks
Time : 2 hours
Date : 9 - 6 -2015

1- (a) Deduce from the first principles the transfer function of an armature controlled D.C. motor.

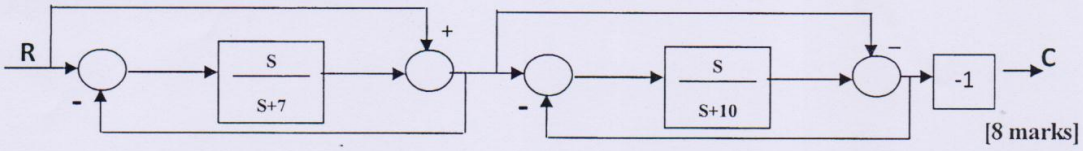
(b) Find the transfer function for the systems shown **[12 marks]**



(a)

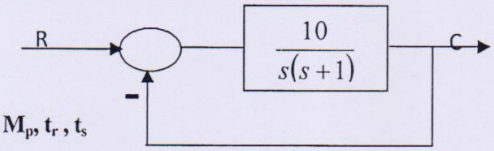
(2) (a)For the system shown find the transfer function then find the system gain and time constant.

(b) For the same system: Show that the proper choice of feedback element can reduce the system time constant to minimum value without any gain reduction.



[8 marks]

3-(a) Show that the proper choice of feedback element can reduce the external disturbance. **[8 marks]**



(b) Consider the system shown in Figure find w_d,ζ, t_p, M_p, t_r , t_s

4-(a) Compare between the open loop and closed loop systems.

-b- For the unity feedback system $G = \dfrac{K}{S(1+s)(s+2)}$ **constract the root locus , then Find:**

*** break away point.** *** the gain for critical stability**

*** Sustained Oscillation Frequency** *** the system roots at critical stability** **[10 marks]**

5.a. The open –Loop T.f of a unity feedback system is given by

$$G(s) = \frac{K}{s(s+2)(s^2+s+1)}$$

find the range of K for stability then determine the value of K which will cause sustained oscillations in the closed-loop system. What are the corresponding oscillation frequencies?

b. Test the system stability and find its roots $s^5 + s^4 + 2s^3 + 2s^2 + s + 1$

c- For the unity feedback system $G = \dfrac{100}{(10+S)(2+4S)}$ **Find:**

i-The system type & The system Gain.

ii-Static error coefficients & The Corresponding steady state error. then comment on the results . **[16 marks]**

With all best wishes
Dr. Sabry F. Saraya

Mansoura University
Faculty of Engineering
Biomedical Engineering Program.
Automatic Control Systems

Date: 11/6/2016

Course: ECE252
Time allowed: 2 Hours
Level 200 Term Exam
Total Score: 50 Marks
Exam in Two Papers

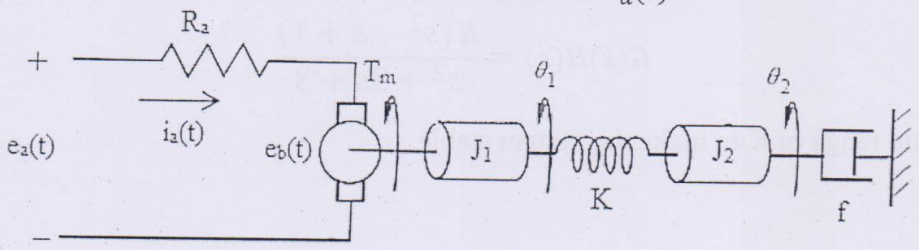
Attempt all questions assuming any missing data.

Question1 [17 Marks]

1. What are the types of control system? List the advantages and disadvantages of each type, illustrate your answer by examples? [4]

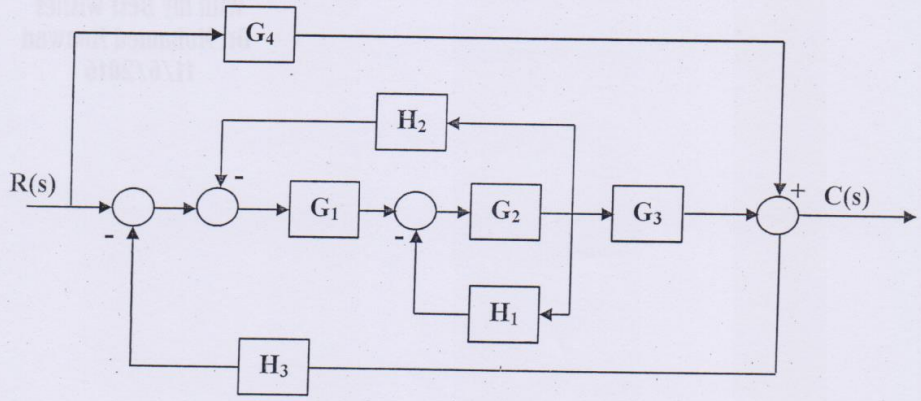
2. Solving the following differential equation:
$\ddot{y} - 10\dot{y} + 9y = 5t \qquad y(0) = -1,\ \dot{y}(0) = 2$ [5]

3. Find the transfer function of the following model $\frac{\theta_2(s)}{E_a(s)}$ [8]



Question2 [17 Marks]

1. Reduce the system shown to a single transfer function. [7]



2. Define the following terms: [4]
a. Rise Time b. Maximum Overshoot c. Settling Time d. Peak Time