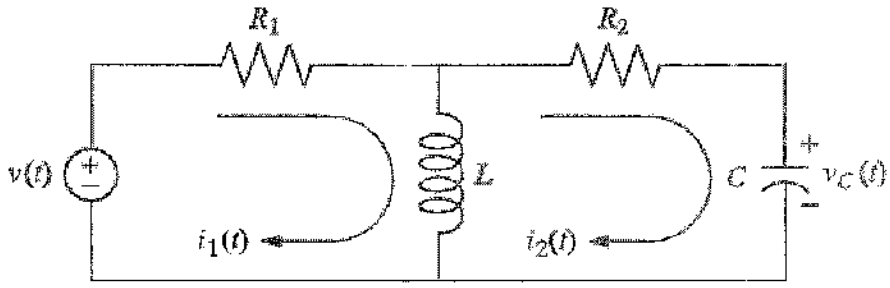
**Kafrelsheikh University**
**Faculty of Engineering**
**Electrical Engineering Department**
**Final Exam, 2018 - 2019**
**Subject: Modeling and Simulation.**

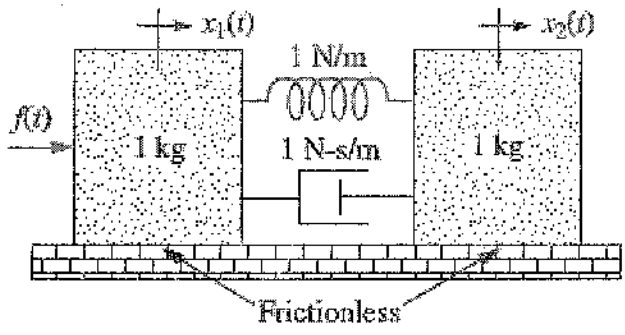
**Year: 3th Computer Engineering & systems**
**Academic Number : ECS3214**
**Date: 29 / 5 / 2019**
**Time: 3 Hours.**
**Full Mark: 100, 2 pages**

**This exam measures ILOs no: a5, a12, a16, b2, b6, b9, b12, b14, c3, c11, c16, d1, d3, d4, d5, d6, d7, d8**

**1. Given the network figure below, find the transfer function, $I_2(s)/V(s)$. [ 15 Marks]**




**2. Find the transfer function, $G(s) = X_2(s)/F(s)$ for the translational mechanical network shown in Figure below: [ 15 Marks]**




**3. Find State Space Representation model using *cascaded method*. [ 15 Marks]**

$$y''' + 8y'' + 19y' + 12y = 5u$$

**4. Obtain both analytically and computationally the rise time, peak time, maximum overshoot, and settling time in the unit-step response of a closed-loop system given by: [ 15 Marks]**

$$\frac{C(s)}{R(s)} = \frac{36}{s^2 + 2s + 36}$$

**5. A unity feedback control system has the process: [15 Marks]**

$$G(s) = \frac{1}{S(S+1)(S+3)}$$

**Design a PID controller using Ziegler-Nichols closed loop method.**

**Question #2: Choose the correct answer: [10 Marks]**

**1- The input of a controller is:**

**a. Sensed signal** **b. Error signal**
**c. Desired variable value** **d. Signal of fixed amplitude not dependent on desired variable value**

**2- PID controller is also known as**

a. Three term controller
b. two term controller
c. Four term controller
d. proportional controller

**3- The system with the open loop transfer function 1/s(1+s) is:**

a. Type 2 and order 1
b. Type 1 and order 1
c. Type 0 and order 0
d. Type 1 and order 2

**4- The integral control:**

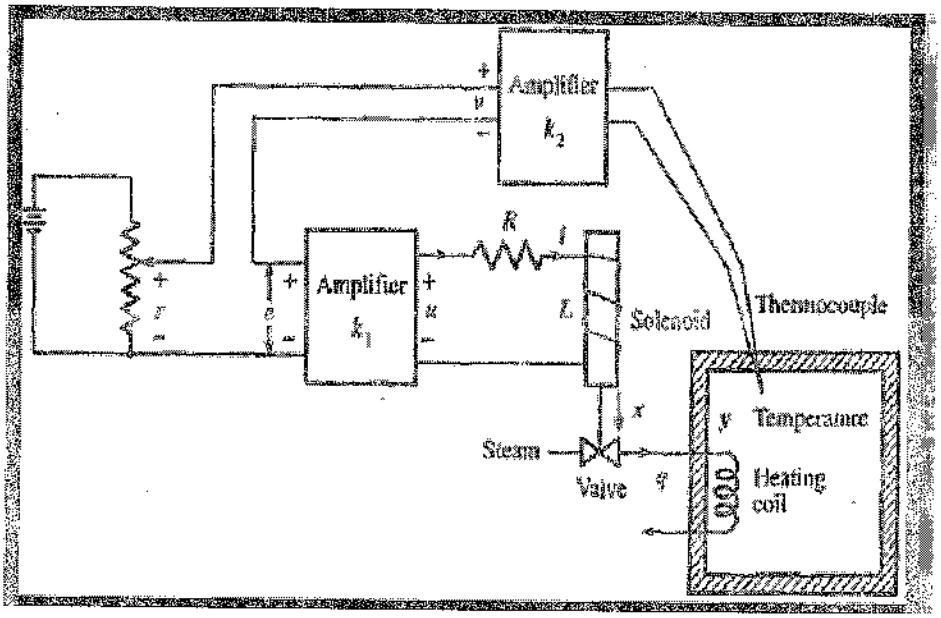
a. Increases the steady state error
b. Increases the noise and stability
c. Decreases the steady state error
d. Decreases the damping coefficient

**5- The time constant of the first order system means that the output is reached to _____ from its steady state value**

a. 98%
b. 63%
c. 50%
d. 15%

## Question #3: [15 Marks]

Consider the temperature control system shown below. The problem is to control the temperature $y$ inside the chamber. The chamber is heated by steam. The flow $q$ of hot steam is proportional to the valve opening $x$; that is, $q=k_q x$. The valve opening $x$ is controlled by a solenoid and is assumed to be proportional to the solenoid current $i$; that is, $=k_s i$. It is assumed that the chamber temperature $y$ and the steam flow $q$ are related by $\frac{dy}{dt} = -cy + k_c q$ where $c$ depends on the insulation and the temperature difference between inside and outside the chamber. Find $\frac{V(s)}{R(s)}$




********** With Best Wishes **********

*Dr. Wessam Fikry, Committee of Correctors and Testers*