



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN

ELECTRICAL AND ELECTRONICS ENGINEERING

EED 217: CONTROL SYSTEMS I

DATE: 5/6/2017

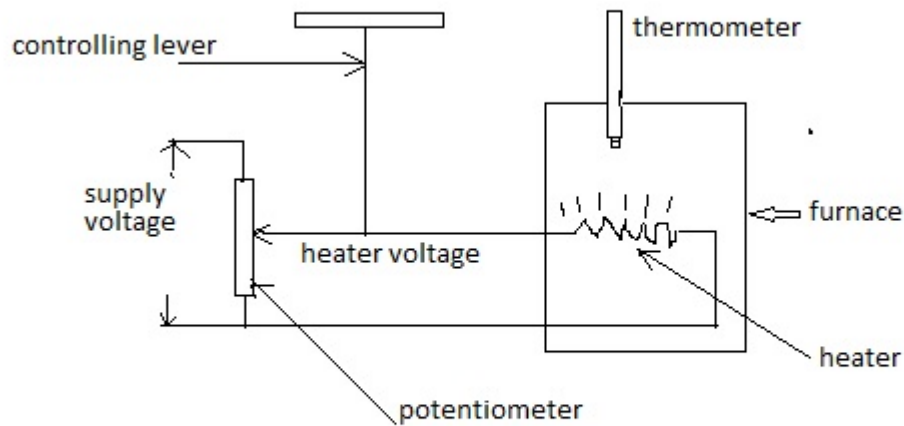
TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

(a)



Identify (i) the manipulated input

(ii) dynamic variable

(iii) measurable out put

Explain its operation.

(10 marks)

(b) Name three types of input signals.

(6 marks)

(c) With an aid of a canonical block diagram of a closed loop system derive

(i) closed loop tranfer function

(ii) error ratio

(iii) primary feed back ratio.

(9 marks)

(d) Define the following terms

(i) a system

(ii) a control system

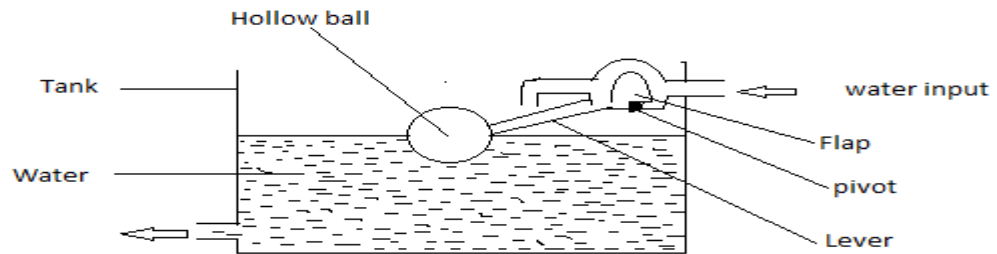
(2 marks)

(d) State any three advantages of a feedback in a control system.

(3marks)

QUESTION TWO (20 MARKS)

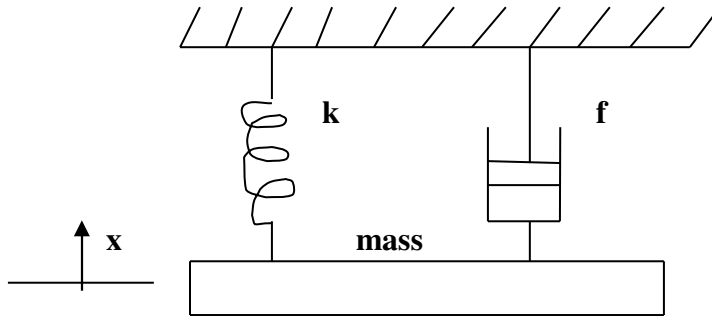
Fig below shows a control system used to maintain constant water level in the tank.



- i) Identify the following
 - ii) controlled variable
 - iii) error signal
 - iv) correction element
 - v) measuring device
 - vi) state wheather the system is open or closed loop
- (20 marks)

QUESTION THREE (20 MARKS)

- (a) A mechanical system consisting of a mass M attached to a spring (of stiffness K) and a dash pot (viscous friction coefficient f) on which a force F operates as shown below.

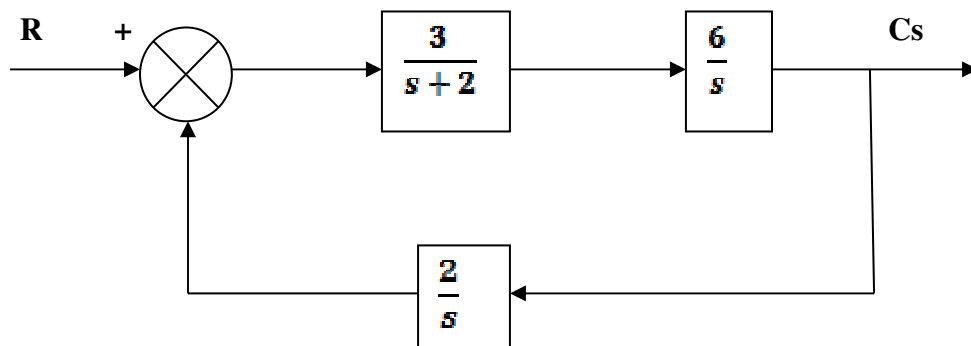


derive the transfer function.

(5 marks)

- (b) for the system shown below, determine

- open loop transfer function
- closed loop transfer function
- error ratio
- feed back transfer function.

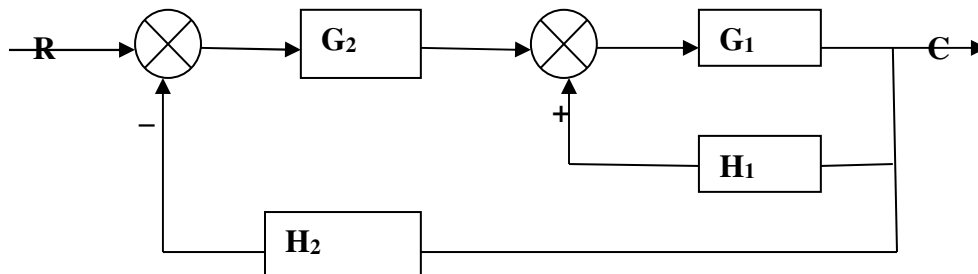


(15 marks)

QUESTION FOUR (20 MARKS)

Using the block diagram algebra, reduce the block diagram of figure below to its canonical form and hence determine

- i) forward transfer function
- ii) feed back transfer function
- iii) error ratio
- iv) primary feedback ratio
- v) open loop transfer function



(20 marks)

QUESTION FIVE (20 MARKS)

- (a) With an aid of a diagram , explain

- (i) overshoot
- ii) rise time
- iii) settling time
- iv) delay time
- v) peak time

(10 marks)

- (b) For the multi input system below, obtain the transfer function

(10 marks)

