



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL ENGINEERING

EED 217: CONTROL SYSTEMS 1

DATE: 11/11/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

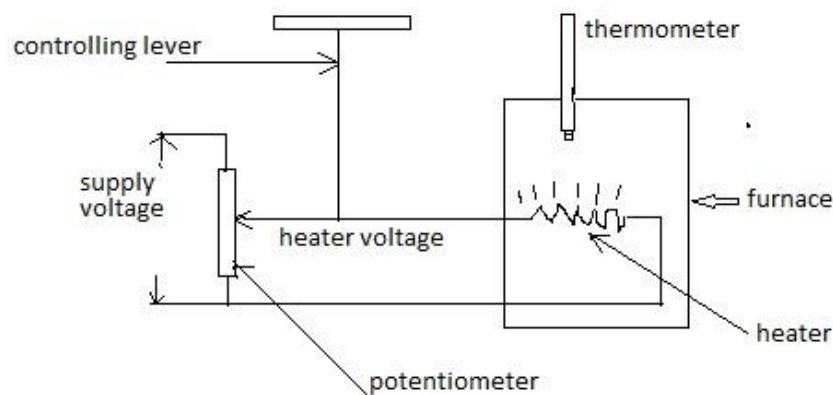
Answer Question One and any Other Two Questions

QUESTION ONE (30 MARKS)

a) Identify

- i. the manipulated input
- ii. dynamic variable
- iii. measurable out put
- iv. Explain its operation.

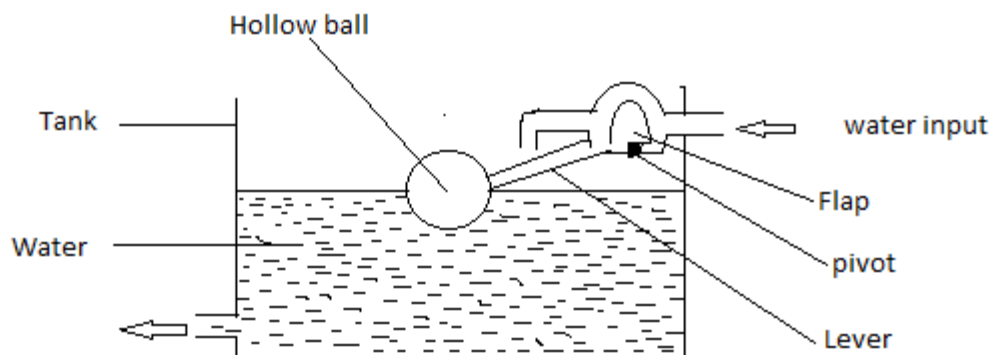
(10 marks)



- 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 transfer 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)
- e) State any three advantages of a feedback in a control system. (3 marks)

QUESTION TWO (20 MARKS)

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

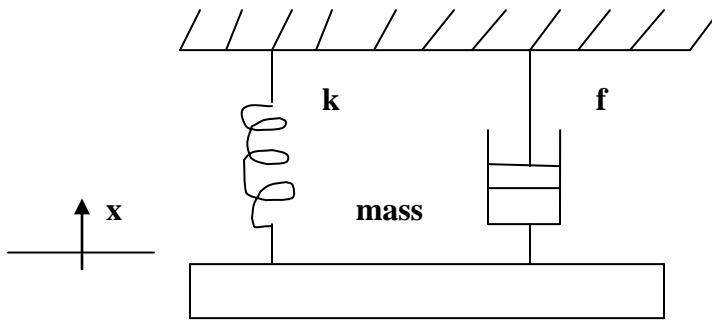


Identify the following

- a) controlled variable
- b) error signal
- c) correction element
- d) measuring device
- e) state whether the system is open or closed loop (20 marks)

QUESTION THREE (20 MARKS)

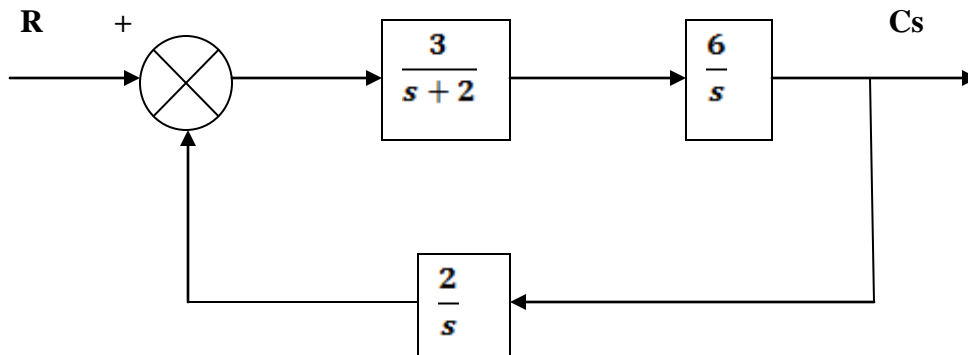
- a) A mechanical system consisting of a mass M attached to a spring (of stiffness K) and a dash pot (viscous friction coefficient f) on which a force F operates as shown below.



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.

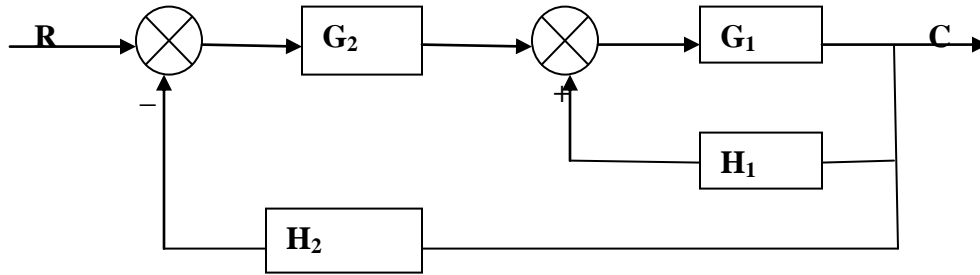


(15 marks)

QUESTION FOUR (20 MARKS)

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

- Forward transfer function
- Feed back transfer function
- Error ratio
- Primary feedback ratio
- Open loop transfer function



(20 marks)

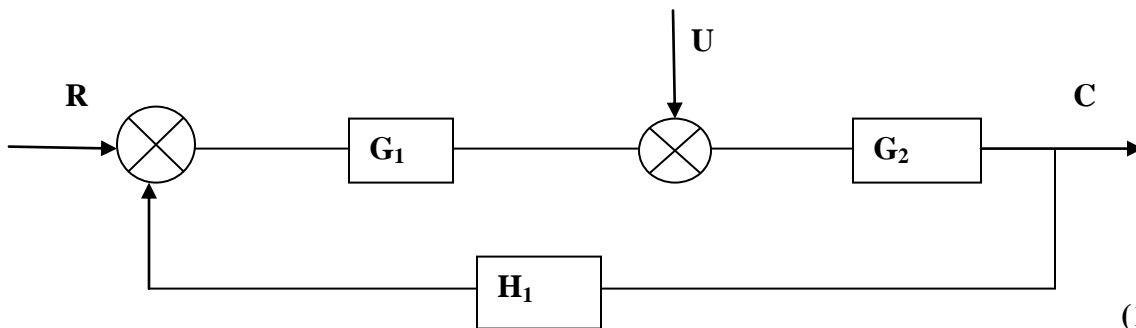
QUESTION FIVE (20 MARKS)

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)