



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MARINE ENGINEERING

MARINE INSTRUMENTATION AND CONTROL 2

EMR 2311

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: Pick HOURS

DATE: Pick Date Select Month Pick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **five** Questions;. Attempt any **THREE** Questions.

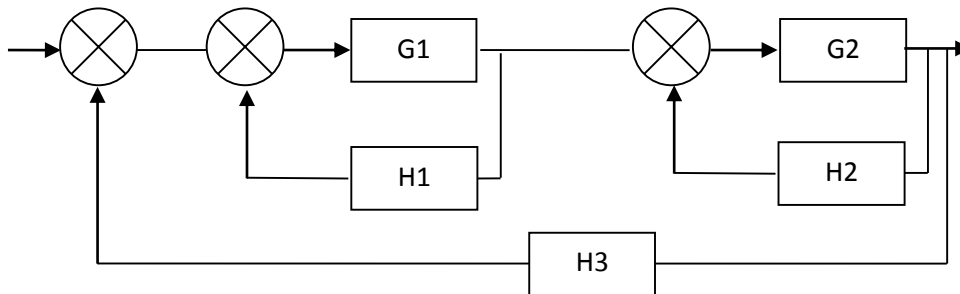
Do not write on the question paper.

Question 1

- a) Define the following terms
 - 1 Controller
 - 2 Plants
 - 3 Disturbance6 marks
- b) State and explain 3 ways in which control system are classified . 6 marks
- c) Give 4 comparison between open loop and closed loop system . 8 marks

Question 2

- a) Explain how a block reduction is done if the block are
 - 1 In cascade
 - 2 In parallel
 - 3 Has a feedback loop (6 marks)
- b) Reduce the block diagram shown below and state its transfer function (14 marks)



Question 3

- a) Define the following terms while giving examples
 - 1 Manipulated variable
 - 2 Controlled variable
 - 3 Set points6 marks
- c) State and explain 3 reasons why manufacturers control the production process. 6 marks
- d) With the aid of a diagram explain the four essential elements of a process. 8 marks

Question 4

- a) Define the following terms
 - 1 Rise time
 - 2 Setting time
 - 3 Steady-state error

4state change (8 marks)

b) Briefly explain the following modes of analogue controllers and for each give advantage and disadvantage .

1 Proportional control

2 Integral control

3 Derivative control

12 marks

Question 5

a) Draw control system block diagram for toilet tank filling system. 6 marks

b) Write short notes about PID control. 8 marks

c) Explain one way of tuning the PID controller . 6marks