



# TECHNICAL UNIVERSITY OF MOMBASA

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*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 Actuator
- 3 Feedback element
- 4 Servomechanism

8 marks

b) Explain the effect of feedback element on the following

- 1 Overall gain of the system.
- 2 Stability
- 3 Sensitivity of the system

6 marks

c) Give 3 comparison between open loop and closed loop system . 6 marks

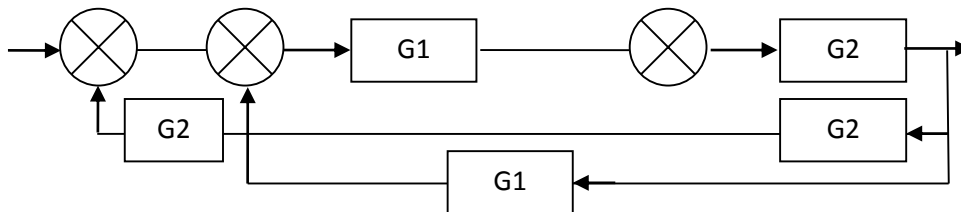
QUESTION 2

a) Explain how a block reduction is done if the block are

- 1 In cascade
- 2 In parallel
- 3 Has a feedback loop

6marks

b) Reduce the block diagram shown below and state its function . 14 marks



QUESTION 3

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

QUESTION 4

a) Define the following terms

- 1 Rise time

2 Setting time

3 Steady-state error

4 state 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) Define the following terms while giving examples

1 Manipulated variable

2 Controlled variable

3 Set points

6 marks

b) State and explain 3 reasons why manufacturers control the production process.

6 marks

c) With the aid of a diagram explain the four essential elements of a process.

8 marks