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 DateSelect MonthPick Year

<u>**Instructions to Candidates**</u>
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
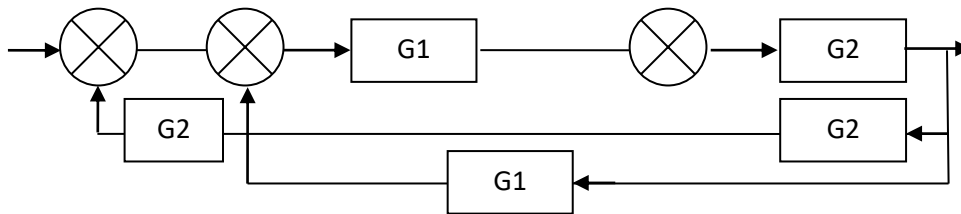c) Give 3 comparison between open loop and closed loop system .   6 marks

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

G1   G2   G2   G2   G1

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) Expalin one way of tuning the PID controller .   6marks

QUESTION 4

a)Define the following terms

   1 Rise time

2 Setting time

3Steady-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   Deriative control   12 marks

QUESTION 5

a)Define the following terms while giving examples

1 Manipulated variable

2 Controled 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