



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL ENGINEERING

EED 217: CONTROL SYSTEMS

DATE: 16/8/2021

TIME: 2:00 – 4:00 PM

INSTRUCTIONS:

Attempt all questions

- 1
 - a) State and explain TWO reason for system modelling (10 marks)
 - b) Briefly explain the three element of closed loop control system
Error detector
The controller
Output element
- 2
 - a) Define the following terms (6 marks)
System stability
Routh stability criteria
 - b) Considering a 4th order system with characteristic equation below determine if the system is stable or unstable. (14 marks)
$$S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$$
3.
 - a) Form a Routhie table for a system with the given characteristic equation
$$S^6 + S^5 - 2S^4 - 3S^3 - 7S^2 - 4S - 4 = 0$$
 and determine whether the system is stable or not
 - b) Define the term transfer function (4 marks)
4.
 - a) Define the following terms as used in control systems.
 - i. Control
 - ii. Feedback
 - iii. Disturbance
 - iv. Input
 - v. Output
 - vi. System(12 marks)

- b) Explain three advantages and Two disadvantages of Open Loop Control Systems. (8 marks)
- 5 a) Using a block diagram define the following terms
- i. Direct or forward transfer functions
 - ii. Closed loop transfer functions
 - iii. Error ration
 - iv. Primary feedback ration (10 marks)
- b) With the aid of a diagram explain
- i. Overshoot
 - ii. Rise time
 - iii. Settling time
 - iv. Delay time
 - v. Peak time (10 marks)