



# TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied and Health Sciences

DEPARTMENT OF MATHEMATICS AND PHYSICS

UNIVERSITY EXAMINATION FOR:

**BACHELOR OF TECHNOLOGY IN APPLIED PHYSICS**

**(ELECTRONICS AND INSTRUMENTATION)**

APS 4323: SIGNAL AMPLIFICATION AND PROCESSING.

END OF SEMESTER EXAMINATION

**SERIES: MAY 2016**

**TIME: 2 HOURS**

## 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 question **ONE (COMPULSORY)** and any other **TWO** questions.

**Do not write on the question paper.**

## Question ONE (30Marks)

- (a). i. Define Gain (2mks)  
ii. What is the meaning of permissible distortion. (2mks)  
iii. Distinguish between low and high band filtering. (2mks)  
iv. Classify amplifiers according to their type of configuration. (3mks)
- (b). i. State any three types of sources of noise in a signal (3mks)  
ii. What is Signal Noise Ratio. (2mks)
- (c). i. Give any two limitations of class A amplifier. (2mks)  
ii. Sketch an Ideal amplifier model. (3mks)  
iii. State any three advantages of Class C amplifier (3mks)  
iv. Calculate the current, voltage and power gain of an amplifier which has an input signal of 1mA at 10mV and an output signal of 10mA at 1V, express your answer in decibels. (6mks)
- (d). State two types of distortion (2mks)

### Question TWO (20Marks)

- (a). What is the meaning of the following term.
- i. Oscillator (2mk)
  - ii. Rectifier (1mk)
  - iii. Modulator (1mk)
- (b).i. Explain why it is necessary to modulate an audio signal (6mks)
- ii. If the maximum and minimum voltage of an AM wave are  $V_{\max}$  and  $V_{\min}$  respectively. Show that modulation factor  $m$  is given by  $m = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}}$  (4mks)
- (c). For a class B amplifier using a supply  $V_{cc} = 30V$  and driving a load of  $16\Omega$ , determine
- i. Max. power input (2mks)
  - ii. Max. power output (2mks)
  - iii. Efficiency (2mks)

### Question THREE (20Marks)

- (a). Define the following
- i. Modulation (1mks)
  - ii. Modulation factor (1mk)
- (b). i. Explain the three types of modulation (6mks)
- ii. Explain the importance of modulation factor (2mks)
- iii. The maximum peak-to-peak of an AM wave is  $16mV$  and the minimum peak-to-peak voltage is  $4mV$ . Calculate the modulation factor. (4mks)
- iv. Explain the three limitation of amplitude modulation (6mks)

### Question FOUR (20Marks)

- (a). i. Explain any three types of noise in an amplifier. (6mks)
- ii. Using a circuit diagram, explain how class A amplifier operates. (10mks)
- iii. Give two disadvantages of class C amplifier is used. (2mks)
- iv. State two areas where class A amplifiers are used. (2mks)

### Question FIVE (20 Marks)

- (a). i. Using a circuit diagram, explain how a class C amplifier operates. (10mks)
- ii. Using a circuit diagram, explain how bandpass filter operates. (7mks)
- iii. A practical amplifier is not 100% efficient, explain. (3mks)