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. What is signal amplification.   (1mk)

   ii. Classify amplifiers according to their frequencies of operation.   (3mks)

   iii. Sketch a class AB waveforms for input and output signal   (4mks)

   iv. Determine the voltage, current and power gain in decibels of an amplifier that has an input signal of 0.5mA at 5mV and a corresponding output signal of 5mA at 0.5V   (6mks)

(b). Define the following terms as used in signal amplification.

   i. Noise   (1mk)

   ii. Noise factor.   (1mk)

   iii. Demodulation   (1mk)

   iv. Amplifier Efficiency   (1mk)

(c). i. State any three noise elimination techniques   (3mks)

   ii. State three applications of class C amplifier   (3mks)

(d). Sketch a half wave rectifier circuit diagram with capacitor filter   (3mks)

(e). State three reasons why distortion of an output signal waveform may occur (3mks)

Question TWO (20Marks)

(a). i. List down five characteristics of an ideal amplifier (5mks)

ii. For a class B amplifier providing a 20Vpeak signal to a 16Ω load(speaker) and a power supply of Vcc= 30V, determine.

I. Input power (3mks)

II. Output power (2mks)

III. Efficiency. (2mks)

(b). Compare Amplitude Modulation and Frequency Modulation (8mks)

Question THREE (20Marks)

(a) i. Explain any three advantages of using a transformerless class AB amplifier (6mks)

ii. Use a circuit diagram to explain how a transformerless class B amplifier operates (10mks)

iii. Why is class C configuration not used in audio applications. (2mks)

iv. How can current gain in class B be boosted (2mks)

Question FOUR (20Marks)

(a). Classify amplifiers according to the signals they operate (2mks)

(b). Explain two functions of detector circuit (4mks)

(c). Explain the first four stages of superhetrodyne radio receiver (8mks)

(d). Explain the advantages of the superhetrodyne principle (6mks)

Question FIVE (20Marks)

(a). i. State the Sampling Theorem. (2mks)

ii. State when and why oversampling is done on a signal. (2mks)

iii. What is the meaning of Aliasing, as used in signal sampling. What is its effect. (3mks)

iv. Sketch a curve of signal g(t) that is bandlimited (3mks)

(b). Determine the Fourier Transform $G_s(\omega)$ of a sampled signal $g_s(t)$ and sketch the curves of the Fourier Transform and the sampled signal. (10mks)