



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN ANALYTICAL CHEMISTRY

DAC 15S

ACH 2204: Instrumental methods of analysis I

END OF SEMESTER EXAMINATION

**SERIES: DECEMBER 2016**

**TIME: 2 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 question ONE (Compulsory) and any other TWO questions.

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

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## Question ONE

- a) Define and give the mathematical equation of the following terms as used in analytical chemistry
  - (i) Sensitivity
  - (ii) Detection limit
  - (iii) Limit of quantitation (6 marks)
- b) State the importance of monochromator in a spectrometer (4 marks)
- c) A certain research lab deals with trace analysis of metals using Atomic Absorption spectrometer found that most signals were too tiny and with so much background noise. As an analytical chemist, which signal conditioning operations would you advise them to apply to improve their output signals (4 marks)
- d) Name the type or types of noise that can be reduced by
  - (i) Decreasing the temperature of the measurement (1 mark)
  - (ii) Decreasing the frequency used for the measurement (1 mark)
  - (iii) Decreasing the bandwidth of the measurement (1 mark)
- e) List any THREE factors that affect photometric accuracy (3 marks)
- f) State THREE causes of deviation from Beer-Lambert Law (3 marks)
- g) Identify THREE types of chemical reactions occurring in the flame in FES (3 marks)
- h) List FOUR types of Nebulization (4 marks)

**Question TWO**

- a) Stray light is one of the factors that affect photometric accuracy, give FIVE different sources of stray light. (10marks)
- b) Describe the working principles of a phototube detector (5marks)

**Question THREE**

- a) A certain research lab deals with trace analysis of metals using Atomic Absorption spectrometer found that most signals were too tiny and with so much background noise. As an analytical chemist, which signal conditioning operations would you advice them to apply to improve their output signals (5 marks)
- b) Using a schematic diagram explain basic functions of spectrophotometer (10 marks)

**Question FOUR**

- a) In which instrument is Fourier analyses mostly applied state at least three advantages of such an instrument over on ordinary instrument (3 marks)
- b) Discuss three types of noise are frequency dependent and explain how they are reduced (12 marks)

**Question FIVE**

- a) Draw a UV spectrometer and explain its working principle (12 marks)
- b) Using equations describe how stray light affects Beer-Lamberts Law (3 marks)