TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BTAC YEAR 3 SEMESTER 1

ACH 4302 : ANALYTICAL INSTRUMENTATION II PAPER 2

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2 HOURS

DATE: Pick Date Dec 2016

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

a. Differentiate between

   i. selectivity factor and retention factor (2 marks)

   ii. Ion exchange chromatography and size exclusion chromatography (2 marks)

b. Name 3 sources used in UV spectrophotometer (3 marks)

c. Define the following terms

   i. background correction (1 mark)

   ii. protecting agent (1 mark)

   iii. fluorescence (1 mark)

   iv. Atomization (1 mark)

   v. selectivity factor (1 marks)

d. Explain why is background correction necessary for the analysis? (2 marks)

e. State the vibrational modes for water. (3 marks)

f. Briefly explain working principle of photomultiplier tube (4 marks)
g. Name two different types of IR spectrometers (2 marks)
h. Give the advantages and disadvantages of Fourier transform IR spectrophotometers (4 marks)
i. What are the various parts of the Mass spectrometer? (3marks)

Question TWO

a. Differentiate between the following terms
    i. Reverse and normal phase chromatography (2 marks)
    ii. Size exclusion and partition chromatography (2 marks)
b. Explain using a diagram the working principle of an electron captured detector. (6 marks)
c. Explain three applications of TLC (6 marks)
d. State four advantages of thin layer chromatography (4 marks)

Question THREE

a. Biefly explain principle of NMR (2 marks)
b. For the following compound CH_3CH_2OH
    i. calculate number of multiplets for each band and relative area (6 marks)
    ii. sketch the nmr spectra of CH_3CH_2OH (3 marks)
c. Define the following terms
    i. Pulse damper (1 marks)
    ii. Loop injector (1 marks)
    iii. isocratic elution (1 mark)
d. State 4 factors to consider when selecting a detector in liquid chromatography? (4 marks)
e. Name 2 detectors used in gas chromatography (2 marks)

Question FOUR

a. State three advantages of Electrothermal over Flame Atomization (3 marks)
b. Describe the inductively coupled plasma (ICP) torch and explain working principle. (5 marks)
c. Using diagrams differentiate between single and double beam spectrophotometers (4 marks)
d. Differentiate between flame emission and flame absorption spectrometry (6 marks)
e. State the selection criteria for carrier gas. (2 marks)

Question FIVE

a. Using a diagram expain how an FTIR works (10marks)
b. Differentiate between non-dispersive and dispersive spectrophotometers? (6 marks)
c. Describe how to prepare the following samples using IR spectrophotometer
    i. Gases (2 marks)
    ii. Nonvolatile Liquid (2 marks)