KENYATTA UNIVERSITY
UNIVERSITY EXAMINATIONS 2010/2011
INSITUTIONAL BASED PROGRAMME (DECEMBER SESSION)
EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE AND BACHELOR OF EDUCATION

SCH 404: INSTRUMENTAL METHODS

DATE: **Thursday 28th April 2011** **TIME:** **11.00a.m – 1.00p.m**

INSTRUCTIONS: Answer ALL questions

Question one

a) List two factors in the following:-

i. Those considered in selecting a solvent for molecular UV-absorption measurements.

ii. Those which affect vibrational coupling (4 Marks)

b) In terms of instrument components state briefly how the following differ.

i. Atomic emission and atomic absorption

ii. NMR and MS

iii. IR fluorometer and IR spectroflurometer

iv. Double and single beam instruments (8 Marks)

c) Without using diagrams, explain the working of the following:-

i. Hollow cathode lamp

ii. Flame ionization detector

iii. UV- detector (9 Marks)

d) Using a block diagram, outline the instrumental components of GLC. (2 Marks)

Question Two

a) Clearly differentiate between:-

i. Wide line and high resolution spectra.

ii. Temperature profile and flame structure.

iii. Normal and reverse phase HPLC

iv. Electronic and vibrational transition.

v. Activation and isotope dilution analysis. (10 Marks)

b) Write a brief explanation to the following statements:-

i. Vacuum systems are important in mass spectrometers.

ii. There is less effect of scattering radiation when the sample is placed between the source and wavelength selector.

iii. Cuvettes should not be touched with fingers.

iv. The band of radiation from an interference filter is narrower.

v. An IR spectra has a biwildering array of maxima and minima.

vi. Flourescence measurements are less dependent on temperature (12 Marks)

Question Three

a) Differential scanning calorimetry (DSC) is an important technique in analysis.

i) List 4 samples that can be analyzed by DSC. (2 Marks)

ii) Describe the working of DSC (4 Marks)

iii) How is quantitative and qualitative measurements achieved? (4 Marks)

b) Both flame and electrothermal atomizers are employed in absorption spectroscopy.

i) Describe either of these atomization techniques. (3 Marks)

ii) State two advantages of each of these techniques. (4 Marks)

c) In quantitative analysis using a UV-vis spectrophotometer, a compound had a transmittance of 8.42% in a 2.5cm cell. Calculate its concentration given its molar absorptivity of 2.1×10^3 L/mol/cm. (4 Marks)

d) State the cause of the following

i) Line and band spectra

ii) Chemical shift and spin-spin splitting. (4 Marks)