ELIZADE UNIVERSITY, ILARA-MOKIN

FACULTY OF BASIC AND APPLIED SCIENCES,

DEPARTMENT OF PHYSICAL AND CHEMICAL SCIENCES

BIOCHEMISTRY OPTION

FIRST SEMESTER EXAMINATION

COURSE: BCH 407 (INSTRUMENTATION AND BIOANALYTICAL TECHNIQUES).

TIME ALLOWED: 2 HOURS

Instruction: Answer three (3) Questions in all with at least One (1) question from each section.

SECTION A

QUESTION 1

Given the table below showing research data from four biochemical analysis ([OH* hydroxyl radical], [NO* Nitric oxide radical], [DPPH* DiPhenylPicrylHydrazyl radical], [ACE (Lungs) – Angiotensin-1 Converting Enzyme in the lungs]) carried out in the laboratory on *Moringa oleifera* leaves extract, study the data perfectly and answer the following questions.

1. Give the table an appropriate title…….. 2 marks
2. If you are to write project report using this data, what should the probable title of the report? 2 marks
3. Based on the EC_{50} values, interpret the result for each biochemical assay carried out 6 marks
4. Comment on the statistical difference in the NO* Nitric oxide radical scavenging assay result 2 marks
5. If the dried leaves are to be packaged as tea and used as supplement by a hypertensive patient, which of the drying methods will you recommend? Give reasons for your answer relating ACE assay with hypentension 8 marks.

EC_{50} for Scavenging and inhibitory potentialss (µg/mL)				
Sample	OH*	NO*	DPPH*	ACE (Lungs)
Oven-dried	80.7 ± 1.8^{b}	100.1 ± 2.3^{a}	107.1 ± 4.0^{b}	86.8 ± 2.2^{b}
Sun-dried	71.9 ± 1.8^{a}	101.2 ± 1.8^{a}	92.3 ± 3.5^{a}	71.5 ± 1.9^{a}
Shade-dried	93.3 ± 2.2^{c}	121.9 ± 2.2^{b}	128.8 ± 5.2^{c}	116.8 ± 3.8^{c}

Values represent mean ± standard deviation (n = 3).

Values with the same superscript number on the same column are not significantly ($P<0.05$) different.

QUESTION 2

(a) List and write short notes on the two important parameters in microscopy — 4 marks

(b) With the aid of well labelled diagrams differentiate between Dark field and Phase Contrast microscope — 10 marks

(c) Differentiate between Scanning Electron and Scanning Probe microscope — 6 marks

QUESTION 3

(a) Define (i) Beer's law — 2 marks

(ii) Lambert's law — 2 marks

(iii) Beer-Lambert's law — 5 marks

(b) Briefly describe radioisotope tracer technique — 5 marks

(c) Give a brief description of Thin Layer Chromatographic Technique — 6 marks

SECTION B

QUESTION 1

1 Describe the working principles and procedures of **ANY TWO** of the following:

(a i.) Immunoelectrophoresis

(a ii.) Isoelectric focusing

(a iii.) Capillary electrophoresis — **(10 marks)**

(Provide necessary illustrations where possible)

b. A particular protein (8-globulin) purified on native PAGE had a single band with a corresponding weight of 150 kDa, subsequent purification using SDS-PAGE resulted in 4 distinct bands with molecular weights of 55, 45, 35 and 15 kDa respectively. From your knowledge of protein chemistry, deduce what happened and explain the results obtained? — **(5 marks)**

c. Briefly explain the principle behind discontinuous pH gel electrophoresis — **(5 marks)**

QUESTION 2

2. a. Describe the following bioreactors (**ANY TWO**) using **ILLUSTRATIONS ONLY** and also give the advantages and disadvantages:

i. stirred tank ii. air-lift iii. Packed-bed iv. fluidized-bed — **(10 marks)**

b. Mention 10 parts of a batch fermenter and describe its functions — **(5 marks)**

c. Briefly discuss the working principles of paper electrophoresis — **(5 marks)**