FACULTY OF NATURAL RESOURCES MANAGEMENT AND AGRICULTURE

DEPARTMENT OF ANIMAL PRODUCTION AND HEALTH

INTRODUCTION TO BIOCHEMISTRY (NAP1101/LAS1105)

PRINCIPLES OF BIOCHEMISTRY (NHC1105)

Semester I, Examination

June 2026

Time Allowed : 3 hours
Special requirement : None

Instructions to Candidates:

1. This paper consists of six questions, answer **ALL** questions in **Section A** and **ANY TWO** in **Section B**.
2. Marks for each question are shown in brackets. Where a question has subdivisions, the marks for each subdivision are given.
3. Illustrate your answer, where applicable, with large clearly labelled diagrams.

MARK ALLOCATION PER SECTION	MARKS
SECTION A	**60**
SECTION B	**40**
TOTAL ATTAINABLE MARKS	**100**

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SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION 1

a) Differentiate between the following:

i. Arrhenius acid and Bronsted–Lowry acid. **[2]**

ii. Oxidation and reduction reactions. **[2]**

iii. Optical and geometrical isomerism. **[2]**

iv. Glycosidic bond and peptide bond. **[2]**

b) Outline the properties of water that make it biologically important. **[4]**

c) Giving examples in each case, classify amino acids according to their side chains. **[10]**

QUESTION 2

a) Compare and contrast prokaryotic and eukaryotic cells. **[8]**

b) Discuss the importance of cell compartmentalisation in regulating metabolic pathways. **[8]**

c) Describe how regulation of metabolic pathways maintains homeostasis. **[4]**

QUESTION 3

a) Describe the structure and function of NAD^+, FAD, and acetyl-CoA in metabolism. **[8]**

b) Explain the energy yield of one turn of the Krebs cycle, clearly indicating the number of NADH, $FADH_2$, ATP (or GTP), and CO_2 molecules produced. **[4]**

c) Discuss the role of the Krebs cycle as an amphibolic pathway and explain how it links carbohydrate, lipid and protein metabolism. **[6]**

SECTION B: ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION 4

a) Explain the biochemical basis of enzyme specificity. **[4]**

b) Discuss factors affecting enzyme activity. **[6]**

c) Compare and contrast competitive and non-competitive enzyme inhibition. Use graphs to illustrate your answer. **[10]**

QUESTION 5

A soybean plant is cultivated in soil enriched with Super Compound D (14%N : 28%P_2O : 14%K_2O) to promote growth and seed protein yield. Discuss the cellular and molecular processes involved, from the uptake of nitrogen by the roots to the synthesis and storage of proteins in the developing seeds. **[20]**

QUESTION 6

A feedlot steer is placed on a high-energy diet to enhance growth rate and carcass quality. Discuss the biochemical processes involved from digestion and absorption of carbohydrates to ATP production and fat deposition. **[20]**