



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied and Health Sciences
Department of Pure & Applied Sciences

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN INDUSTRIAL MICROBIOLOGY & BIOTECHNOLOGY

ABT 4211: CARBOHYDRATE METABOLISM

SUPP/SPECIAL EXAMINATION

SERIES: PickyearDEC 2024

TIME:2HOURS

DATE:Pick DateDecPick Year2024

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attemptquestion ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE

- a) Differentiate between;
 - i) Glycogenesis and glycolysis.
- ii)** Oxidative phosphorylation and substrate level phosphorylation. (4marks)
- b) Explain the following symptoms.
 - i) Lactose intolerance
 - ii) Hereditary fructose intolerance (4 marks)
- c) Identify the reactions in which the following molecules take part;
 - i) Pyruvate (1 mark)
 - ii)** Hexokinase (1 mark)
 - iii)** Uridine diphosphate glucose (UDP-glucose) (1 mark)
- d) State the role of the following enzymes.
 - i) UDP-glucose pyrophosphorylase (2 marks)
 - ii)** Ribulose 5-phosphate isomerase. (2 marks)
- e) State the consequences of deficiency of glucose 6- phosphate dehydrogenase. (2 marks)
- f) Write the net equation for glycolysis. (2 marks)
- g) Outline fructose metabolism in the liver. (4 marks)
- h) Outline the Cori cycle (4 marks)
- i) State any **THREE** uses of galactose in the body. (3 marks)

QUESTION TWO

- a) If a 0.1M solution of glucose 1-phosphate at 25°C is incubated with a catalytic amount of phosphoglucomutase, the glucose 1- phosphate is transformed to glucose 6- phosphate. At equilibrium, the concentrations of the reaction components are;
- Phosphoglucomutase



Gas constant, R, = 8.315 J/mol.K

Calculate K'eq and $\Delta G'^0$ for this reaction.

(7 marks)

- b) Discuss the process and significance of glycogenolysis.

(13 marks)

QUESTION THREE

- a) Discuss photophosphorylation.

(10 marks)

- b) Describe the Calvin Cycle.

(10 marks)

QUESTION FOUR

- (a) Illustrate the chemical reactions of the TCA cycle that generate NADH

(6 marks)

- (b) With the aid of relevant illustrations, discuss the glyoxylate pathway.

(8 marks)

- (c) Describe digestion, absorption, and transport of carbohydrates in the human body.

(6 marks)

QUESTION FIVE

Describe;

- a) The gluconeogenesis metabolic process.

(10 marks)

- b) FIVE carbohydrate metabolism disorders.

(10 marks)