



# 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 4205: BASIC METABOLISM I

END OF SEMESTER EXAMINATION

**SERIES:** 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) Write the net reaction for glycolysis (2marks)
- b) Illustrate the reactions of TCA that generate NADH (3marks)
- c) State the catalytic role of the following;  
 (i) Glycogen phosphorylase (1mark)  
 (ii) Citrate synthase (1mark)
- d) Identify the reaction in which the following biomolecules take part  
 (i) Ribulose 1, 5-bisphosphate (1mark)  
 (ii) UDP- glucose (1mark)
- e) Outline fructose metabolism (4marks)
- f) Differentiate between;  
 (i) C<sub>3</sub> and C<sub>4</sub> plants (2marks)  
 (ii) Cyclic and non-cyclic photophosphorylation (2marks)

- g) State the implication of glucose 6-phosphate dehydrogenase deficiency in man. (1 mark)  
 h) Illustrate pyruvate decarboxylation reactions. (4mark)  
 i) Calculate the standard free-energy change for the following metabolically important enzyme-catalyzed reaction at 25 °C and pH 7.0. (4 marks)

$$R = 8.315 \text{ J/mol} \cdot \text{K}$$

$$K'_{eq} = -0.0475$$

Triose phosphate isomerase



### Question TWO

With the aid of relevant illustrations, discuss the enzymatic process of glycolysis

(20marks)

### Question THREE

- (a) Describe the glyoxylate cycle (10marks)  
 (b) Discuss the breakdown of glycogen in the liver cells (10marks)

### Question FOUR

- (a) Describe the process of gluconeogenesis (10marks)  
 (b) Discuss the CO<sub>2</sub> assimilation reactions in higher plants (10marks)

### Question FIVE

- (a) Describe the mitochondrial components of the ETC (10marks)  
 (b) Explain how oxidative phosphorylation occurs in the inner mitochondrial membrane (10marks)