



**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**

**BACHELOR OF SCIENCE IN MOLECULAR BIOLOGY & FORENSIC  
TECHNOLOGY**

**ABT 4211: CARBOHYDRATE METABOLISM**

**SPECIAL/SUPPLEMENTARY EXAMINATION**

**SERIES: SEPTEMBER 2018**

**TIME:2HOURS**

**DATE:Pick DateSep2018**

**Instructions to Candidates**

You should have the following for this examination

-Answer Booklet, examination pass and student ID

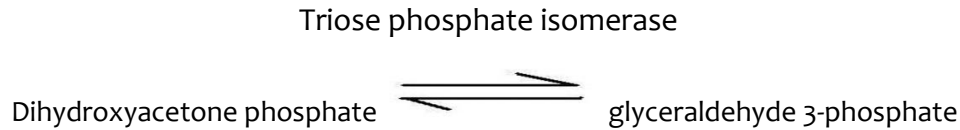
This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

**Question ONE**

- a) Illustrate the irreversible reactions of glycolysis (6marks)
- b) State the catalytic role of the following; (1mark)  
(i) Phosphofructokinase (1mark)  
(ii) Ribulose 5-phosphate isomerase (1mark)
- c) Identify reactions in which the following molecules take part (1mark)  
(i) Uridine diphosphate glucose (1mark)  
(ii)  $\alpha$ -ketoglutarate (1mark)
- d) Outline galactose metabolism (5marks)
- e) State the implication of aldolase B deficiency in a human being. (3marks)

- f) Illustrate pyruvate decarboxylation reactions. (4marks)
- g) Differentiate between;
- (i) Gluconeogenesis and glycogenolysis (2marks)
- (ii) Enthalpy and entropy (2marks)
- h) Calculate the standard free-energy change for the following metabolically important enzyme-catalyzed reaction at 25 °C and pH 7.0. (4 marks)
- $R = 8.315 \text{ J/mol} \cdot \text{K}$
- $K'_{eq} = -0.0475$



### Question TWO

- (a) With the aid of relevant illustrations, describe the tricarboxylic acid (TCA) cycle. (10marks)
- (b) Describe the mitochondrial components of the electron transport chain (ETC). (10marks)

### Question THREE

Discuss

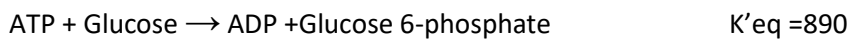
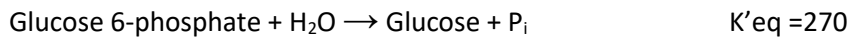
- a) The light independent reactions of photosynthesis in higher plants. (10marks)
- b) The breakdown of glycogen in the liver cells. (10marks)

### Question FOUR

- (a) Describe the Hexose monophosphate pathway (10marks)
- (b) Discuss the process of glycogenesis in the liver cells. (10marks)

### Question FIVE

- a) The equilibrium constants of two coupled enzymatic reactions at 25°C are as follows;



Gas constant,  $R = 8.318 \text{ J/mol} \cdot \text{K}$

Calculate the standard free energy of hydrolysis of ATP.

(12 marks)

- b) Discuss the stages of glycolysis that lead to conversion of glucose to glyceraldehyde 3-phosphate.

(8 marks)