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OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2020 /2021 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER MAIN EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE IN MICROBIOLOGY

COURSE CODE: **MIC 410**

COURSE TITLE: **MICROBIAL METABOLISM**

DATE: **8TH MARCH 2021** **TIME: 9.00 A.M – 12.00 P.M**

INSTRUCTIONS TO CANDIDATES

- **SEE INSIDE**

THIS PAPER CONSISTS OF 3 PRINTED PAGES **PLEASE TURN OVER**

REGULAR - MAIN EXAM

MIC 410: MICROBIAL METABOLISM

STREAM: BSc. MICROBIOLOGY **DURATION: 3 Hours**

INSTRUCTIONS TO CANDIDATES

i. *Answer **ALL** questions from section A and any **THREE** from section B.*

ii. *Diagrams should be used whenever they serve to illustrate the answer.*

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

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SECTION A (24 MARKS)

Question One

a) What is the terminal electron acceptor in aerobic respiration? (2 Marks)

b) What is the name given to the process of breakdown of sugars to pyruvate and similar intermediates? (2 Marks)

c) In the following redox pairs, which compound is reduced and which is oxidized?

i. NAD^+ and NADH (2 Marks)

ii. $FADH^2$ and FAD (2 Marks)

d). Define fermentation and state the end-products of fermentation (4 Marks)

Question Two

a) Explain the fundamental differences between;

i. Enzyme repression and enzyme induction (4 Marks)

ii. Catabolic and anabolic pathways (4 Marks)

b) Which of the following chemical reactions represent photosynthesis (2 Marks)

A. $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2 + ATP + Heat$

B. $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O + ATP + Heat$

C. $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$

D. $C_6H_{12}O_6 + CO_2 + Ethyl\ alcohol + ATP + Heat$

c) What is the process of converting chemical energy of glucose into the chemical bonds of ATP? (2 Marks)

SECTION B (36 MARKS)

Question Three

Describe the Embden-Meyerhof pathway citing enzymes and products involved at various stages. (12 Marks)

Question Four

a). Classify enzymes on the basis of their biochemical action. (7 Marks)

b). Fill in the blanks in the table below (5 Marks)

Nutritional type	Carbon source	Energy source
Photolithoautotroph		
Photoheterotroph		
Chemolithoautotroph		
Chemolithoheterotrophs		
Chemoorganoheterotrophs		

Question Five

Explain the basic steps in the Krebs cycle, its input and output, and how it is linked to oxidative phosphorylation. (12 Marks)

Question Six

Give an account of characteristics of enzymes (12 Marks)

Question Seven

a) Explain factors that affect enzymatic activity (8 Marks)

b) Account for the 38 ATP molecules that *E. coli* bacteria generate from Catabolism of 1 molecule of glucose. (4 Marks)

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