CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN BIOCHEMISTRY

BIOC 333: MICROBIAL METABOLISM

STREAMS: BSC. BIOC **TIME: 2 HOURS**

DAY/DATE: MONDAY 14/04/2025 **8.30 A.M. – 10.30 A.M.**

INSTRUCTIONS

- **Answer Question ONE and any other TWO questions**
- **Do not write on the question paper**

QUESTION ONE (30 Marks)

a) Describe methylglyoxal pathway in bacterial species. [5 Marks]

b) Describe the serine pathway in methylotrophic bacteria. [6 Marks]

c) Compare and contrast glucose degradation via the semiphosphorylative Entner-Doudoroff (ED) and Nonphosphorylative ED pathways in prokaryotes. [8 Marks]

d) Using specific examples, explain how propionic acid bacteria dissimilate glucose. [6 Marks]

e) List five examples of Anoxygenic photosynthetic bacteria and explain how they fix carbon dioxide for their cellular requirements. [5 Marks

QUESTION TWO (20 Marks)

(a) Compare and contrast eukaryotic and prokaryotic oxidative Citric acid cycle. [12 marks]

(b) Discuss organic C-1 dissimilation by methylotrophs. [8 marks]

QUESTION THREE (20 Marks)

a) Identify the missing steps of the autotrophic 3-hydroxypropionate CO_2 fixation cycle in *Chloroflexus aurantiacus* as stipulated by Jan Zarzycki. [10 Marks]

b) Using a well labelled diagram, explain how electron transport chain in bacteria is coupled to oxidative phosphorylation. [10 Marks]

QUESTION FOUR (20 Marks)

(a) Discuss heterolactic acid fermentation pathway, highlighting its industrial application. [10 Marks]

(b) List four (4) examples of autotrophic methanogenic bacteria. [4 Marks]

(c) Describe the pay-off phase of glycolytic pathway. [6 Marks]

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