CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

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

BIOC 333: MICROBIAL BIOCHEMISTRY

STREAMS: BIOC **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 07/07/2021 **8.30 A.M- 10.30 A.M**

INSTRUCTIONS
(i) Answer Question ONE and any TWO questions
(ii) Do not write on the question paper

QUESTION ONE (30 Marks)

(a) The *Embden–Meyerhof-Parnas* pathway of glycolysis is a central metabolic pathway in various eukaryotic and prokaryotic cells but the mechanisms for initial phosphorylation of glucose differ. Using chemical structure, explain how glucose is converted to G-6-phosphate by eukaryotes and prokaryote. (6 Marks)

(b) Describe the formation of Acetyl CoA from formaldehyde using serine pathway in methylotrophic bacteria. (6 Marks)

(c) Explain how thermoacidophilic Archaebacteria have modified Entner- Doudoroff glycolytic pathway to meet their cellular requirements. (6 Marks)

(d) Methylglyoxal pathway operates as an alternate to the glycolytic pathway when enteric bacteria experiences conditions of low inorganic phosphate concentration. Describe this pathway highlighting its importance. (5 Marks)

(e) Give five examples of bacteria that can fix nitrogen and demonstrate structurally how the fixation is achieved. (7 Marks)

QUESTION TWO (20 Marks)

(a)Explain how anoxygenic photosynthesis differs from oxygenic photosynthesis. (10 marks)

(b) Describe anoxygenic photosynthesis type II reaction centers in red filamentous anoxygenia phototrophs (FAPs) and purple bacteria. (10 marks)

QUESTION THREE (20 Marks)

(a) Describe electron transport chain in *E. coli* during aerobic conditions. (10 Marks)

(b)Discuss butyric Acid (butanol) fermentation, highlighting its industrial application. (10 Marks)

QUESTION FOUR (20 Marks)

(a) Discuss the reductive Acetyl CoA pathway utilized by *Acetobacterium woodii* to fix CO_2. (10 Marks)

(b) Give five examples of chemoautotrophs and reactions they catalyze. (10 Marks)

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