

CHUKA UNIVERSITY

THIRD YEAR EXAMINATION BIOC 309: BIOCHEMISTRY OF GENE EXPRESSION

STREAM: Y3S2 BSc. BIOCHEMISTRY

TIME: 2 HOURS

INSTRUCTIONS

- i. Answer Question One and any other Two Questions**
- ii. Do not write on the question paper**

Question One (30 marks)

- a. Differentiate between an operon and a regulon. (5marks)
- b. What are promoters? Describe the *E. coli* promoter (5 marks)
- c. Explain the different ways through which gene regulation can occur. (5marks)
- d. Explain why coupled transcription and translation can occur in bacteria and not in eukaryotic cells. (5 marks)
- e. Describe the structure and role of core RNA polymerase and the holoenzyme.(5 marks)
- f. Briefly describe the identifiable steps during the chemical synthesis of RNA in prokaryotes. (5 marks)

Question Two (20 marks)

- a. Cells respond to an abrupt increase in temperature by inducing synthesis of a specific group of proteins to cope with this stress. Discuss this statement with regard to *E. coli*. (10 marks)
- b. cAMP and CAP protein are potential activators of the lac operon. Provide molecular explanation. (10 marks)

Question Three (20 marks)

- a. Describe how replication occurs in retroviruses. (10 marks)
- b. Describe the structure of the Human Immunodeficiency Virus genome. (10 marks)

Question Four (20 marks)

Explain the mechanisms for activation of proto-oncogenes under following topics.

- a. Gene amplification. (10marks)
- b. Insertional mutagenesis. (10marks)