

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

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

BIOC 350: BIOCHEMISTRY OF NUCLEIC ACID

STREAMS: BSC (BIOCHEM)

TIME: 2 HOURS

DAY/DATE: TUESDAY 03/12/2019

11.30 AM – 1.30 PM

INSTRUCTIONS:

- Answer question ONE (Compulsory) and any other TWO questions
- Sketch diagrams may be used whenever they may help illustrate your answer
- Do not write anything on the question paper
- This is a closed book exam. No reference materials are allowed in the examination room
- There will be NO use of mobile phones or any other unauthorized materials

QUESTIN ONE (30 MARKS)

- (a) With a use of a diagram, illustrate two types of sugars involved in the biosynthesis of nucleotides in their -Furanoside ring structures. [6 marks]
- (b) Below is the sequence of a complete mRNA from a bacterial cell:
 ACUAGCAGGAGACGUAAGCGAUGUGCCAGAUGCGCAGUCACACAUAACUG
 C AAG3'
- (i) State the number of amino acids of the protein synthesized from this mRNA strand. [2 marks]
- (ii) State how many tRNAs will bind to the ribosome to make this protein [2 marks]

(iii) Using the genetic code provided, determine the sequence amino acids in the protein synthesized from the above mRNA sequence. [4 marks]

(c) Differentiate prokaryotic and eukaryotic DNA replication. [8 marks]

(d) Discuss sequentially various stages of transcription clearly indicating various enzymes involved in each stage. [8 marks]

QUESTION TWO (20 MARKS)

(a) Demonstrate the formation of phosphodiester bond in the nucleic acids. [5 marks]

(b) Explain the four mechanisms involved in DNA damage repair during the process of DNA replication. [10 marks]

(c) Explain the difference between conservative and semi conservative DNA replication. [5 marks]

QUESTION THREE (20 MARKS)

(a) With a use of a suitable diagram, demonstrate the formation of hydrogen bonds between adenine and thymine and between cytosine and guanine. [8 marks]

(b) Discuss the role of a major enzymes and proteins involved in DNA replication. [8 marks]

(c) State the differences between positive gene regulation and negative gene regulation. [4 marks]

QUESTION FOUR (20 MARKS)

(a) With a use of a suitable diagram, discuss the formation of a replication fork. [6 marks]

(b) Discuss four (4) characteristics of a genetic code. [8 marks]

(c) Explain five (5) of the causes of DNA damage. [6 marks]
