UNIVERSITY OF ESWATINI
FINAL EXAMINATION PAPER: JULY 2019

TITLE OF PAPER:	INTRODUCTION TO MOLECULAR BIOLOGY
COURSE CODE:	BIO 202
TIME ALLOWED:	THREE HOURS
INSTRUCTIONS:	1. ANSWER SECTION A (COMPULSORY) AND ANY TWO OTHER QUESTIONS IN SECTION B. 2. ANSWER A TOTAL OF 3 (THREE) QUESTIONS. 3. ILLUSTRATE YOUR ANSWERS WITH LARGE AND CLEARLY LABELLED DIAGRAMS WHERE APPROPRIATE.

SPECIAL REQUIREMENTS:

1. CANDIDATES MAY USE CALCULATORS

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATORS

[Please Turn Over]

SECTION A, [Compulsory, Total marks: 50]

Question 1

a) Briefly explain the following terms: [12 marks]

i. Mitosis and meiosis
ii. DNA renaturation and denaturation
iii. Conservative and dispersive replication
iv. Transcription and replication
v. Nucleoside and nucleotide
vi. Purines and pyrimidines

b) Indicate the correct terms/phrases in the following paragraph [16 marks]

When both strands of DNA serve as template, the mechanism of DNA replication is said to be (i) _____. DNA replication in *E. coli* begins at a site in the DNA called the (ii) _____. At the replication fork the (iii) _____ strand is synthesized continuously while the other strand is synthesized discontinuously. On the strand synthesized discontinuously, the short pieces are called (iv) _____. An RNA primer for each of the pieces above is synthesized by an enzyme called (v), and this RNA primer is removed after the fragment is synthesized by the enzyme (vi) _____, using its (vii) _____. The nicks left behind in this process are sealed by the enzyme (viii) ____.

c) The template strand of a segment of double-stranded DNA contains the sequence: (5')-TAC CTT TGA TAA GGA TAG CCC TTC ATC-(3'). What is the mRNA sequence that can be transcribed from this strand? [2 marks]

d) What is the difference between informational and functional RNAs, give examples and describe their functions. [12 marks]

e) Describe the three mechanisms of translational repression known to exist in eukaryotes? [8 marks]

Section B, [Answer any two questions]

Question 2

Discuss eukaryotic and prokaryotic gene expression, highlighting similarities and differences between the two. [25 marks]

Question 3

(a) Describe the mechanism of catabolite repression used in the *lac* operon. [13 marks]

(b) Briefly describe the steps involved in de-novo pyrimidine biosynthesis. [12 marks]

Question 4

a) Briefly describe the principle and steps involved in the polymerase chain reaction. [15 marks]

b) Briefly describe gel electrophoresis [10 marks]

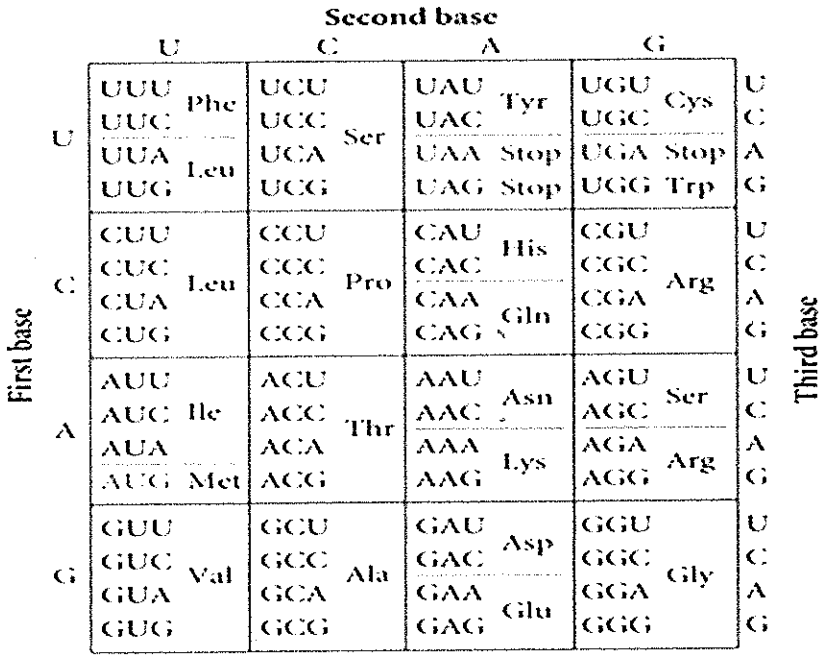

Figure 1: The Genetic Code

THE END