UNIVERSITY OF SWAZILAND
RESIT EXAMINATION PAPER: JULY 2018

TITLE OF PAPER:	INTRODUCTORY MOLECULAR BIOLOGY
COURSE CODE:	BIO 202
TIME ALLOWED:	THREE HOURS
INSTRUCTIONS:	1. ANSWER QUESTION 1 (COMPULSORY) IN SECTION A 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:	NONE

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

SECTION A: COMPULSORY (ANSWER ALL QUESTIONS IN THIS SECTION)

Question 1

(a) Describe the structure of nucleotides and explain their role in cells. (7 marks)

(b) Explain the following terms: (3 marks)
(i) Operon,
(ii) Constitutive gene,
(iii) Polycistronic mRNA.

(c) Identify any five proteins/enzymes involved in DNA replication and explain their roles. (10 marks)

(d) Briefly explain two functions of DNA supercoiling. (3 marks)

(e) Explain how aminoacyl-tRNA is formed. (6 marks)

(f) Briefly explain in what sense and to what extent the genetic code is:
(i) degenerate, (2 marks)
(ii) ordered, (2 marks)
(ii) universal. (2 marks)

(g) Illustrate the schematic structure of a eukaryotic gene and the pre-mRNA and mRNA derived from it. Assume that the gene contains three exons. Identify the following items. (15 marks)
(i) 5' untranslated region
(ii) Promoter & the antileader
(iii) AAUAAA consensus sequence
(iv) Transcription start site
(v) 3' untranslated region in the antitrailer;
(vi) the terminator
(vii) Introns
(viii) Exons
(ix) Poly(A) tail
(x) 5' cap

[Total Marks = 50]

SECTION B. (ANSWER ANY TWO QUESTIONS IN THIS SECTION)

Question 2

(a) Describe the mechanism of catabolite repression as it relates to the *lac* operon. (10 marks)

(b) Discuss the similarities and differences between DNA replication and RNA transcription. (15 marks)

[Total marks = 25]

Question 3

Discuss the different types of post-translational modifications of nascent peptides, highlighting their roles. (25 marks)

[Total marks = 25]

Question 4

(a) Plant DNA extraction using the CTAB method requires that β-Mercaptoethanol, PVP (polyvinylpyrrolidone), and Phenol/Chloroform-Isoamyl Alcohol be used at specific stages in the extraction protocol. Briefly explain the role of these chemicals in DNA extraction. (7 marks)

(b) Explain the significance of A_{260}/A_{280} and A_{260}/A_{230} ratios in determining nucleic acid purity. (7 marks)

(c) Explain the use of ethidium bromide (EtBr) in a Molecular Biology Laboratory. (4 marks)

(d) Briefly explain the process of DNA gel electrophoresis. (7 marks)

[Total marks = 25]

END OF QUESTION PAPER