UNIVERSITY OF ESWATINI

FINAL EXAMINATION PAPER: NOVEMBER 2019

PROGRAMMES:	B.Sc. III
	B. Ed Secondary III
TITLE OF PAPER:	ADVANCED MOLECULAR BIOLOGY
COURSE CODE:	BIO 341
TIME ALLOWED:	THREE HOURS
INSTRUCTIONS:	1. THIS PAPER IS DIVIDED INTO TWO SECTIONS
	2. ANSWER QUESTION 1 (COMPULSORY) FROM SECTION A and ANY TWO QUESTIONS FROM SECTION B
	5. EACH QUESTION CARRIES TWENTY FIVE (25) MARKS
	6. ILLUSTRATE YOUR ANSWERS WITH LARGE AND CLEARLY LABELLED DIAGRAMS WHERE APPROPRIATE.

SPECIAL REQUIREMENTS: CALCULATOR

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Section A

Question 1 (COMPULSORY)

1.1 A circular DNA plasmid, pDA102, has a size of 4.35 kb. When the plasmid DNA digested with combinations of restriction enzymes and the resulting fragments are electrophoresed, the following data is obtained. Using these data, construct a restriction map of plasmid pDA102 for the restriction enzymes SalI and HhaIII. (6 marks)

Digest Performed	Size of Fragments Obtained
SalI	2.30 kb, 0.25 kb, 1.80 kb
HhaIII	2.10 kb, 1.55 kb, 0.70 kb
SalI + HhaIII	1.20 kb, 1.10 kb, 0.75 kb, 0.70 kb, 0.35 kb, 0.25 kb

1.2 Briefly explain any five of the different forms of gene mutations. (10 marks)

1.2 Explain the principle of the polymerase chain reaction (PCR) (5 marks)

1.3 Briefly explain the application of the following and indicate the expected results:

a) Y chromosome (5 marks)

b) AMEL marker (5 marks)

c) Mitochondrial DNA markers (5 marks)

1.5 Match the types of DNA damage a) to g) to the most appropriate of the DNA repair mechanisms i) to v) that can be expected to repair the damage. (14 marks)

Type of DNA damage	DNA repair mechanisms
a). Disintegration of a sugar residue due to oxidative damage.	**i)** non-homologous end joining
b) A simple base modification, such as 8- oxoguanine	**ii)** base excision repair 5
c) A double-stranded DNA break occurring in G1 phase.	**iii)** nucleotide excision repair
d) A pyrimidine dimer	**iv)** homologous recombination-mediated DNA repair
e) A basic site due to depurination	
f) A double-stranded DNA break occurring in G2 phase.	
g) A bulky aromatic hydrocarbon adduct that distorts the double helix.	

Section B: choose any two (2) questions from this section.

Question 2

Genes are naturally transferred between bacteria using the following mechanisms, outline the steps involved in these processes. Clearly drawn and labelled diagrams may be used.

(a) Transformation (5 marks)
(b) Generalized transduction (5 marks)
(c) specialized transduction (5 marks)
(d) F^+ conjugation (5 marks)
(e) Resistance plasmid conjugation (5 marks)

TOTAL= 25 MARKS

Question 3

Explain the ideal/ fundamental characteristics of a suitable cloning vector and expression vector. (15 Marks)

Discuss the mechanism of RNAi in eukaryotic gene control. (10 marks)

TOTAL= 25 MARKS

Question 4

Explain how genomic libraries can be constructed. (10 marks)

Tabulate and outline the summery of southern, northern and western blotting techniques. (15 marks)

TOTAL= 25 MARKS

END OF EXAMINATION PAPER

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MAIN EXAMINATION PAPER 2019

TITLE OF PAPER	:	ANIMAL PHYSIOLOGY
COURSE CODE	:	B401/BIO431
TIME ALLOWED	:	THREE HOURS
INSTRUCTIONS	:	1. ANSWER ANY FOUR QUESTIONS 2. EACH QUESTION CARRIES TWENTY FIVE (25) MARKS 3. WHEREVER POSSIBLE ILLUSTRATE YOUR ANSWERS WITH LARGE CLEARLY LABELLED DIAGRAMS

SPECIAL REQUIREMENTS:

1. CALCULATORS (CANDIDATES MAY BRING THEIR OWN)
2. GRAPH PAPER (ORDINARY)

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QUESTION 1.

Discuss fully ANY THREE of the following:

(i) Riboflavin (5 Marks)
(ii) Calcium (5 Marks)
(iii) Ascorbic acid (5 Marks)
(iv) Magnesium (5 Marks)
(v) Vitamin E (5 Marks)

[Total Marks = 25]

QUESTION 2.

Life and physiological systems on earth are governed by physical laws and by the characteristics of materials that exist on the planet. Discuss this statement fully by making use of relevant examples. (25 Marks)

QUESTION 3.

(a) How is body temperature regulated in endotherms? (15 Marks)

(b) What is mean by torpor? Define and discuss torpor by making use of appropriate examples. (10 Marks)

[Total Marks = 25]

QUESTION 4.

(a) Briefly describe the structure and function of the human male reproductive system (20 Marks)
(b) What is meant by puberty? (5 Marks)

[Total Marks = 25]

QUESTIONS 5.

(a) Differentiate between resting potential and action potential. (10 Marks)
(b) Write notes on the following:
(i) Post-synaptic potentials (5 Marks)
(ii) Conduction speed (5 Marks)
(iii) Electrical synapses (5 Marks)

[Total Marks = 25]

QUESTION 6.

You go home to visit and you find that your father's cows are all looking thin and malnourished. How would you go about correcting this? Give a factual basis for your strategy. (25 Marks)