

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER: MAY 2014

TITLE OF PAPER: APPLIED BIOLOGY

COURSE CODE: B405

TIME ALLOWED: THREE HOURS

- INSTRUCTIONS:
1. THIS PAPER IS DIVIDED INTO FOUR SECTIONS.
  2. USE SEPARATE ANSWER BOOKLETS FOR SECTIONS A AND B.
  3. ANSWERS TO SECTIONS C AND D SHOULD BE IN ONE BOOKLET.
  3. ANSWER A TOTAL OF FOUR QUESTIONS, CHOOSING ONE QUESTION FROM EACH SECTION.
  4. EACH QUESTION CARRIES TWENTY FIVE (25) MARKS
  5. ILLUSTRATE YOUR ANSWER WITH LARGE AND CLEARLY LABELLED DIAGRAMS WHERE APPROPRIATE

SPECIAL REQUIREMENTS: NONE

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

PTO

**SECTION A**

**Answer one question only from this section**

**Question 1**

Explain the symptoms of plant diseases.

(25 marks)

**[Total marks = 25]**

**Question 2**

Water originates from various sources. The end-user's actually enjoy or suffer from the transit systems before it is utilizable. Trace the source of contamination and design a study on how to alleviate water quality problems. (25 marks)

**[Total marks = 25]**

PTO

**SECTION B****Answer one question only from this section****Question 3**

What threats do agricultural activities pose to invertebrates? Analyse these with special reference to insects.

(25 marks)

**[Total marks = 25]****Question 4**

Discuss in detail the chemical and biological control methods of pest control, elaborating on their *pros* and *cons*.

(25 marks)

**[Total marks = 25]**

PTO

**SECTION C**

**Answer one question only from this section**

**Question 4**

An outbreak of a food-borne bacterial disease with strange and incomprehensible signs and symptoms has been reported in Manzini. You are a member of the taskforce that has to come up with a remedy to this epidemic, but you need to identify the causative agent first. With that in mind, devise and espouse a molecular/bioinformatics diagnostic protocol to decipher the genus or species this bacterium may belong or be closely related to. (25 marks)

**Question 5**

- (a) Explain the difference between gDNA library and cDNA library. (5 marks)
- (b) Given an inoculum of a certain fungal species as starting material, outline the construction of a typical cDNA library. (20 marks)

**PTO**

**SECTION D**  
**Answer one question only from this section**

**Question 7**

Discuss the mechanism of RNA interference in eukaryotes, highlighting its role in gene expression control, cellular defense and therapeutics. (25 marks)

**Question 8**

- (a) Discuss the principle and application of DNA microarray technology in functional genomics. (10 marks)
- (b) Evaluate the application of molecular markers in human DNA forensic investigations. (15 marks)

**END OF QUESTION PAPER**