

UNIVERSITY OF SWAZILAND

MAIN EXAMINATION PAPER: MAY 2011

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 EACH SECTION**
 - 2. ANSWER A TOTAL OF FOUR QUESTIONS, CHOOSING ONE QUESTION FROM EACH SECTION.**
 - 3. EACH QUESTION CARRIES TWENTY FIVE (25) MARKS**
 - 4. ILLUSTRATE YOUR ANSWER 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

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SECTION A

Answer **one** question from this section.

Question 1

Review the major reasons for the emergence of new infectious diseases.

What methods are available for controlling these diseases? (25 marks)

[TOTAL MARKS = 25]

Question 2

Demonstrate the use of microorganisms in industrial settings. (25 marks)

[TOTAL MARKS = 25]

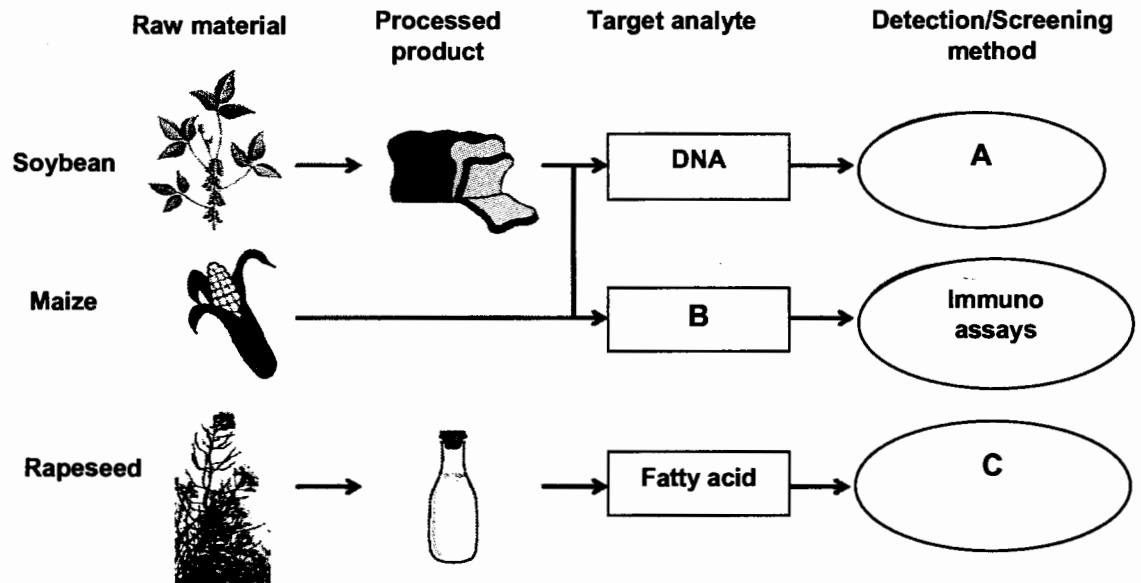
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SECTION B

Answer **one** question from this section.

Question 3

Detection and screening of GM food may involve molecular, biochemical and analytical methods. Shown below is a diagram with typical crops that can be genetically modified.



- (a) Identify the missing labels **A**, **B** and **C**. (3 marks)
- (b) Distinguish between the following terms as they apply to GMOs:
 (i) detection and screening, (4 marks)
 (ii) event-specific and construct-specific PCR. (4 marks)
- (c) A consignment of *Glycine max. L* (soybean) from South Africa has been impounded at Ngwenya Border Post by the Swaziland Environmental Authority (SEA) on suspicion that it could be genetically modified. Suppose you were asked to genetically screen this consignment, explain how you would do this, highlighting sampling strategies, laboratory precautions, expected results and concomitant advice you would give to SEA as a way forward. (14 marks)

[TOTAL MARKS = 25]

Question 4

- (a) Appraise the application of molecular markers in conservation of plant genetic resources. (5 marks)
- (b) Explain the difference between a genomic DNA and a cDNA library. (5 marks)
- (c) With the aid of diagrams, outline the construction of a typical cDNA library. (15marks)

[TOTAL MARKS = 25]

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SECTION C

Answer **one** question from this section.

Question 5

- (a) What are man-made lakes? Indicate their significance in the socio-economic development of Swaziland. (15 marks)
- (b) Explain why fish is an important fresh-water resource for most people in the tropical countries of the world. (10 marks)

[TOTAL MARKS = 25]

Question 6

- (a) Explain the term aquaculture. As a fishery officer, advise the government on the suitable fish and areas for commercial aquaculture practices within the country. (10 marks)
- (b) It has been stated that the incidence of schistosomiasis (bilharzia) and malaria may increase especially in the lowveld of the country. Discuss. (15 marks)

[TOTAL MARKS = 25]

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SECTION D

Answer **one** question from this section.

Question 7

- (a) At any given time, a host has a number of microorganisms associated with it. How then does one determine the pathogen among them? (10 marks)
- (b) Broadly describe plant disease symptoms and how they relate to the host-pathogen interaction. (15 marks)

[TOTAL MARKS = 25]

Question 8

Discuss the maize production protocol followed by farmers in Swaziland as a scientifically sound disease management procedure. (25 marks)

[TOTAL MARKS = 25]

END OF QUESTION PAPER