

UNIVERSITY OF SWAZILAND

MAIN EXAMINATION PAPER: DEC 2013

TITLE OF PAPER: INTRODUCTORY BOTANY

COURSE CODE: B111

TIME ALLOWED: THREE HOURS

- INSTRUCTIONS:**
1. THIS PAPER IS DIVIDED INTO TWO SECTIONS
 2. ANSWER 2 QUESTIONS FROM EACH SECTION IN TWO SEPARATE BOOKLETS.
 3. ANSWER QUESTION 1 (COMPULSORY) AND ONE OTHER QUESTION FROM SECTION A.
 4. ANSWER 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: GRAPH PAPER.

CANDIDATES MAY BRING CALCULATORS.

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

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SECTION A

Question 1 (COMPULSORY)

- (a) Discuss the functions of plant hormones and secondary metabolites in plant systems. (12 marks)
- (b) A series of tyrosinase *in vitro* assays were performed at different initial concentrations of substrate (L-Tyrosine) to obtain product dopamine as shown in the table below.

[L-Tyrosine] (mM)	Initial velocity (μM dopamine/min)
0.1	4.76
0.2	9.09
0.5	20
1	33.33
2	50
5	71.43
10	83.33

Draw the Michaelis-Menten and Lineweaver-burke plots to estimate the Michaelis constant, K_m , for enzyme tyrosinase and V_{max} of this reaction. Comment on any discrepancies in the values obtained using the two plots. (13 marks)

[Total marks = 25]

Question 2

Describe the fluid mosaic model of plasma membranes, illustrating how the membrane structure is related to its various named functions. (25 marks)

[Total marks = 25]

Question 3

- (a) State the differences between the following:
- (i) mitosis and meiosis, (6 marks)
 - (ii) DNA and RNA, (6 marks)
 - (iii) Nucleotide and nucleoside, (1 mark)
 - (iv) saturated fatty acid and unsaturated fatty acid. (1 mark)
- (b) Explain the function of any three RNAs found in a cell. (6 marks)
- (c) State whether fructose is a reducing sugar or not. Justify your answer. (5 marks)

[Total marks = 25]

PTO

SECTION B
ANSWER ANY TWO (2) QUESTIONS FROM THIS SECTION.

Question 4

- (a) Clearly indicate how field samples would help you to identify a fungus using both asexual and sexual stages produced. (6 marks)
- (b) Match the structures in column A to their functions in column B (8 marks)
- | Column A | Column B |
|-----------------------|----------------------------------|
| (i) Cell wall | 1. Attachment to surfaces |
| (ii) Endospore | 2. Cell wall formation |
| (iii) Fimbriae | 3. Motility |
| (iv) Flagella | 4. Protection from osmotic lysis |
| (v) Glycocalyx | 5. Protection from phagocytes |
| (vi) Pili | 6. Resting |
| (vii) Plasma membrane | 7. Protein synthesis |
| (viii) Ribosomes | 8. Selective permeability |
| | 9. Transfer of genetic material. |
- (c) Why is an endospore called a resting structure? Of what advantage is an endospore to a bacterial cell? (3 marks)
- (d) Diagrammatically, show how a gram-positive and a gram-negative bacterium differ. (3 marks)
- (e) Given that the optimal conditions for bacterial growth are never met, explain the logistic curve of *E-coli*. (5 marks)

[Total marks = 25]

Question 5

- (a) What is a virus? (5 marks)
- (b) With specific examples, name and draw the four morphological classes of viruses. (8 marks)
- (c) Explain how viruses multiply within their host cells. (6 marks)
- (b) Write an essay on the relevance of viruses to humans? (6 marks)

[Total marks = 25]

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Question 6

- (a) Draw the following:
- (i) *Euglena spp.* (1.5 marks)
 - (ii) *Fucus spp.* (1.5 marks)
 - (iii) A perithecium (1.5 marks)
 - (iv) An apothecium (1.5 marks)
 - (v) A basidiocarp (1.5 marks)
 - (vi) *Pinnularia spp.* (1.5 marks)
 - (vii) *Chlamydomonas spp.* (1.5 marks)
 - (viii) A cleistothesium (1.5 marks)
 - (ix) A pycnidium (1.5 marks)
 - (x) An acervulus (1.5 marks)
- (b) Explain the economic importance of fungi. (5 marks)
- (c) Write an essay on the importance of algae to the environment. (5 marks)

[Total marks = 25]**END OF QUESTION PAPER**