

UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATION PAPER: JUNE 2009

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: NONE

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

[PLEASE TURN OVER]

## SECTION A

ANSWER QUESTION 1 AND ONE OTHER QUESTION FROM THIS SECTION.

## Question 1 (COMPULSORY)

- (a) Explain the cellular functions of the following organelles:
- (i) cell wall, (3 marks)
  - (ii) mitochondria, (3 marks)
  - (iii) chloroplasts, (3 marks)
  - (iv) ribosomes, (3 marks)
  - (v) endoplasmic reticulum. (3 marks)
- (b) Define the following:
- (i) hypertonic solution, (2 marks)
  - (ii) hypotonic solution, (2 marks)
  - (iii) isotonic solution, (2 marks)
  - (iv) autotroph, (2 marks)
  - (v) heterotroph. (2 marks)

**[TOTAL MARKS = 25]**

## Question 2

- (a) Explain the effect of the degree of fatty acid saturation on the fluidity of the fats/oils. (5 marks)
- (b) (i) Draw the general chemical formula of an amino acid. (2 marks)
- (ii) Explain what globular proteins are. (3 marks)
- (iii) List five characteristics of enzymes. (5 marks)
- (iv) Explain how you can graphically determine the  $K_m$  and  $V_{max}$  of an enzyme catalysed reaction (5 marks)
- (v) State 5 agents/conditions that can cause protein denaturation (5 marks)

**[TOTAL MARKS = 25]**

## Question 3

- (a) List the components that make up a nucleotide. (3 marks)
- (b) A double-stranded DNA molecule has an  $(A+T)/(G+C)$  ratio of 0.6. On the basis of this information, calculate the following:
- (i) the A+C mole fraction, (2 marks)
  - (ii) the A+G mole fraction, (2 marks)
  - (iii) the G+C mole fraction, (2 marks)
  - (iv) the mole fraction of each of the four nucleotides (A, T, G, & C), (2 marks)
- (c) In a single strand of DNA, explain if it is ever possible for the number of adenines (A) to be greater than the number of thymines (T). (2 marks)

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**Question 3 contd.**

(d) A certain segment of DNA has the following nucleotide sequence in one strand: **5'-ATTGGTGCATTACTTCAGGCTCT-3'**.

(i) Give the sequence in the other strand. Label its 5' and 3' ends. (2 marks)

(ii) Write down the sequence of the RNA transcript. (2 marks)

(e) Giving examples, explain why plants produce secondary metabolites.

(8 marks)

**[TOTAL MARKS = 25]**

**SECTION B**

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

**Question 4**

(a) Name and elaborate on the characteristics used in taxonomy.

(4 marks)

(b) List the principles that underlie the methods of Numerical taxonomy.

(10 marks)

(c) Write an essay on "the relevance of systematics in contemporary biology".

(11 marks)

**[TOTAL MARKS = 25]**

**Question 5**

(a) Name and define the types of hyphae that arise when fungal hyphae fuse without their nuclei fusing.

(8 marks).

(b) What are the sexual spores produced by:

(i) deuteromycetes,

(1 mark)

(ii) ascomycetes,

(1 mark)

(iii) basidiomycetes,

(1 mark)

(iv) zygomycetes.

(1 mark)

(c) Cite some examples of toxic fungi.

(3 marks)

(d) Explain the following:

(i) asexual spores in basidiomycetes,

(3 marks)

(ii) vegetative forms in basidiomycetes,

(3 marks)

(iii) sporocarps in ascomycetes.

(4 marks)

**[TOTAL MARKS = 25]**

**[PLEASE TURN OVER]**

**Question 6**

- (a) Draw well labelled diagrams of the following:
- (i) *Dryopteris* spp. (2 marks)
  - (ii) *Funaria* spp. (2 marks)
  - (iii) *Pellia* spp. (3 marks)
  - (iv) a longitudinal section through an archegonium of *Anthoceros* spp. (3 marks)
- (b) Explain the types of life cycles in plants. (6 marks)
- (c) Outline the characteristics of non vascular plants. (4 marks)
- (d) Explain how gametophytes are specialized in plants. (5 marks)

**[TOTAL MARKS = 25]**

**END OF QUESTION PAPER**