

UNIVERSITY OF SWAZILAND
MAIN EXAMINATION PAPER: DECEMBER 2017/2018

TITLE OF PAPER: INTRODUCTORY BOTANY

COURSE CODE: BIO101

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 COUNTS TWENTY FIVE (25) MARKS.
 6. USE CLEARLY LABELLED DIGRANS WHERE NECESSARY.

SPECIAL REQUIREMENTS: NONE

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

SECTION A

PTO

Question 1 (COMPULSORY)

- (a) (i) State the functional group necessary for a sugar to be reducing. (1 mark)
 (ii) Is fructose an aldose or a ketose? (1 mark)
 (iii) Does fructose give the same result as glucose when reacted to Benedict's reagent? Explain your answer. (4 marks)
 (iv) What are anomers? How are they formed? (3 marks)
- (b) Draw a general structure of an amino acid. (2 marks)
- (c) Briefly explain what happens during light-dependent and light-independent reactions of photosynthesis. (5 marks)
- (d) State any four non-covalent interactions that stabilise the tertiary structure of proteins. (4 marks)
- (e) Define K_m and V_{max} of an enzyme-catalysed reaction. (2 marks)
- (f) Explain how enzyme-substrate affinity can be inferred from K_m . (3 marks)

[Total marks = 25]

Question 2

- (a) State the differences between the following:
 (i) Mitosis and meiosis, (6 marks)
 (ii) DNA and RNA, (5 marks)
 (iii) Nucleotide and nucleoside, (1 mark)
 (iv) Saturated fatty acid and unsaturated fatty acid. (1 mark)
- (b) Briefly explain the function of any three RNAs found in a cell. (6 marks)
- (c) Explain the role played by **any three** of the following during plant growth.
 (i) nitrogen, (2 marks)
 (ii) gibberellins (GAs), (2 marks)
 (iii) auxin, (2 marks)
 (iv) abscisic acid (ABA), (2 marks)
 (v) phosphorus, (2 marks)
 (vi) ethylene. (2 marks)

[Total marks = 25]

Question 3

Describe the structure of the plasma membrane, using clearly labelled diagram and highlighting how this structure is related to the membrane's different named functions. (25 marks)

SECTION B

ANSWER ANY TWO (2) QUESTIONS FROM THIS SECTION.

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Question 4

a) Clearly indicate how field samples can be used to identify a fungus using both asexual and sexual stages produced. (6 marks)

b) Match the structure in **Column A** to its function in **Column B** (8 marks)

Column A

- i. Cell wall
- ii. Endospore
- iii. Fimbriae
- iv. Flagella
- v. Glycocalyx
- vi. Pili
- vii. Plasma membrane
- viii. Ribosomes

Column B

- 1. Attachment to surfaces
- 2. Cell wall formation
- 3. Motility
- 4. Protection from osmotic lysis
- 5. Protection from phagocytes
- 6. Resting
- 7. Protein synthesis
- 8. Selective permeability
- 9. Transfer of genetic material.

c) Why is an endospore referred to as a resting structure? What advantage does an endospore confer to bacteria? (3 marks)

d) Indicate how a gram-positive and a gram-negative bacterium differ, using a clearly labelled diagram. (3 marks)

e) Given that the optimal conditions for bacterial growth are never met, explain the growth curve *E. coli*. (5 marks)

[TOTAL MARKS = 25]

Question 5

(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)

PTO

(b) Briefly discuss the economic importance of fungi. (5 marks)

(c) Discuss the importance of algae in the environment. (5 marks)

[TOTAL MARKS = 25]

Question 6

a) Explain what a virus is. (5 marks)

b) List the four morphological classes of viruses. For each class, give specific examples and draw a diagram. (8 marks)

c) Explain how viruses multiply within their host cells. (6 marks)

d) Discuss the relevance of viruses to humans? (7 marks)

[TOTAL MARKS = 25]

END OF EXAM PAPER