

UNIVERSITY OF SWAZILAND
FACULTY OF AGRICULTURE AND ENGINEERING
DEPARTMENT OF BIOLOGICAL SCIENCES

MAIN EXAMINATION PAPER 2016/2017

- PROGRAMMES:** BSc. I
B. Ed Secondary I
B.Ed. Primary I
- TITLE OF PAPER:** INTRODUCTORY BOTANY
- COURSE CODE:** BIO 101
- 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.

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

SECTION A**Question 1 (Compulsory)**

- (a). State three characteristics of plant cells (3 marks)
- (b) State any two differences between the following: (8 marks)
- (i) mitosis and meiosis,
 - (ii) prokaryotic cell and a eukaryotic cell,
 - (iii) DNA and RNA,
 - (iv) Seliwanoff's and Barfoed's test.
- (c) Draw the structures of the following: (8 marks)
- (i) D-glucose,
 - (ii) D-mannose,
 - (iii) D-fructose.
 - (iv) α -amino acid
- (d) With reference to the structures you have drawn above, explain the relationship between
- (i) glucose and mannose (3 marks)
 - (ii) either glucose and fructose or mannose and fructose (3 marks)

[TOTAL MARKS = 25]**Question 2**

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

Question 3

- 3 Write notes on primary, secondary, tertiary and quaternary structures of proteins. (25 marks)

SECTION B: Answer ANY TWO (2) questions from this Section**Question 4**

(a) Why would you wish to stain microorganisms? (3 marks)

(b) Determine the colour of the bacterium after:
 (i) simple staining with methylene blue, (1 mark)
 (ii) simple staining with crystal violet, (1 mark)
 (iii) the Gram's stain. (1 mark)

(c) Match the structures in column A to their functions in column B (8 marks)

Column A

- (i) Cell wall
- (ii) Endospore
- (iii) Fimbriae
- (iv) Flagellum
- (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

(d) Draw a well labelled diagram of a gram-positive and a gram-negative cell wall of a bacterium. (3 marks)

(e) Starting with a single cell, how many cells of bacteria would you count at the fourth generation of growth? (2 marks)

(f) Given that the optimal conditions for bacterial growth are never met, explain the growth curve of *E. Coli*. (6 marks)

[TOTAL MARKS = 25]

Question 5

(a) What is a virus? (5 marks)

(b) Why are viruses called obligatory intracellular parasites? (1 mark)

(c) With specific examples, name and draw the morphological classes of viruses. (8 marks)

(d) List the steps of viral multiplication within host cells. How does the host cell recognize the virus? (5 marks)

(e) Write a short essay on the relevance of viruses of humans? (6 marks)

[TOTAL MARKS = 25]

Question 6

- (a) Indicate how you would identify the divisions of fungi using both the asexual and sexual spores they produce? (3 marks)
- (b) Draw the following structures of fungi: (6 marks)
- (i) A perithecium,
 - (ii) An apothecium,
 - (iii) A cleistothecium,
 - (iv) A pycnidium,
 - (v) An acervulus,
 - (vi) A basidiocarp.
- (c) Draw the habit of the following: (6 marks)
- (i) *Chlamydomonas* spp,
 - (ii) *Fucus* spp,
 - (iii) *Pellia* spp,
 - (iv) *Dryopteris* spp.
- (d) Tabulate the most notorious human diseases caused by microorganisms and then use your comprehensive knowledge of mycology to explain the relevance of fungi to humans (10 marks)

[TOTAL MARKS = 25]

END OF EXAMINATION PAPER