GWANDA STATE UNIVERSITY

FACULTY OF NATURAL RESOURCES MANAGEMENT AND AGRICULTURE

DEPARTMENT OF CROP SCIENCE

PROGRAMME: BSc HONOURS HORTICULTURE AND CROP PRODUCTION

NAP 1102 INTRODUCTION TO MICROBIOLOGY

FINAL EXAMINATION

JUNE-JULY 2023

This examination paper consists of 3 pages.

Time Allowed: 3 hours.

Total Marks: 100

Special Requirements: none

Examiner's Name: Dr A Banda

Instructions

1. Answer **ALL** questions in Section A
2. Answer **TWO (2)** questions in Section B

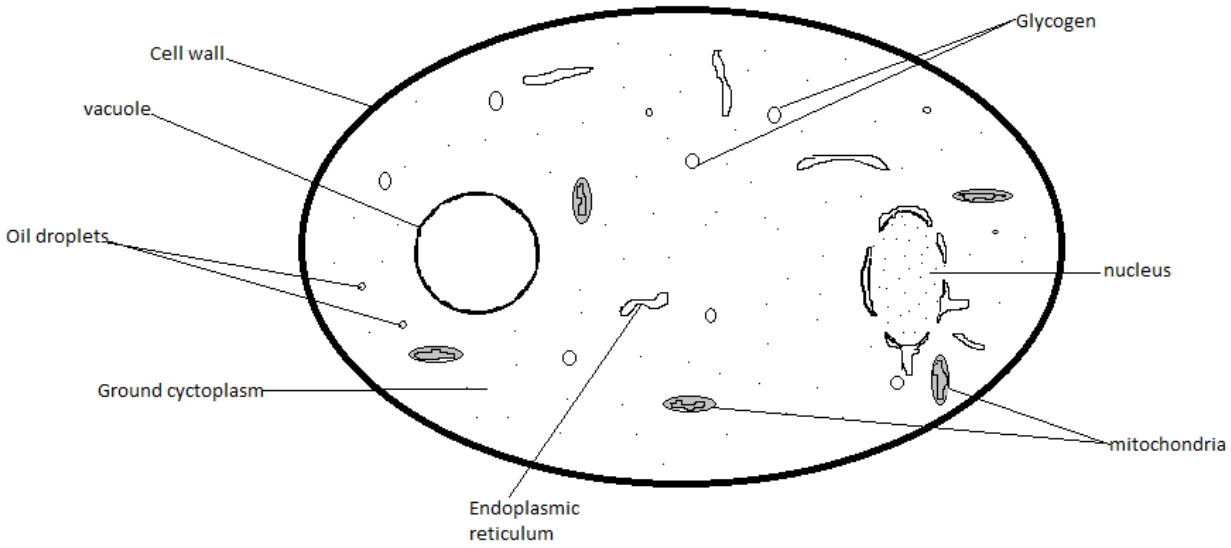
Mark allocation

Question	**Marks**
Section A	60
Section B	40
Total attainable marks	100

SECTION A: Answer **ALL** questions.

Question 1

The accompanying diagram shows a highly magnified yeast cell. Yeast is a fungus and has both plant-like and animal-like features.
Eight parts are labelled in the diagram. In a table as below write the name of each of the eight parts in the column you think most appropriate **8 marks**



Found in both animal and plant cells	Found in plant cells but not in animal cells	Found in animal cells but not in plant cells

Explain how you would:

(i) Adjust the focus of a microscope; **2 marks.**

(ii) Adjust the intensity of light passing through the specimen **2 marks.**

(iii) Increase the magnification power of the microscope **3 marks.**

c. Make a labelled diagram to show the structure of a bacterial cell such as from the preparation of a Giemsa stain **5 marks.**

Question 2

a. Make a list of the components of a fertile soil and discuss the importance of each **9 marks.**

b. What is the significance of: (i) practicing crop rotation; (ii) adding lime to soil? **6 marks.**

c. Describe how to measure humus in soil **5 marks.**

Question 3

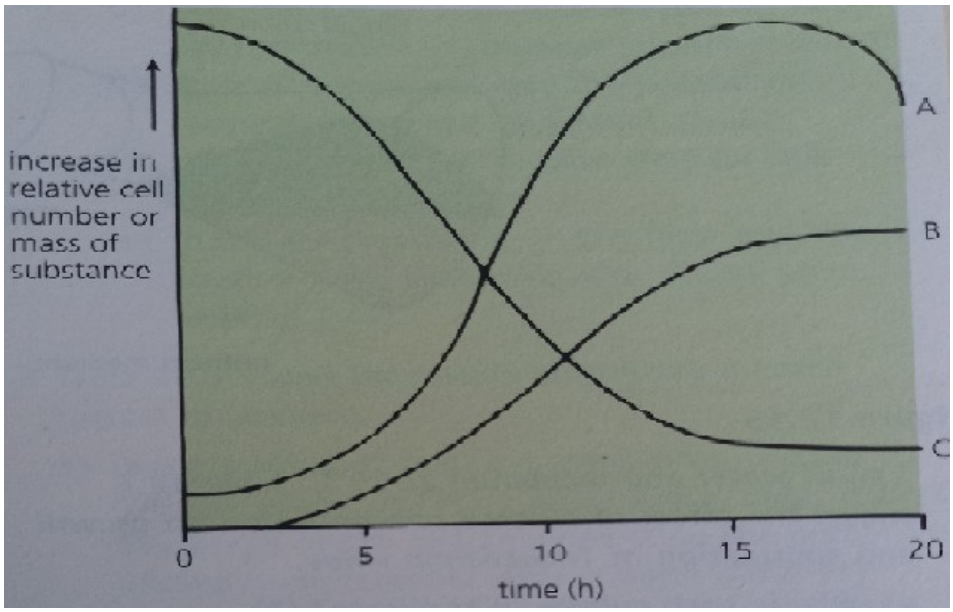
a. Match the chemical requirement to its correct typical source of chemical and explanation as follows:-

1-a-(i)

Chemical requirements	Typical source of chemical	Explain
1. Carbon	a. Compound containing sulphate group	(i) is needed for the synthesis of some amino acids
2. Hydrogen	b. Compound containing ammonium or nitrate group	(ii) is needed for the synthesis of nucleic acids, amino acids and proteins
3. Oxygen	c. Compound containing phosphate group	(iii) is needed for the synthesis of ATP and nucleic acids
4. Nitrogen	d. Water and air	(iv) Essential component of all organic materials
5. Phosphorus	e. Water and organic compounds	(v) Oxygen is a component of many organic materials and the final electron acceptor in aerobic respiration
6. Sulphur	f. Organic compound such as carbohydrate	(vi) Organic compounds provide the microbe with energy and raw materials for biosynthesis

12 marks

b.



Adapted from Torrance et al., 2012

The graph in Figure 2 shows the results from closely monitoring the changes that took place during the fermentation of a closed batch of wine. Describe

(i) The line which represents the number of live yeast cells **3 marks**

(ii) The line which represents the mass of glucose present in the fermenter **3 marks**

(iii) The line which represents the mass of alcohol present in the fermenter **2 marks**

SECTION B: Answer any **THREE** questions.

Question 4

a. Briefly describe the critical factors required by microorganism for growth **5 marks.**

b. State the differences between nutrient agar and nutrient broth **7 marks**.

c. With the aid of a diagram give an account of the four phases of growth undergone by a population of bacteria growing in a finite volume of liquid culture medium **9 marks**

Question 5

Describe the terrestrial carbon cycle, placing great emphasis on the role played by microorganisms in the cycle. **20 marks**

Question 6

Describe the production of the following products.

i. Wine **6 marks**

ii. Lactic acid **3 marks**

iii. Cheese making **6 marks**

iv. Silage **5 marks**

END OF QUESTION PAPER!!!