

LUSAKA APEX
MEDICAL UNIVERSITY



FACULTY OF PRE-MEDICAL SCIENCES

UNIVERSITY EXAMINATIONS NOVEMBER 2023
BS 1001

CELLS AND BIOMOLECULES

WEDNESDAY 15TH NOVEMBER 2023

DURATION: Three Hours

TOTAL MARKS: 100

Examiners: Ms. K Malisa, Dr. G. Chakolwa and Ms. A. Chawe

INSTRUCTIONS FOR THE WHOLE PAPER

1. Write your Student Identity Number on all pages of the answer booklet(s).
2. Answer ALL the questions in this paper.
3. Present your work in a clear and logical manner.
4. All drawings should be in pencil.
5. Any disregard for examinations rules and regulations will result in you being disqualified from this examination.
6. Ensure that you sign in the examination attendance register before leaving the examination room

SECTION A: CELLS, CELL DIVISION AND MICROBIOLOGY

A1. Using your knowledge on cell types and their differences, complete the following table by indicating the words present or absent in your answer booklet. Indicate the number of the cell and the answer only. Do not draw the table.[30marks]

Structure	Vibrio Cholerae cell	Onion cell	Red blood cell
Nucleus	1.	2.	3.
Cell membrane	4.	5.	6.
Cytoplasm	7.	8.	9.
Cytoskeleton	10.	11.	12.
Flagellum	13.	14.	15.
Capsule	16.	17.	18.
Cell wall	19.	20.	21.
Chloroplasts	22.	23.	24.
Centrioles	25.	26.	27.
Endoplasmic reticulum	28.	29.	30.

A2. Identify the following microorganisms [6 Marks]

- Unicellular non-nucleated microorganisms_____
- Infectious agent that possess no genome_____
- Microorganisms incapable of possessing both RNA and DNA at the same time_____
- Non-photosynthetic disease causing cell walled eukaryotic organisms_____
- Two examples of groups of organisms capable of functioning as normal flora are
 - _____
 - _____

A3. Under classification of micro-organisms answer the following questions. [4 Marks]

- (a) Highest level of classification of cellular organisms _____
- (b) Number of kingdoms available _____
- (c) Kingdom that was used as a catchall for all organisms that could not fit in kingdom Animalia and Plantae _____
- (d) Between cellular and acellular microorganisms. Which organisms have scientific names that obey binomial nomenclature rules? _____

A4. State the difference(s) between mitosis and meiosis with regards to the following:

- (a) Location of occurrence in human beings. [2 Marks]
- (b) Number and composition of daughter cells produced. [2 Marks]
- (c) Onset (When does the process take place?). [2 Marks]
- (d) Genetic variation. [2 Marks]

A5. State any two advantages of asexual reproduction over sexual reproduction. [2 Marks]

SECTION B: BIOMOLECULES

B1. (a) Draw the structure of a water molecule clearly indicating the bond angle. [1 Mark]

(b) Why is the water molecule not linear? [1 Mark]

(c) What do you understand by the term electronegativity? [1 Mark]

(d) Water has a very high specific heat capacity. In this regard, what is specific heat capacity? [1 Mark]

(e) What is the biological importance of water having a very high specific heat capacity?
[1 Mark]

B2. (a) Give examples of the following types of carbohydrates:

- i. Structural carbohydrate found in bacterial cell walls [1 Mark]
- ii. Structural carbohydrate found in plant cell walls [1 Mark]
- iii. Storage carbohydrate found in animals [1 Mark]
- iv. Storage carbohydrate found in plants [1 Mark]
- v. Reducing sugar. [1 Mark]

(b) Explain the difference between a condensation reaction and hydrolysis using alpha glucose. [5 Marks]

B3. (a) State three functions of cholesterol in the cell membrane. [3 Marks]

(b) State three functions of cholesterol in the human body. [3 Marks]

(c) What is the scientific term used for buildup of bad cholesterol in arteries? [1 Mark]

(d) List three lifestyle changes one can make to prevent the buildup of bad cholesterol.

[3 Marks]

B4. Use a diagram to illustrate how dipeptides are formed. [5 Marks]

B5. (a) Use a diagram to illustrate the induced fit model of enzyme activity. [3 Marks]

(b) How does temperature affect the rate of an enzyme controlled reaction? [4 Marks]

(c) What is the difference between an apoenzyme and a holoenzyme? [2 Marks]

(d) What do you understand by the term non-competitive enzyme inhibition? [1 Mark]

B6. A single strand of Nucleic acid has the following base sequence :

AAATTCCCTTAACCCTGGG

(a) Is the strand DNA or RNA? Give a reason for your answer [2 Marks]

(b) If it were the other type of nucleic acid, what sequence would it have been?

[1 Mark]

(c) Write the corresponding sequence of the other strand antiparallel to the one shown above. [1 Mark]

(d) Is the sequence shown above primary, secondary, tertiary or quaternary structure?

[1 Mark]

B7. Which vitamin/mineral deficiencies cause the following conditions? [5 Marks]

(a) Osteoporosis

(b) Scurvy

(c) Dementia

(d) Pernicious Anemia

(e) Hyponatremia

TOTAL MARKS=100