



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**Faculty of Health, Applied Sciences and Natural Resources**

**Department of Health Sciences**

<b>QUALIFICATION:</b> BACHELOR OF MEDICAL LABORATORY SCIENCES	
<b>QUALIFICATION CODE:</b> 08BMLS	<b>LEVEL:</b> 5
<b>COURSE:</b> CELL AND MOLECULAR BIOLOGY	<b>COURSE CODE:</b> CMB521S
<b>DATE:</b> JANUARY 2023	<b>SESSION:</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>SUPPLEMENTARY / SECOND OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	Ms Roselin Tsauses
<b>MODERATOR:</b>	Ms Vanessa Tjijenda

<b>INSTRUCTIONS</b>	
<ol style="list-style-type: none"><li>1. Answer all questions.</li><li>2. Please write neatly and legibly.</li><li>3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.</li><li>4. No books, notes and other additional aids are allowed.</li><li>5. Mark all answers clearly with their respective question numbers.</li></ol>	

**Permissible material**

Non programmable calculator is allowed.

**THIS EXAMINATION PAPER CONSISTS OF 8 PAGES** (Excluding this front page)

## Section A (20 marks)

### Question 1

[20]

1. Evaluate the statements in each numbered section and select the most appropriate answer. Write the letter of the correct answer next to the corresponding number. **(One (1) mark is allocated for each correct answer. There is only one (1) correct answer for each question.)**
- 1.1 Which of the following cell organelles is called a suicidal bag? (1)
- (a) Lysosomes
  - (b) Golgi bodies
  - (c) Cell membrane
  - (d) Mitochondria
- 1.2 Which of the following cell organelles is involved in the breakdown of organic matter? (1)
- (a) Lysosomes
  - (b) Cytoplasm
  - (c) Golgi bodies
  - (d) Mitochondria
- 1.3 Which of the following cell organelles is present in plant cells and absent in animal cells? (1)
- (a) Nucleus
  - (b) Vacuole
  - (c) Chloroplast
  - (d) Cytoplasm
- 1.4 Which of the following is a single membrane-bound organelle? (1)
- (a) Vacuole
  - (b) Golgi Apparatus
  - (c) Endoplasmic Reticulum
  - (d) All of the above

- 1.5 Which of the following cell organelles is present in animal cells and absent in plant cells? (1)
- (a) Nucleus
  - (b) Centrosome
  - (c) Golgi bodies
  - (d) All of the above
- 1.6 Which of the following is not a double membrane-bound organelle? (1)
- (a) Chloroplast
  - (b) Mitochondria
  - (c) Endoplasmic Reticulum
  - (d) All of the above
- 1.7 Chromosomes are located in the \_\_\_\_\_ . (1)
- (a) Golgi bodies
  - (b) Vacuoles
  - (c) Nucleus
  - (d) Plastids
- 1.8 Hydrophilic means \_\_\_\_\_ . (1)
- (a) water attracting
  - (b) water dreading
  - (c) water reacting
  - (d) all of the above
- 1.9 According to the fluid mosaic model of cell membranes, which type of molecule spans the membrane, from its inner to outer surface? (1)
- (a) carbohydrate
  - (b) cholesterol
  - (c) phospholipid
  - (d) protein

- 1.10 What are the membrane structures that function in active transport? (1)
- (a) peripheral proteins
  - (b) carbohydrates
  - (c) integral proteins
  - (d) hydrophobic molecules
- 1.11 All of the following are found in membranes except: (1)
- (a) nucleic acids
  - (b) phospholipids
  - (c) glycoproteins
  - (d) glycolipids
- 1.12 The membrane proteins that catalyze active transport reactions differ from soluble enzymes in that \_\_\_\_\_ (1)
- (a) they do not enhance the rates of reaction.
  - (b) the product(s) of the reaction move in a specific direction.
  - (c) the substrate(s) of the reaction are all outside the cell.
  - (d) they are not specific.
- 1.13 Following are the membrane bound cell organelles except: (1)
- (a) Endoplasmic reticulum
  - (b) Lysosome
  - (c) Ribosomes
  - (d) Peroxisome.
- 1.14 In Osmosis, movement of \_\_\_\_\_ occurs through the semi-permeable membrane. (1)
- (a) Solvent
  - (b) Solute
  - (c) Both (a) and (b)
  - (d) All the above

- 1.15 The rough ER is specially well developed in cells actively engaged in: (1)
- (a) Protein synthesis
  - (b) Nucleotide synthesis
  - (c) Lipid synthesis
  - (d) Secretory functions
- 1.16 Ribosomes are made up of \_\_\_\_\_. (1)
- a. RNA only
  - b. RNA and proteins
  - c. RNA, DNA and proteins
  - d. nucleic acids, proteins and lipids
- 1.17 In mitochondria cristae act as sites for \_\_\_\_\_. (1)
- (a) protein synthesis
  - (b) phosphorylation of flavoproteins
  - (c) breakdown of macromolecules
  - (d) Oxidation–reduction reaction
- 1.18 Which of the following statements are correct regarding the Golgi apparatus? (1)
- a. sorting and packaging
  - b. exocytosis of melanin granules
  - c. exocytosis of thyroxine hormone
  - d. all of the above
- 1.19 In the rough endoplasmic reticulum, ribosomes are located on \_\_\_\_\_. (1)
- (a) the cytoplasmic side
  - (b) on the luminal side
  - (c) both (a) and (b)
  - (d) all throughout

- 1.20 Which of the following is NOT a function of mitochondrion? (1)
- a. electron transport and associated ATP production
  - b. Fatty acid breakdown
  - c. non-shivering thermogenesis
  - d. glycolysis and associated ATP production

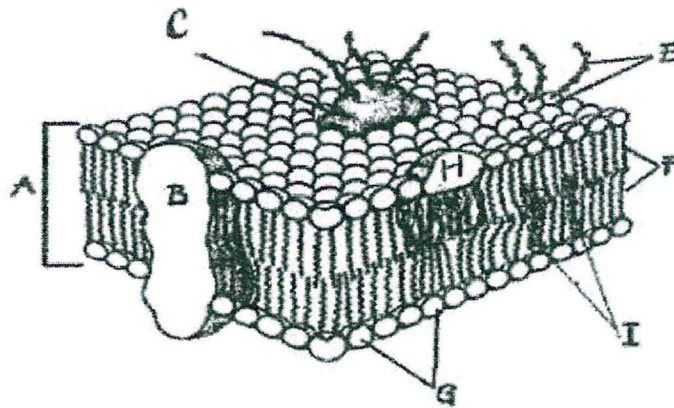
### Section B (30 marks)

#### Question 2

[15]

- 2.1 Study the diagram below and identify the parts indicated below.

Write the correct letter next to the corresponding number of each part.



- 2.1.1 Phospholipid bilayer (1)
- 2.1.2 Phosphate heads (1)
- 2.1.3 Fatty acid tails (1)
- 2.1.4 Integral protein (1)
- 2.1.5 Peripheral protein (1)
- 2.1.6 Glycoprotein (1)
- 2.1.7 Glycolipids (1)



2.2 Match the cell membrane structure or its function with the correct letter from the cell membrane diagram in question 2.1. Write the correct letter next to the corresponding number of each structure or function indicated below.

- 2.2.1 Attracts water. (1)
- 2.2.2 Repels water. (1)
- 2.2.3 Helps maintain flexibility of membrane. (1)
- 2.2.4 Makes up the bilayer. (2)
- 2.2.5 Involved in cell-to-cell recognition. (2)
- 2.2.6 Help transport certain materials across the cell membrane. (1)

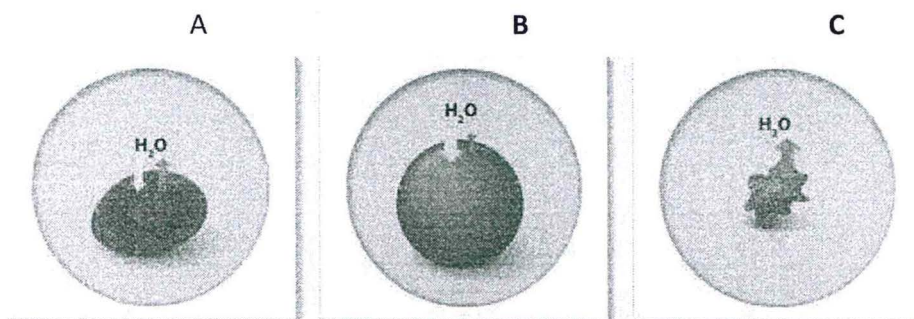
**Question 3**

**[15]**

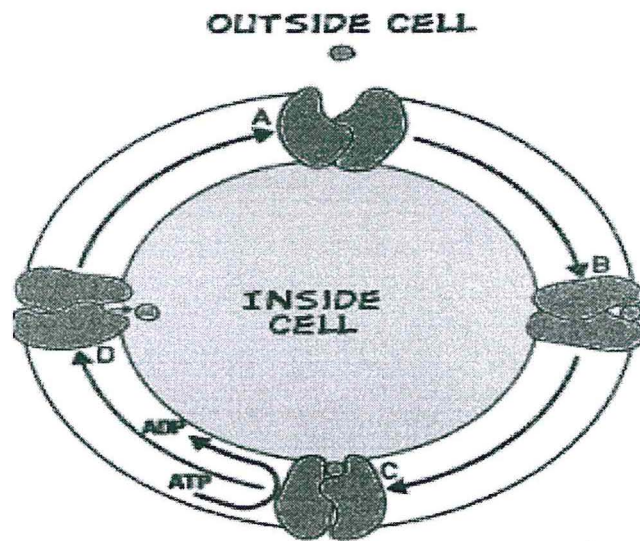
3.1 Define the following terms:

- 3.1.1 Isotonic (2)
- 3.1.2 Hypertonic (2)
- 3.1.3 Hypotonic (2)

3.2 Critically assess the diagrams labelled A, B and C below and indicate the tonicity (hypotonic, hypertonic or isotonic) of the solution to the red blood cells in each of the diagrams. Write the correct answer next to the corresponding letter. (3)



3.3 What type of transport is depicted by the figure below? Substantiate your answer. (6)



### Section C (25 marks)

#### Question 4

[14]

- 4.1 Name the three (3) main cell organelles that play a role in vesicular transport. (3)
- 4.2 Briefly describe the three (3) steps involved in vesicular formation. (6)
- 4.3 Outline the basic steps involved in exocytosis during vesicular transport. (5)

#### Question 5

[11]

- 5.1 Discuss the different types of receptors involved in cell communication in detail. (10)
- 5.2 What is cell-to-cell adhesion? (1)



## Section D (25 marks)

### **Question 6**

**[14]**

- 6.1 Apply your knowledge about the cell cycle to recall the longest phase of the cell cycle and discuss the stages in a logical sequence. (10)
- 6.2 Draw a neatly labelled diagram of the structure of the eukaryotic chromosome indicating the following parts: (4)
- 6.2.1 Chromatid
  - 6.2.2 Centromere
  - 6.2.3 Short arm
  - 6.2.4 Long arm

### **Question 7**

**[11]**

- 7.1 State two (2) reasons why DNA replication is biologically important. (2)
- 7.2 Outline the steps involved in DNA transcription in the correct order. (9)

**Good luck!**