



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES**

**DEPARTMENT OF BIOLOGY, CHEMISTRY AND PHYSICS**

<b>QUALIFICATION:</b> BACHELOR OF SCIENCE (MAJOR AND MINOR)	
<b>QUALIFICATION CODE:</b> 07BOSC	<b>LEVEL:</b> 5
<b>COURSE NAME:</b> GENERAL BIOLOGY 1A	<b>COURSE CODE:</b> GNB501S
<b>SESSION:</b> JUNE 2023	<b>PAPER:</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>FIRST OPPORTUNITY QUESTION PAPER</b>	
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<b>MODERATOR:</b>	Dr. Lamech Mwapagha

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li><li>4. All written work <b>MUST</b> be done in <b>BLUE</b> or <b>BLACK</b> ink.</li></ol>

**PERMISSIBLE MATERIAL**

Scientific Calculator

**THIS QUESTION PAPER CONSISTS OF EIGHT (8) PAGES**  
(Including this front page)

## SECTION A: MULTIPLE CHOICE QUESTIONS

[20]

- There are 20 multiple choice questions in this section. Each question carries 1 mark.
- Answer **ALL** questions by selecting the **LETTER** with the correct answer.

1.1 Which of the following cell organelles is called the powerhouse of the cell?

- A. Nucleus
- B. Lysosomes
- C. Chloroplast
- D. Mitochondria

1.2 Name the outermost boundary of the cell?

- A. Plasma membrane
- B. Cytoplasm
- C. Nuclear membrane
- D. None of the above

1.3 Which of the following is known as mitoplast?

- A. Mitochondria without outer membrane
- B. Another name for mitochondria
- C. Mitochondria without MEMBRANES
- D. Mitochondria without inner membrane

1.4 The rRNA is Synthesized by\_\_\_\_\_

- A. Golgi body
- B. Nucleus
- C. Nucleolus
- D. Cytoplasm

1.5 Identify the organelle that is NOT bounded by a double membrane

- A. Chloroplast
- B. Mitochondria
- C. Endoplasmic Reticulum
- D. All of the above

1.6 Which of the following does not affect the rate of photosynthesis

- A. Carbon dioxide concentration
- B. Oxygen concentration

- C. Light intensity
- D. Temperature

1.7 Which of the following is the most likely explanation for a high rate of crossing-over between two genes?

- A. The two genes are far apart on the same chromosome.
- B. The two genes are both located near the centromere.
- C. The two genes are sex-linked.
- D. The two genes code for the same protein.

1.8 DNA replication can be described as

- A. semiconservative
- B. conservative
- C. degenerative
- D. dispersive

1.9 What would be the sequence of bases of an mRNA molecule that was transcribed from the sequence of DNA bases shown below?

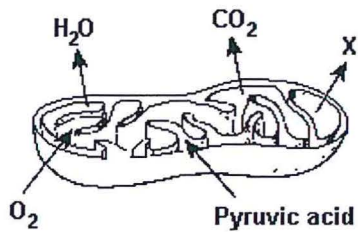
GTAGTAGGT

- A. GTAGTAGGT
- B. CAUCAUCCA
- C. UCGUCGUUC
- D. AUGAUGAAU

1.10 The main result of aerobic respiration is the

- A. conversion of radiant energy into chemical energy
- B. production of lactic acid as an end product
- C. storage of energy in a polysaccharide
- D. production of ATP from the breakdown of glucose

1.11



The diagram shows a mitochondria. Letter X most likely represents

- A. ATP
- B. maltose
- C. lactic acid
- D. PGAL

1.12 Recombination of genes occur at ....

- A. Prophase in mitosis
- B. Prophase I in meiosis
- C. Prophase II in meiosis
- D. Metaphase II in meiosis

1.13 Which out of the following is not a divisional stage.

- A. Telophase
- B. Interphase
- C. Metaphase
- D. Prophase

1.14 During which stage of aerobic respiration is oxygen necessary.

- A. Glycolysis
- B. Pyruvate Dehydrogenase Complex
- C. Citric Acid Cycle
- D. Electron Transport Chain and Oxidative Phosphorylation

1.15 Which of the following is not a result of increased carbon dioxide in the atmosphere?

- A. Increase in Earth's temperature
- B. Decrease in Earth's temperature
- C. Melting of icecaps
- D. Dying crops

1.16 Which of the following best describes the parents in a testcross?

- A. One individual has the dominant phenotype and the other has the recessive phenotype.
- B. Both individuals are heterozygous.
- C. Both individuals have the dominant phenotype.

D. Both individuals have the recessive phenotype.

1.17 Which of the following is the most likely explanation for a high rate of crossing-over between two genes?

- A. The two genes are far apart on the same chromosome.
- B. The two genes are both located near the centromere.
- C. The two genes are sex-linked.
- D. The two genes code for the same protein.

1.18 If in the F1 and F2 generations the same characteristics appeared in both male and females, it would be safe to assume that these traits for eye color and wing length...

- A. are sex-linked
- B. vary in dominance according to sex
- C. are sex-influenced characteristics
- D. are autosomal characteristics

1.19 If a single locus controls wing shape, then the alleles for this gene act as...

- A. dominant-recessive alleles
- B. incomplete-dominance alleles
- C. codominant alleles
- D. multiple alleles

1.20 Which of the following is the most likely mechanism by which the *S. pyogenes* acquired the ability to produce exotoxins?

- A. Bacteriophages engulfed cellular debris from dead bacteria.
- B. Bacteriophages in the environment activated bacterial cell division.
- C. Bacteriophage DNA became integrated in the bacterial chromosome.
- D. bacteriophage proteins were absorbed into bacterial cells by endocytosis.

## **SECTION B**

**[80]**

- There are **FIVE (5)** questions in this section. Answer all Questions.

### **QUESTION 2: FILL IN THE BLANK**

**[10]**

- 2.1 The study of the structure and composition of cells is called \_\_\_\_\_ (1)
- 2.2 \_\_\_\_\_ is a jellylike substance found floating inside the plasma membrane. (1)
- 2.3 The cells in the \_\_\_\_\_ contain no chloroplasts and are transparent to allow light to penetrate into the leaf. (1)
- 2.4 The \_\_\_\_\_ help to regulate the movement of gases into and out of the leaf. They also help to control the loss of water vapour (transpiration). (1)
- 2.5 \_\_\_\_\_ is a product of cellular respiration and is produced as an end product of glycolysis. (1)
- 2.6 Energy gained during aerobic respiration is \_\_\_\_\_ times more than anaerobic respiration (1)
- 2.7 ATP synthase relies on the facilitated diffusion of \_\_\_\_\_ down their concentration gradient to produce ATP. (1)
- 2.8 Many organisms, including humans, use sexual reproduction. Gametes (sex cells) are produced, which fuse together to form a single cell called a \_\_\_\_\_. (1)
- 2.9 Organisms have two complete sets of chromosomes. This means that there are two copies of each kind of chromosome, one of which came from the organism's mother and one from its father. These two similar chromosomes are called \_\_\_\_\_. (1)
- 2.10 \_\_\_\_\_ is meiosis producing sperm cells & occurs in the testes (1)

### **QUESTION 3: Short answer questions**

**[20]**

- 3.1 List three common features that prokaryotic and eukaryotic cells share. (3)
- 3.2 Explain ways in which the nucleus plays an important role in the cell. (2)
- 3.3 What causes muscle fatigue? (3)
- 3.4 What happens after mitosis (6)
- 3.5 Name and explain the different types of cell reproduction (6)

**QUESTION 4: TRUE OR FALSE**

**[20]**

4.1 The Cell theory does not apply to virus

(2)

- a. True
- b. False

4.2 The cell wall is mainly composed of protein

(2)

- a. True
- b. False

4.3 No replication of DNA occurs during prophase 1.

(2)

- a. True
- b. False

4.4 The significance of mitosis is its ability to not produce daughter cells which are exact copies of the parental cell.

(2)

- a. True
- b. False

4.5 Mitosis is the means by which damaged cells must be replaced by the exact copies of the originals, if the tissue is to be repaired to its former condition.

(2)

- a. True
- b. False

4.6 Eukaryotes have a nucleus & membrane-bound organelles which must be copied exactly so the 2 new cells formed from division will be exactly alike

(2)

- a. True
- b. False

4.7 Proteins are used to build cells and do much of the work inside cells

(2)

- a. True
- b. False

4.8 A codon does not designate an amino acid

(2)

- a. True
- b. False

4.9 mRNA leaves the nucleus through its pores and goes to the ribosomes in the cytoplasm

(2)

- a. True
- b. False

4.10 Only one of the two DNA nucleotide strands acts as a template for synthesis of a complimentary copy, instead of both as in replication. (2)

- a. True
- b. False

**QUESTION 5: Essay Questions**

**[30]**

5.1 Explain the structure DNA molecule

(8)

5.2 Discuss the two phases of photosynthesis

(15)

5.3 Meiosis reduces chromosome number and rearranges genetic information. Explain how the reduction and rearrangement are accomplished in meiosis.

(7)

***THE END***