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QUALIFICATION : **BACHELOR of MEDICAL LABORATORY SCIENCES**	
QUALIFICATION CODE: **08BMLS**	LEVEL: **5**
COURSE: **CELL AND MOLECULAR BIOLOGY**	COURSE CODE: **CMB521S**
DATE: **NOVEMBER 2024**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

FIRST OPPORTUNITY: QUESTION PAPER

EXAMINER: Ms Belinda Roselin Tsauses

MODERATOR: Ms Vanessa Tjijenda

INSTRUCTIONS:

1. Answer all questions in the answer book.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

1. None.

ATTACHEMENTS

1. None.

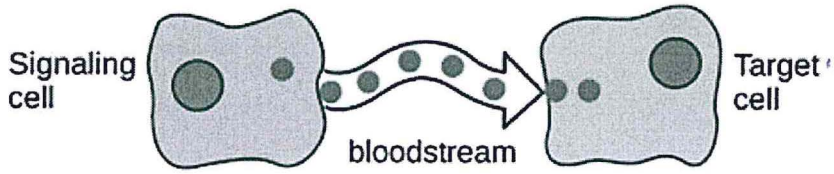
This question paper consists of 6 pages including this front page.

SECTION A: MULTIPLE CHOICE AND TRUE / FALSE [20 MARKS]

QUESTION 1: MULTIPLE CHOICE QUESTIONS [10 MARKS]

Evaluate the statements in each numbered section and select the most appropriate answer or phrase from the given possibilities. Fill in the appropriate letter next to the number of the correct statement/phrase in your ANSWER BOOK. [10]

1.1 The following type of signaling in cell communication represents: (1)



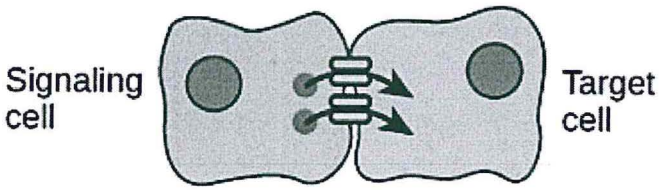
a) Endocrine signaling.

b) Paracrine signaling.

c) Direct signaling.

d) Autocrine signaling.

1.2 The diagram below explains that cell communication is taking place by: (1)



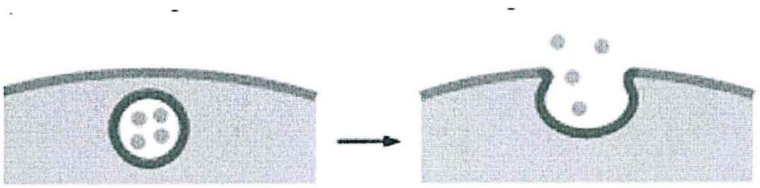
a) Only affecting the cells in close proximity.

b) A cell signaling a nearby cell.

c) A cell signaling itself.

d) A cell targeting a neighbouring cell through gap junctions.

1.3 The following diagram specifically depicts the process of_____ in cellular transport. (1)



a) Exocytosis.
b) Vesicular transport.
c) Endocytosis.
d) Pinocytosis.

1.4 Receptor-mediated endocytosis is a specialized type of _____. (1)

a) Endocytosis.
b) Exocytosis.
c) Pinocytosis.
d) Phagocytosis.

1.5 The complete set of relationships among amino acids and codons is said to be a _____: (1)

a) Swap.
b) Wobble.
c) Histone.
d) Genetic code.

1.6 The first step of vesicular formation is: (1)

a) Vesicular budding.
b) Vesicular fusion.
c) Vesicular targeting.
d) Cargo selection.

1.7 One of the three (3) pathways of vesicular transport that is responsible for recycling cellular molecules is known as the: (1)

a) Secretory pathway.
b) Endocytic pathway.
c) Retrieval pathway.
d) Vesicular pathway.

1.8 The main cell organelles involved in vesicular transport are: (1)

a) Golgi complex, ribosomes and the mitochondria.
b) Golgi complex, lysosomes and the endoplasmic reticulum.
c) Nucleus, ribosomes and the golgi complex.
d) None of the above.

1.9 In terms of the genetic code, the stop codons are: (1)

a) UAA, UAG and UGA.
b) UAA, AUG and UGA.
c) UAG, TUG and TAG.
d) UGA, TUG and TAG.

1.10 The first step in the DNA replication process is known as: (1)

a) Primer binding.
b) Termination.
c) Elongation.
d) Replication fork formation.

QUESTION 2: TRUE/FALSE QUESTIONS **[10 MARKS]**

Evaluate the statements and select whether the statement is true or false. Write the word 'True' or 'False' next to the corresponding number in your ANSWER BOOK. [10]

2.1 Resistance to apoptosis is a key characteristic of malignant cells. (1)

2.2 Cell growth refers to an increase in the total mass of a cell, excluding cytoplasmic, nuclear and organelle volume. (1)

2.3 Proliferation refers to the growth and reproduction of cells. (1)

2.4 Dysfunction of cell adhesion in metastasis and loss of cell–cell adhesion in tumour cells causes them to escape their site of origin and spread through the circulatory system. (1)

2.5 Cell surface receptors are hydrophobic signalling molecules that typically works by binding to the extracellular portion of a receptor protein. (1)

2.6 In cell communication, receptors are protein molecules in the target cell or on its surface that binds to ligands. (1)

2.7 The process of DNA duplication is called DNA replication. (1)

2.8 During the DNA replication process, DNA polymerase joins DNA fragments together by forming phosphodiester bonds between nucleotides. (1)

2.9 Before new complementary DNA is formed, there must be a starting point (primers). (1)

2.10 Proofreading is important in preventing mutations from occurring in newly-synthesized DNA. (1)

SECTION B: SHORT ANSWER QUESTIONS **[38 MARKS]**

Please answer ALL of the questions in this section.

QUESTION 3: **[14 MARKS]**

3.1 Name any five (5) important inorganic ions that are transported in and out of the cell. Indicate the correct charges. (**No marks will be awarded to answers with incorrect charges.**) (5)

3.2 From your answers in question 3.1, extract examples of two (2) ions that are actively transported in and out of the cell using ATP. Indicate which ion is abundant inside the cell and outside the cell. (4)

3.3 In your own words, briefly explain the importance of membrane potential in cells and how it is established. (6)

QUESTION 4: **[24 MARKS]**

4.1 Sketch a neatly labelled diagram showing the two (2) major phases of the cell cycle. The diagram should clearly indicate the four (4) steps of the two (2) phases and a brief description of each step. Indicate any sub-divisions of the steps where applicable. (12)

4.2 Describe four (4) characteristics relating to the molecular structure of DNA. (8)

4.3 Nucleotides are molecules that are the basic building blocks of the nucleic acids in DNA and RNA. Give the full names of the four (4) nucleotides in RNA. (4)

SECTION C: LONG ANSWER QUESTIONS [42 MARKS]

Please answer ALL of the questions in this section. Give your answers in point form.

QUESTION 5: **[18 MARKS]**

Detail the steps involved in the transcription process of DNA in the correct order and draw a labelled diagram to demonstrate your understanding of what is achieved at the end of each step. **(One (1) mark for naming the correct step, three (3) marks for detailing each step and two (2) marks for the diagram.)**

QUESTION 6: **[24 MARKS]**

Explain the order and the way in which DNA is packaged into chromosomes and describe the structure of a chromosome, supported by a labelled diagram. **(Twenty (20) marks are allocated for explaining and describing, and four (4) marks for the diagram.)** (24)

END OF QUESTION PAPER.