NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION: BACHELOR OF SCIENCE (MAJOR AND MINOR)	
QUALIFICATION CODE: 07BOSC	**LEVEL:** 6
COURSE CODE: CEB601S	**COURSE NAME**: CELL BIOLOGY
SESSION: JUNE 2019	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly. 4. All written work **MUST** be done in **BLUE** or **BLACK** ink.

PERMISSIBLE MATERIALS

Scientific Calculator

THIS QUESTION PAPER CONSISTS OF NINE (9) 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. The kind of electron microscope which is used to study internal structure of cells is;
   A. Scanning electron microscope
   B. Transmission electron microscope
   C. Light microscope
   D. Compound microscope

2. Which of the following microscopy techniques, relies on the specimen interfering with the wavelength of light to produce a high contrast image, without the need for dyes or any damage to the sample?
   A. Conventional bright field light microscopy
   B. Phase contrast microscopy
   C. Electron microscopy
   D. Fluorescence microscopy

3. Apoptosis is classified as;
   A. Non-programmed cell death
   B. Accidental cell death
   C. Programmed cell death
   D. Mitotic cell death

4. Which of the following organelles and functions are **NOT** correctly related?
   A. Endoplasmic reticulum--photosynthesis
   B. Vacuoles--storage
   C. Lysosomes--enzymes
   D. Mitochondria--cellular respiration

5. Acts as the digestive system inside a cell. It helps to break down old or unneeded parts of the cell, and substances that have been brought into the cell from the outside.
   A. Endoplasmic reticulum
   B. Ribosome
   C. Lysosome
   D. Mitochondria

6. The volume enclosed by the plasma membrane of plant cells is often much larger than the corresponding volume in animal cells. The most reasonable explanation for this observation is that;
   A. Plant cells are capable of having a much higher surface-to-volume ratio than animal cells.
   B. Plant cells have a much more highly convoluted (folded) plasma membrane than animal cells.
   C. Plant cells contain a large vacuole that reduces the volume of the cytoplasm.
   D. Plant cells can have lower surface-to-volume ratios than animal cells because plant cells synthesize their own nutrients.

7. Which structure is the site of the synthesis of proteins that may be exported from the cell?
   A. Rough ER
   B. Lysosomes
   C. Plasmodesmata
   D. Free cytoplasmic ribosomes

8. When a _____ reaches its _____ , there is a specific means of receiving it and acting on the message. This task is the responsibility of specialized proteins called _____ .
   A. signaling molecule; receptor; G proteins
   B. signaling molecule; target cell; G proteins
   C. signaling molecule; target cell; receptors
   D. kinase; receptor; proteases

9. Movement of phospholipids from side to side is called;

A. Facilitated diffusion

B. Lateral diffusion

C. Transverse diffusion

D. Simple diffusion

10. The ribonucleotide polymer (5')GTGATCAAGC(3') could only form a double-stranded structure with;

A. (5')CACTAGTTCG(3')

B. (5')GCTTGATCAC(3')

C. (5') GCTTGAGCAC (3')

D. (5')CACUTTCGCCC(3')

11. Which of the following apply to intercellular junctions?

A. The three major adhesive junctions of animal cells are adherens junctions, desmosomes and hemidesmosomes.

B. The junctional complexes of gastrointestinal enterocytes ensure that nutrients are only absorbed through the spaces between the cells, which prevents them absorbing potentially harmful substances.

C. Desmosomes and hemidesmosomes connect epithelial cells to their basement membrane and adjacent cells respectively.

D. Gap junctions and plasmodesmata are homologous structures.

12. Which of the following statements about the electron transport chain is correct?

A. The electron transport chain is made up of a chain of electron carriers with increasing redox potential.

B. The electron transport chain is made up of a chain of electron carriers with decreasing electron affinity.

C. The electron transport chain is made up of a chain of electron carriers with decreasing oxidising power.

D. The electrons transferred from carrier to carrier in the electron transport chain gain energy.

13. Holes in plant leaves that allow carbon dioxide to enter and oxygen to leave.

A. Stomata
B. Roots
C. Chlorphyll
D. Chloroplast

14. In paracrine signaling, the signaling molecules affects only;

A. Target cells close to the cell from which it was secreted
B. Target cells distant from its site of synthesis in cells of an endocrine organ
C. Both (a) and (b)
D. None of the above

15. Which of the following is a mismatch?

A. Polymerase – Taq polymerase
B. Template – double stranded DNA
C. Primer – oligonucleotide
D. Synthesis – 5' to 3' direction

16. At what temperature does denaturation of DNA double helix take place?

A. 60°
B. 54°
C. 74°
D. 94°

17. Cancer is caused by;

A. Uncontrolled meiosis
B. Rupturing of cells
C. Uncontrolled mitosis
D. Loss of immunity of the cells

18. Cell junctions that prevent small molecules from passing in between two cells are called;
    A. Gap junctions
    B. Tight junctions
    C. Adhesions
    D. All of the above

19. Which of the following statements about the reactions of glycolysis is correct?
    A. In glycolysis glucose-6-phosphate is split into glyceraldehyde-3-phosphate and dihydroxyacetone phosphate.
    B. In glycolysis fructose-1:6-bisphosphate is split into glyceraldehyde-3-phosphate and dihydroxyacetone phosphate.
    C. In glycolysis fructose-6-phosphate is split into glyceraldehyde-3-phosphate and dihydroxyacetone phosphate.
    D. In glycolysis glucose-6-phosphate is isomerized to fructose-1:6-bisphosphate.

20. In polysaccharides, monosaccharides are joined by
    A. Glycosidic bond
    B. Glucose bond
    C. Peptide bond
    D. Covalent bond

END OF SECTION A

SECTION B [80]

- There are **SEVEN** (7) questions in this section. Answer all Questions.

Question 1 [10]

a) Calculate the field of view (ØFOV) in µm of a microscope with a field of view index (FVI) 20 and an objective magnification of X40. (3)

b) Briefly discuss **FOUR (4)** demerits of the confocal microscope. (7)

Question 2 [10]

a) State **THREE (3)** classes of molecules that are contained in the Extracellular matrix. (3)

b) Briefly describe the roles of proteoglycans and glycosaminoglycans (3)

c) Describe the **TWO (2)** types of Heterochromatin. (4)

Question 3 [10]

a) Describe Protein scaffolds. (3)

b) Distinguish between Essential and Non-essential amino acids. (2)

c) With the aid of an amino acid generic structure draw a tripeptide. (5)

Question 4 [14]

a) Briefly describe the functions of the following RNA's: (10)

I. Messenger RNA (mRNA)

II. Ribosomal RNA (rRNA)

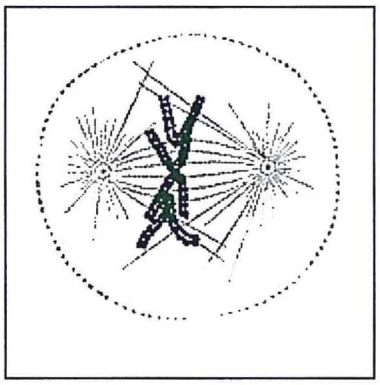
III. Transfer RNA (tRNA)

IV. Small nuclear RNA (snRNA)

V. microRNA (miRNA)

b) Identify the phases of mitosis shown in the images below: (4)

I



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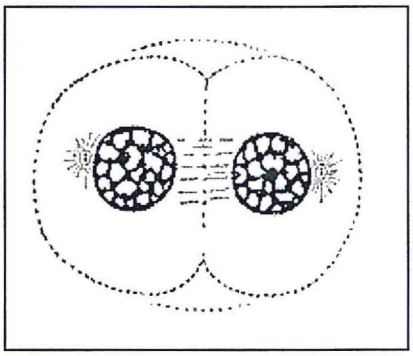

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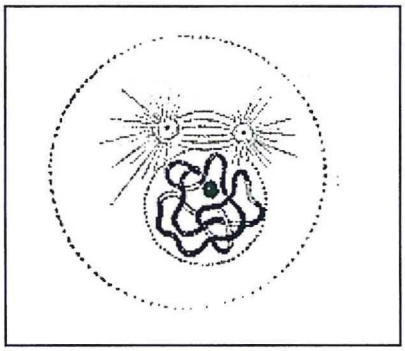
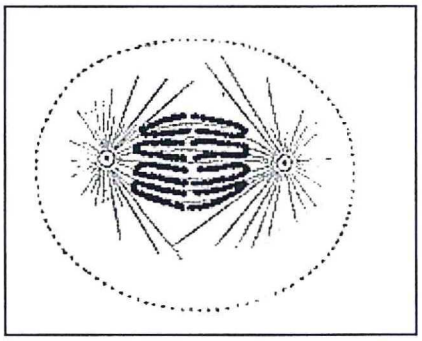


IV

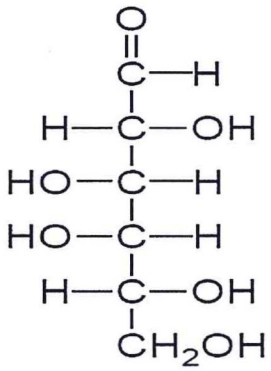


Question 5 **[12]**

a) Distinguish between amylose and amylopectin on the basis of their glycosidic bonds (2)

b) State **SIX (6)** important enzymes responsible for Krebs cycle reactions (6)

c) Sketch the cyclic form of α-D-glucose; (4)



Question 6 **[10]**

a) Briefly describe the **THREE (3)** carrier proteins used in active transport. (6)

b) With the aid of a sketch distinguish between phagocytosis and pinocytosis. (4)

Question 7 **[14]**

a) Briefly discuss the aerobic cellular respiration as a metabolic pathway that breaks down glucose and produces ATP. (8)

b) Discuss how cholera toxin disrupts the regulation of intestinal secretion following GPCR signalling. (6)

THE END