NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

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: JULY 2022	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY 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 MATERIAL

Scientific Calculator

THIS QUESTION PAPER CONSISTS OF TEN (10) 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. Lysosomes can be expected to be present in large numbers in cells which;
   A. are migrating
   B. are actively dividing
   C. carry out phagocytosis
   D. replicate DNA

2. In lactose, the linkage is;
   A. β-1-4 linkage
   B. α-1-2 linkage
   C. β-1-2 linkage
   D. α-1-4 linkage

3. The stage of mitosis when chromosomes condense to form rod-shaped structures visible under the microscope is called;
   A. metaphase
   B. telophase
   C. prophase
   D. anaphase

4. Cell surface receptors may be any of the following except;
   A. G protein linked
   B. enzymic receptors
   C. single-pass transmembrane proteins for neurotransmitters
   D. chemically-gated ion channels

5. What are centrioles involved in?

   A. cell division

   B. lysosome formation

   C. intracellular digestion

   D. ribosome formation

6. 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

7. The ____ surrounds the cell like a belt, preventing the passage of substances between the cells.

   A. gap junction

   B. desmosome

   C. hemidesmosome

   D. tight junction

8. Two molecules of acetyl-coenzyme A yields what energy rich molecules when metabolized via the citric acid cycle?

   A. 6 NADH + 2 $FADH_2$ + 2 GTP

   B. 3 NADH + 1 $FADH_2$ + 1 GTP

   C. 4 NADH + 1$FADH_2$ + 1 GTP

   D. 3 NADH + 2 $FADH_2$ + 1 GTP

9. Which of the following deoxyoligonucleotides will hybridize with a DNA containing the sequence (5')AGACTGGTC(3')?

   A. (5')CTCATTGAG(3')

   B. (5')GACCAGTCT(3')

   C. (5')GAGTCAACT(3')

   D. (5')TCTGACCAG(3')

10. Which of the following statements about the regulation of a metabolic pathway is correct?
    A. Most metabolic pathways are regulated
    B. Regulation of metabolic pathways always involves changing the amount of enzymes
    C. Metabolic regulation always depends on control by hormones
    D. Most metabolic pathways are not regulated

11. The mobile carrier protein that transports fructose to inside the cell using energy is
    A. SGL T-1
    B. GLUT-5
    C. GLUT-2
    D. All the above

12. Which of the following statements is **FALSE**?
    A. Cell walls are found in plants but not in animals
    B. Cell walls are found inside the plasma membrane of a cell
    C. The main constituent of a primary cell wall is cellulose molecules
    D. Secondary cell walls contain lignin, a substance that makes them stronger than primary cell walls

13. Migration of cancerous cells from the site of origin to other part of the body forming secondary tumours is called;
    A. proliferation
    B. diapedesis
    C. metastasis
    D. none of the above

14. 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

15. 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

16. 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

17. The chemical equation for photosynthesis;

A. $6CO_2 + C_6H_{12}O_6$ --->using sunlight ---> $6H_2O + 6O_2$
B. $6CO_2 + 6O_2$ --->using sunlight ---> $C_6H_{12}O_6 + 6H_2O$
C. $6CO_2 + 6H_2O$ --->using sunlight ---> $C_6H_{12}O_6 + 6O_2$
D. $6O_2 + 6H_2O$ --->using sunlight ---> $C_6H_{12}O_6 + 6CO_2$

18. In which phase of the cell cycle is DNA replicated?

A. G1 phase
B. S phase
C. G2 phase
D. M phase

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-6-phosphate is split into glyceraldehyde-3-phosphate and dihydroxyacetone phosphate
    C. In glycolysis glucose-6-phosphate is isomerized to fructose-1:6-bisphosphate.
    D. In glycolysis fructose-1:6-bisphosphate is split into glyceraldehyde-3-phosphate and dihydroxyacetone phosphate

20. Which statement about fatty acid metabolism is true?
    A. The product is pyruvate, which then enters the citric acid cycle
    B. The product is acetyl-CoA, which then enters the citric acid cycle if there is a balance between fat and carbohydrates
    C. The product is a short fatty acyl-CoA, which is stored in the adipose tissue
    D. The product is acetyl-CoA, which forms acetoacetate and D-3-hydroxybutyrate if there is a balance between fat and carbohydrate

END OF SECTION A

SECTION B [80]

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

Question 1 [16]

a) Briefly describe the following terms (6)

I. Electron Affinity:

II. Atomic radius:

III. Photobleaching:

IV. Electronegativity:

V. Phototoxicity:

VI. Ionization Energy:

b) Use your knowledge of atomic calculations to complete the following chart. (6)

Element name (atom or ion)	Symbol	$\#p^+$	$\#e^-$	$\#n^0$	Charge
Argon				20	
Potassium ion	39 K^{+1} 19	19			
sulphur ion				16	-2

c) 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. (4)

Question 2 **[17]**

a) Briefly describe the important players linked to cellular respiration (6)

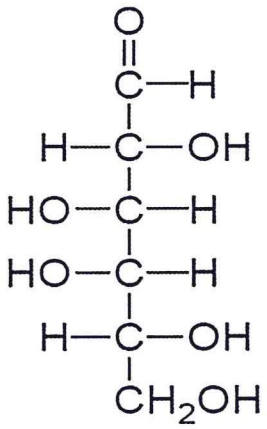
b) The glycolysis pathway is regulated by **THREE (3)** enzymes namely; (3)

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

Question 3 **[15]**

a) State **FIVE (5)** basic differences between the nuclear and mitochondrial DNA. (5)

b) Draw the cyclic form of β–D-galactose (4)



c) With the aid of an amino acid generic structure draw a tripeptide (6)

Question 4 **[18]**

a) Discuss the Bicarbonate Buffer System in blood (4)

b) Use a schematic energy diagram to show how enzymes speed-up reactions. (4)

c) Briefly, delineate **FIVE (5)** factors that affect enzyme action. (10)

Question 5 **[14]**

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

b) Describe how Inositol triphosphate (IP3) and diacylglycerol (DAG): with the aid of Phospholipase C enable signal transduction. (6)

c) Describe the mechanism of action of Sarin nerve gas as a potent irreversible inhibitor. (5)

END OF SECTION B

PERIODIC TABLE OF THE ELEMENTS

1																	18
1 **H** 1.00794	2											13	14	15	16	17	2 **He** 4.00260
3 **Li** 6.941	4 **Be** 9.01218											5 **B** 10.81	6 **C** 12.011	7 **N** 14.0067	8 **O** 15.9994	9 **F** 18.9984	10 **Ne** 20.179
11 **Na** 22.9898	12 **Mg** 24.305	3	4	5	6	7	8	9	10	11	12	13 **Al** 26.9815	14 **Si** 28.0855	15 **P** 30.9738	16 **S** 32.06	17 **Cl** 35.453	18 **Ar** 39.948
19 **K** 39.0983	20 **Ca** 40.08	21 **Sc** 44.9559	22 **Ti** 47.88	23 **V** 50.9415	24 **Cr** 51.996	25 **Mn** 54.9380	26 **Fe** 55.847	27 **Co** 58.9332	28 **Ni** 58.69	29 **Cu** 63.546	30 **Zn** 65.38	31 **Ga** 69.72	32 **Ge** 72.59	33 **As** 74.9216	34 **Se** 78.96	35 **Br** 79.904	36 **Kr** 83.8
37 **Rb** 85.4678	38 **Sr** 87.62	39 **Y** 88.9059	40 **Zr** 91.22	41 **Nb** 92.9064	42 **Mo** 95.94	43 **Tc** (98)	44 **Ru** 101.07	45 **Rh** 102.906	46 **Pd** 106.42	47 **Ag** 107.868	48 **Cd** 112.41	49 **In** 114.82	50 **Sn** 118.69	51 **Sb** 121.75	52 **Te** 127.6	53 **I** 126.9	54 **Xe** 131.29
55 **Cs** 132.905	56 **Ba** 137.33	71 **Lu** 174.967	72 **Hf** 178.49	73 **Ta** 180.948	74 **W** 183.85	75 **Re** 186.207	76 **Os** 190.2	77 **Ir** 192.22	78 **Pt** 195.08	79 **Au** 196.967	80 **Hg** 200.59	81 **Tl** 204.383	82 **Pb** 207.2	83 **Bi** 208.908	84 **Po** (209)	85 **At** (210)	86 **Rn** (222)
87 **Fr** (223)	88 **Ra** 226.025	103 **Lr** (260)	104 **Rf** (261)	105 **Db** (262)	106 **Sg** (263)	107 **Bh** (264)	108 **Hs** (265)	109 **Mt** (268)	110 Uun (269)	111 Uuu (272)	112 Uub (269)		114 Uuq		116 Uuh		118 Uuo

Lanthanides:	57 **La** 138.906	58 **Ce** 140.12	59 **Pr** 140.908	60 **Nd** 144.24	61 **Pm** (145)	62 **Sm** 150.36	63 **Eu** 151.96	64 **Gd** 157.25	65 **Tb** 158.925	66 **Dy** 162.50	67 **Ho** 161.930	68 **Er** 167.26	69 **Tm** 166.934	70 **Yb** 173.04

Actinides:	89 **Ac** 227.028	90 **Th** 232.038	91 **Pa** 231.036	92 **U** 238.029	93 **Np** 237.048	94 **Pu** (244)	95 **Am** (243)	96 **Cm** (247)	97 **Bk** (247)	98 **Cf** (251)	99 **Es** (252)	100 **Fm** (257)	101 **Md** (258)	102 **No** (259)