NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

SCHOOL OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGY, CHEMISTRY AND PHYSICS

QUALIFICATION: ALL PROGRAMMES	
QUALIFICATION CODE:	**LEVEL:** 4
COURSE CODE: BSC410S	**COURSE NAME**: BASIC SCIENCE
SESSION: JULY 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION PAPER	
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MODERATOR:	DR E. OMOREGIE

INSTRUCTIONS	
1.	Write all your answers in the answer booklet provided.
2.	Read the whole question before answering.
3.	Begin each question on a new page.
4.	A Periodic Table is attached at the back of this paper.

PERMISSIBLE MATERIALS

Non-programmable Scientific Calculator

THIS PAPER CONSISTS OF 18 PAGES

(INCLUDING THIS FRONT PAGE)

SECTION A: BIOLOGY [35]

QUESTION 1: **(20)**

Question type: Multiple choices. Read the questions carefully, choose and write the correct letter. Each question carries **1 mark**.

1.1 Which of the following is NOT a monosaccharide? (1)

A. Glucose
B. Galactose
C. Fructose
D. Maltose

1.2 Sucrose is composed of; (1)

A. Glucose + Fructose
B. 2 Fructose molecules
C. 2 glucose molecules
D. Fructose and a lot of other industrial chemicals

1.3 Most dietary fibers are made of; (1)

A. cellulose
B. starch
C. chitin
D. glycogen

1.4 Which of the following defines a trans fatty acid? (1)

A. Any fatty acid with a double bond in it.
B. Any fatty acid with no double bonds in it.
C. Any fatty acid with two carbon-chains on the same side of a double bond.
D. Any fatty acid with two carbon-chains on opposite sides of a double bond.

1.5 A greater stability of the biosphere would most likely result from; (1)

A. decreased finite resources
B. increased deforestation
C. increased biodiversity
D. decreased consumer populations

1.6 Which of the following is the correct sequence of levels of classification in an increasing order? (1)

A. genus, species, order, phylum, family, class, kingdom
B. genus, species, order, family, class, phylum, kingdom
C. species, genus, family, order, class, phylum, kingdom
D. kingdom, phylum, class, family, order, genus, species

1.7 A plant that is an angiosperm have the following characteristics; (1)

A. Angiosperm means "covered seed"
B. Have flowers, fruits with seeds
C. Live everywhere – dominant plants in the world
D. Does not include herb plants

1.8 Which of the following options is NOT a feature of monocot plant? (1)

A. One cotyledon
B. Flowers in multiples of three
C. parallel leaf venation
D. tap root system

1.9 The following are three kinds of globular protein EXCEPT; (1)

A. keratin in hair and nails
B. haemoglobin in red blood cell
C. myosin in muscle tissues
D. enzymes in cells

1.10 Anaerobic digestion of animal waste produce a substance known as; (1)

A. Methane
B. Butane
C. Propane
D. Hexane

1.11 Which of the following is NOT an example of a fermentation process? (1)

A. Biogas production
B. Wine and beer production
C. Cheese production
D. Glucose production

1.12 Which levels of classification are included in the binomial system? (1)

A. Genus and species
B. Phylum and genus
C. Kingdom and class
D. Kingdom and phylum

1.13 The binomial system of classification was developed by; (1)

A. Darwin
B. Linnaeus
C. Wallace
D. Malthus

1.14 The biological definition of a species _____. (1)

A. recognizes that distinctive characteristics that are passed from parent to offspring
B. states that members of a species interbreed
C. says that members of a species share the same gene pool
D. all of the above

1.15 Organisms that have the ability to use an atmospheric gas to produce an organic nutrient are known as; (1)

A. herbivores
B. decomposers
C. carnivores
D. autotrophs

1.16 Disaccharides are produced during the process of; (1)

A. Hydrolysis
B. Condensation
C. Hydrogenation
D. Polarization

1.17 Which of these statements describes enzymes? (1)

A. They control the transport of materials.
B. They provide energy for chemical reactions.
C. They affect the rate of chemical reactions.
D. They absorb oxygen from the environment.

1.18 Which of these phrases is an example of autotrophic nutrition? (1)

A. a cow eating grass in a field
B. a mushroom digesting a dead log
C. an apple tree making its own food
D. a tapeworm feeding in the body of a dog

1.19 Using the traditional five kingdom system of classification, a prokaryotic organism is classified as a _____. (1)

A. Fungus
B. Monera
C. Protist
D. Animal

1.20 The domain Eukarya contains _____ kingdoms. (1)

A. One

B. Two

C. Three

D. Four

QUESTION 2 **(15)**

2.1 Explain the difference between glycogen and glycerol. (2)

2.2 Explain the production of trans fats and why it is unhealthy. (4)

2.3 Explain how energy is lost from one trophic level to the other. (2)

2.5 List two ecological pyramids. (2)

2.6 List the five steps used to make beer. (5)

SECTION B: CHEMISTRY [30]

QUESTION 3: **(20)**

Question Type: Multiple Choices. Choose and write a letter corresponding to the correct answer. Each correct answer carries **1 mark**.

3.1 How many significant figures are in 100.50 m? (1)

A. 3

B. 4

C. 5

D. 1

3.2 How many significant figures are in 250 000 years? (1)

A. 5

B. Exact

C. 2

D. 6

3.3 Which of these options is a heterogenous mixture? (1)

A. Air
B. Blood
C. Rain
D. Both A and B

3.4 Which of these options is a homogenous mixture? (1)

A. Air
B. Rain
C. Blood
D. Both A and B

3.5 The following chemical reaction takes place to give a substance that is familiar to almost everyone in the world i.e Sodium chloride or table salt:

$2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$

(i) Identify the reactant (s) (1)

A. Na and Cl
B. Na
C. Cl
D. NaCl

(ii) Identify the product (s) (1)

A. Na and Cl
B. Na
C. Cl
D. NaCl

3.6 Which of the following options is a solvent? (1)

A. Table salt
B. Hydrogen
C. Water
D. Oxygen

3.7 A process which involves the output of energy or release of heat is called? (1)

A. Exothermic

B. Dissolving

C. Endothermic

D. Thermodynamic

3.8 Hydrogen is an example of a sample of matter classified as; (1)

A. Compound

B. Homogeneous mixture

C. Heterogeneous mixture

D. Element

3.9 In relations to composition, a saturated solution contains (1)

A. A lot of solute in a given amount of solvent

B. More solvent in a given amount of solute

C. As much solute as the given amount of solvent

D. None of the above

3.10 The two phase changes involved in simple distillation are; (1)

A. Evaporation and condensation

B. Evaporation and deposition

C. Evaporation and sublimation

D. Evaporation and melting

3.11 The weather forecast for Tuesday was estimated to be 28.4℃ . What reading would this temperature give in degree Fahrenheit? (1)

A. 543.2 °F

B. 83.12°F

C. 83.1 °F

D. 543 °F

3.12 Convert this number to PROPER scientific notation: 0.000780×10^{-8} (1)

A. 7.80×10^{-12}

B. 7.80×10^{-11}

C. 7.80×10^{-4}

D. 7.80×10^{-5}

3.13 The answer to the calculation below should be reported to how many significant figures? (97+19.5)/434.97= _____ (1)

A. 2

B. 3

C. 4

D. 5

3.14 Which distance measurement below is the longest? (1)

A. 795 µm

B. 0.003 km

C. 45,000 nm

D. 1,100 mm

3.15 SI unit for temperature is: (1)

A. °C

B. °F

C. °K

D. K

3.16 Which of these statements is correct about the Alkali metals group on the Periodic Table? (1)

A. They have density less than water.

B. They are the most reactive metals.

C. They form positive charged ions during ionic bonding.

D. All of the above.

3.17 If concentration of H^+ is equal to 1×10^{-7}, then solution is; (1)

A. neutral

B. basic

C. acidic

D. aqueous

3.18 The identity of a particular element on the Periodic Table is determined by the; (1)

A. number of electrons in the shell

B. number of protons and neutrons in the nucleus

C. number of protons in the nucleus only

D. number of protons, neutrons and electrons

3.19 Sodium hydrogen carbonate is used in the following; (1)

A. Used in drains and oven cleaners.

B. Additives in food and drinks.

C. As an antacid to relieve indigestion.

D. Both A and C.

QUESTION 4 (10)

Question Types: Brief statement responses.

4.1 Provide definitions for the following terms: (4)

a. Atom

b. Significant figure

c. Element

d. Neutralization

4.2 Use your knowledge of atomic calculations to complete the following table.

Note: *Symbol* = $^{mass\ no.}Element^{net\ charge}$ (3)

Symbol	(i) ——	$^{80}Br^{-1}$
Protons	35	35
Neutrons	45	45
Electrons	(ii) _____	(iii) _____
Mass number	(iv) ____	80
Net Charge	0	(v) ____

4.3 Classify each of the following options as an element or compound: (1)

a. water: _____

b. oxygen: _____

4.4 Name the products obtained from the following reaction: (1)

Acid + Metal → _____

4.5 Perform out the following calculation and provide the answers to the correct number of significant figures: (1)

0.237 × 6.792 = ___

SECTION C: PHYSICS [35]

QUESTION 5: **(20)**

Question type: Multiple choices. Read the questions carefully, choose and write the correct letter. Each question weighs **1 mark**.

5.1 Consider the following acronym T.A.I.L.S. Which one of these options is NOT correct? (1)

A. When drawing a graph, an interval is not needed.
B. A title for a graph should be considered.
C. Know which graph you required to draw.
D. The graph should be 2/3 the size of the graph page.

5.2 Newton's third law of motion is also called: (1)

A. Inertia
B. Acceleration
C. Action and reaction
D. Law of speed

5.3 When a bus starts suddenly, the passengers are pushed back. This is an example of which of the following options? (1)

A. Newton's first law of motion
B. Newton's second law of motion
C. Newton's third law of motion
D. None of the above-mentioned laws.

5.4 What is the mass of an object that requires a force of 90 N to accelerate at a rate of 2.6 m/s^2? (1)

A. 44.6 kg
B. 34.6 kg
C. 54.6 kg
D. 74.6 kg

5.5 Upon catching a ball, a cricket fielder swings his hand backwards. The concept behind this is explained by; (1)

A. Newton's first law of motion
B. Newton's second law of motion
C. Newton's third law of motion
D. The law of inertia.

5.6 Rock climbers pulling their vertical rope downwards to push themselves upwards is an example for which law of motion? (1)

A. Newton's first law of motion
B. Newton's second law of motion
C. Newton's third law of motion
D. None of the above.

5.7 An airplane is flying horizontally at an altitude with a uniform velocity. Then the net force acting on the airplanes is; (1)

A. acting vertically upwards
B. acting vertically downward
C. in the forward direction
D. zero.

5.8 An object is released from rest and falls in the absence of air resistance. Which of the following options is true about its motion? (1)

A. Its acceleration is zero.
B. Its acceleration is constant.
C. Its velocity is constant.
D. Its acceleration is increasing.

5.9 Which of these options is the formula for calculating acceleration? (1)

A. $\text{Acceleration} = \frac{\text{mass}}{\text{velocity}}$

B. $\text{Acceleration} = \frac{\text{force}}{\text{mass}}$

C. $\text{Acceleration} = \frac{\text{mass}}{\text{force}}$

D. $\text{Acceleration} = \frac{\text{mass}}{\text{distance}}$

5.10 A car of mass 2000 kg can produce a force of 8000N by the engine. Calculate the acceleration of the car. (1)

A. 8 m/s^2

B. 4 m/s^2

C. 10 m/s^2

D. 100 m/s^2

5.11 Energy possessed by a body virtue of its motion is called; (1)

A. Physical energy

B. Potential energy

C. Kinetic energy

D. geothermal energy

5.12 Which of the following below is an example of non-renewable energy? (1)

A. Wind energy

B. Geothermal

C. Nuclear energy

D. Biofuels

5.13 In geothermal energy, _____ produced from underground rocks is used to drive turbines, which drive electric generators to produce electricity. (1)

A. water
B. steam
C. dust
D. fire

5.14 Energy involved in creating work gets _____. (1)

A. used up
B. transferred
C. exhausted
D. lost

5.15 Which of the following instruments is used to measure an electric voltage? (1)

A. Voltmeter
B. Galvanometer
C. Ammeter
D. Potentiometer

5.16 The electrical symbol in figure 5.1 below represent which of the following. (1)

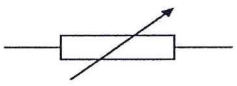

Fig. 5.1

A. Rheostat
B. Lamp
C. Galvanometer
D. Millimeter

5.17 Which of the units given below is the SI unit of resistance? (1)

A. Ampere
B. Volt
C. Ohm
D. Watt

5.18 The process by which the nuclei of a nuclide emit α, β or γ ray is known as; (1)

A. Transmutation
B. Radioactive Decay
C. Isotopes.
D. Nucleons.

5.19 Both mass and atomic numbers are not changed by radioactive emission of; (1)

A. Beta
B. Gamma
C. Alpha
D. The atomic number is affected by all forms of radioactive decay.

5.20 Isotopes of an element have a different number of; (1)

A. proton
B. neutron
C. electron
D. atom

QUESTION 6 **(15)**

6.1 What do you understand by the term non-renewable energy? (2)

6.2 State two advantages and disadvantages each of using fossil fuels? (4)

6.3 Define radioactive decay. (2)

6.4 A radioactive Polonium-218 decays to Radon-218 by beta emission as shown. (3)

6.5 A heating coil marked 1000 W is used to heat water for 15 minutes. Calculate; (4)

energy given out in joules.

END

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)