QUALIFICATION: **VARIOUS**	
QUALIFICATION CODE: **VARIOUS**	LEVEL: **4**
COURSE: **BASIC SCIENCE**	COURSE CODE: **BSC410S**
DATE: **JANUARY 2025**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

SUPPLEMENTARY/SECOND OPPORTUNITY: EXAMINATION PAPER

EXAMINER: *Mr Petrus Paulus, Mrs Marta Elvin and Mr Ambicious Lifasi,*

Dr Vaino Indongo

MODERATOR: *Prof Edosa Omoregie*

INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
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 MATERIAL:

Non-Programmable Calculator

ATTACHEMENT

None

This paper consists of 16 pages including this front page and a Periodic Table

SECTION A: BIOLOGY **[35]**

QUESTION 1 **(20)**

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

1.1 Choose the correct statement about how humans fit in with the rest of nature.

A. Humans are a part of an evolutionary process.
B. Humans share the same cellular chemistry with other living things.
C. Humans are a part of the biosphere.
D. All of these are correct.

1.2 Organisms within communities and ecosystems feed on one another to obtain energy and nutrients. What component does not cycle within an ecosystem?
A. soil nutrients
B. energy
C. plant nutrients
D. components of hard animal structures.

1.3 _____ occurs when organisms try to get the same resources.

A. Predation
B. Competition
C. Parasitism
D. Symbiosis

1.4 All of the following are examples of negative symbiosis except;

A. commensalism.
B. competition.
C. predation.
D. parasitism.

1.5 The main function of rennet in the manufacture of hard cheese is to____.

A. make the milk taste better
B. lower the pH of milk and kill the other lactic acid bacteria
C. lower the pH of milk and form of curds
D. enhance removal of whey so that the cheese can be made more efficiently

1.6 Unsaturated fats;

A. are more common in animals than in plants
B. have fewer fatty acid molecules per fat molecule
C. are associated with greater health risks than saturated fats
D. have double bonds in their fatty acid chains

1.7 Viruses are assigned to the kingdom;

A. Archaebacteria
B. Eubacteria
C. Protista
D. none of the above

1.8 Fungi digest their food by
A. photosynthesis and then absorbing the small nutrients externally
B. phagocytosis and secreting enzymes onto the food before digestion.
C. releasing digestive enzymes into their food and digesting it externally
D. dissolving food into simpler nutrients and then absorbing the food through photosynthesis

1.9 What gives yoghurt a sour taste?

A. Lactic acid
B. Sour milk
C. Fermented fruits
D. Complete fermentation

1.10 A starter culture in the food industry is_____.

A. fungi that are used to make food rot so that we can eat the food
B. bacteria that are used in the fermentation of food products
C. a microorganism that is used to control the growth of other organisms
D. a microorganism that can withstand high temperatures and can be used in fermentation industries

1.11 Which one of the following does NOT explain why there is a decrease in energy through the trophic levels in an ecosystem?
A. There is an increase in biomass as trophic levels decrease.
B. There is an increase in the number of individuals as trophic levels decrease.
C. Energy is lost as organisms grow older over time.
D. Energy is lost from the processes of respiration and metabolism.

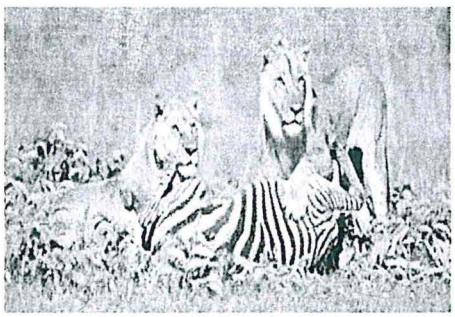
1.12 Which statement illustrates a biotic factor interacting with an abiotic factor?

A. A sea turtle transporting a pilot fish to a source of food.
B. A rock moving during an earthquake.
C. A plant absorbs sunlight, which is used for photosynthesis.
D. Wind cause waves to form on a lake.

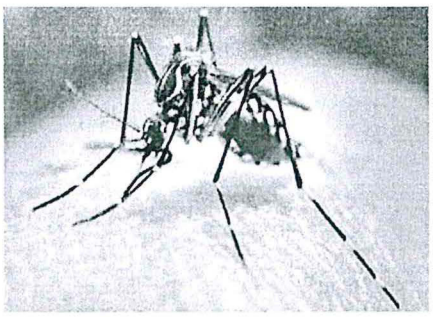
1.13 Two groups are absolutely essential to the functioning of an ecosystem. They are;

A. biotic and abiotic
B. producers and carnivores
C. sun and air
D. producers and decomposers

1.14 Which ecological interaction or symbiotic relation is represented by diagrams I and II below?



I



II

A. I) Cooperation II) Parasitism
B. I) Cooperation II) Mutualism
C. I)Commensalism III) Competition
D. I)Predation IV) Parasitism

1.15 The condensation of glucose and fructose will yield _____.

A. maltose, a disaccharide
B. sucrose, a disaccharide
C. lactose, a polysaccharide
D. sucrose, a polysaccharide

1.16 Retardation in growth and poor bones development in children is due to the deficiency of which nutrient and mineral?

A. Carbohydrates and Potassium
B. Proteins and Calcium
C. Fats and Vitamin D
D. Water and Iodine

1.17 Enzymes are secreted by the body to facilitate digestion by breaking bonds between repeated sugar units. The hydrolysis of maltose will yield_____.

A. glucose and glucose
B. glucose and lactose
C. glucose and fructose
D. glucose and galactose

1.18 Which class of vitamins has the potential of becoming toxic to the body and why?

A. Vitamin C and B, because they need to be taken in daily.
B. Water-soluble vitamins are they can easily be transported throughout the body.
C. Fat-soluble vitamins when taken in excessive amounts, as they stay longer in the body.
D. Water -soluble vitamins as they can easily be transported to different body parts by water.

1.19 Fibre cannot be digested; however, it is an important part of our diet for various reasons. Identify, which of the following reasons is false?

A. As it remains undigested it passes through the entire gut from mouth to anus and thus keeps food moving smoothly through our system.
B. It prevents constipation.
C. The fibre absorbs poisonous waste from the digested food.
D. High fibre diets are believed to increase the risk of heart disease, bowel cancer and cholesterol in the body.

1.20 What is function of fermentation in the production of yoghurt?

A. to convert lactose to lactic acid which coagulates the milk.
B. to adds sweetness to the yoghurt.
C. to soften the yoghurt.
D. all of the above (A, B & C).

QUESTION 2 **[15]**

Question Type: Structured Questions.

2.1 State SIX characteristics of living things. (3)

2.2 Given the following information on the classification of the African elephant, write down its scientific name? (2)

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Proboscidea

Family: Elephantidae

Genus: Loxodonta

Species: Africana

2.3 Discuss why producers and decomposers are indispensable in the smooth functioning of the ecosystem. (2)

2.4 State **four** important **uses of proteins** in your body. (4)

2.5 Discuss the significance of fermentation in bread and yoghurt production. (4)

SECTION B: CHEMISTRY **[35]**

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 The density of water can be classified as an;
A. Extensive chemical property
B. Extensive physical property
C. Intensive chemical property
D. Intensive physical property

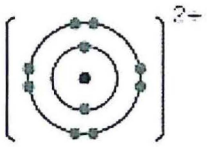
3.2 A _____results in a new substance and it cannot be reversed by physical mean.

A. Physical change
B. Chemical change
C. Physical property
D. Chemical property

3.3 What is the correct formula when converting from °F to °C?
A. °C = 1.8 (°F) + 32
B. $°C = \frac{°F-32}{1.8}$
C. $°C = \frac{°F+32}{1.8}$
D. $°C = \frac{°F}{1.8} - 32$

3.4 One of the following rules DOES NOT apply when determining significant figures.
A. Non-zeros digits always count as significant figures
B. Leading zeros do not count as significant figures
C. Trailing zeros always count as significant figures
D. Captive zeros always count as significant figures

3.5 The below electronic configuration has been derived from;



A. Magnesium (Mg) which has lost 2 electrons
B. Oxygen (O) which has gained 2 electrons
C. Neon (Ne) which has 10 electrons
D. None of the above

3.6 According to the Bronsted-Lowry's theory
A. An acid requires a base to have OH^-
B. An acid is substance that receives a proton
C. An acid is a substance that donates a proton
D. A and C are correct.

3.7 Which statement is correct about the Alkali metals group on the Periodic Table?
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

3.8 If concentration of H^+ is equal to 1×10^{-7} then solution is
A. Neutral
B. Basic
C. Acidic
D. Aqueous

3.9 Elements in group 1;
A. Will likely gain one electron in their outer shell
B. Will likely lose one electron of their outer shell
C. Can behave as either A or B depending on electrons availability
D. They are inert elements (do not exchange electrons)

3.10 Sodium hydrogen carbonate is used in the following;
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

3.11 One of the followings IS NOT a base;
A. NaOH
B. KOH
C. CH_3COOH
D. $Ca(OH)_2$

3.12 The mixture of two or more metals is known as;
A. Ore
B. Alloy
C. Metalloid
D. Mineral

3.13 An element has an atomic number 14, this element belongs in group _____and period _____

A. 4, 3
B. 5,2
C. 3, 4
D. 2,5

3.14 Magnesium hydroxide is used in the following;

A. Used in toothpaste to neutralize acid
B. Aids in digestion in the stomach
C. As an antacid to relieve indigestion
D. Both A and C

3.15 Physical properties of bases;

A. Turns red litmus paper blue
B. pH less than 7
C. Turns blue litmus paper red
D. pH equal to 7

3.16 How many significant figures does this number have: **104, 000**?

A. 2
B. 3
C. 4
D. 6

3.17 How many electrons are in a lead (IV) cation (Pb^{+4})?

A. 82
B. 78
C. 86
D. 207.2

3.18 How many neutrons are present in the nucleus of a strontium (Sr) – 88 isotope?

A. 38
B. 50
C. 87
D. 88

3.19 Which of these bases is not an alkali?

A. NaOH
B. KOH
C. $Ca(OH)_2$
D. $Cu(OH)_2$

3.20 A strong base has a pH of _____

A. 7
B. 5-9
C. 1-3
D. 12-14

QUESTION 4 **[15]**

Question Types: Brief statement responses.

4.1 Hydrochloric acid is a strong acid. What is meant by a strong acid? (1)

4.2 Write the following numbers to the **CORRECT** scientific notation form: (2)

a) 22.96×10^8
b) 0.728×10^5

4.3. Draw the electronic configuration fluorine and calcium ion. (2)

4.4 Name the products obtained from the following reactions: (2)

a. Acid + Metal →
b. Acid + Water →

4.5 Carry out the following operations and express each answer to correct number of significant figures and units. (3)

a) 5.6792 m + 4.33 m + 0.6 m =
b) 3.70 g – 2.9133 g =
c) 4.51 cm × 3.6666 cm =

4.6 Identify the separation techniques used in the following mixtures: (5)

Mixtures	**Separation technique**
Rice and water	
Water and ethanol	
Water and kerosene oil	
Salt water	
Butter and cream	

SECTION AC: PHYSICS **[30]**

QUESTION 5 **(20)**

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

5.1 Which of the following is the main purpose of a graph?

A. To show the data clearly
B. To decorate some of the information that may be difficult to express in another form
C. To compress a large set of data into a form that is clear, manageable and easy to read
D. To simplify things that are too complex

5.2 The advantage of using a line graph over bar graph is that a line graph can show_____

A. The speed of car A or B
B. Can show how car A accelerates faster than car B
C. The variation between two variables over a given time
D. None of the above

5.3 The following graph is discrete and descriptive.

A. Line graph
B. Bar Graph
C. Histogram
D. Pie chart

5.4 The following sets a **line graph** apart from a bar graph.

A. The length or height of the bar is equal to the quantity within that category of data
B. Show change over a period of time
C. Composed of discrete bars that represent different categories of data
D. Well descriptive and easily understood

5.5 Which is not correct about a bar graph?

A. The length or height of the bar is equal to the quantity within that category of data
B. Show change over a period of time
C. Composed of discrete bars that represent different categories of data
D. Well descriptive and easily understood

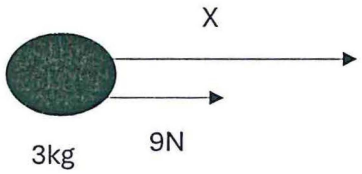
5.6_____ is Not a Renewable source of energy

A. Geothermal
B. Tidal
C. Biomass
D. None of the above

5.7 The energy produced by the ocean as a result of the movement of water flowing back and forth is called

A. Geothermal
B. Heat energy
C. Hydroelectric
D. Tidal

5.8 If the acceleration of the body is 10.0 m/s^2, what is the value of a force X in figure below?



A. 30 N
B. 21 N
C. 15 N
D. 10 N

5.9 _____involves using visual representation to present data.

A. Polygon
B. Graph
C. Pyramid
D. None of these

5.10 What is the full meaning of **I** in the acronym **T.A.I.L.S** used in constructing a graph?

A. Intercept
B. Inline
C. Interval
D. None of these.

5.11 Consider the following acronym T.A.I.L.S. Which one is NOT correct?

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.

5.12 What is the formula for calculating weight (W)?

A. W = mv
B. W = mt
C. W = mg
D. W = md

5.13 Which of the following is a fundamental force of nature.

A. Gravity.
B. Vibration
C. Elastic force
D. Frictional force.

5.14 What is resistance?

A. How much electricity flows through a given point
B. None of the above
C. the movement of negative charges (electrons) in a circuit
D. How much electricity is prevented from flowing through a give point

5.15 A measure of how much energy electrons receive is known as;

A. Battery
B. charge
C. resistance
D. Voltage

5.16 If a parallel circuit is opened in the main line, the current_____

A. Increases in the branch of the lowest resistance
B. Increases in each branch
C. Is zero in all branches
D. Is zero in the highest resistive branch

5.17 Isotopes of an element have a different number of;

A. Proton
B. Neutron
C. Electron
D. Atom

5.18 The process by which the nuclei of a nuclide emits a photon is known as;

A. Alpha decay
B. Gamma decay
C. Beta decay
D. All the above

5.19 _____ is not a renewable source of energy.

A. Geothermal
B. Tidal
C. Biomass
D. None of the above

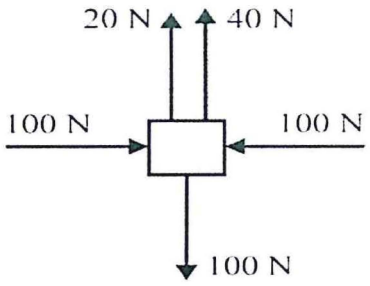
5.20 The energy produced by the ocean as a result of the movement of water flowing back and forth is called;

A. Geothermal
B. Heat energy
C. Hydroelectric
D. Tidal

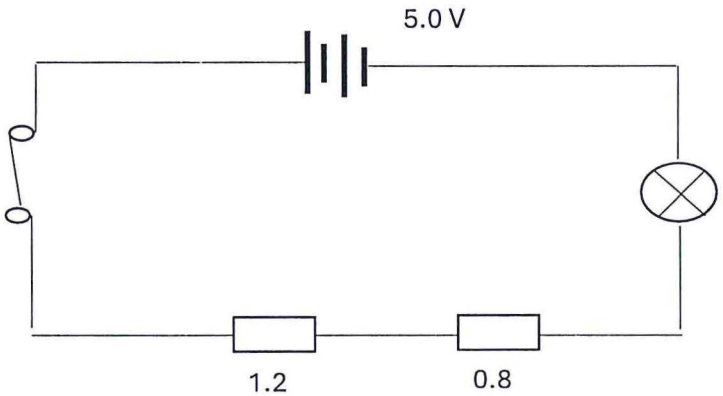
QUESTION 6 **(10)**

Structured questions

6.1 Calculate the resultant force. (4)



6.2 Determine the current (I) across the circuit in the figure below? (4)



6.3 Distinguish between **half-life** and **radioactive decay**. (2)

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)