nAmIBIA UnIVERSITY
OF SCIEnCE AnD TECHnOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION: VARIOUS	
QUALIFICATION CODE: VARIOUS	**LEVEL:** 4
COURSE CODE: BSC410S	**COURSE NAME:** BASIC SCIENCE
SESSION: JUNE 2019	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION PAPER	
EXAMINER(S)	MR PETRUS PAULUS, MS MARTA AMUANYENA, MS MARY MUTWA, MR VAINO INDONGO AND MR TAUNO NANGHONGA
MODERATOR:	PROF HABAUKA KWAAMBWA

INSTRUCTIONS
1. Write all your answers in the answer booklet provided, using **black/blue** ink pen only.
2. Read the whole question before answering.
3. Begin each question on a new page.
4. The Periodic Table is attached at the back of this question paper.

PERMISSIBLE MATERIALS

Scientific Calculator

THIS QUESTION PAPER CONSISTS OF 12 PAGES
(INCLUDING THIS FRONT PAGE AND PERIODIC TABLE)

SECTION A: BIOLOGY   [35]

QUESTION 1   [20]
Question Type: Multiple Choices. Each answer equals 2 marks.

1.1 A non-living organism is one that _____;   (2)
   A. shows all the 7 characteristics of living organisms
   B. lacks one or more characteristics of living organisms
   C. has ceased to show the characteristics of living organisms
   D. responds to danger and grow

1.2 Which of the following statements best describes the Gymnosperms?   (2)

   A. They are lower plants with seeds that are totally enclosed and borne on the scales of cones.
   B. They are plants with seeds that are totally exposed and borne on scale of cones.
   C. They are basically vascular plants.
   D. They produce fruits from their flowers.

1.3 A food web is _____ .   (2)
   A. the same as a food chain
   B. linear, involving one organism at a trophic level
   C. the grouping of heterotrophs without producers
   D. the interconnection of food chains involving more than one organism at a trophic level

1.4 The type of symbiotic relationship in which a tapeworm is living inside a human body is called_____.   (2)
   A. Mutualism
   B. ectoparasitism
   C. endoparasitism
   D. commensalism

1.5 When a species has gone out of existence and cannot be found anywhere else in the world is known to be _____.   (2)
   A. extinct
   B. endangered
   C. disappeared
   D. poor conservation

1.6 Scurvy or bleeding of the gums and pain in the joints is an outcome of a deficiency in ___. (2)

   A. Vitamin C
   B. Fats
   C. Carbohydrates
   D. Vitamin A

1.7 Which vitamin is essential as an antioxidant that protects organs like the lungs? (2)
   A. Vitamin B
   B. Vitamin E
   C. Vitamin C
   D. Vitamin K

1.8 The most important component(s) to the human body is/are_____. (2)
   A. proteins
   B. water
   C. carbohydrates
   D. vitamins

1.9 Gasohol is _____. (2)
   A. the production of gasoline from biomass
   B. a gasoline substitute containing 90% gasoline and 10% alcohol from fermentation
   C. the production of alcohol
   D. a combination of 50% ethanol and 50% gasoline to fuel cars

1.10 _____ causes the slight sour taste of yoghurt. (2)
   A. Carbon dioxide
   B. Casein
   C. Lactic acid
   D. Lactose

QUESTION 2 [15]

Question Type: Structured questions

2.1 Briefly discuss why a scientific name of organisms is more important than its common name.

(2)

2.2 State the two domains of prokaryotic organisms and the corresponding kingdoms   (2)

| Domain	Kingdom

2.3 Organisms in the ecosystem competes for resources in different ways. State and explain the two types of competition?   (4)

2.4 Briefly discuss the role of the enzyme amylase in the digestion of a polysaccharide such as starch.   (2)

2.5 Which class or group of vitamins can be toxic if consumed in excessive amount and why? (2)

2.6 Explain fermentation and its role in the production of yoghurt?   (3)

2.7 Study the food chain shown in diagram 1 below and answer the questions that follows.   (5)
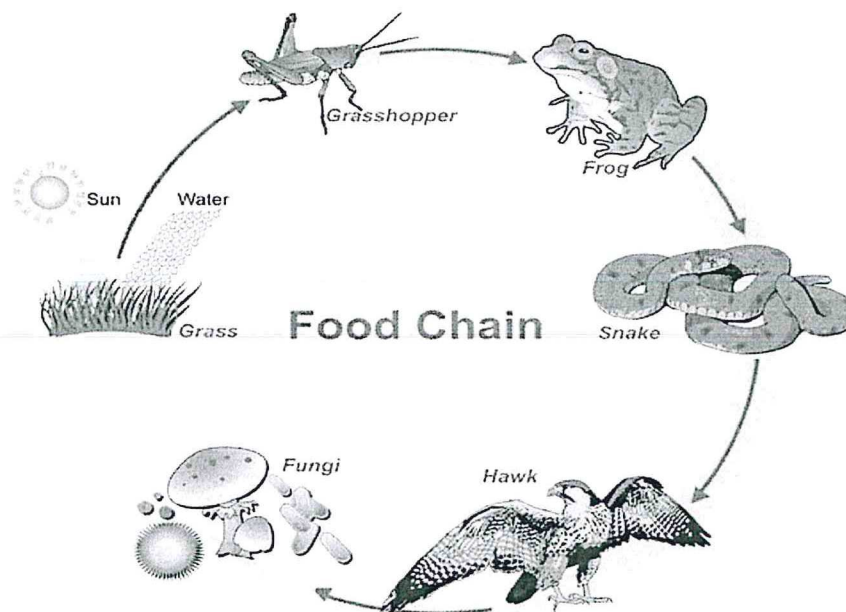
Diagrams 1: Food Chain

2.7.1   Which organism is responsible returning nutrient back to the soil and what are they called?   (1)

2.7.2 If the grass has 600 000 J energy, how much energy will the hawk receive? Show you calculations. (2)

2.7.3 State the two organisms in the food chain that are indispensably important to the function of the ecosystem (2)

2.8 Discuss the statement, *"You are what you eat"*? (2)

2.9 What is the relationship between **vitamin D** and **bone** development? (1)

2.10 Briefly discuss why fermentation is important in the production of yoghurt? (2)

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 **2 marks**.

3.1 The density of water can be classified as an _____ . (2)

    A. Extensive chemical property
    B. Extensive physical property
    C. Intensive chemical property
    D. Intensive physical property

3.2 An appropriate physical method that can be used to separate one liquid from a mixture of liquids that have different boiling points is called _____. (2)

    A. Magnetisation
    B. Separating funnel
    C. Simple distillation
    D. Fractional distillation

3.3 The process of reverse sublimation is classified as an _____ process and involves the _____ in energy of the particles which make up the sample of matter. (2)

A. Exothermic and decrease
B. Endothermic and increase
C. Endothermic and decrease
D. Exothermic and increase

3.4 Which element is expected to have the same number of electronic shells as potassium? (2)

A. Calcium
B. Lithium
C. Sodium
D. Both B and C

3.5 Which of the following statements is true about ions? (2)

A. Atoms whose number of electrons does not equal number of protons
B. Atoms whose number of electrons equals number of protons.
C. Atoms whose number of electrons equals number of neutrons.
D. Atoms whose number of electrons does not equal number of neutrons.

3.6 Magnesium hydroxide is used in the following; (2)

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

3.7 One physical properties of a base is _____. (2)

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

3.8 How many significant figures does the measurement 45.020 g has? (2)

A. Five
B. Four
C. Two
D. Three

3.9 Round the following number to four significant figures and express the result in scientific notation: **379.65** (2)

    A. 3.797×10^2
    B. 379.7
    C. 3.796×10^{-2}
    D. 3.796×10^2

3.10 If the temperature is 212 ˚F, what is the temperature in degrees Celsius (2)

    A. 0 ˚C
    B. 100 ˚C
    C. 10˚C
    D. 85.7 ˚C

QUESTION 4   [15]

Question Types: Brief statement responses.

4.1 Provide definitions for the following terms: (5)

    a. Element
    b. Error
    c. Isotopes
    d. A concentrated acid
    e. A weak acid

4.2 Use your knowledge of atomic structure to complete the following table.
    Note: $Symbol = {}^{mass\ no.}Element^{net\ charge}$ (4)

Symbol			$^{80}Br^-$
Protons	15		35
Neutrons	16		45
Electrons		10	
Mass number		24	80
Net Charge	0	+2	

4.3 Classify each of the following as a physical or chemical property: (2)

    a. A dead fish rotting: _____
    b. Dissolving salt in water: _____
    c. Milk turns sour: _____
    d. Sugar ferments to form alcohol: _____

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

    a. Acid + Base → _____
    b. Acid + Carbonate → _____

4.5 In doing the following calculation, record the answer to the correct number of significant figures. (2)
    a. (0.250 / 25.00) x 1.010
    b. 713.1 - 3.872

SECTION C: PHYSICS [30]

QUESTION 5 [15]

Question Type: Multiple Choice Questions. Each question has **2 marks**.

5.1 Energy produced by the oceans as a result of movements of water flowing back and forth is called _____. (2)

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

5.2 Another name for **crude oil** is _____. (2)

    A. Natural gas
    B. Biofuels
    C. Petroleum
    D. Coal

5.3 A gas produced by burning fossil fuels and cause 'acid rain' is known as _____. (2)

    A. Sulphur dioxide
    B. Natural gas
    C. Oxygen
    D. Carbon dioxide

5.4 The splitting of nucleus into smaller parts of mostly radioactive elements to produce electric energy is known as _____. (2)

    A. Fusion
    B. Fission
    C. Radioactivity
    D. Transmutation

5.5 An alpha particle is well known as _____. (2)

    A. Gamma ray
    B. Helium atom
    C. Beta particle
    D. An electron

5.6 Suppose that a radionuclide undergoes alpha decay. The net effect on the parent nuclide is that there is _____. (2)

    A. a loss of 2 in mass number and loss of 4 in the atomic
    B. a loss 2 in both mass number and atomic number
    C. a loss of 4 in mass number and a loss 2 in the atomic number
    D. a loss of 4 in mass number and atomic number increases by 1

5.7 The rate of flow of charges in the circuit is called _____. (2)

    A. Resistance
    B. Capacitance
    C. Current
    D. Power

5.8 Consider an equation of a straight line: y = mx + c. Which letter represents the gradient of a line? (2)

    A. m
    B. c
    C. x
    D. y

5.9 When electrical components are connected one after the other then current flow _____. (2)

    A. divides
    B. is the same through the circuit
    C. increases
    D. None of the above

5.10 When resistors are connected in parallel, total resistances in the circuit will___. (2)

    A. Remain the same
    B. Increase
    C. Decrease
    D. Vanish rapidly

QUESTION 6 [10]

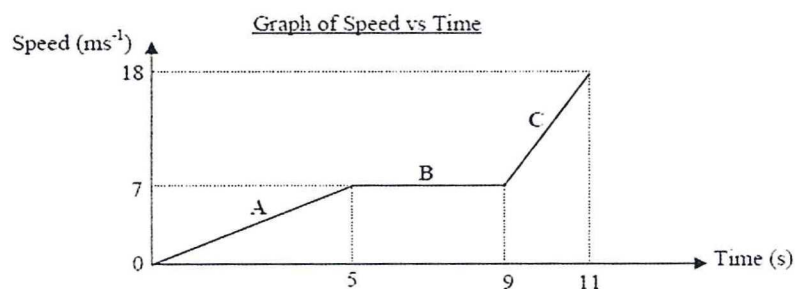**Question Type:** Structured questions.

6.1 Define 'Inertia'. (1)

6.2 A cart at the top of a 300 m hill has a mass of 420 g. What is the cart's gravitational potential energy? Use: **g = 10 m/s²**. (2)

6.3 Study the speed-time graph below representing a journey of a car and answer the questions relating to the graph.

Graph of Speed vs Time

    a) Calculate the acceleration over Part C of the graph. (2)

b) Calculate the total distance travelled over parts A and B. (2)

6.4 Complete the table to show the charge, origin and relative position in the atoms of neutrons, electron and beta particles. (3)

Particle	Charge	Relative position
neutrons	(i)	(ii)
electron	(iii)	Electron orbital's
proton	Positive	Electron's Nucleus

END

PERIODIC TABLE OF THE ELEMENTS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 **H** 1.00794																	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											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)