NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES
DEPARTMENT OF NATURAL AND APPLIED SCIENCES

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

SECOND OPPORTUNITY/SUPPLEMENTARY FM, PM AND DM EXAMINATION PAPER	
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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

1. Examination script
2. Scientific Calculator

THIS 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 mark.

1.1 Prokaryotes differs from the eukaryotes in a way that_____. (2)

A. prokaryotic organisms do not have a membrane bound nucleus while the eukaryotes do have
B. all prokaryotes are unicellular whereas all eukaryotes are all multicellular
C. prokaryotes are simple-multicellular, but the eukaryotes are complex-multicellular
D. they include protozoans and algae and not bacteria

1.2 Most conifers are monoecious, meaning that _____. (2)

A. they have separate male and female flowers on the same plant
B. they have male flowers on one plant, and female flowers on another plant
C. their flowering parts are in multiples of three
D. their flowering parts are usually in fours or fives

1.3 Pollination occurs in flowering plant, and it is important for _____. (2)

A. the growth of the flower plant
B. fertilization to reproduce
C. the production nectar needed by bees
D. making the flowers bright in colour

1.4 In the ecosystem, a habitat is defined as the _____. (2)

A. attitude of animals towards the plants in the environment
B. place in which an organism lives and provides means of survival
C. larger animals suppressing the smaller once over limited resources
D. interaction between the biotic and abiotic components

1.5 The black rhinos are the smaller of the two African rhino species. They are critically endangered. What is the main cause? (2)

A. Persistent drought conditions resulting food shortage for them
B. Strong intra-specific competition over limited resources resulting some dying
C. Climate change and natural disasters
D. Over-exploitation through illegal and excessive hunting for valuables on them

1.6 In terms of energy transfer in the ecosystem, how much energy will a lion that is a tertiary consumer get, considering that the producer had 100 000 J energy? (2)

A. 100 000 J
B. 1 000 000 J
C. 1 000 J
D. 100 J

1.7 Enzymes are secreted by the body to facilitate digestion by breaking bonds between repeated sugar units. The hydrolysis of sucrose will yield_____. (2)

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

1.8 Which class of vitamins has the potential of becoming toxic to the body and why? (2)

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. Vitamin C because it fights against infections.

1.9 Pasteurization is one of the key initial processes in the manufacturing of dairy products. What is its function? (2)

A. To destroy pathogenic bacteria and other microorganisms that may cause unwanted changes.
B. To convert the lactose in the milk into lactic acid.
C. To coagulate the milk.
D. To give taste to the dairy products.

1.10 During wastewater treatment, at which stage of the treatment are the microorganisms involved? (2)

A. Secondary treatment stage, to consume the major part of the organic matter in the effluent
B. Primary treatment stage to remove physical particles and debris from the wastewater
C. Tertiary treatment stage to make the water fit for drinking by all
D. During both primary and tertiary treatment stages

QUESTION 2 [15]

Question Type: Structures question.

2.1 The world is made up of many different things. Some of these things are living and others are non-living.

2.1.1 Explain the difference between living things and non-living things. (2)

2.1.2 Briefly describe how microorganisms such as bacteria demonstrate the characteristic of movement. (2)

Bacteria have:

2.2 Explain why the transfer of energy in an ecosystem is referred to as energy flow, not energy cycling. (2)

2.3 Mary is a very fat woman and decides to go on a diet to lose some weight. In her diet, she leaves out all plant and animal fats completely. Explain why you think she is **not** taking a wise action. (5)

2.4 Discuss the various ways antibiotics attack disease causing bacteria. (4)

SECTION B: CHEMISTRY [35]

QUESTION 3 [20]

Question Type: Multiple Choices. Each answer equals 2 marks.

3.1 What do you call a process which involves the input of energy or absorption of heat? (2)

A. exothermic
B. dissolving
C. endothermic
D. thermodynamic

3.2 Carbon dioxide is an example of a sample of matter classified as _____. (2)

A. a compound
B. a homogeneous mixture
C. a heterogeneous mixture
D. an element

3.3 In terms of composition, a dilute solution contains; (2)

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

3.4 Fractional distillation involves two phase changes, which are; (2)

A. evaporation and condensation
B. evaporation and deposition
C. evaporation and sublimation
D. evaporation and melting

3.5 What answer should be reported, with the correct number of significant figures, for the following calculation? (2)

$$(249.362 + 41.0)/63.498$$

A. 4.6
B. 4.57
C. 4.573
D. 4. 5728

3.6 The fundamental unit of matter is known as _____. (2)

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

3.7 Which statement is correct about the Halogen group in the Periodic Table? (2)

A. They exist as solids, liquids and gases in nature.
B. They are the most reactive non-metals.
C. They form negatively charged ions during ionic bonding.
D. All of the above.

3.8 If concentration of H^+ is greater than 1×10^{-7}, then solution is (2)

A. neutral
B. basic
C. acidic
D. aqueous

3.9 The two physical quantities that define any sample of matter are; (2)

A. weight and volume
B. mass and weight
C. mass and volume
D. volume and area

3.10 Elements with the same atomic number but different mass numbers are referred to as; (2)

A. ions
B. neutral
C. isotopes
D. nuclides

QUESTION 4 **[15]**

4.1 Carry out the following calculations and provide the answers to the correct number of significant figures: (2)

a) $0.237 \times 6.792 =$ _____

b) $409.35 + 0.98 + 0.238 =$ _____

4.2 By using prefix, what is the name of the unit that equals to: (2)

(a) 10^{-9} gram = _____

(b) 10^{-6} meter = _____

4.3 Apply the rules of rounding off numbers and round off the numbers below to the number of significant figures stated. (2)

a. Round off 0.0285 nm to two significant figures.

b. Round off 9.998 g to three significant figures.

4.4 Complete the following sentences: (2)

(a) An acid is a proton _____.

(b) Water soluble bases are called _____.

4.5 Apply your knowledge on atomic structure and show the electron arrangements for the following atoms:

a) Magnesium ion (2)

b) Oxygen (1)

4.6 Indicate which **physical separation technique** you would use to separate the following mixtures. (2)

a) Two immiscible liquids = _____

b) Sugar dissolved in water = _____

SECTION C: PHYSICS **[35]**

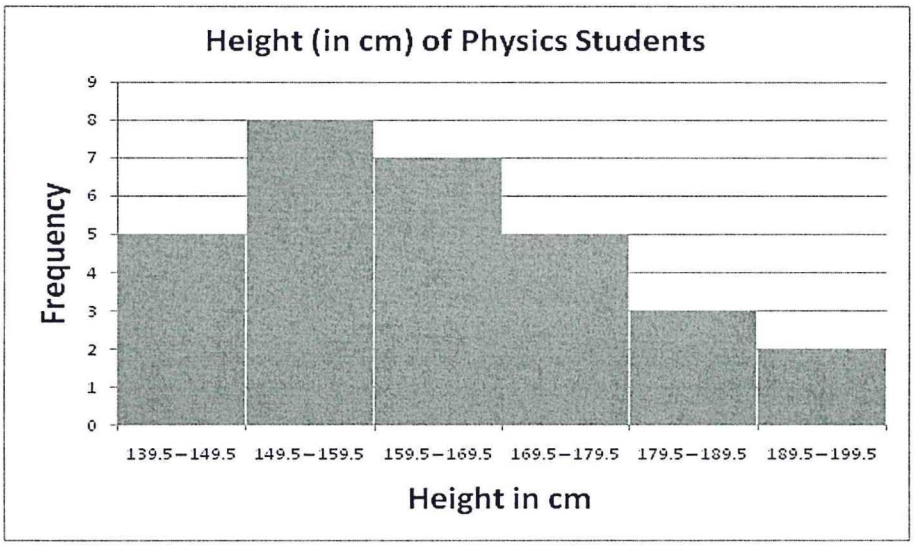
QUESTION 5 **[20]**

Question Type: Multiple Choices. Each answer equals 2 marks.

Use the following table and graph to answer questions **5.1 – 5.3.**

The height (in cm) for 30 students in a Physics class was determined as follows:

Height in cm	Frequency
139.5 – 149.5	5
149.5 – 159.5	8
159.5 – 169.5	7
169.5 – 179.5	5
179.5 – 189.5	3
189.5 – 199.5	2



5.1 The graph drawn is known as _____. (2)

A. pie chart
B. line graph
C. bar graph
D. histogram

5.2 How many students have heights more than 169.5? (2)

A. 10
B. 8
C. 5
D. 2

5.3 What percentage of students have heights between 139.5 – 149.5? (2)

A. 17%
B. 30%
C. 22%
D. 12%

5.4 Markus and Luc have decided to change the position of their stove. The two of them pushed the stove along the floor in opposite. Each of them applied a force of 10 N as shown by the free body diagram below.

What is the resultant force? (2)

A. 0 N
B. 10 N
C. 20 N
D. none of the above.

5.5 What is the mass of a stone that moves with an acceleration of 3 m/s^2 when a force of 15 N is exerted on it? (2)

A. 10 kg
B. 15 kg
C. 5 kg
D. 20 kg

5.6 A sound wave has a frequency of 50.0 Hz and velocity of 123.0 m/s. What is the wavelength? (2)

A. 246.0 m
B. 24.60 m
C. 0.2460 m
D. 2.460 m

5.7 A type of energy source formed from the fossilized remains of pre-historic plant and animal material is known as _____. (2)

A. fossil fuels
B. biomass
C. biofuels
D. geothermal

5.8 Energy produced by the oceans as a result of movements of water flowing back and forth. (2)

A. geothermal energy
B. heat energy
C. hydroelectric energy
D. tidal energy

5.9 A beta particle is well known as _____. (2)

A. gamma ray
B. helium atom
C. X ray
D. an electron

5.10 The uncharged radiation is called _____. (2)

A. beta
B. alpha
C. gamma
D. cosmic

QUESTION 6 **[10]**

Question type: Brief statement responses.

6.1 If you were employed by the Directorate of Atomic Energy as a Radiation Scientist, list **one** advantage and **one** disadvantage you would offer with respect to the use of nuclear energy. (2)

6.2 State the Law of Conservation of Energy state. (2)

6.3 State Ohm's Law (2)

6.4 State the difference between **alternating** and **direct** current. (2)

6.5 Define the term **inertia**. (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)