INTEGRATED SCIENCE

INS 01

29/07/ 2022 8:30 AM-11:30 AM

NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

TTC NATIONAL EXAMINATIONS, 2021-2022

SUBJECT: INTEGRATED SCIENCE

OPTION: EARLY CHILDHOOD AND LOWER PRIMARY EDUCATION (ECLPE)

INSTRUCTIONS:

1) Write your names and index number on the answer booklet as written on your registration form, and **DO NOT write** your names and index number on additional answer sheets if provided.
2) Do not open this question paper until you are told to do so.
3) This paper consists of **two sections**: **A, B**
   - **Section A**: Attempt **all** questions. **(55 marks)**
   - **Section B:** Attempt any **three** questions. **(45 marks)**
4) Use a **blue** or **black** pen.

SECTION A: ATTEMPT ALL QUESTIONS (55 marks)

1) Choose the correct answer.

a) Greenhouse effect refers to .....

i) Ability of atmosphere to retain water vapour.

ii) Ability of certain atmospheric gases to trap and keep the Earth relatively warm.

iii) Ability of cloud to scatter electromagnetic radiation.

iv) Ability of chlorophyll to give plants their green colour, it reflects the green wavelengths of white light and it absorbs other wavelengths of white light. **(1 mark)**

b) Why are forests important for mitigating climate change?

i) Forests serve as sieve in the carbon cycle, they absorb more carbon dioxide from atmosphere through photosynthesis than they release.

ii) Trees provide building materials.

iii) Trees are an important food source.

iv) Leaves of trees reflect all sunlight away from the Earth. **(1 mark)**

c) Which of the following is an example of climate?

i) An intense thunderstorm in Rutsiro.

ii) A hot day in Kirehe.

iii) The average temperature in Gicumbi over the past 50 years.

iv) Cool weather in Busogo. **(1 mark)**

2) Choose whether the following statements are **true (T)** or **false (F)**

a) Smoking can affect a person's ability to smell and taste food.

b) Marasmus is a sexual transmissible disease.

c) Alcohol is an addictive substance.

d) Incubation period is the period between infection and the appearance of signs of a disease. **(4 marks)**

3) What are the allowed values for each of the four quantum numbers namely n, l, m_l, and m_s? **(4 marks)**

4) State:

a) One main division of nervous system. **(1 mark)**

b) Two main functions of nervous system. **(2 marks)**

5) Major male reproductive organs can be categorized in three groups due to their functions. **(3 marks)**

Match the organs with their functions.

Organs	**Functions**
A. Testes, scrotum, epididymis	1) They secret the ejaculatory fluid.
B. Cowper's gland, seminal vesicles, prostate gland and vas deferens.	2) They are those used for copulation and deposition of the sperm within the female.
C. Penis, urethra, and vas deferens.	3) They travel, produce and store Sperm.

6) **Match the disease with its cause.** **(4 marks)**

Name of disease	**Cause**
1) Influenza	a) A paramyxovirus (RNA virus)
2) Common cold	b) HIV
3) Mumps	c) Myxovirus (DNA virus)
4) AIDS	d) Large variety of viruses, most common are rhinovirus (RNA virus)

7) Explain why isotopes have the same chemical properties but different physical properties. **(3 marks)**

8) a) Give the name and formula of the gas extracted by Kivu watt power station. **(2 marks)**

b) Outline all possible uses of the chemical compound extracted by Kivu watt power station. **(2 marks)**

9) Explain why the following occur across the periodic table of elements.

a) The atomic radius decreases across a period. **(1 mark)**

b) Electronegativity decreases down a group. **(1 mark)**

c) Electron affinity increases across a period. **(1 mark)**

10) a) Convert 20 cm into m. **(1 mark)**

b) State the instrument used to measure the mass of an object. **(1 mark)**

c) A 40 kg metal sphere is attracted by another metal sphere of 15 kg by a gravitational force **F** when the distance between their centres is 20 cm. The universal gravitational constant $G=6.67\times10^{-11}\ Nm^2/kg^2$ Find **F**. **(2 marks)**

11) **Figure 1** below shows three appliances **R, S, T** connected into the electrical circuit.

The potential difference **U** between terminals **p** and **q** is 110.4 V

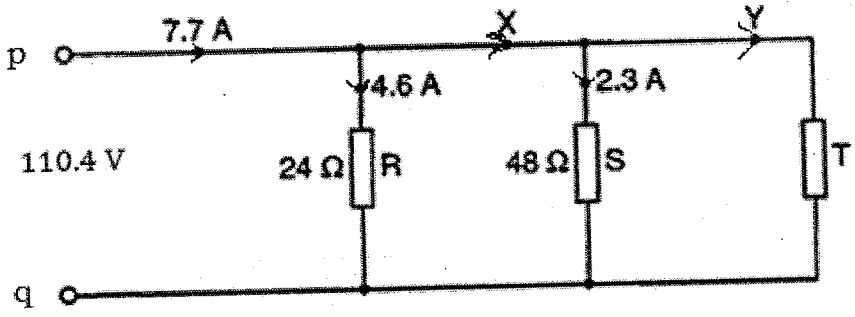

Figure 1

a) What is the electric current at point **Y**? **(1 mark)**

b) Find the resistance of the appliance **T**. **(2 marks)**

c) If there is a fault in the appliance **T**, will the electric current be able to pass through **S**? **(1 mark)**

12) Use the general rules of naming organic compounds to find the IUPAC names of the following compounds.

a) CH_3-COOH **(1 mark)**

b) CH_3-$CH(CH_3)$-COOH **(1 mark)**

c) HCOOH **(1 mark)**

d) HOOC-CH_2-COOH **(1 mark)**

e) CH_3-CH_2-$CH(CH_3)$-COOH **(1 mark)**

13) Analyze the following diagram (**figure2**).

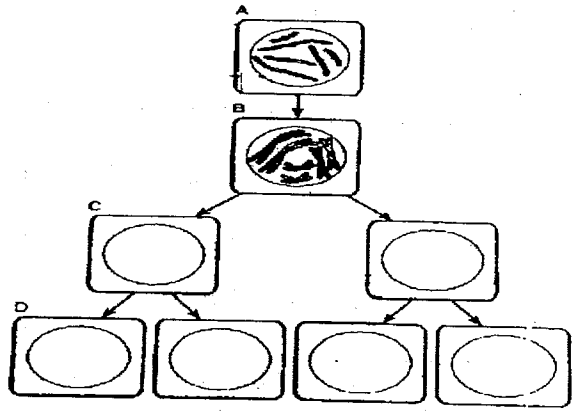

Figure 2

a) i) Where do you think this cell could be found in an animal? **(1 mark)**

ii) Explain your answer in (i) above. **(1 mark)**

b) How many chromosomes are in each daughter cell? **(1 mark)**

14) Evaluate at least 4 uses of esters. **(4 marks)**

15) Predict what will happen if all bees die. **(4 marks)**

SECTION B: ATTEMPT ONLY THREE QUESTIONS (45 marks)

16) Analyse the appearance of (a) $\mathbf{F_1}$ and (b) $\mathbf{F_2}$ progenies when a pure (homozygous) tall pea plant is crossed with a pure (homozygous) dwarf pea plant. **(15 marks)**

17) a) State the factors that affect the photoelectric effect. **(3 marks)**

b) The photoelectric effect is represented by the equation

$hf = \phi + Ek$

Describe the three terms given in this equation. **(3 marks)**

c) To investigate the properties of the photocell (***figure 3***), different colour filters were used to change the frequency of the light hitting the zinc cathode.

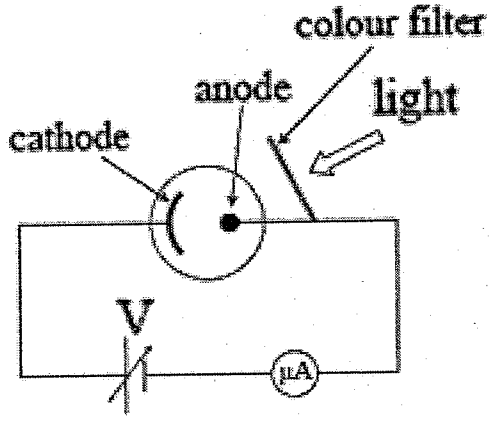

Figure 3

A graph of maximum kinetic energy of emitted electrons, in electron volts, against frequency is drawn below (***figure 4***).

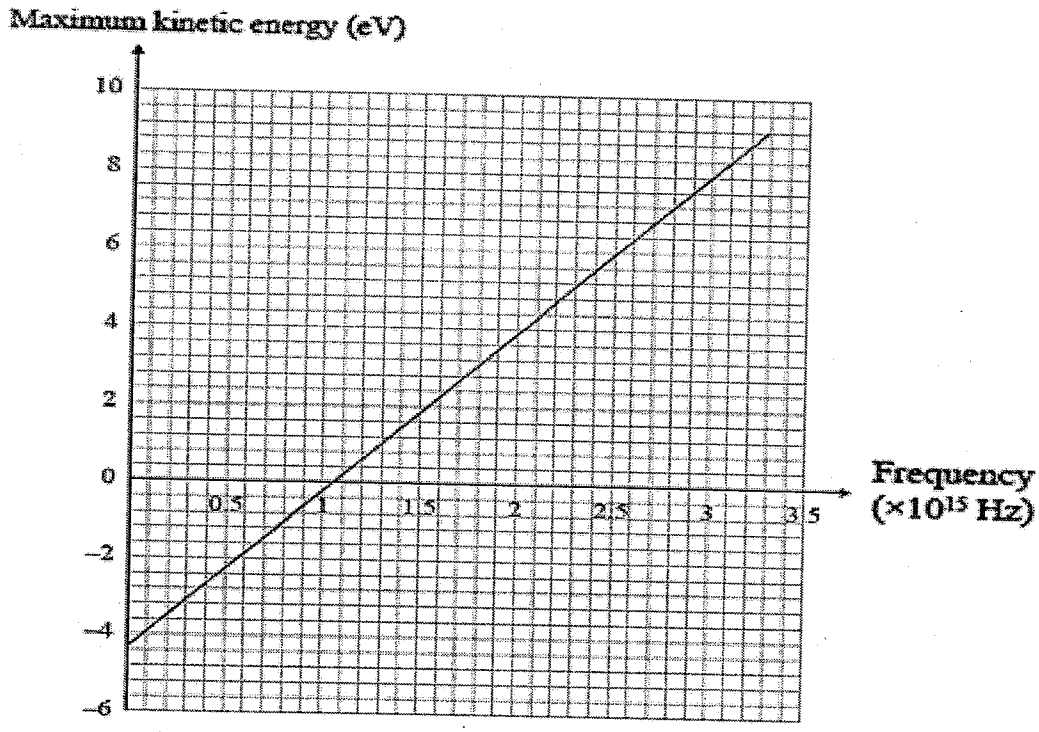

Figure 4

i) From the graph, determine the threshold frequency of zinc.

(2 marks)

ii) Using information from the graph, calculate a value for Planck's constant from the gradient/slope, **S**, of the graph. Show your working. Maximum kinetic energy must be in **J**.
Note that $1eV = 1.6x1\,0^{-19}\ \ J$

(3 marks)

d) The work function for lithium is $4.6\times10^{-19}\ J$

i) Calculate the lowest frequency of light that will cause photoelectric emission.

(2 marks)

ii) What is the maximum energy of electrons emitted when the light of frequency $7.3\times10^{-19}\ Hz$ is used?
Planck's constant h=6.63x10^{-34}Js.

(2 marks)

18) Use the following table to give the names and structures of any five alcohols with the formula $C_5H_{12}O$. State, in each case, whether they are primary, secondary or tertiary alcohols. **(15 marks)**

Name	Structure	Type of alcohol: Primary, secondary or tertiary

19) a) With reasons, predict the changes that can happen when women get pregnant. **(8 marks)**

b) Write short notes on the methods of birth control. (20 lines maximum) **(7 marks)**

20) a) Evaluate the types of proteins in cell membrane. **(12 marks)**

b) Justify the reasons why muscle cells have many mitochondria while fat storage cells have few mitochondria. **(3 marks)**