THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
DIPLOMA IN SECONDARY EDUCATION EXAMINATION

731/1 **PHYSICS 1**

Time: 3 Hours **Year: 2020**

Instructions

1. This paper consists of sections A, B and C with a total of **sixteen (16)** questions.
2. Answer **all** questions in section A and **two (2)** questions from each of sections B and C.
3. Section A carries **forty (40)** marks and sections B and C carry **thirty (30)** marks each.
4. Mathematical tables and non-programable calculators may be used.
5. Communicative devices and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. The following information may be useful:

   Pie, $\pi=3.14$

   Standard Temperature = 273 K

   Atomic mass of carbon atom = 12

   Atomic mass of oxygen atom = 16



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SECTION A (40 Marks)

Answer **all** questions in this section.

1. Show that, the angular momentum and Plank's constant have the same physical units.

2. (a) Give the meaning of the term electrolysis.
   (b) Derive the chemical equations that will take place at the anode and cathode electrodes during the electrolysis of copper sulphate solution.

3. A cart of mass 500 kg is standing at rest on the rail. If a man weighing 70 kg running parallel to the rail track with a velocity of 10 ms^{-1} jump on the cart, compute the velocity with which the cart will start moving.

4. (a) What will be the effect on the temperature of the gas molecules inside the cooking gas containers in a lorry which is moving with a uniform speed? Briefly explain.
   (b) Calculate the root mean square speed (r.m.s) of carbon dioxide gas molecules at normal temperature and pressure, given molar gas constant $R = 8.31\ J\,mol^{-1}K^{-1}$.

5. (a) Describe the concept of colours of oil film on water.
   (b) The shortest length of air column in a resonance tube with one end closed is resonated to a note of frequency 500 Hz and found to be 160 mm. Determine the velocity of a sound wave.

6. How does heating of the room by thermal convection process occur?

7. Differentiate the following terms as applied in teaching and learning Physics.
   (a) Teaching aids and improvisation
   (b) Curriculum and syllabus

8. In four points, show how a physics teacher uses an "Observation Schedule" to assess student's practical work.

9. With two examples in each case, describe two categories of Physics curriculum material.

10. Briefly describe four steps you would follow to provide first aid to an electric shock victim in Physics laboratory.

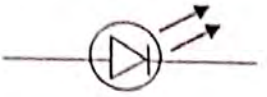
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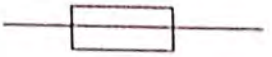
SECTION B (30 Marks)

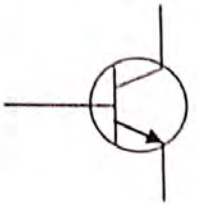
Answer **two (2)** questions from this section.

11. (a) With the aid of a well labeled diagram, explain electrical properties of semiconductors basing on the band theory of solids.
    (b) Why **n-p-n** transistors are more commonly used than **p-n-p** transistors?
    (c) What does each of the following symbols represent?

(i) 

(ii) 

(iii) 

(iv) 

12. (a) What are the four characteristics of radioactive decay?
    (b) A half life of a radioactive material contains 10^{18} atoms is 2 days. Calculate the fraction remaining and the activity of the sample after 5 days.
    (c) (i) Find the mass number and atomic number of an atom X with 19 nucleons and 10 neutrons.
    (ii) If the atom in part (c)(i) is bombarded with an alpha particle, what will be the resultant mass number and atomic number of the daughter nucleus?

13. (a) Show how the earth's climate is affected by green-house effect.
    (b) Draw the vertical structure of the atmosphere and;
    (i) indicate the five layers from the surface of the solid earth.
    (ii) show the variation of temperature gradient from the surface of the earth.
    (c) State two importance of the first atmospheric layer from the surface of the solid earth.

SECTION C (30 Marks)

Answer **two (2)** questions from this section.

14. Design a table which shows the lesson development part of a lesson plan of 80 minutes when you are planning to teach the concept of Friction Force in a Form Three class.

15. Use six steps to show how a physics teacher can teach the concept of "Effect of Turning Forces" to Form Two students by the demonstration method.

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16. "The principles of teaching and learning physics enable students to understand well the subject". Support this statement by using five points.

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