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

731/1 **PHYSICS 1**

Time: 3 Hours *Thursday, 20th May 2010 a.m.*

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in section A, **two (2)** questions from section B, and **two (2)** questions from section C.
3. Section A carries 40 marks, section B carries 40 marks and section C carries 20 marks.
4. Mathematical tables and non-programmable calculators may be used.
5. Cellular phones are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. The following constant may be useful.
   (a) Thermoconductivity of Cooper $K_{cu} = 400\ Wm^{-1}\ ^oC^{-1}$
   (b) Acceleration due to gravity $g = 10\ m/s^{-2}$
   (c) Density of water , $\zeta = 1 g/cm^3$
   (d) $\pi = 3.14$

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SECTION A (40 Marks)

Answer **all** questions in this section.

1. (a) Define the term dimensional analysis.

   (b) Mention three applications of dimensional analysis.

2. The following two waves in a medium are superposed $y_1 = A\sin(5x - 10t)$, $y_2 = A\sin(4x - 9t)$ where x is in metres and t in seconds. Write an equation for the combined disturbance.

3. (a) What is meant by the term semiconductor?

   (b) Give two (2) differences between a pure metal and a pure semiconductor.

4. An aluminum wire found in TANESCO network has a cross sectional area of 100 mm^2. If there are 2×10^{35} electrons per m^3 and a current of 13A is flowing through the wire, what is the drift velocity of the electrons?

5. (a) Define the following terms:

   (i) Natural frequency (ii) Forcing frequency.

   (b) Calculate the angular position of the second order maximum created by monochromatic light of wavelength 700nm. which passes through a diffraction grating of spacing 3.5cm.

6. (a) What is the source of heat in the interior of the earth?

   (b) Explain how the thermal energy is lost or transmitted in different layers of the earth.

7. Mention four (4) uses of cathode ray oscilloscope (CRO).

8. What is meant by the following terms:

   (a) Resistance (b) Conductivity (c) Current density

9. (a) What is geophysics?

   (b) Give short notes on two of the following parts of the lithosphere.

   (i) Crust
   (ii) Mantle
   (iii) Core

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10. The velocity V of a transverse wave in a stretched string is found to depend on the tension F of the string and the linear mass density μ, of the string. Using the method of dimensions, derive the relationship between V, F and μ. Show that the dynamic pressure is dimensionally equivalent to pressure.

SECTION B (20 Marks)

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

11. Explain briefly the importance of teaching and learning Physics.

12. Suppose you have been asked to teach a form two class the subtopic "Heat transfer in solids". Prepare a lesson plan for 80 minutes.

13. (a) State three Physics laboratory regulations and three safety precautions.

    (b) What is the common hazard which can be caused by glassware in the Physics Laboratory?

14. (a) Why should teaching and learning of Physics be measured and evaluated?

    (b) What classroom challenges did you experience as a physics student teacher during your teaching practice?

SECTION C (10 Marks)

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

15. (a) Prepare a marking scheme for the following question. A pendulum of mass 50g is pulled aside to a vertical height of 20 cm from the horizontal and released. Find;

    (i) the maximum potential energy of the pendulum.
    (ii) the maximum speed of the pendulum.
    (iii) the kinetic energy of the pendulum when it is at a height of 8 cm from the horizontal.

    (b) Explain the energy transformation in this case.

    (c) State the principle of conservation of energy.

16. Give the meaning of the terms "sterm, responses, key and distractors" with reference to the objective test item given below.

An object is thrown vertically upwards; at its highest position the object has

A. an upward acceleration
B. no acceleration of $10m/s^2$
C. a downward acceleration of $10m/s^2$
D. an instantaneous to $10m/s^2$

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17. It has been observed that learners find it difficult to distinguish between temperature, heat and internal energy. Develop in the form of lessons, teaching and learning materials that could enable O-level students develop a clear understanding and distinction among the three concepts.

18. Prepare a tabulated interactive lesson plan for 80 minutes to form III class on refraction of light by using lenses.

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