THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

731/1 **PHYSICS 1**

Time: 3 Hours **Year: 2022**

Instructions

1. This paper consists of sections **A** and **B** with a total of **fourteen (14)** questions**.**
2. Answer **all** questions.
3. Section **A** carries **forty (40)** marks , and section **B** carry **sixty (60)** marks.
4. Non-programmable calculators may be used
5. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet (s).

SECTION A (40 Marks)

Answer **all** questions in this section

1. Refer a simple pendulum experiment in determining the acceleration due to gravity to:
   (a) obtain the relationship of physical quantities involved in that experiment by using dimensional knowledge.
   (b) Give two reasons that made students to commit systematic errors while conducting that experiment.
2. (a) Briefly explain how is the pressure of a gas affected when its volume is reduced to half at constant temperature as the pressure of the gas varies inversely proportional to temperature and (b) Briefly justify the statement based on the temperature variation that "water exist in more than one form of matter.
3. (a) Give the two necessary conditions that enable a satellite to be stationary in space.
   (b) calculate the orbital radius of the satellite if it takes a period of one day to go around its orbit and it rotates at the same speed as that of the moon.
4. Use a sketched diagram to analyze the interchange between kinetic and potential energies of the particle that is in Simple Harmonic motion.
5. Describe the applications of radioactivity in daily life to first year student teachers.
6. Use slinky coil spring to explain the propagation behaviour of transverse and longitudinal waves.
7. draw a truth table for a room of three doors and associated three switches A, B and C which turned on light when one enters the room through any door and presses the associated switch. On leaving the room through any door and pressing the associated switch, the light goes off. Assume that the light is off when A = B = C = 0.
8. Give four suggestions on how to reduce the running costs of a Physics laboratory.
9. Give four reasons why the school Physics laboratory technician preferred to use a mercury thermometer during the preparation for heat experiments.

10. Justify the following statement in two points: “Students learn Physics concepts best by doing”.

SECTION B (60 Marks)

Answer **all** questions from this section

11. (a) Draw lines of heat flow and sketched graphs which show variation of the temperature of the rod along its length when the surface of the rod is

    (i) unlagged

    (ii) lagged.

    (b) Deduce the rate of heat flow through a plaster ceiling, measuring $5m \times 3m \times 15mm$, in contact with 45 mm thick layer of insulating material. If the inside and outside surfaces are at the surrounding air temperature of 15 ºC and 5 ºC respectively, the thermal conductivity of plaster ceiling is 0.60 $Wm^{-1}K^{-1}$ and that of insulating material is 0.040 $Wm^{-1}K^{-1}$.

12. (a) Derive an expression related to the experiment conducted by Rural Electrical Agency (REA) on the Ohmic conductors and ended up with a conclusion that the resistance of a conductor depends on the two factors.

    (b) Given an electrical circuit represented in Figure 1 for a staff room lighting,

    Determine (i) the potential difference (p.d) between A and C

    (ii) the amount of current pass through B.

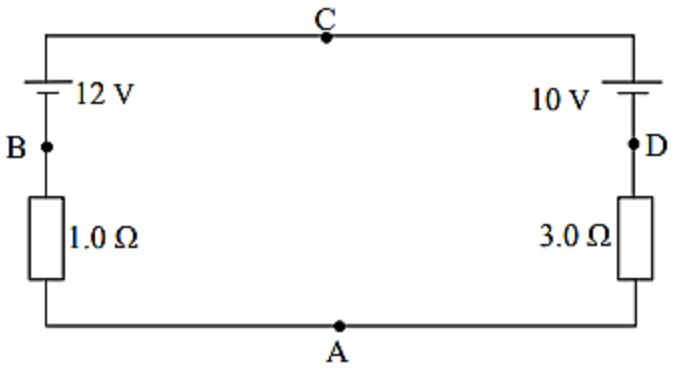

Figure 1

13. Use a diagram of the moment of force to prepare a comprehensive marking scheme from the following monthly test question: " A uniform metre rule is pivoted at its centre. If 20 g mass is placed at the 10 cm mark and a 50 g mass at the 40 cm mark from one end of the ruler, at what distance must a second 50 g mass be placed for the system to be in rotational balance?"
14. Use six factors to support the statement that "A good Physics teacher must consider the factors for selecting teaching method that enable the students to understand well certain concepts before teaching sessions".