THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

031/1 **PHYSICS 1**
(For School Candidates Only)

Time: 3 Hours **Monday, 11th October 2010 a.m.**

Instructions

1. This paper consists of sections A, B, and C.
2. Answer **all** questions in sections A and B and **two** (**2**) questions from section C.
3. Calculators and cellular phones are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).
5. Where necessary the following constants may be used:

   Acceleration due to gravity, $g = 10 m/s^2$

   $\pi = 3.14$

This paper consists of printed 7 pages.

SECTION A (20 Marks)

Answer **all** questions in this section.

1. For each of the items (i)-(x), choose the correct answer among the given alternatives and write its letter beside the item number.

   (i) Which one of the following statements about alpha and beta particles is correct?
   - A They carry the same charge.
   - B Each alpha particle has four times the mass of the beta particle.
   - C Alpha particles have a larger range in air than beta particles.
   - D When in motion, they are deflected in opposite directions by a magnetic field.
   - E Alpha particles cause ionization while beta particles do not.

   (ii) Light waves differ from sound waves because
   - A light is an electromagnetic wave but sound is a mechanical wave.
   - B sound waves do not travel in water but light waves do.
   - C the speed of light is independent of the medium it travels but the speed of sound depends on the medium.
   - D interference is obtained with light waves but not with sound waves.
   - E the speed of sound waves is greater than that of light waves in the same medium.

   (iii) In a laboratory, the diameter of a piece of wire can accurately be measured by
   - A Vernier Calliper
   - B Micrometer screw gauge
   - C Engineer's Calliper
   - D Rate meter
   - E A thread wound round it once.

   (iv) A basic condition for diffraction of a wave when it passes through an opening is that
   - A the wavelength of the incident wave must be greater than the size of the opening.
   - B the amplitude of the wave must be smaller than the size of the opening.
   - C the wavelength of the wave must be shorter than the corresponding size of the opening.
   - D the wavelength of the wave must almost be equal to the size of the opening.
   - E the amplitude of the wave must be greater than the opening.

   (v) A specific latent heat of fusion of a substance is defined as energy required to
   - A change a unit mass of the substance from solid to liquid.
   - B change a unit mass of a substance from solid to liquid at constant temperature.
   - C change the mass of a substance from solid to liquid at constant temperature.
   - D cause a unit temperature rise of a substance.
   - E cause a unit mass of water to freeze at 0°C.

(vi) For an oscilloscope just to display the wave form of an a.c supply which controls should be adjusted.

A Y-shift then X-time base
B X-time base then Y-shift
C Y-shift then brightness
D X-time base then Y-gain
E Y-gain then focus.

(vii) A regular rise and fall in loudness of a music played at a distance is called

A intensity
B timbre
C pitch
D beats
E resonance

(viii) Which of the following are non-magnetic metals?

A Iron and steel
B Aluminium and Zinc
C Nickel and Cobalt
D Nickel and steel
E Iron and Cobalt

(ix) The temperature of liquid in a thermos flask remains unaltered for a long time because heat loss by

A conduction is minimized
B convection and radiation are reduced
C radiation and convection are minimized
D conduction and radiation are reduced
E all modes of heat transfer are reduced.

(x) A body is said to be in equilibrium if

A the body moves with uniform speed
B the net force acting on the body is zero
C the upward forces on the body counter balance some of the downward forces
D its centre of gravity is low positioned
E its centre of gravity is high.

2. Match the times in **List A** with responses in **List B** by writing the letter of the correct response beside the item number.

List A	List B
(i) Newton's 3rd Law of motion	A Cells with conducting materials used in electrolysis
(ii) Kelvin	B Used in forming thick and real images
(iii) Proton	C A measure of electrical work
(iv) Voltameters	D Can be detected by means of scintillation counter
(v) Kwhr	E Is used in covering wounds in hospitals
(vi) Radiation	F The moon is in penumbra of the shadow of the Earth
(vii) Intrinsic semiconductor	G Action equals reaction
(viii) γ-radiation	H Thermodynamic temperature
(ix) Venus	I The moon is in the umbra of the shadow of the Earth
(x) Total Lunar eclipse	J Rate of change of momentum
	K Degrees centigrade
	L Measure of power generated
	M Heat transfer which requires material medium
	N Applied in construction for reinforcing concrete structures
	O A morning star
	P A positive charge
	Q The heat transfer that does not require matter
	R A shooting star
	S Pure semiconductor in which external impurity is not added
	T Impure semiconductor with a hole

SECTION B (60 Marks)

Answer **all** questions in this section.

3. (a) What is meant by the terms heat capacity and specific heat capacity? State how they are related. **(3 marks)**

   (b) Explain briefly how heat losses have been prevented in a vacuum flask. **(3 marks)**

   (c) A heater of 500W is used to raise the temperature of 50 kg of material of specific heat capacity of 960J/kg K, from 18°C to 38°C. Assume that all of the heat from the heater is given to the material. Calculate:
   (i) heat capacity of the material **(2 marks)**
   (ii) the time taken in seconds. **(2 marks)**

4. (a) (i) Explain the terms opaque and translucent and give an example of each. **(2 marks)**

   (ii) Danger signs along the road as well as tail and brake lamps of motor vehicles rear are painted red. Briefly explain the reason behind. **(1 mark)**

   (b) What is the basic difference between real and virtual image as formed by curved surfaces. **(2 marks)**

   (c) (i) Give two reasons why convex mirror are used as driving mirror? **(2 marks)**

   (ii) A convex mirror of focal length 18cm produces an image on its axis 6cm away from the mirror. Calculate the position of the object. **(3 marks)**

5. (a) (i) Define the terms astronomy and asteroids. **(2 marks)**
   (ii) Is scorpion a galaxy or a constellation? Give reason for your answer. **(1 mark)**

   (b) Distinguish between:
   (i) a planet and a star **(1 mark)**
   (ii) a comet and a meteor **(1 mark)**

   (c) Which planet in the solar system is
   (i) closest to the Sun? **(1 mark)**
   (ii) furthest from the Sun? **(1 mark)**
   (iii) closest to the earth? **(1 mark)**
   (iv) surrounded by rings? **(1 mark)**
   (v) the second largest planet? **(1 mark)**

6. (a) (i) State Ohm's Law. **(1 mark)**
   (ii) Explain briefly, with the aid of a circuit diagram, how you would verify Ohm's law in the laboratory. **(3 marks)**

   (b) How would you know when is necessary to recharge an accumulator? **(2 marks)**

(c) (i) State briefly the variation of the potential over a pear-shaped conductor and the variation of density of the charge. **(2 marks)**

(ii) An electron passes between two plates, one of which A, carries a positive charge and the other B a negative charge. What is the effect on the electron? **(2 marks)**

7. (a) (i) What is meant by the terms solenoid and electromagnetic induction? **(1 mark)**

(ii) List down two applications of electromagnetics. **(1 mark)**

(b) Describe the structure and mode of action of a simple d.c. motor. **(3 marks)**

(c) (i) Draw a diagram of an electric bell showing the polarity of the electromagnet, the direction of the current, the core, the yoke, spring and the armature. **(3 marks)**

(ii) Explain what will happen to the mode of action of the electric bell if the core and yoke are made of steel instead of soft iron. **(2 marks)**

8. (a) (i) What particle are emitted in thermionic emission? Explain why they are emitted. **(2 marks)**

(ii) What do you understand by the term transistor? **(1 mark)**

(b) (i) How a common emitter arrangement of a transistor is stabilized for temeperature changes? **(2 marks)**

(ii) Show the circuit symbol for pnp-transistor and npn-transistor. **(2 marks)**

(c) Draw a simple common emitter amplifier circuit using npn-transistor as a current amplifier. **(3 marks)**

SECTION C (20 Marks)

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

9. (a) Define acceleration due to gravity and state Newton's first Law of motion. **(2 marks)**

(b) An object is seen to fall from an aeroplane and observed to take 15 seconds in reaching the ground. Assuming that air resistance is negligible, calculate:

(i) the height of the plane. **(2 marks)**

(ii) the velocity with which the object strikes the ground. **(2 marks)**

(c) (i) Find the average force required to stop a train weighing 200 tons traveling at 54 km/h in two minutes from the application of the brakes.

(ii) What distance will the train travel in that time? **(4 marks)**

10 (a) (i) Distinguish between longitudinal and transverse waves. **(1 mark)**

(ii) Explain how beats are formed. **(2 marks)**

(b) A light wave is refracted into an optically less dense medium. What change will occur in:

(i) the frequency **(1 mark)**

(ii) the speed **(1 mark)**

(iii) the wavelength. **(1 mark)**

(c) (i) What is an echo? **(1 mark)**

(ii) A sound is sent out from the ship and its reflection from the floor of the ocean returns one second later. Assuming that the velocity of sound in water is 1500 m/s, how deep is the ocean? **(3 marks)**

11. (a) (i) Define electromagnetic field. **(1 mark)**

(ii) Show electromagnetic field lines pattern due to a solenoid. **(1 mark)**

(b) With the aid of a well labeled diagram, explain how an electric bell operates. **(4 marks)**

(c) How can you make a galvanometer read

(i) higher current values? **(2 marks)**

(ii) higher voltage values? **(2 marks)**