

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

031/1

PHYSICS 1

(For Both School and Private Candidates)

Time: 3 Hours

Monday, 11th November 2013 a.m.

Instructions

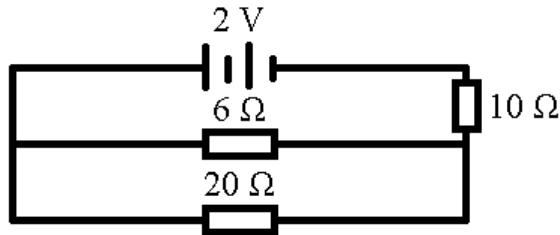
1. This paper consists of sections A, B and C.
2. Answer **all** questions in sections A and B and **one (1)** question from section C.
3. Calculators and cellular phones are not allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).
5. Where necessary the following constants may be used:
 - (i) Acceleration due to gravity, $g = 10 \text{ N/kg}$ or 10 m/s^2
 - (ii) Density of air = 1.2 kg/m^3
 - (iii) Density of mercury = 13200 kg/m^3
 - (iv) Density of water = 1000 kg/m^3
 - (v) Linear expansivity of steel = $11 \times 10^{-6} \text{ K}^{-1}$
 - (vi) $\pi, \pi = 3.14$

SECTION A (30 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) Two forces of 5 N and 8 N are acting at the same point and are inclined at an angle of 45° to each other. What will be their resultant force?
 - A 11.2 N
 - B 12 N
 - C 22.4
 - D 1.2 N
 - E 1.12 N
 - (ii) Which of the following are good examples of ferromagnetic materials?
 - A iron and ceramic
 - B zinc and iron
 - C copper and nickel
 - D nickel and cobalt
 - E cobalt and ceramic
 - (iii) A white shawl wrapped around a baby keeps the baby warm because the shawl
 - A is a poor reflector
 - B is a poor radiator
 - C has pockets of air trapped in it
 - D conducts heat to the baby
 - E stops convection currents.
 - (iv) A body is said to be in equilibrium if
 - A it moves with uniform speed
 - B the net force acting on it is zero
 - C the upward and downward forces are equal
 - D its centre of gravity is low positioned
 - E its centre of gravity is high.
 - (v) The correct statements about sound waves is that they
 - A are transverse waves
 - B can travel in vacuum
 - C can be polarized
 - D cannot be polarized
 - E do not require medium.

- (vi) In order to produce electrons in a discharge tube the
- A anode should be at a higher potential than the cathode
 - B potential difference at the anode should be low
 - C cathode should be heated indirectly at low voltage supply
 - D electrodes should be at the same potential
 - E electrons must be accelerated at higher potential.
- (vii) The battery in the circuit shown in the following diagram has an e.m.f. of 2 V and negligible internal resistance.



- What will be the current flowing in the $6\ \Omega$ resistor?
- A 0.15 A
 - B 0.64 A
 - C 1.42 A
 - D 0.10 A
 - E 0.33 A
- (viii) The image formed by plane mirrors are always
- A real, magnified and laterally inverted
 - B virtual, laterally inverted and same in size
 - C magnified, virtual and erect
 - D laterally inverted, same in size and real
 - E erect, real and magnified.
- (ix) Which of the following particles is used to cause fission in an atomic reaction?
- A proton
 - B deuteron
 - C neutron
 - D beta-particle
 - E alpha-particle
- (x) The layer in the atmosphere where weather phenomena are formed is called
- A stratosphere
 - B magnetosphere
 - C thermosphere
 - D troposphere
 - E exosphere.

2. Match the items 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) The lowest energy level where electrons are normally present.	A Light-emitting diode (LED)
(ii) The amplitude levels which usually occurs in any digital signal.	B Transducers
(iii) The energy level where electrons may not occupy.	C Rectification
(iv) Increases the electrical conductivity of a semiconductor.	D Bipolar transistor
(v) Produces an abundance of mobile electrons in the material.	E Semiconductors
(vi) The region near the boundary which is fairly free of majority charge carriers.	F Valence band
(vii) Materials which have significant electrical conductance at room temperature.	G Nodes
(viii) Increases the region or width of the depletion layers and rise the potential barrier.	H Fermi level
(ix) Convert an input signal of one form into an output signal of another form.	I Reverse bias
(x) The relationship between input signal and output signal of an amplifier.	J Transfer function
	K n-type doping
	L Dopants
	M Forbidden
	N Thermistors
	O Depletion layer

3. For each of the items (i)-(x), fill in blank spaces by writing the correct answer on the space provided.

- (i) What is a term given to a glowing asteroid in space which can be seen with naked eyes? _____
- (ii) The timbre of a sound is also referred to as _____.
- (iii) The angle between the horizontal component of the Earth's magnetic field and true north is called _____.
- (iv) The production of an e.m.f. in a conductor as a result of changing current in the same conductor is referred to as _____.
- (v) The combination of multiple echoes in the listener's ear produce a louder and more sustained sound called _____.

- (vi) When the temperature at the surface is below the freezing point, dew takes the form of ice called _____.
- (vii) The movement of particles from a region of high concentration to one of low concentration is called _____.
- (viii) Wheelbarrows and bottle openers are in the _____ class of levers.
- (ix) The process of converting sinusoidal wave forms into unidirectional (non-zero) waveforms is known as _____.
- (x) A resistor of low resistance used to convert a moving coil galvanometer into an ammeter is called _____.

SECTION B (60 Marks)

Answer **all** questions in this section.

4.
 - (a) Mention three differences between boiling and evaporation.
 - (b) Briefly explain reasons for the following:
 - (i) When a cold bottle is brought into a warm room, it becomes misted over
 - (ii) Frost is more likely to occur on a clear night than on a cloudy night.
 - (c)
 - (i) Define coefficient of linear expansion and give its SI unit.
 - (ii) A metal pipe which is 1 m long at 40°C increases in length by 0.3% when carrying a steam at 100°C. Find the coefficient of expansion of the metal.

5.
 - (a) The half-life of a certain radioactive substance is 64 days. Explain the meaning of this statement.
 - (b) A certain radioactive material has a half-life of 2 minutes. If the initial count rate is 256 per minute;
 - (i) how long does it take to reach a count rate of 32 per minute?
 - (ii) what fraction of the original number of atoms is left undecayed?
 - (c)
 - (i) What is meant by nuclear fission?
 - (ii) A uranium nucleus, U-238, with atomic number 92, emits two α -particles and two β -particles and finally forms a thorium (Th) nucleus. Write the nuclear equation for this process.

6.
 - (a) Briefly explain why
 - (i) Nylon clothes crackle when undressed?
 - (ii) Petrol road tankers usually have a length of metal chain hanging and touching the ground?
 - (b) What would happen when
 - (i) an ebonite rod is rubbed with fur?
 - (ii) a glass rod is rubbed with fur?
 - (c)
 - (i) Define electric current.
 - (ii) Two cells each of e.m.f. 6 V and internal resistance of $5\ \Omega$ and $6\ \Omega$ respectively are connected in parallel to a resistor of $10\ \Omega$. Find the current flowing in the $10\ \Omega$ resistor.
7.
 - (a) What is an altimeter?
 - (b) Briefly explain the reasons for the following:
 - (i) A person at great height suffers from nose bleeding.
 - (ii) It is painful to walk barefoot on a road that is covered by pebbles.
 - (c) A cube of sides 2 cm is completely submerged in water so that the bottom of the cube is at a depth of 10 cm. Calculate:
 - (i) the difference between the pressure on the bottom of the cube and the pressure on its top.
 - (ii) the weight of water displaced by the cube.
8.
 - (a)
 - (i) What is meant by impulse of a force?
 - (ii) Briefly explain why seat-belts are designed to stretch in a collision.
 - (b)
 - (i) Define momentum.
 - (ii) The cork of a bottle of mass 4 g is ejected with a velocity of 10 m/s in 0.1 second. Find the force exerted on the bottle.
 - (c) A car of mass 2000 kg is travelling along a straight road at a constant velocity of 10 m/s developing 3.0 kilowatts. If the engine of the car is switched off:
 - (i) Calculate the energy lost by the car in coming to rest
 - (ii) Briefly explain the energy changes in the process stated in (c) above.
9.
 - (a) What is meant by the following terms as used in geophysics:
 - (i) Tsunami.
 - (ii) Magma.

- (b) (i) List down the various layers of the atmosphere starting from the Earth's surface.
- (ii) Which layer in part (b) (i) above is nearest to the Earth? Explain two importances of it.
- (c) (i) What is a constellation?
- (ii) Briefly explain the causes of ocean tides.

SECTION C (10 Marks)

Answer **one (1)** question from this section.

- 10. (a) (i) State the laws of electromagnetic induction.
- (ii) Mention two advantages of a.c. generators over d.c. generators.
- (b) (i) Briefly explain why the core of a transformer is made of thin layers of metal insulated from one another.
- (ii) Describe the structure of a step-up transformer and state how it works.
- (c) A transformer with 4800 turns in the primary coil is designed to work from 240 V a.c. mains to give a supply of 8 V in order to ring a bell.
 - (i) What would happen if the transformer were connected to a 240 V d.c. mains?
 - (ii) Briefly explain why the primary current increases when a bell is being rung?
- 11. (a) Mention two practical examples in our daily life in which the principle of conservation of energy is applied.
- (b) (i) What is a simple pendulum.
- (ii) Describe the energy changes that take place when a simple pendulum swings from one side to another.
- (c) Name a machine or an apparatus used to change the following forms of energy.
 - (i) Heat energy to mechanical energy.
 - (ii) Mechanical energy to electrical energy.
 - (iii) Electrical energy to sound energy.
 - (iv) Sound energy to electrical energy.
 - (v) Heat energy to electrical energy.