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 **Wednesday, 09th November 2016 a.m.**

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in section 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, $g = 10 m/s^2$
   (ii) Specific heat capacity of copper, $C = 420 J/kg$
   (iii) Specific latent heat of fusion of ice = $334,800 J/kg$
   (iv) Pie, $\pi = 3.14$

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 in the answer booklet provided.

(i) The position of the centre of gravity of an object has a significant influence in its
A elasticity B plasticity C stability D rigidity
E elastic limit.

(ii) Which statement explain the basis of heliocentric theory?
A The earth was known to revolve around the sun.
B The earth was stationary.
C The sun was known to revolve around the earth.
D The sun was stationary.
E The earth was known to revolve around its axis.

(iii) Which among the following is a reason for the sky to appear blue while being observed from the earth?
A Regular reflection of sunlight B Irregular refraction of sunlight
C Diffuse refraction of sunlight D Selective scattering of sunlight
E Regular diffraction of sunlight.

(iv) The suspended magnetic needle always comes to rest with its axis in a vertical plane called
A geographic meridian B magnetic meridian
C geographic declination D magnetic declination
E geographic north pole.

(v) The correct arrangement of metals in ascending order of their linear expansivities is
A Iron, Copper, Invar, Brass and Nickel
B Nickel, Brass, Invar, Copper and Iron
C Brass, Copper, Nickel, Iron and Invar
D Invar, Iron, Nickel, Copper and Brass
E Nickel, Brass, Iron, Invar and Copper.

(vi) The loudness of a note produced by a vibrating object depends on
A the number of vibrations per second B the overtones present
C the quality of sound D the wavelength between two nodes
E the amplitude of vibration.

(vii) How many number of images will be formed if the angle between two mirrors is $0^{0}C$?
A 2 B 3 C 4 D 5 E Infinite.

(viii) The correct statement about radio waves is that:

A they have shortest wavelength
B they can be produced by comets in space
C they don't undergo reflection
D they require medium on its transmission
E they have smallest frequency.

(ix) What is the function of cathode in x-ray tube?

A To control heat produced on the target.
B To accelerate the speed of electrons.
C To conduct heat away from the target.
D To control brightness on the screen.
E To focus electrons on the target.

(x) Which of the following circuit elements has ability to produce gain as used in electronics?

A inductor
B diode
C resistor
D capacitor
E amplifier.

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

List A	List B
(i) The eye-lens becomes thick when contracted and thin when relaxed.	A. Short sight
(ii) Prevent the internal reflection of light in the eye	B. Long sight
(iii) The thick and transparent protective cover in front of the eye-lens which refracts light most.	C. Ciliary muscles
(iv) Hold the eye-lens in position.	D. Suspensory ligaments
(v) Provides two images of the same object which are slightly different in perspective.	E. Binocular vision
(vi) The light sensitive area of cells at the back of the eye.	F. Retina
(vii) Images of distant objects which are focused in front of the retina.	G. Aqueous humour
(viii) The circular opening in the iris through which light passes.	H. Vitreous humour
(ix) The most light sensitive spot on the retina.	I. Pupil
(x) The coloured circle round the eye-lens.	J. Fovea centralis
	K. Iris
	L. Cornea
	M. Slim lens
	N. Choroid layer
	O. Fatter lens

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

(i) Waves which travel perpendicularly to the direction of the vibrations are called _____.

(ii) The Wheatstone bridge is a circuit widely used for accurate measurement of _____.

(iii) Sugar tongs and tweezers are in which class of levers? _____.

(iv) The speech current along the telephone line can be converted into sound waves in the air by means of _____.

(v) A blue cable in the three-pin plug of electrical circuit represents _____.

(vi) Which quantity is induced whenever there is a change in the magnetic flux linked with a circuit? _____.

(vii) The product of mass and velocity of a body is called its _____.

(viii) A device that opens and closes a circuit in response to changes in temperature is called _____.

(ix) The successive decay of unstable nucleus until a stable fragment is achieved is known as _____.

(x) A teapot with a silvery surface keeps the water hot for some time because it conduct heat by _____.

SECTION B (60 Marks)

Answer **all** questions in this section.

4. (a) (i) Define turning effect of force and give its SI unit.
(ii) How the moment of force can be increased considerably in practical life? Give two examples.

(b) (i) List two factors that affect stability of a body.
(ii) Briefly explain why the handle of a door is near its outside edge?

(c) (i) What is meant by a balanced beam?
(ii) A uniform rod AB of mass 6.0 g is balanced horizontally about a knife edge at a distance of 3cm from end A where a mass of 8.0 g is hanging. Find the length of the rod.

5. (a) (i) State the law of inertia.
(ii) Use the law in (a) (i) to define force.

(b) A ticker-tape is moved through a ticker-timer for 5.0 seconds. If the timer is operating at 25 Hz;

(i) How many dots would have been printed on the tape?

(ii) What kind of motion does the tape represent? Give a reason.

(c) A shell of mass 30 kg is fired at a velocity of 600 ms^{-1} from a gun of mass 7000 kg.

(i) What is the recoil velocity of the gun?

(ii) Briefly explain the significance of the answer obtained in (c) (i) above.

6. (a) (i) Distinguish between light spectrum and dispersion of light.

(ii) Briefly describe how a light ray passes through an equilateral glass prism.

(b) Study Figure 1 which represents three primary colours combined together and answer the questions that follow:

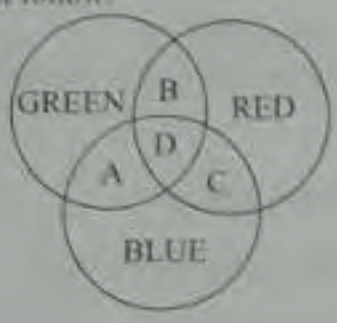


Figure 1

(i) Identify the colours represented by the letters A, B, C and D.

(ii) What general name is given to the colours obtained by mixing two primary colours?

(iii) Name the colour produced as a result of mixing three primary colours.

7. (a) What is meant by the terms:

(i) Bimetallic strip.

(ii) Linear expansivity of the solid.

(b) Briefly explain on the following observations:

(i) In cold weather the metal blade of a knife feels cooler than the wooden handle.

(ii) A cool breeze blows from the sea on a hot summer day.

(c) (i) Define latent heat of fusion of a substance.

(ii) A copper block of mass 0.68 kg is suspended in a freezing mixture at – 50 ^{0}C for some time and then transferred to a large volume of water at 0 ^{0}C. Calculate the mass of ice formed.

8. (a) (i) Distinguish between primary and secondary cells, giving one example of each.

(ii) Identify two defects of a simple cell.

(b) (i) Explain why lead-acid accumulators are used in car batteries rather than dry cells?
(ii) A cell of unknown e.m.f, E and internal resistance 2Ω is connected to a 5Ω resistance. If the terminal p.d, V is 1.0 V, calculate the e.m.f, E of a cell.

(c) (i) List two devices that are important when checking electrical faults in domestic appliances.
(ii) Briefly explain why a very high voltage is necessary when transmitting electrical energy from power station?

9. (a) (i) What is Zodiacal light?
(ii) Mention three uses of earth satellite.

(b) (i) Give two examples of a Jovial planet and two examples of a terrestrial planet.
(ii) How are the bodies in the solar system kept in normal positions?

(c) (i) Which planet is often called " Morning star""?
(ii) Briefly explain how astronomy gave rise to the 12 months of the year.

SECTION C (10 Marks)

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

10. (a) (i) What is meant by radioactive element?
(ii) Name three instruments which are used to detect radiation from radioactive source.

(b) Figure 2 shows the deflection of radiations from a radioactive element by an electric field.

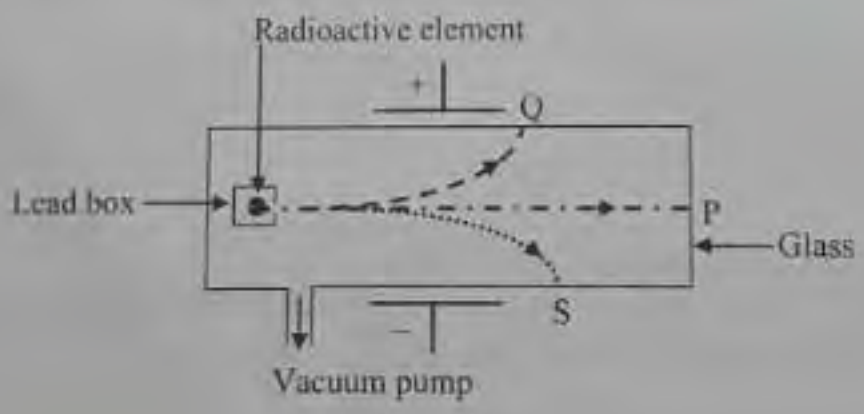


Figure 2

(i) Identify the radiations Q, P and S, giving reasons for your answers.
(ii) Briefly explain why the radioactive source is kept inside a lead box leaving only a small hole?

(c) (i) What are radioisotopes?
(ii) State two important applications of radioisotopes.

11. (a) (i) State the purpose of dynamo.

(ii) How can an a.c dynamo be converted to a d.c dynamo.

(b) (i) Briefly explain why an e.m.f is induced in the coil as it rotates.

(ii) At what position of the coil in 11 (b) (i) is the induced e.m.f zero?

(c) Explain the function of each of the following features of a simple electric motor:

(i) Split-ring commutator.

(ii) Brushes.