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, 09th November 2015 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 = $10 m/s^2$
   (ii) Density of water = 1.0 g/cm^3
   (iii) Linear expansivity of iron = $1.24\times10^{-5\text{-}1}K$
   (iv) Specific latent heat of fusion of ice = $336 J/g$
   (v) Velocity of sound in air = $340 m/s$
   (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 in the answer booklet provided.

(i) A spiral spring of natural length 1.50m is extended to 1.505m by a force of 0.80N What will be its extension when the applied force is 3.20N?

A 0.005m B 6.020m C 0.020m
D 4.520m E 1.57.

(ii) Which of the following electromagnetic waves is used to detect flaws and defects in steel plates?

A infrared waves B ultraviolet waves C x-rays
D gamma rays E micro waves.

(iii) A part of human eye that corresponds to the film in a camera is called

A cornea B iris C lens
D pupil E retina.

(iv) The sun generates its energy by a process called

A thermonuclear fission B thermonuclear fusion
C geothermal energy D geothermal fusion
E geothermal fission.

(v) What will be the size of the image formed if an object 4cm tall is placed 20cm in front of a concave mirror of focal length 15cm?

A 60cm B 40cm C 24cm
D 12cm E 3cm.

(vi) What is the main function of step up transformer?

A To change a.c to d.c current B To decrease resistance in a circuit
C To increase a.c voltage D To decrease a.c voltage
E To increase a.c current.

(vii) The most probable radiation forming a well-defined track when passed in a cloud chamber is called

A gamma-rays B beta rays C cathode rays
D alpha rays E x-rays.

(viii) The effect of adding an acceptor impurity to a silicon produce a crystal called

A P-type B N-type C PN-type
D NP-type E PNP-type.

(ix) Colours are produced when white light passes through glass prism because
A light waves interfere
B glass prism colours the light
C in glass different colours travel at different speeds
D different colours are filtered
E diffraction of light occurs.

(x) Which of the following statements is true when the resistance, R, of a wire is measured using an ammeter, voltmeter and rheostat?
A the ammeter is in parallel with R
B the voltmeter is in series with R
C a graph of V against I has a gradient equal to R
D a graph of I against V has a gradient equal to R
E the rheostat is in parallel with R.

2. Match the times 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 region nearest the earth of which most weather phenomenon occur. (ii) The layer in which the ozone layer is found. (iii) The boundary which separates stratosphere and other layers. (iv) The boundary which separates troposphere and stratosphere. (v) The region found in exosphere where satellites orbit the earth. (vi) The outermost region of the atmosphere. (vii) The layer which is also known as the upper atmosphere. (viii) The collective name given to troposphere and stratosphere. (ix) The layer just above the stratosphere in which most meteors burn while entering the earth's atmosphere. (x) The layer of gases containing numerous small suspended solid and liquid particles that surrounds the earth.	A. Stratosphere B. Atmosphere C. Ionosphere D. Stratopause E. Magnetosphere F. Troposphere G. Exosphere H. Thermosphere I. Hydrosphere J. Lithosphere K. Mesopause L. Mesosphere M. Lower atmosphere N. Tropopause

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

   (i) The rate of change of displacement is called _____.

   (ii) The process whereby the eye can alter its focal length in order to form images of objects at different distances is known as _____.

   (iii) The rule used to deduce the direction of the magnetic field lines due to solenoid or a circular coil is called _____.

   (iv) The function of an induction coil is to produce _____.

   (v) The wheatstone bridge is an electric device used to measure _____.

   (vi) A force which causes anticlockwise rotation is said to have a positive _____.

   (vii) The kinetic theory of matter has been used to account for elasticity, surface tension and _____.

   (viii) The quality of a note produced by a musical instrument depends on its fundamental frequency and _____.

   (ix) The name given to the collection of heavenly bodies that revolve around the sun is _____.

   (x) The increase in the average temperature of the world's atmosphere refers to _____.

SECTION B (60 Marks)

Answer **all** questions in this section.

4. (a) (i) What effect does an increase in temperature have on the density of most liquids?
   (ii) Explain the procedure of using methylated spirit, water and a pendulum bob to find the relative density of spirit.

   (b) (i) State Archimedes' Principle.
   (ii) Briefly explain why does a ship sink deeper in fresh water than in sea water?

   (c) When a piece of wood is put in a graduated cylinder containing water, the level of the water rises from $17.7cm^3$ to $18.5cm^3$. Calculate the
   (i) Mass of a piece of wood.
   (ii) Total volume of a piece of wood given that its relative density is 0.60.

5. (a) Define the following terms:
   (i) Coefficient of superficial expansion.
   (ii) anomalous expansion of water.

   (b) (i) How much heat is needed to change 340g of ice at 0°*C* to water at 0°*C?*
   (ii) What is the name of heat lost by ice in (b) (i) above?

   (c) An iron rivet of radius 8.95mm at 20°*C* is to be inserted into the hole of iron plate of radius 8.92mm at 20°*C*. What temperature must the rivet be heated in order to fit into the hole?

6. (a) (i) State two ways in which the image formed in plane mirror differs from that in a pin hole camera.
   (ii) What is the effect of moving the pinhole camera closer to the object?

   (b) (i) List three rules used to locate images in curved mirrors.
   (ii) Give two similarities and two differences that exist between the human eye and a lens camera.

   (c) A mirage is often seen by a motorist as a pool of water on the road some distance ahead.
   (i) Draw a sketch diagram to show the formation of such a mirage.
   (ii) Briefly explain how mirage is formed.

7. (a) (i) What is meant by the internal resistance of a cell?
   (ii) Distinguish between a cell and a battery.

   (b) (i) Draw a well labeled diagram of a dry cell (Leclanche).
   (ii) Identify three disadvantages of a Leclanche cell over a lead-acid accumulators.

   (c) The current of 3.0*A* passes through a coil of resistance 5Ω connected to the terminals of a cell of constant e.m.f, E (Volt) and internal resistance, r (ohm). If a uniform wire of length, L (cm) is joined across the ends of a 5Ω coil to form a parallel arrangement of resistance 4Ω , the current is reduced to 0.25A. Determine the
   (i) internal resistance of a cell.
   (ii) e.m.f of a cell.

8. (a) (i) Define nuclear fission.
   (ii) Mention two products of nuclear fission.

(b) Figure 1 shows a comparison of the penetrating power of three types of radiations.

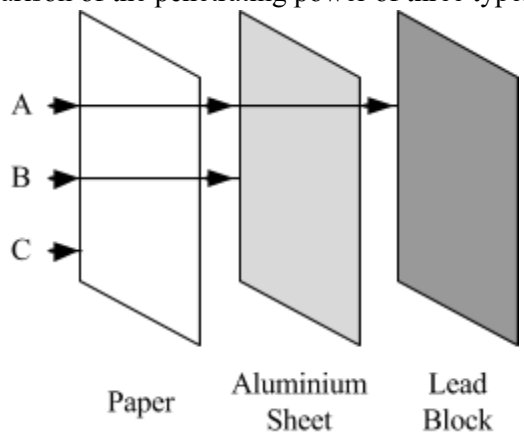


Figure 1

(i) Identify the name of radiations represented by the letters A, B and C.
(ii) Write two properties of each type of radiation named in 8 (b) (i).
(iii) What effect does the radiation B has on the nucleus of an atom?

(c) Complete the following equations and for each name the type of decay.
(i) $^{226}_{88}Ra \rightarrow$ _____ + $^{222}_{86}Rn$.
(ii) $^{222}_{86}Rn \rightarrow 2\,^{0}_{-1}e +$ _____.

9. (a) What is meant by the following terms?
(i) Asteroids.
(ii) Astronomy.

(b) Distinguish between:
(i) Constellations and a galaxy.
(ii) Meteor and meteorites.

(c) (i) Mention two types of tides.
(ii) With the aid of diagram, describe how ocean tides are formed.

SECTION C (10 Marks)

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

10 (a) (i) List four main parts of a ripple tank.
(ii) What role does a stroboscope play in a ripple tank experiment?

(b) (i) Explain why there are four strings of different thickness in a violin?
(ii) What does a violinist do to change the note emitted by a particular string?

(c) (i) Briefly explain how a resonance tube works.

(ii) Calculate the frequency of vibration in a resonance tube of shortest length of $0.22m$ when the next resonance length is $0.47m$.

11. (a) (i) State the functions of the hair springs in a moving coil galvanometer.

(ii) Explain why moving coil galvanometer is unsuitable for measuring alternating currents.

(b) (i) Draw the magnetic field lines pattern in a horizontal plane due to a current carrying straight conductor when a d.c flows through it.

(ii) What would happen on the pattern if a.c were used instead of d.c?

(c) (i) What should be done in order to increase the speed of rotation in a d.c electric motor?

(ii) An electric motor is connected by cable to a generator and produce a current of $10A$ at $240V$. Calculate the resistance of the cable.