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

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

Time:3 Hours **Thursday, 27th November 2014 p.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) Pi, $\pi = 3.14$
   (iii) Density of water = $1{,}000\ kg/m^3$
   (iv) Specific heat capacity of water = $4{,}200\ J\ kg^{-1}\ K^{-1}$
   (v) Specific latent heat of fusion of ice = $334{,}400\ J\ kg^{-1}$

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 liquid at 80°C is as hot as a piece of metal at

A 200°F B 144°F C 32°C
D 212°C E 176°C .

(ii) Which of the following statements is true about musical interval?

A is the sum of two frequencies
B is the difference between two frequencies
C is the ratio of two frequencies
D is a multiple of the fundamental frequency
E has high frequency at shorter wavelength.

(iii) The only light reflected by both yellow and blue pigments is

A Green B White C Red
D Cyan E Indigo.

(iv) A small group of bright stars forming patterns in the sky are called

A Comets B Asteroids C Constellations
D Meteorites E Meteors.

(v) When a galvanometer is used to measure electric current in a circuit it must be connected with a

A shunt in series B multiplier in parallel
C shunt in parallel D multiplier in series
E Shunt and multiplier in parallel

(vi) Which of the following process occurs when more molecules of water return to it than escaping from it?

A Evaporation B Condensation C Diffusion
D Osmosis E Crystallization.

(vii) The human ear can respond frequencies of sound in the range of

A 2kHz to 100kHz B 20kHz to 5000kHz
C 100Hz to 1000kHz D 20Hz to 20kHz
E 10Hz to 100kHz

(viii) The radiating power of different surfaces may be compared by means of

A Leslie's experiment B Convection experiment
C Hopes apparatus D Conductivity apparatus
E Bimetallic strip apparatus

(ix) Most of the atoms of heavy nuclei are radioactive because they

A undergo fusion
B undergo fission
C are unstable
D are stable
E have more protons than neutrons.

(x) The function of soft iron cylinder round the neck of a cathode ray tube in television receivers is to provide

A strong magnetic field
B conduction of electricity
C mechanical protection
D magnetic shielding
E potential drop between the terminals.

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) Originates from the space outside our atmosphere.	A. Green light
(ii) It is used to detect infrared radiation	B. Infrared rays
(iii) A part of electromagnetic spectrum used for photography.	C. Photographic plates
	D. Hygrometer
(iv) Rays in the electromagnetic spectrum with longer wavelength.	E. Rock salt prism
	F. Gamma rays
(v) Can not be reflected by a glass mirror but hardly with glass lenses or prism.	G. X-rays
	H. Barometer strip
(vi) Its frequency varies from about 30 kHz to 1.2 x 10^5 MHz.	I. Cosmic rays
	J. Tungsten lamps
(vii) Can be used to identify minerals and to detect forgeries.	K. Ultraviolet radiation
	L. Microwaves
(viii) Its wavelength ranges from 550 nm to 600 nm.	M. Radio waves
(ix) Can detect ultraviolet radiation.	N. Blue light
(x) Oscillating magnetic and electric field vectors are at right angles.	O. Electromagnetic waves
	P. Yellow light

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

(i) Forumlae are very useful tools of science because they express the general relationship between _____.

(ii) The movement of an object through equal distances in equal times is called _____.

(iii) The force due to gravity on an object is called its _____.

(iv) High jumpers could leap a very high distance on the moon surface because of very weak _____.

(v) The turning effect of force about a point is called its _____.

(vi) The change in momentum of an object to which force is applied within a very short time is called _____.

(vii) Water has maximum density at a degree centigrade of _____.

(viii) The boundary between the crust and the mantle is called _____.

(ix) The resolved component of a force, F in a direction inclined at an angle, θ to it is given by _____.

(x) The number of pulses per second in a Geiger-Muller tube gives a measure of _____.

SECTION B (60 Marks)

Answer **all** questions in this section.

4. (a) (i) Define the term upthrust.
   (ii) List down two conditions that make an object float.

   (b) (i) What is meant by capillary action?
   (ii) Briefly explain three applications of capillarity in real life.

   (c) A cube of wood of side 4.0 cm and a density of 500 kg $m^{-3.}$ is placed on the surface of water.
   (i) What fraction of wood would be immersed in water?
   (ii) Calculate the force applied to the cube that makes the top surface of the cube be on the same level as the water surface.

5. (a) (i) Define centripetal force.
   (ii) Mention two benefits of centripetal force.

   (b) Briefly explain how each of the following energy transformation takes place:
   (i) Mechanical energy to light energy.
   (ii) Chemical energy to mechanical energy.

   (c) A catapult is used to fire a stone of mass 30 g vertically to a height of 5 m. Calculate the:
   (i) potential energy gained by the stone.
   (ii) speed of the stone as it leaves the catapult.

6. (a) (i) State the laws of reflection of light.
   (ii) Give two examples which illustrate that light travels in a straight line.

   (b) Explain the reason for the following:
   (i) Light and heat from the sun disappear during the total eclipse of the sun.
   (ii) Radio telescope uses a parabolic metal reflector.

   (c) (i) Draw a diagram to show how a right-angled isosceles glass prism can be used to turn a ray of light through 90°.
   (ii) What is an advantage of using a prism rather than a silvered mirror for the purpose in (c) (i) above?

7. (a) (i) What is meant by specific latent heat of vaporization.
(ii) Name two factors which affect the boiling point and freezing point of water.

(b) Explain in terms of kinetic theory of matter;
(i) What changes is taking place while the liquid is boiling?
(ii) Why it takes longer to boil a tea on top of high mountains than at the sea level?

(c) (i) Define heat capacity.
(ii) Calculate the final temperature of water formed if 8.4 KJ of heat is supplied to 0.02 kg of ice at 0°C.

8. (a) (i) Define magnetic field
(ii) Name four instruments or devices in which electromagnets are essential parts.

(b) (i) Under what circumstance are eddy currents formed?
(ii) Give two advantages and two disadvantages of eddy currents.

(c) A 250 V mains transformer has 1000 turns in the primary coil and it is used to supply energy to a 15V, 35W domestic refrigerator.
(i) How many turns are there in the secondary coil?
(ii) What is the efficiency of the transformer if the current drawn from the main supply is 175 mA?

9. (a) (i) What is tidal energy?
(ii) Mention three renewable sources of energy.

(b) (i) State the energy conversion in a solar cell and give two practical uses of it.
(ii) Why solar cells are not likely to be used to generate electricity in the near future?

(c) (i) What is meant by green house effect?
(ii) List down four main greenhouse gases.

SECTION C (10 Marks)

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

10 (a) Name two semiconductors which are of special importance in electronics.

(b) Distinguish between:
(i) donor and acceptor atoms.
(ii) n-type and p-type semiconductors.

(c) Study Figure 1 then answer the questions that follow:

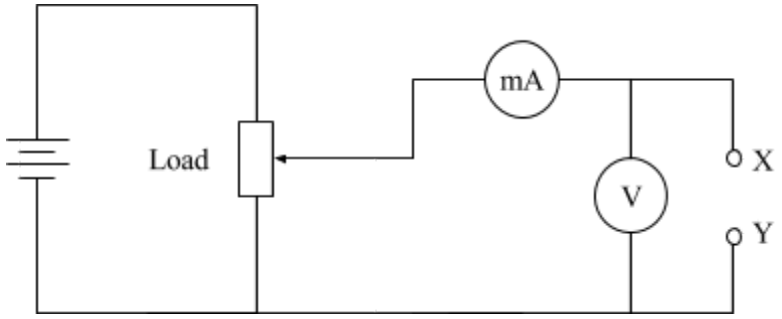

Figure 1

(i) Complete the circuit by showing how a p-n junction diode should be connected between X and Y in order for the current to flow.
(ii) Sketch the expected characteristics when the diode is connected in this manner.
(iii) Give the name of the type of connection described in (c)(i) above.
(iv) What will happen within a circuit if the terminals of a battery are reversed?

11. (a) (i) What is atmospheric pressure?
(ii) Mention three devices that make use of atmospheric pressure in daily life.

(b) Briefly explain the function of each of the following features of a lift pump:
(i) The intake valve.
(ii) The transfer valve.

(c) (i) What is a bicycle pump?
(ii) List down the main parts of a bicycle pump.
(iii) Briefly explain how does a bicycle pump works.