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

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

Time: 3 Hours **Friday, 27th November 2015 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 = 10m/s^2 or 10 N/kg
   (ii) Specific heat capacity of ice = 2100J/kg K
   (iii) Specific latent heat of fusion of ice = 3.2 x 10^5 J/kg
   (iv) Average density of air = 1.25 kg/m^3
   (v) Density of fresh water = 1000kg/m^3
   (vi) Density of mercury = 13600Kg/m^3
   (vii) Relative density of sea-water = 1.03
   (viii) Pi, π = 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 in the answer booklet provided.

(i) Which of the following liquids does NOT contract if cooled from 4°C to 0°C?

A Milk B Pure oil C Pure water
D Kerosene E Sea water.

(ii) The force that drives an electric current through an electric component is called

A Coulomb B Farad C Ampere
D Potential difference E An e.m.f.

(iii) Figure 1 shows how the bob of a simple pendulum was pulled aside to position A and then realised to position C via position B. At what position will the bob attain maximum kinetic energy?

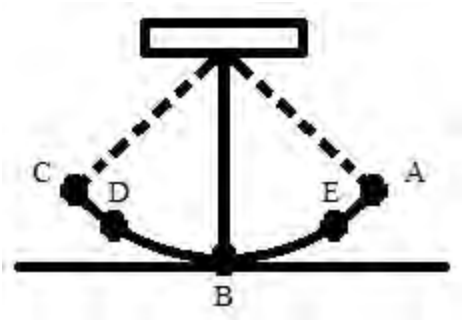

Figure 1

A Position A B Position B C Position C
D Position D E Position E

(iv) What makes a coin inside the water at the bottom of a vessel appear to rise when viewed from above?

A Reflection of light. B Refraction of light. C Mirage of light.
D Spectrum of light. E Diffraction of light.

(v) Which one of the following is the characteristic of the magnetic lines of force?

A They cross each other.
B They cannot pass magnetic substance.
C They run from South pole to North pole outside the magnet.
D They are continuous and form closed loop.
E They attract each other when travelling in the same direction.

(vi) The free charge carrier of electricity through pure semiconductors are

A electrons and holes B electrons and protons C neutrons and holes
D neutrons and protons E protons and holes

(vii) A larger celestial body in the solar system made up of hot gases are known as

A Planet B Star C Moon
D Constellation E Galaxy.

(viii) Which of the following phenomenon is a consequence of global warming?

A Black bodies effect B Atmospheric pressure C Greenhouse effect
D Electromagnetic effect E Earthquakes.

(ix) A book appears to be red when seen in white light, but in magenta light it will appear to be

A blue B yellow C green
D red E magneta.

(x) Figure 2 shows the arrangement of three capacitors.

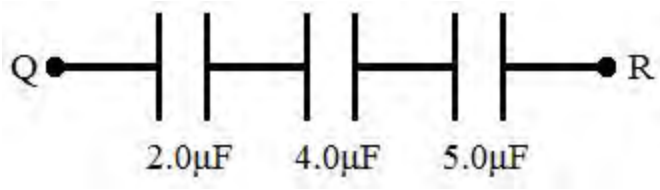

Figure 2

What will be the value of equivalent capacitance across two terminals QR?

A 1.95 μF B 1.05 μF C 1.85 μF
D 1.59 μF E 1.15 μF.

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

List A		List B
(i)	An instrument that resist the flow of electric current.	A. Galvanometer
(ii)	An instrument that cuts off the flow of current in a circuit when exceeds a specific value.	B. Battery
(iii)	An instrument used to measure the electromotive force.	C. Voltmeter
(iv)	An instrument that detects the presence of electric current.	D. Ammeter
(v)	An instrument used to measure the flow of electric current in a circuit.	E. Rheostat
(vi)	An instrument that measures the potential differences of a wire.	F. Potentiometer
(vii)	An instrument which protects an electric circuit against excess current.	G. Transformer
(viii)	An instrument that produce electrical energy.	H. Resistor
(ix)	An instrument designed to produce variable resistance.	I. Spectrometer
(x)	An instrument that detects small electric charges.	J. Gold leaf Electroscope
		K. Circuit breaker
		L. Fuse
		M. Thermostat

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 product of force and time is known as _____.

(ii) The study of stationary electric charges is called _____.

(iii) Which process involves heat transfer through gases? _____.

(iv) What physical quantity is obtained by the ratio of distance moved by effort to the distance moved by the load? _____.

(v) Which category of the material whose electrical conductance lie between an insulator and a conductor? _____.

(vi) The discharge of electrons from heated metal is known as _____.

(vii) The process of mixing coloured lights by reflection from a white surface is called _____.

(viii) What name is given to the fixed path along which planets travel around the sun? _____.

(ix) Which device is used to control the flow of current in one direction within an electronic circuit? _____.

(x) The nature of an earthquake is usually described by measuring its magnitude and _____.

SECTION B (60 Marks)

Answer **all** questions in this section.

4. (a) Distinguish between density and relative density.

(b) (i) State the law of floatation.
(ii) List two conditions for the body to float.

(c) (i) A ship of mass $1.2 \times 10^6 kg$ floats in sea-water. What volume of sea-water does it displace?
(ii) Total volume of a piece of wood given that its relative density is 0.60.

5. (a) (i) When is friction useful?
(ii) Give two disadvantages of friction.

(b) Study Figure 3 then answer the questions that follow.

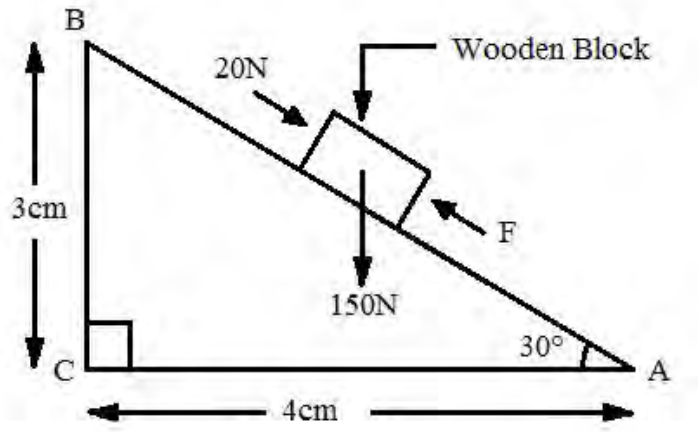

Figure 3

(i) Calculate the work done in rising the wooden block from point A to B.
(ii) Briefly explain if it is possible for the wooden block to remain stationary when placed at the mid-point of an inclined plane?

(c) A machine with two pulley system and efficiency of 75% is used to lift a load of 120N through a distance of 0.5m. Calculate:
(i) Its mechanical advantage
(ii) The energy wasted by the machine.

6. (a) Mention three sources of thermal energy in everyday life.

   (b) How can the temperature of the following substances be compared with its steam?
   (i) Boiling pure water.
   (ii) Boiling porridge.

   (c) A lump of copper of mass 0.5 kg is placed in an oven for some time then quickly transferred to a large dry block of ice at 0°C forming 0.3kg of ice after a short period.
   (i) Estimate the temperature of the oven.
   (ii) Give two reasons why the estimated temperature in (c) (i) might be lower than the actual temperature of the oven?

7. (a) List four common devices which utilize the atmospheric pressure.

   (b) Explain why the swimmer feels much greater pressure of water at the deep end than at the shallow end?

   (c) Calculate the height of the mountain given that its air pressure at the base is 75cmHg and that at the top is 60cmHg.

8. (a) (i) Explain what happens when a white light is incident on a triangular glass prism.
   (ii) Calculate the angle of refraction in the glass if light is incident in the air at 40° on a plane glass surface of refractive index of 1.52.

   (b) Derive an expression, $u = \left(\frac{m+1}{m}\right) f$ by using the mirror formula where, m stand for magnification of the image formed and other symbols carry their usual meaning.

   (c) A concave mirror has a focal length of 40 cm. How far from the mirror must an object be placed to produce an image that is
   (i) twice the size of the object.
   (ii) half the size of the object.

9. (a) Describe four signs before an earthquake occurs.

   (b) (i) List four effects of volcanoes.
   (ii) Briefly explain how volcanoes are formed.

   (c) Figure 4 shows the structure of volcano. Identify the parts marked A, B, C, D and E.



Figure 4

SECTION C (10 Marks)

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

10 (a) (i) Define thermionic emission.

(ii) What is the function of metal rectifiers in battery chargers?

(b) Figure 5 shows a stationary wave, W obtained on the screen when an a.c voltage, V is connected to the Y plate of an Oscilloscope.

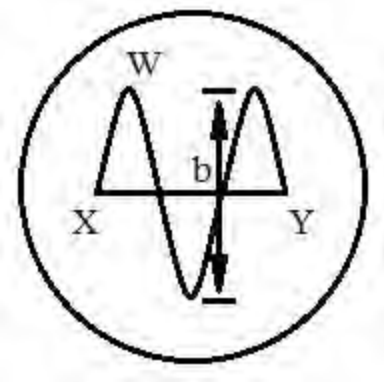

Figure 5

(i) What does part XY and the height, 'b' represents?

(ii) Briefly explain how the value of 'b' can be achieved.

(c) (i) Give four applications of X-rays in daily life activities.

(ii) Explain how X-rays are produced.

11. (a) (i) List four behaviours of waves.

(ii) Give two applications of each behaviour listed in 11 (a) (i).

(b) (i) Differentiate echoes from reverberations.

(ii) Why is it important to use sound absorbers in larger buildings?