Name……………………………………………………… Personal No ………………………

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**535/2**

**PHYSICS**

**Paper 2**

**Uganda Certificate of Education**

PHYSICS

**Paper 2**

2 hours 15 minutes

**INSTRUCTIONS TO CANDIDATES:**

* *Answer only* ***five*** *questions.*
* ***Where necessary use:***

*Acceleration due to gravity, g = 10 m s-2*

*Specific heat capacity of water = 4200 J kg-1 K-1*

*Density of water = 1000 kg m-3*

*Speed of sound in air = 320 m s-1*

*Specific latent heat of vapourization = 2.26 x 103 J kg-1*

*Specific latent heat fusion of ice = 3.34 x 102 J kg-1*

*Density of mercury = 13600 kg m-3*

**Turn Over**

1. (a) Define acceleration due to gravity. (01 mark)

 (b) The figure below shows a velocity-time graph of a car of mass 800 kg.

*t*(s)

0

10

0

70

65

20

*V*(m s-1)

Find the;

 (i) Accelerating force. (03 marks)

 (ii) Total distance moved. (03 marks)

 (c) Explain the following observations;

 (i) An object which is moving over a horizontal surface retards to rest when the accelerating force is removed. (02 marks)

 (ii) A high jumper flexes his knees on landing on a hard surface.

 (04 marks)

 (d) (i) State the principle of conservation of momentum. (01 mark)

 (ii) A trolley of mass 0.30 kg is moving at 20 m s-1. Find its momentum. (02 marks)

1. (a) (i) Define *moment of a force.* (01 mark)

 (ii) State the principle of moments. (01 mark)

 (b

P

Bale of cotton

Piston

A

B

E

The diagram above represents a system used to compress a bale of cotton of weight 10000 N. The rigid rod AB is 2 m long and is pivoted at a point P, 0.5 m from end A. At end A of the rod is hinged a piston arm at the opposite end of which is a ram of area $2 m ^{2}$. If the pressure exerted on the cotton bale is $4200 Nm^{-2}$, find the minimum effort (E) required to exert this pressure when the system is in equilibrium. (04 marks)

(c) (i) Describe an experiment to demonstrate that pressure in liquids changes with depth. (04 marks)

(ii) Find the pressure exerted on a deep sea diver who is 25 m below the surface of the sea whose waters are of density$ 1200 kg m^{3}$, assuming the atmospheric pressure is 75 cmHg. (03 marks)

(d) A spring balance reads $3.56 N$ when a metal cube of side $2.0 cm$ is suspended in air from the spring. Find the reading of the spring balance when the metal cube is completely submerged in mercury. (03 marks)

1. (a) Define the following terms as applied to waves:

 (i) Amplitude. (01 mark)

 (ii) Frequency. (01 mark)

 (b) Describe an experiment to demonstrate resonance of sound. (03 marks)

(c) A student standing 540 m in front of a high wall in clear space makes a loud sound and hears an echo after 3 seconds.

(i) Determine the speed of sound in air. (03 marks)

(ii) State two factors which affect the speed of sound in air. (02 marks)

(d) A radio wave transmits at 5 MHz, Find its wavelength. (03 marks)

(e) Draw a sketch diagram to show how circular waves are reflected from a plane reflector. (03 marks)

1. (a) Give two methods of producing electrons from metals. (02 marks)

 (b) State the effect of each of the following on a fine beam of electrons

(i) Electric field. (02 marks)

(ii) Magnetic field. (02 marks)

(iii) Gravitational field. (01 mark)

 (c) (i) With the aid of a labelled diagram, describe how X-rays are produced. (05 marks)

 (ii) Distinguish between hard X-rays and soft X-rays. (02 marks)

(iii) What precautions should be taken to minimize health hazards? (02 marks)

1. (a) Define a ray of light (01 mark)

 (b) (i) What is meant by power of accommodation with reference to the eye? (01 mark)

 (ii) Explain with the aid of sketch ray diagram how the eye defect called long sightedness arises. (04 marks)

(iii) Describe, with the aid of a diagram, how the defect mentioned in (b)(ii) can be corrected. (04 marks)

 (c) (i) State the laws of refraction. (02 marks)

(ii)

S

Air

A

Q

R

P

N

O

Air

Glass

60º

The diagram shows a ray of light incident on a glass block at angle of incidence of 60º. If the refractive index of glass is 1.50, calculate the angle of refraction. (02 marks)

(iii) Redraw the diagram in (c) (ii) showing the subsequent path of the ray through glass until it emerges out of the glass block indicating all the appropriate angles involved. (02 marks)

1. (a) State Charles’s law. (01 mark)

 (b) Describe an experiment to verify Charles’s law. (06 marks)

 (c) At $27^{o}C$ a fixed mass of gas occupies a volume of $120 cm^{3}$. Find the volume of the gas if it is cooled to $7^{o}C$ , at constant pressure. (02 marks)

1. The diagram below shows a shiny silver surfaced electric kettle being used to heat water from a mains supply.

Plastic lid

Rubber stands

Heating element

 Briefly explain how each of the following features of the kettle enhances its efficiency.

1. The heating element is situated at the bottom of the kettle. (01 mark)

(ii) The kettle is made of shiny silvered surface. (01 mark)

1. The lid is made of plastic material. (01 mark)
2. A kettle rated at 1600 W, 240 V is used to heat $2000 cm^{3}$ water initially at $25^{o}C$ to its boiling point. If the specific heat capacity of the material of the kettle is $120 Jkg^{-1}K^{-1}$, find how much time is taken for the water to reach its boiling point. (04 marks)

1. (a) State the law of charges. (01 mark)

 (b) Describe with the aid of suitable diagrams how a gold leaf electroscope can be charged negatively by induction. (05 marks)

 (c)

$$+$$

$$+$$

$$+$$

$$+$$

$$+$$

$$+$$

$$+$$

$$+$$

A sharp pin is placed on the cap of the gold leaf electroscope as shown in the diagram above. A positively charged rod is held next to the sharp end of the pin. Draw the diagram and use it to explain what happens to the electroscope and the charged rod. (04 marks)

 (d) (i) Explain what is meant by polarization as applied to a simple cell. (02 marks)

 (ii) State how polarization can be minimized in a simple cell. (01 mark)

A

S

3 Ω

6 Ω

1 Ω

1.5V,r=1Ω

1.5V,r=1Ω

(e)

The figure above shows two cells each of e.m.f 1.5 V and internal resistance of 1 Ω, connected to three resistors and a switch, S. Find the reading of the ammeter, A when the switch is closed.(03 marks)

1. (a) What is meant by magnetic saturation? (01 mark)

 (b) With the aid of a diagram, explain what is meant by *magnetic shielding*. (03 marks)

(c) Draw a diagram to show the magnetic field patterns resulting from two straight conductors placed vertically near each other carrying a current in:

 (i) The same direction. (01 mark)

 (ii) Opposite directions. (01 mark)

(d) (i) Draw a labeled diagram to show the essential parts of a simple d.c. motor and explain how it works. (05 marks)

 (ii) State any two ways in which the power generated by the d.c. motor may be increased. (02 marks)

 (e) A moving coil galvanometer has a coil of resistance 4 Ω and gives a full scale deflection of 25 mA. Find the value of the resistance required to convert to an ammeter which reads 15 A at full-scale deflection. (03 marks)

***END***