**NAME: …………………………………………..… Class …………**

**232/1**

**July/August 2018**

**PHYSICS**

**PAPER 1**

**Time: 2 Hours**

**MOKASA II EXAMINATION**

**PHYSICS PAPER 1**

**Instructions to the candidate:**

* Write your **name**, **stream** and **admission number** in the spaces provided above.
* Sign in the space provided above.
* This paper consists of two sections; A and B.
* Answer ***all*** the questions both in section **A** and **B** in the spaces provided.
* All workings ***must*** be clearly shown.
* Mathematical tables and/or silent electronic calculators ***may*** be used.
* *Take acceleration due to gravity g=10NKg-1*

**For examiners’ use only**

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| --- | --- | --- | --- |
| **SECTION** | **QUESTION** | **MAXIMUM SCORE** | **STUDENT’S SCORE** |
| Section A | 1-9 | 25 |  |
| Section B | 10 | 11 |  |
| 12 | 10 |  |
| 13 | 11 |  |
| 14 | 09 |  |
| 15 | 14 |  |
| Total  | 80 |  |

***This paper consists of 16 printed pages. The learner should check to ascertain that all pages are printed as indicated and that no question(s) is/are missing.***

1. The following diagram shows a micrometer screw gauge used to measure the diameter of a marble whose actual diameter is 6.60 mm.

 

(i) What is the reading on the micrometer screw gauge (1 mark)

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(ii) Determine the zero error in the instrument (1mk)

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1. The figure below is a cylinder of uniform cross section area **A** containing a liquid of density **ρ** at a height ***h*** . Use the figure to show that the fluid pressure at the bottom is given by ***p= hρg***.

 A (3 marks )

***Liquid*** ***h***

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3. The two graphs of temperature against time were recorded and plotted by two thermometers placed in contact with surfaces X and Y.



Use the graphs to determine:

(i) Which of the surfaces is a poor emitter? (1mark)

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(ii) Which of the surfaces would be a good absorber of heat? (1mark)

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4. Bronze is an alloy made by mixing molten copper and tin. If the alloy contains 80% by mass of copper and 20 % by mass of tin .Calculate the density of bronze (density of copper is 8900 kg /m3 and density of tin is 7000kg/m3  (3 marks)

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5. The figure below shows a wire loop with a string that has been dipped into soap solution.



(i) Complete the sketch below to show the observed effect if the soap film is punctured at X

 (1 mark)

ii) Explain the observations made in **(i)** above ( 1 mark)

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6. The horizontal pipe shown in the diagram has a cross section area of 40.0 cm2 at the wider section and 10 cm2 at the constriction. Water flows in the pipe and the rate from the pipe is 6.00 × 10-3 m 3/s.

 

(a) Account for the difference in the height (h) between the mercury column in the U-shaped manometer (1 mark)

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b). A light helical spring will extend by 20cm when a load of 60N is applied to its lower end .Three such springs X , Y and Z are arranged as shown in the diagram.

 

p

W

y

z

x

 Determine the value of the load W which will cause the point P to move downwards through a distance of 21 cm. (3 marks )

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P

Q

0 2.4m 5.6m 6.0m

Calculate the tension T on string Q (3marks)

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 (2 marks)

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 **SECTION B (55 MARKS)**

**10.** a). Define power of a machine (1mark)

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b) The radius of the effort piston of a hydraulic lift is 2.8 cm while that of the load piston is 8.4 cm. This machine is used to raise a load of 120kg at a constant velocity through a height of 3m. Given that the machine is 75 % efficient. Calculate:

(i.) The velocity ratio of the lift (2marks )

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(ii) The effort needed (2 marks)

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(iii) The energy wasted in using the machine (3 marks)

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(iv) State one cause of energy wastage? (1 mark)

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(i) Heat capacity, C (1 mark)

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(ii) Latent heat of fusion, Lf (1mark)

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b) In an experiment to determine the specific latent heat of vaporization of steam **lv**, the following results were obtained

* mass of calorimeter, mc = 250 g
* mass of calorimeter +water = 750 g
* mass of ice at 0ºC in the calorimeter mi= 20g
* Final temperature when dry steam at 1000c is passed over the calorimeter =25ºC
* mass of condensed steam ms =25 g

(Given that the specific latent heat of fusion of ice is 3.36 ×105 Jkg-1, the specific heat capacity of copper is 400 Jkg-1 k-1 and specific heat capacity of water is 4200JKg-1k-1.)

Determine the :

1. heat gained by the Ice (2 marks )

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ii. heat gained by the Water ( 1marks)

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iii. heat gained by the Calorimeter (2 marks)

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iv. specific latent heat of vaporization of steam , lv. ( 3 marks )

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c) Explain why a drop of methylated spirit placed at the back of hand feels colder than a drop of distilled water at the same temperature (2 marks)

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12 a). A car moves from rest at a uniform acceleration of 1.0 m/s2 for the 20 s. It continues at the constant velocity for the next 30s and finally takes another 10 s to decelerate uniformly to rest .

1. Find the final velocity of the car after the first 20 seconds. ( 1 mark) ……………………………………………………………………………………………………………………………………………………………………...………………….
2. Sketch a velocity- time graph for the whole journey ( 3 marks)
3. From the graph, determine the total distance covered (3 marks)

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 b) The figure below shows dots which were made by a ticker timer and tape attached to a trolley. The trolley was moving in the direction shown.

 4cm 1cm



Direction Of motion

A B C D

If the frequency of the ticker timer used was 50 Hz,

i) determine the average velocities of:

( I) AB (1mk)

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(II) CD (1 mark)

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ii) The acceleration of the trolley ( 2 marks)

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 c) A body of mass 0.6kg falls from a building 80m high. Determine the velocity at which it strikes the ground (2 marks)

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13 a).State Boyle’s law ( 1 mark)

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b.) Sketch a graph of pressure ( P) against (PV) in the axes provided below for a gas which obeys Hookes law (1mk)

c) A column of air 30cm long is trapped by a mercury thread 6 cm as shown below. When the tube is inverted, the air column is 40cm.

 

 Determine the value of the atmospheric pressure, Pa  (3 marks)

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d) The volume of a mass of a gas at 27ºC and 75cmHg pressure is 200cm3. Find the volume of the gas at -50ºC and 80cmHg pressure. (3 marks)

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14 a). A wooden block **M** of volume 500cm2 and density 800kgm-3 is suspended inside a liquid of density **p** by a string as shown below.



 If the tension **T** on the string is 2N, determine the:

1. Upthrust, **U**. (2 marks)

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ii. Density of the liquid , **p** (2mks)

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b) i. Define centripetal force ( 1 mark ) ……………………………………………………………………………………………………………………………………………………………………………………………………………

ii. Explain why no work is done by a centripetal force acting on a body moving in a circular horizontal plane (1 mark)

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Arrange the tensions TA, TB and TC respectively in ascending order (1 mark)

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1. Explain why wet clothes in a spin dryer, dry faster when the spin drum is rotated at a higher speed (2 marks)

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