**KASSU JET EXAMINATION - 2021**

**Kenya Certificate of Secondary Education**

**232/1**

**PHYSICS**

**PAPER ONE**

**Jan. 2021**

**2 hours**

**Name...................................................................................Index Number......................../............**

**Admission Number………….Class: ……....Candidate’s Signature....................Date...............**

**INSTRUCTIONS TO CANDIDATES**

1. *Write your name, admission number and index number in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above*
3. *This paper consists of* ***TWO*** *sections* ***A*** *and* ***B.***
4. *Answer* ***ALL*** *the questions in section* ***A*** *and* ***B*** *in the spaces provided.*
5. *All working* ***MUST*** *be clearly shown.*
6. *Non programmable silent calculators may be used.*
7. *ALL numerical answers must be expressed in decimal notation.*
8. ***This paper has 14 pages. It is the responsibility of the candidate to ascertain that all the pages are printed as indicated and that no questions are missing.***
9. ***Candidates should answer the questions in English.***

***Constant: g=10N/kg or 10m/s2***

**For Examiners Use Only**

|  |  |  |  |
| --- | --- | --- | --- |
| **Section**  | **Question** | **Maximum Score** | **Candidate’s Score** |
| **A** | **1 – 13** | **25** |  |
| **B** | **14** | **13** |  |
| **15** | **15** |  |
| **16** | **08** |  |
| **17** | **09** |  |
| **18** | **10** |  |
|  **Total Score** | **80** |  |

**SECTION A: (**25 marks**)**

*Answer* ***ALL*** *the questions in this section in the spaces provided.*

1. **Figure 1** shows a magnified portion of the scale of a micrometer screw gauge used to measure the diameter of spherical object.

**Figure 1**

 State the diameter of the object (1mark)

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1. **Figure 2** shows a flask fitted with a glass tube dipped into a beaker containing water at room temperature. The cork fixing the glass tube is air tight.

Air

Glass tube

Water

Flask

**Figure 2**

State with reason what is observed when the flask is held with warm hands. (2marks)

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1. 1800 cm3 of fresh water of density 1g/cm3 is mixed with 2200cm3 of sea water of density 1.03g/cm3. Determine the density of the mixture. (2marks)

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1. a) State the principle of moments. (1 mark)

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 b) **Figure 3** shows a uniform meter rule balancing when a mass of 200g is hung at one end. Determine the tension T in the string (2marks)



**Figure 3**

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**5**. Name two forces that determine the shape of liquid drop on a solid surface. (2marks)

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**6**. It was observed that when air is blown between two pieces of paper, both cling to each other. Explain. (1mark)

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**7.** a) State the Hooke’s Law. (1mark)

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b) **Figure 4** shows identical spiral springs supporting a load of 90N. Each spring has a spring constant k = 200N/m



 **Figure 4**

Determine the total extension of the system (take the weight of the cross bars and springs to be negligible) (2 marks)

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**8.** In an experiment to estimate the diameter of an oil molecule, an oil drop of diameter 0.05cm spreads over a circular patch whose diameter is 20cm. Determine the diameter of the oil molecule. (3marks)

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**9**. **Figure 5** shows a rectangular loop with two thin threads loosely tied and dipped into a soap

solution.



**Figure 5**

Draw on the side of **Figure 5** what is observed when point **B** is punctured. (1mark)

**10** a)**Figure 6** shows a manometer used to measure the lung pressure of a student. Given that the atmospheric pressure is 103360Pa, determine the lung pressure of the student. (2marks)

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**Figure 6**

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b**)** State one factor affecting pressure in fluids. (1mark)

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**11**. Give a reason why mass of a body is constant everywhere. (1mark)

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**12**. A stop watch reads 08:12:84 and 09:10:72 before and after an experiment respectively. Determine the duration of the event in SI units. (2marks)

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**13**. Explain what thermodynamics is as a branch of physics. (1 mark)

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**SECTION B:** ( 55 m*arks*)

*Answer* ***ALL*** *the questions in this section in the spaces provided.*

**14.**a)Define the term work done as applied in physics. (1mark)

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b). **Figure 7**  shows the cross – section of a wheel and axle of radius 6.0 cm and 1.5 cm respectively used to lift a load. Use it to answer the questions that follow.

  **Figure 7**

Determine the:

I)(i) mechanical advantage (M.A) of the system. (1mark)

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 (ii) velocity ratio ( V.R) of the system. (1mark)

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 (iii) efficiency of the machine. (1mark)

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 II) Give one reason why the above machine is not 100% efficient. (1mark)

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c) Define specific latent heat of vaporisation (1 mark)

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d) 1200g of a liquid at 100C is poured into a well-lagged calorimeter. An electric heater

rated 1.5 KW is used to heat the liquid. **Figure 8** shows the variation of temperature of the liquid with time.

 100

 80

 60

 *Temp.*

*(0C)* 40

 20

 0 1 2 3 4 5 6 7 8

  *Time (min)*

**Figure 8**

Use **figure 8** to answer the following questions:

(i)State the boiling point of the liquid (1 mark)

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( ii ) Determine the amount of heat given out by the heater to heat the liquid to the boiling point. (2 marks)

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(iii)Determine the specific heat capacity of the liquid. (2marks)

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iv) If 20g of the liquid vapour was collected by the end of the 8th minute, determine the specific latent heat of vaporization of the liquid. (2 marks)

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**15**.a) **Figure 9** shows a velocity –time graph for the motion of a certain body.

 

**Figure 9**

Describe the motion of the body in the region:

(i) OA: (1mark)

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(ii) AB: (1mark)

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(iii) BC: (1mark)

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(b) A car moving initially at 25m/s decelerates at 4 m/s2.

 (i) Determine the time taken for the car to stop (2marks)

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(ii) Sketch the velocity – time graph for the motion of the car up to the time the car stopped. (1mark)

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c) A ball is projected vertically upwards with initial velocity of 80m/s. Determine the

 time taken to reach maximum height. (2marks)

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d) A bullet of mass 80g moving with a velocity of 20m/s penetrates a sand bag and it’s brought to rest in 0.05 seconds. Determine average retarding force of the sand. (2marks)

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e ) (i) State the principle of conservation of linear momentum (1 mark)

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 (ii) A bullet of mass 60g is fired horizontally with a velocity of 200 m/s into a suspended stationary wooden block of mass 2940g. Determine:

1. Common velocity of both the bullet and the block, if the bullet embedded into the block. (2 marks)

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1. Height to which the block rises. (2 marks)

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**16**. a) Explain why bodies in circular motion undergo acceleration even when their speed is constant. (1mark)

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b) A particle moving along a circular path of radius 5cm describes an arc of length 2cm every second. Determine:

 (i)Its angular velocity. (1mark)

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 ( ii)Its periodic time. (2marks)

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 c) A stone of mass 150g is tied to the end of a string 80cm long and whirled in a vertical circle at 2rev/s. Determine the maximum tension in the string. (3marks)

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 (d) State **one** factor affecting centripetal force (1mark)

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**17**.a) State the Archimedes’ principle. (1 mark)

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b)The weight of a stone in air is 8.5N. When fully immersed in paraffin of density 0.8g/cm³ its weight is 7.3N. Determine the;

(i) up thrust in the paraffin. (1 mark)

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(ii) volume of the stone. (2 marks)

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c**) Figure 10** shows rectangular metal block of density 12,500kgm-3 and dimensions 30cm x 20cm x 20cm suspended inside a liquid of density 1200kgm-3 by a string attached to appoint above the liquid. The three forces acting on the block are; the tension T, on the string, the weight W, of the block, and the up thrust, U, due to the liquid.

**String**

**Liquid**

**Block**

**T**

**U**

**Figure 10**

**Figure 10**

(i) Write an expression relating **T**, **W** and **U** when the block is in equilibrium inside the liquid. (1 mark)

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(ii) Determine the weight, **W**, of the block (1 mark)

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(iii) Determine the weight of the liquid displaced by the fully submerged block (2 marks)

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 (iv) Hence determine the tension, T, in the string (1 mark)

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**18**.a) **Figure 11** shows a set-up that may be used to verify pressure law.



**Figure 11**

(i) State the measurements that should be taken in the experiment. (2 marks)

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ii)Explain how the measurements in (i) above may be used to verify pressure law. (2 marks)

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b)A column of air 26cm long is trapped by mercury thread 5.0cm long as shown in

 **figure11 (a)** . When the tube is inverted as in **figure11 (b)** the air column becomes 30cm long. Determine the value of atmospheric pressure (2 marks)



 **Figure11**

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c)A steel cylinder of capacity 0.45m³ contains nitrogen at a pressure of 40,000Pa when the temperature is 17°C. Determine the pressure of nitrogen if it is allowed to flow into another cylinder of capacity 8.5m³ with the temperature reduced to -23°C. (2 marks)

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d) Using kinetic theory of gases, explain how a rise in the temperature of a gas causes a rise in its pressure if the volume is kept constant. (2 marks)

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