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232/1
Physics Paper 1
FORM 4
2017
2 hou

232
Physics Paper 1
FORM4
2 hours

INSTRUCTIONS TO CANDIDATES

Write your name, signature, and admission number clearly in the spaces above.

The paper consists of sections A and B.

*Answer **all** the questions in the spaces provided.*

Mathematical tables and silent non-programmable calculators may be used.

These values of physical quantities may be useful to you.

Acceleration due to gravity 10 ms^{-1}

Examiner's use only

Section	Question	Maximum score	Student's score
A	1 - 12	25	
B	13	08	
	14	10	
	15	09	
	16	10	
	17	12	
	18	06	

Section A (25 marks)

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

1. A vernier calipers was used to measure the length of the side of a dice. A section of the vernier calipers is shown in Figure 1. Determine the reading on the instrument. (1mrk)

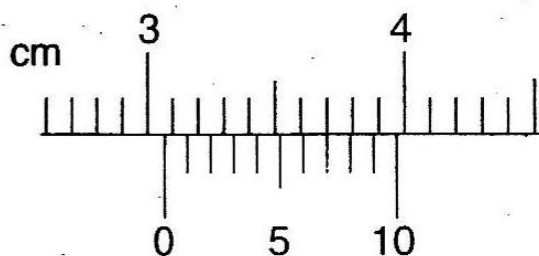


Figure 1

2. Two samples of bromine vapor are allowed to diffuse separately under different conditions, one in a vacuum and the other in air. State with reasons the conditions in which bromine will diffuse faster (2mrks)

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3. The Figure 2 below shows a circuit where a battery of e.m.f. 4.5V, switches A and B, two capacitors $C_1 = 0.6\mu\text{F}$ and $C_2 = 1.0\mu\text{F}$ and a voltmeter are connected.

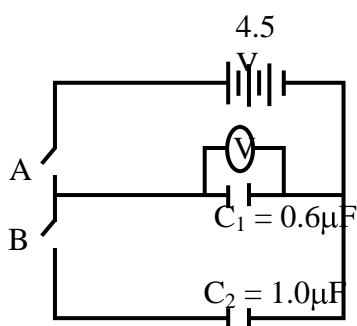


Figure 2

- (a) Determine the charge on C_1 when switch A is closed and switch B is open. (2mrks)

- (b) determine the effective capacitance when both switches are closed (2mrks)

4. State Newton's first law of motion (1mrks)

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5. Give **two** reason why optic fibers are preferred over copper cables in telecommunication (2mrks)

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6. If the soft iron armature in an electric bell is replaced with a steel one, the bell rings once and stops while current continues to flow. Explain this observation (1mrk)

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7. A uniform meter rule of mass 0.4kg has an iron mass fixed at the 20cm mark is balanced when pivoted at the 35cm mark by an attractive force due to a magnet fixed on a bench below the mass as shown in Figure 3 below. Determine the attractive force due to the magnet given that the iron has a mass of 200g. (3mrks)

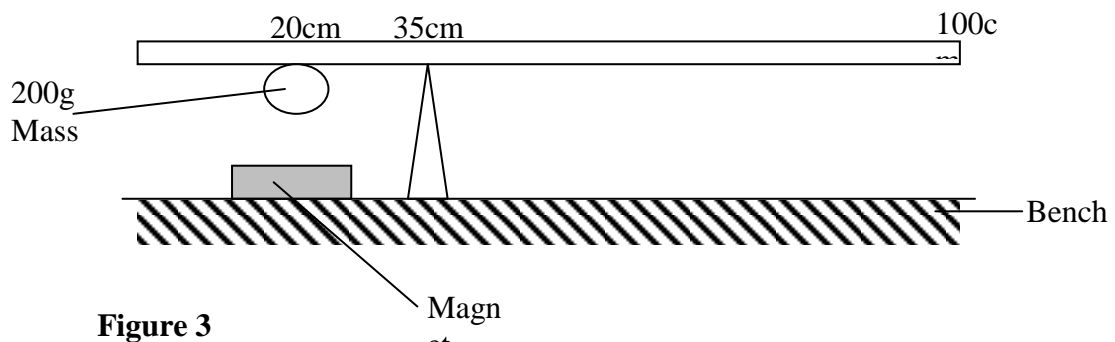
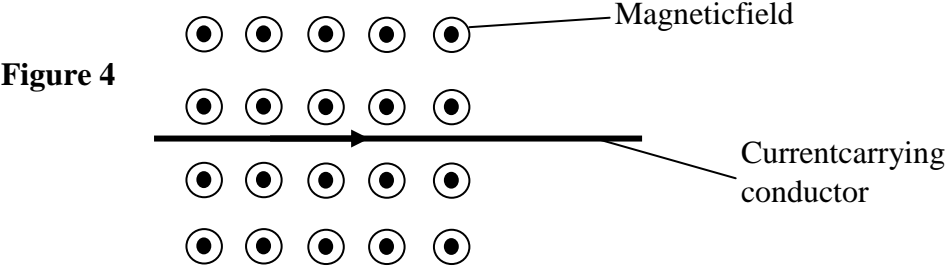


Figure 3

8. (a) state Fleming's left hand rule (1mrk)

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(b) Figure 4 below shows a conductor in a magnetic field. Given that the field is out of the paper, indicate on the diagram the direction of the resultant force on the conductor. (1mrk)



9. State any one condition for the interference of waves to occur. (1mrk)

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10. State and explain one advantage of fitting wide tires on vehicles that move on earth surface such as tractors. (2mrks)

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11. Two identical plastic containers were painted one dull black and the other silvery. They were partially filled with equal amount of water and completely sealed then left in the sun for some time.

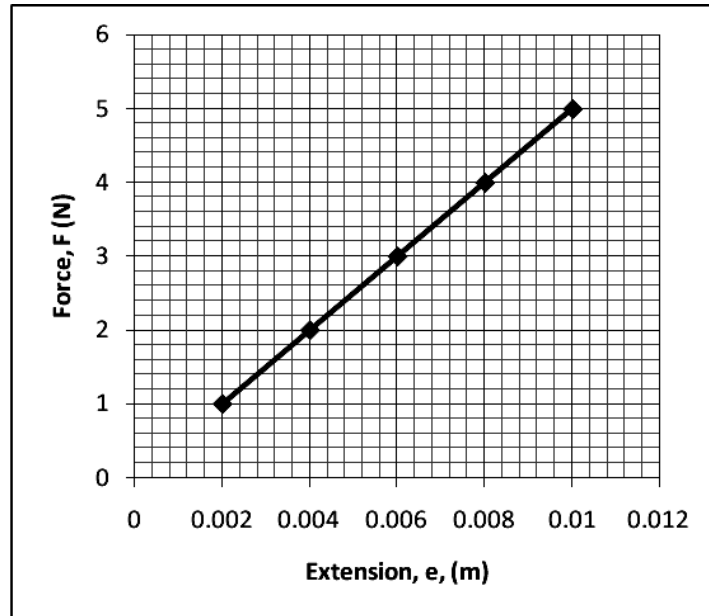
(a) State the observation that was made after some time. (1mrk)

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(b) Explain the above observation (2mrks)

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12. The graph below shows the relationship of force against extension of a certain helical spring made of steel. Use it to answer the questions that follow.



(a) Calculate the spring constant (3mrks)

(b) State one factor that affects the spring constant obtained in (a) above (1mrk)

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SECTION B (55 MARKS)

13. (a) A defective eye focuses a near object as shown in Figure 6 below.

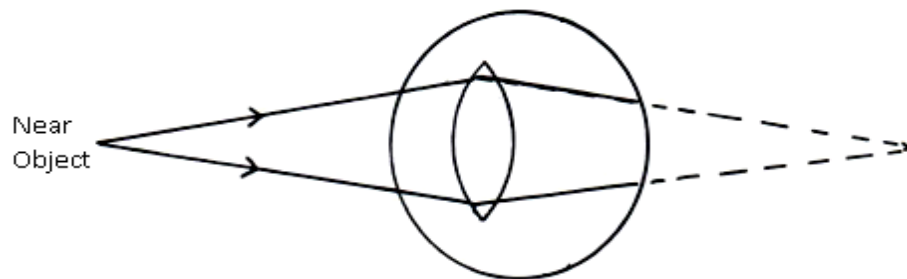


Figure 6

(i) State the defect. (1mrk)

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(ii) Suggest a suitable lens that can be used to correct the defect. (1mrk)

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- (b) (i) A real image, half the size of the object is formed by a lens. If the distance between the object and the image is 450mm. Determine the focal length of the lens. (3mrks)

- (c) Figure 7 below shows a virtual image formed by a convex lens. Complete the ray diagram to show the position of the object. (3mrks)

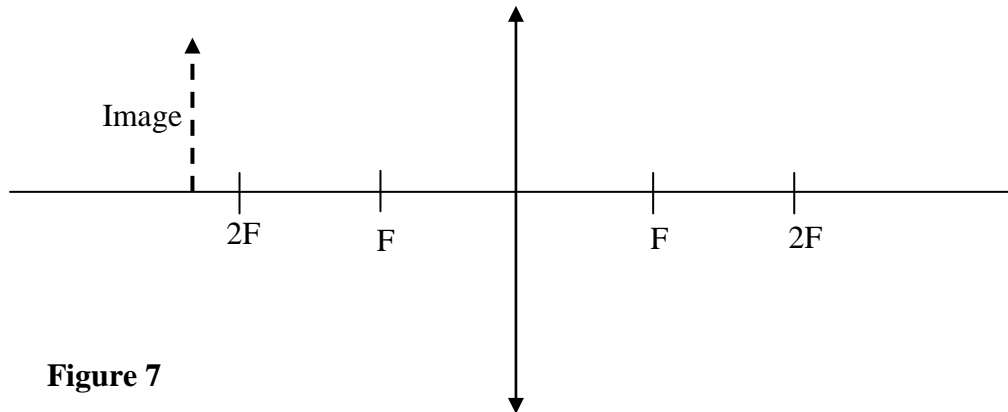
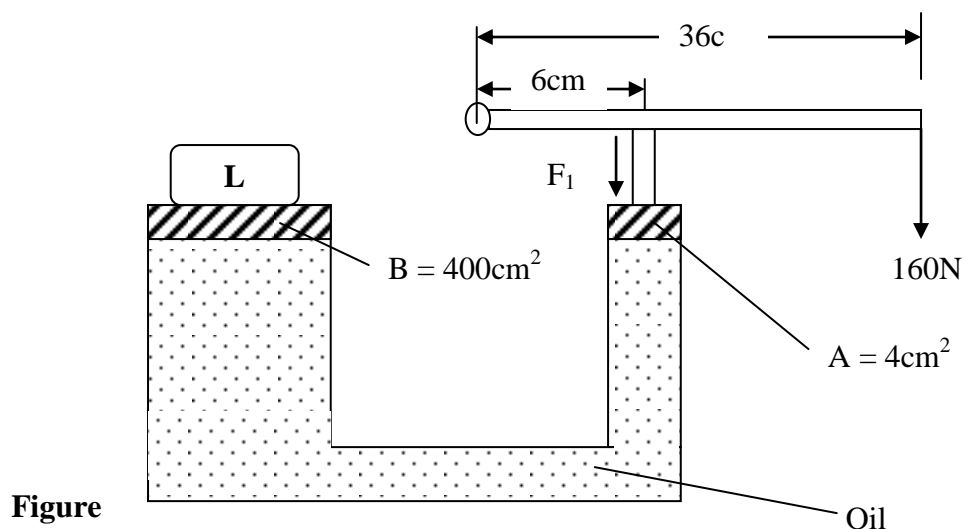


Figure 7

14. (a) Figure 8 Shows a hydraulic lift used to raise a load 'L'. The effort applied is 160N at the end of the lever 36cm long and pivoted at the other end. The plunger is 6cm from the pivot. The area of the plunger A is 4cm² and that of piston B is 400cm².



Figure

Determine:

- (i) The value of force F_1 extended by the plunger on oil. (2mrks)

(ii) The value of the load L (2mrks)

(iii) The velocity ratio of the lever. (2mrks)

(iv) The velocity ratio of the hydraulic lift (2mrks)

(v) Combined velocity ratio of the system (2mrks)

(vi) Efficiency of the system (2mrks)

15. a) Figure 9 below shows a faulty set up used to investigate a certain gas law.

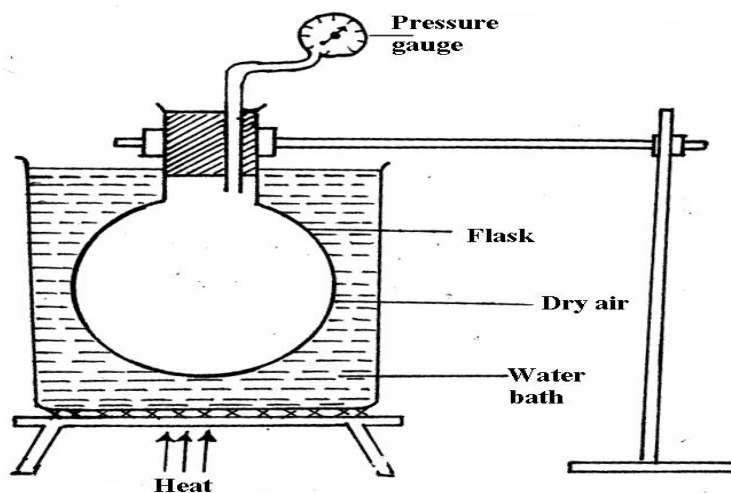


Figure 9

(i) On the diagram, show the missing part required for the set up to be functional. (1mrk)

(ii) State the law being investigated. (1mrk)

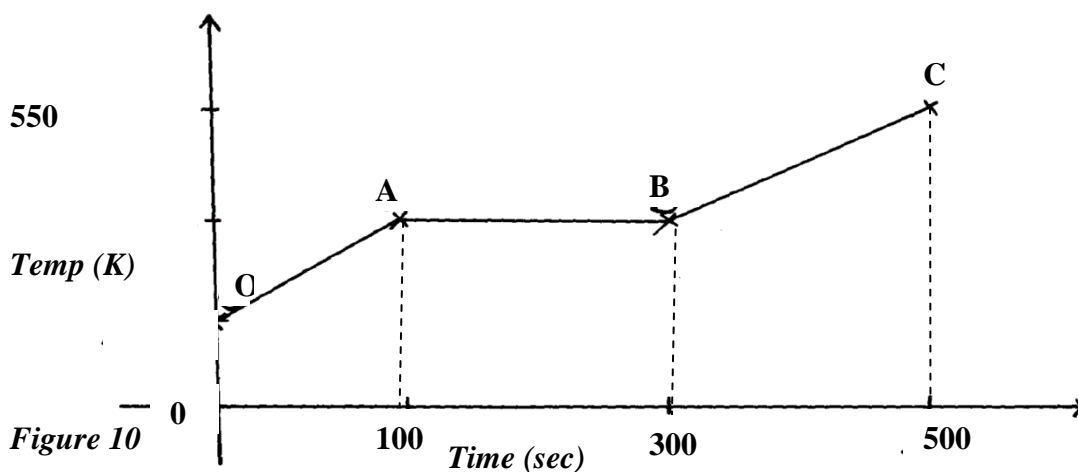
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(iii) The volume of a gas at a pressure of 1.0 kPa is 12m³. If the container is depressurized to 0.8 kPa. Determine the new volume given that the temperature was kept constant. (3mrks)

(b) State **ONE** difference between boiling and evaporation. (1mrk)

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(c) 200g of a solid was uniformly heated by a 0.2 kW heater for some time. The graph in **Figure 10** below shows how the temperature of the solid changed with time.



(i) Explain what is happening between;

(I) O and A (1mrk)

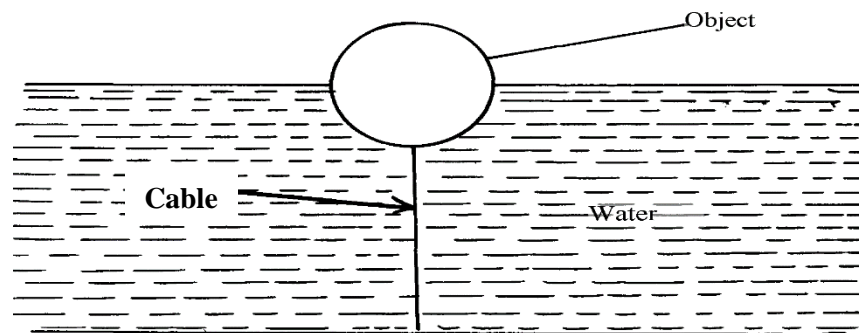
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(II) A and B (1mrk)

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- (ii) Calculate the specific heat capacity of the solid. (3mrks)

16. (i) State the law of floatation. (1mrk)

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- (a) Figure 11 below shows a floating object of volume $40,000 \text{ cm}^3$ and mass 10g . It is held as shown in water of density 1.25g/cm^3 by a light cable at the bottom so that $\frac{3}{4}$ of the volume of the object is below the water surface, take $g = 10\text{N/kg}$ (Assume that up thrust due to air is negligible)



Figure

- (i) Calculate the volume of the object under water. (2mrks)

- (ii) State the volume of water displaced by the object. (1mrk)

- (iii) Calculate the weight of water displaced. (2mrks)

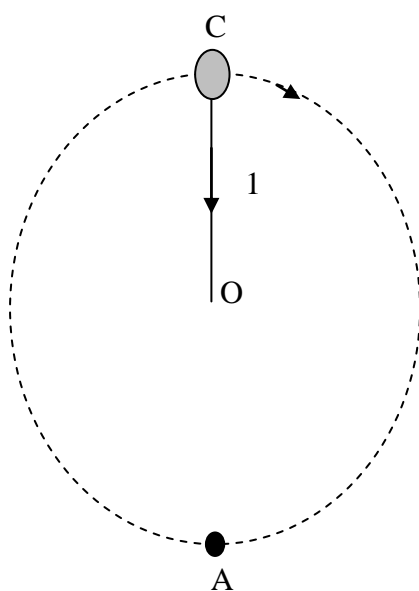
(iv) Determine the tension in the cable

(2mrks)

17. (a) Explain why a body moving with a uniform velocity in a circular path is said to be accelerating(1mrk)

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(a) An object of mass 0.5 kg is attached to one end of a light in extensible string and whirled up in a vertical circle of radius 1m and centre O as shown in Figure 12..(Take $g = 10\text{N/kg}$)



Figure

(i) If the tension on the string when the object is at the lowest point A is 13.0N. Calculate the velocity v of the object. (3mrks)

(ii) Tension on the string when the object is at the highest point C of the circle. (3mrks)

- (iii) If the string was to break when the object is at the lowest point A of the path determine how far the object moves horizontally before it hits the ground which is 0.4m below point A.
(3mrks)

18. Figure 13 below shows how a student set up a circuit using 3 identical bulbs X, Y and Z each rated “12V, 2.0A”

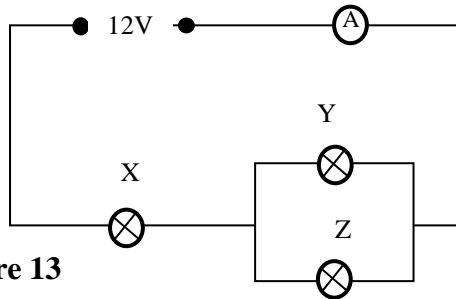


Figure 13

- (a) When operating normally, calculate the resistance of one of the bulbs (2mrks)
- (b) Calculate the effective resistance of the three bulbs. (2mrks)
- (c) Determine What the ammeterreading . (2mrks)