



Name Index Number

Candidate's Signature Date

Instructions to candidates

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) This paper consists of **two** sections: **A** and **B**.
- (d) Answer **all** the questions in sections **A** and **B** in the spaces provided.
- (e) **All** workings **must** be clearly shown.
- (f) Silent non programmable electronic calculators may be used.
- (g) **This paper consists of 13 printed pages.**
- (h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (i) **Candidates should answer the questions in English.**

For Examiner's Use Only

Section	Questions	Maximum Score	Candidate's Score
A	1-13	25	
B	14	11	
	15	12	
	16	10	
	17	11	
	18	11	
Total Score		80	



PDF Compressor Free Version SECTION A: (25 marks)

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

1. In order to determine the size of an oil molecule, a student performed an experiment using five oil drops to make a circular patch of the oil on the surface of water in a waterbath. State two assumptions made by the student during the calculations. (2 marks)

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2. In an experiment to determine the density of Liquid R, a student obtained the followed data:
- Mass of an empty density bottle = 55.0 g
 - Mass of the density bottle + water = 80.0 g
 - Mass of the density bottle + Liquid R = 70.0 g

Determine the density of Liquid R. (*density of water is 1000 kgm⁻³*) (3 marks)

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3. It is observed that when 20 cm³ of alcohol is mixed with 20 cm³ of water, the volume of the mixture is 39 cm³. State a reason why the volume of the mixture is **not** 40 cm³. (1 mark)

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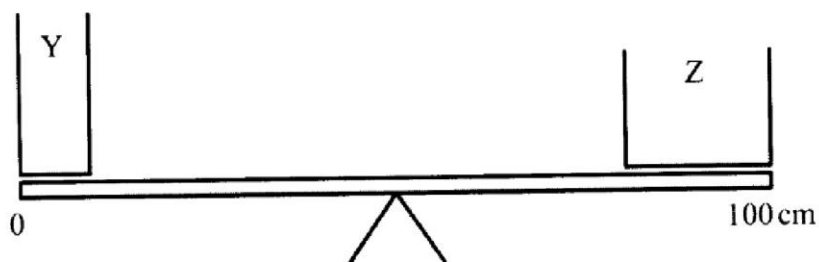
4. When a liquid is heated in a glass flask, it is observed that the level at first goes down and then rises. Explain this observation. (2 marks)

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5. **Figure 1** shows a uniform wooden bar at equilibrium with two cans Y and Z of equal mass but different diameters.

**Figure 1**

The cans are simultaneously filled with equal volumes of water.

Explain the observation made.

(2 marks)

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6. State the reason why the speed of water at the narrow section of a river is higher than at the wider section. (1 mark)

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7. A stone is thrown vertically upwards. Sketch a graph of potential energy (y axis) against time as the stone moves until it hits the ground. (1 mark)



8. Using the definition of impulsive force, show that $F = ma$ (3 marks)

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9. **Figure 2** shows a round bottomed flask fitted with a long capillary tube containing a drop of coloured water.

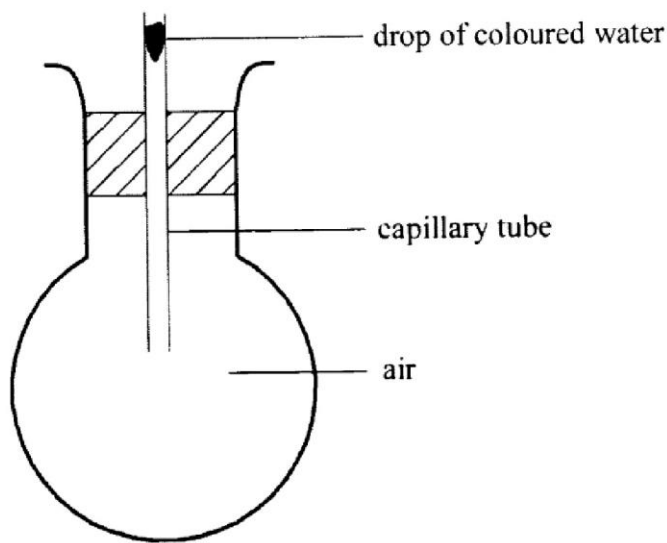


Figure 2

The flask is immersed in ice water for sometime. State the observation made. (2 marks)

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10. State **one** assumption for the experiments carried out to verify the gas laws. (1 mark)

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11. A student who wanted to take a bath mixed 4 kg of water at 80 °C with 6 kg of water at 20 °C. Determine the final temperature of the water. (3 marks)

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12. A uniform metre rule is pivoted at its centre. Two weights of 20 N and 10 N are suspended at the 20 cm and 100 cm marks respectively. Determine the position at which a 10 N weight should be suspended in order to balance the system. (3 marks)

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13. Figure 3 shows two possible designs of a three legged stool.



Figure 3

State a reason why B is more stable than A. (1 mark)

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PDF Compressor Free Version SECTION B: (55 marks)

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

14. (a) A tape attached to an accelerating trolley passes through a ticker timer that makes dots on it at a frequency of 50 Hz. The ticker timer makes 10 dots on a 10 cm long tape such that; the distance **a** between the first two dots is 0.5 cm and the distance **b** between the last two dots is 1.5 cm.

(i) Determine the velocity of the trolley at:

(I) distance **a**, (4 marks)

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(II) distance **b**, (2 marks)

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(ii) Determine the acceleration of the trolley. (3 marks)

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(b) State with a reason what would be observed on the spacing between the dots on the tape when the trolley is made to move on a horizontal surface. (2 marks)

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15. (a) **PDF Compressor Free Version** A student was provided with several identical masses, a metre rule, a spring and a stand, boss and clamp. Outline five steps that the student should follow in order to verify Hooke's law. (5 marks)

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- (b) **Figure 4** shows a graph that was drawn from the results obtained in an experiment to study the extension of a spring.

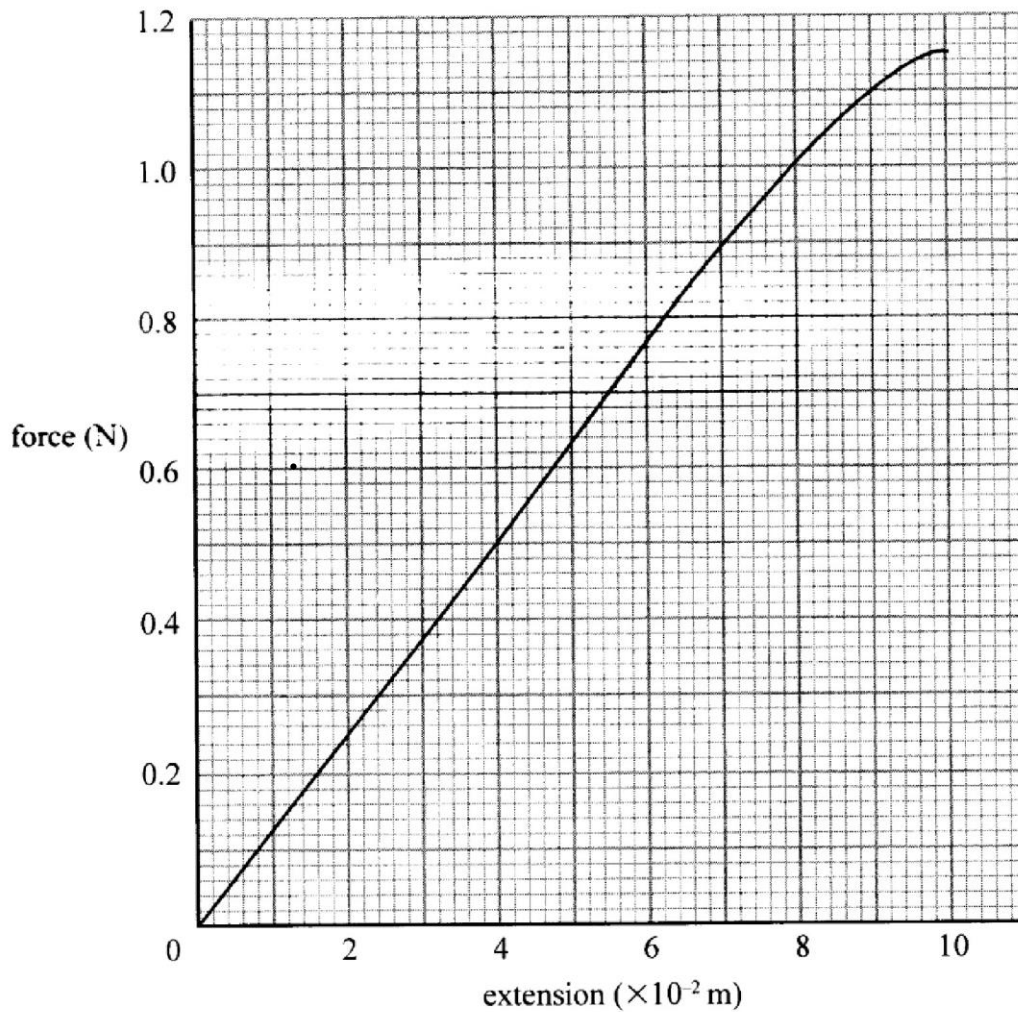


Figure 4



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From the graph determine

- (i) The spring constant K , (3 marks)

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- (ii) The load that causes an extension of 3×10^{-2} m. (1 mark)

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- (c) Three identical springs of spring constant 100 Nm^{-1} are arranged as shown in **Figure 5** to support a 5 N load.

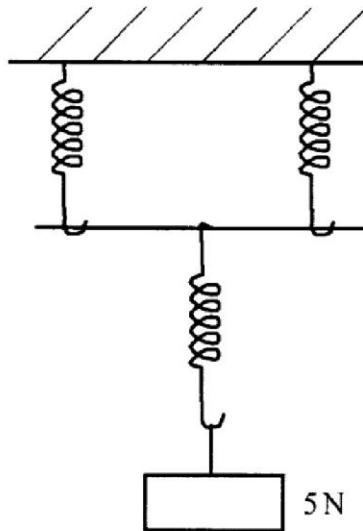


Figure 5

Determine the total extension in the arrangement. (3 marks)

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16. **PDF Compressor Free Version**
 (a) In an experiment to determine the size of an oil molecule, oil is placed on the surface of water after sprinkling lycopodium powder on it.

(i) State **two** reasons why oil is used. (2 marks)

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(ii) State the function of the lycopodium powder. (1 mark)

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(iii) State **any two** assumptions that are made in this experiment. (2 marks)

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(iv) Explain why the oil spreads on the surface of water. (2 marks)

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- (b) The following data was obtained from an experiment to determine the size of a palm oil molecule.

- Volume of 100 drops of palm oil = 15.0 mm^3
- Area of a patch from one drop of oil = $8.0 \times 10^4 \text{ mm}^2$

Determine the size of a palm oil molecule. (3 marks)

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17. (a) State the law of flotation.
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(1 mark)

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(b) **Figure 6** shows two solids W and X made of the same material and immersed in water.

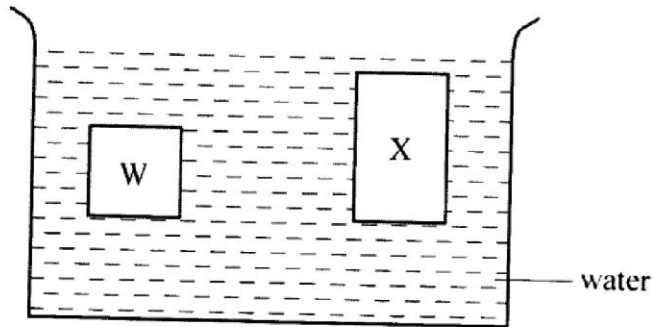


Figure 6

(i) State with a reason which one of the containers experiences a greater upthrust.
 (2 marks)

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(ii) Solid W weighs 12N in air, 2N in water and 4N in another liquid. Determine the density of the other liquid.
 (3 marks)

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- (c) **Figure 7** shows two identical wooden blocks each of mass 0.2 kg suspended in water by two strings **M** and **N**.

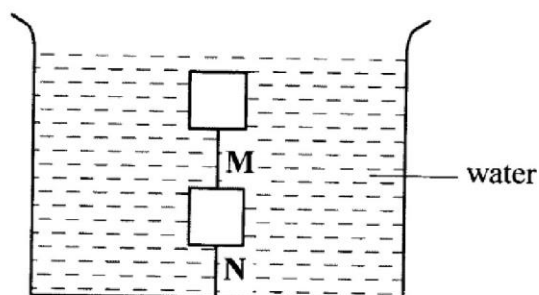


Figure 7

Given that the upthrust on each block is 3.2 N , determine the tension in string;

- (i) **M**, (2 marks)

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- (ii) **N**. (2 marks)

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- (d) State any **one** application of hydrometers. (1 mark)

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18. (a) **Figure 8** shows part of a hydraulic brake system.

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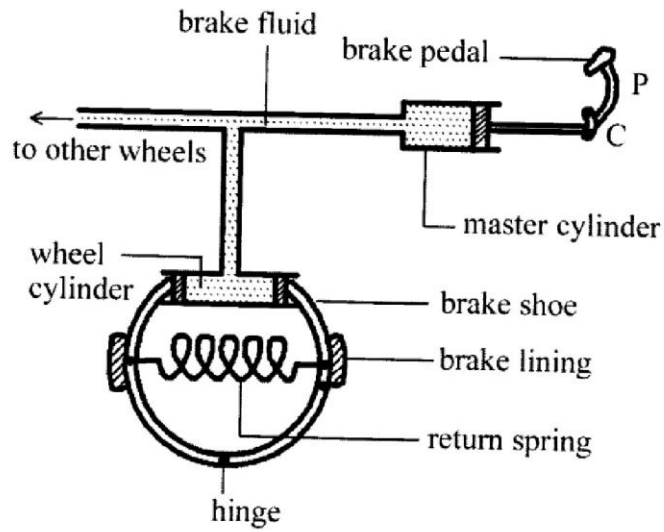


Figure 8

Describe how the systems works.

(5 marks)

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(b) State **three** conditions necessary for a driver to negotiate a bend on a flat level road at a relatively high speed. (3 marks)

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(10) Figure 9 shows two identical cans U and V each with a small opening at the top. Different amounts of water were put into the cans and heated until the water started to boil.

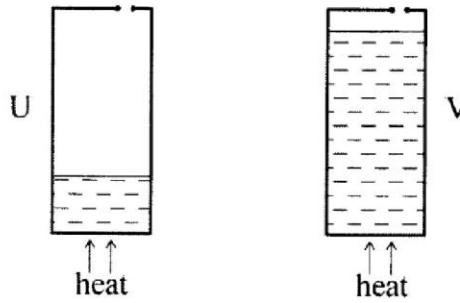


Figure 9

Explain what will be observed when both cans are then suddenly dipped into a cold waterbath. (3 marks)

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