YESMARK TUITION SERVICES

232/1

PHYSICS

PAPER 1

DEC 2015

TIME: 2 HOURS

NAME ……

INSTRUCTIONS

1. The paper consists of two sections, Section **A** and **B**.
2. Answer **ALL** the questions in section A and B in the spaces provided.
3. **ALL** answers and working **MUST** be clearly shown.
4. Mathematical tables and electronic calculators **may be** used.

FOR EXAMINER'S USE:

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-12	25	
B	13	14	
	14	14	
	15	10	
	16	12	
	17	5	
	TOTAL	**80**	

This paper consists of 12 printed pages
Candidates should check to ensure that all pages are printed as indicated and no questions are missing

SECTION A (25 MARKS)

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

1. Figure 1 shows the change in volume of water in a measuring cylinder when an irregular solid is immersed in it.

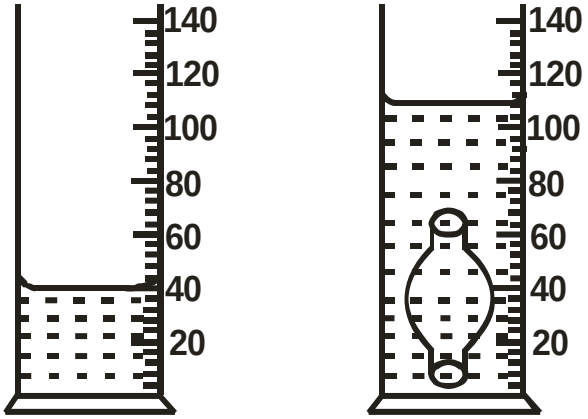

Figure 1

Given that the mass of the solid is 567g, determine the density of the solid in g/cm^3. (Give your answer correct to 2 decimal places.) (3 marks)

2. A steel needle when placed carefully on water can be made to float. When a detergent is added to the water it sinks. Explain this observation. (2 marks)

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3. Two identical beakers A and B containing equal volumes of water are placed on a bench. The water in A is cold while in B it is warm. Identical pieces of potassium permanganate are placed gently at the bottom of each beaker inside the water. It is observed that the spread of colour in B is faster than in A. Explain this observation. (2 marks)

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4. The spiral springs shown in figure 2 are identical. Each spring has a spring constant k = 300N/m

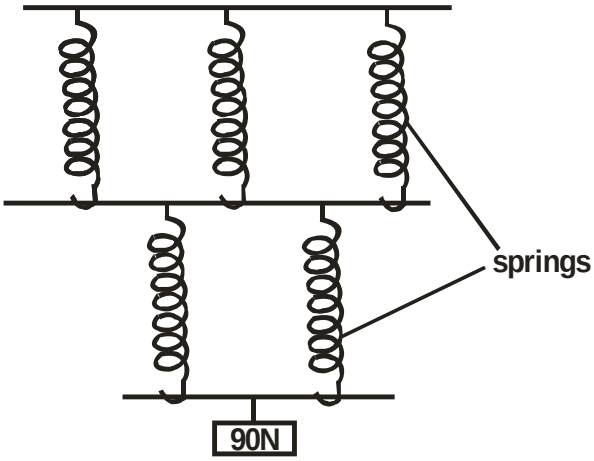

Figure 2

Determine the total extension caused by the 90N weight. (Ignore the weight of the springs and connecting rods). (3 marks)

5. A clinical thermometer has a constriction in the bore just above the bulb. State the use of this constriction. (1 mark)

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6. A turntable of radius 8cm is rotating at 33 revolutions per second. Determine the linear speed of a point on the circumference of the turntable. (3 marks)

7. Water is known to boil at 100^{o}C. A student heated some water and noticed that it boiled at 101^{o}C. State **two** possible reasons for this observation. (2 marks)

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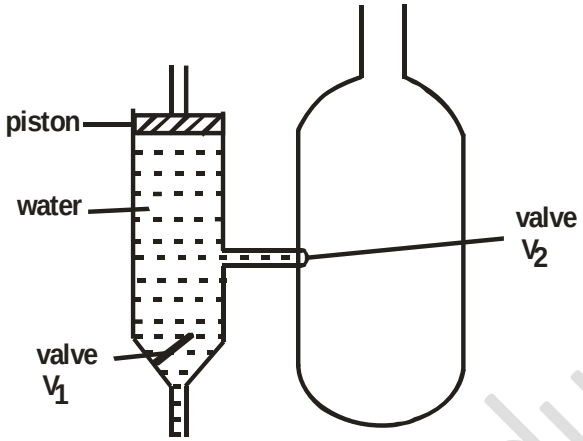
8. The figure below shows a force pump.



Explain how the water gets past valve V_2. (2 marks)

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9. A circular water pond has a depth that decreases gradually from the centre. A source of circular waves vibrating at a constant frequency is placed at the centre of the pond. State **two** changes that would be observed as the waves approach the sides. (2 mark)

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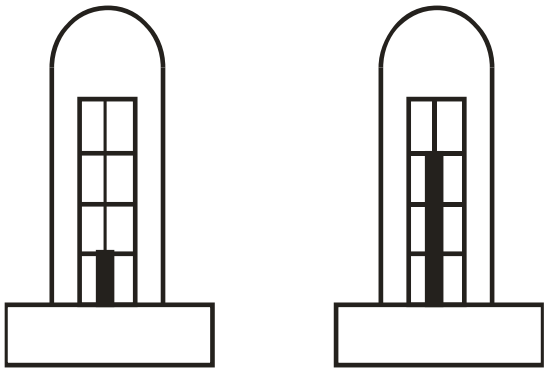
10. A circular disc of radius 15cm is rotating at the rate of 3.5rads^{-1}. Determine the speed at the point on its circumference. (2 marks)

11. The figure below shows two tins X and Y fitted with identical thermometers. The tins had been placed out in the sunshine for the same length of time before the observations were made.



Suggest a possible difference in the two tins that could cause the difference in the temperature readings. (2 marks)

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12. When dust particles are suspended in water and observed through microscope, they are seen to move in random manner. Explain this observation. (2 marks)

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SECTION B (55 MARKS)

Answer ALL the questions

13. a) Distinguish between solid gaseous states of matter in terms of intermolecular forces. (2 marks)

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b) 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:-

i) Volume of the oil drop. (2 marks)

ii) Area of the patch covered by the oil. (2 marks)

iii) Diameter of the oil molecule. (3 marks)

c) State:-

i) Any **two** assumptions made in b(ii) above. (2 marks)

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ii) **Two** possible sources of error in this experiment. (2 marks)

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d) State **one** reason why it is necessary to sprinkle chalk dust on to the water surface. (2 marks)

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14. a) State Archimedes'. (1 mark)

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b) In an experiment to determine the relative density of methylated spirit applying the Archimedes principle, the following were provided; a spring balance, some masses, a piece of thread, water in a beaker and methylated spirit in a beaker. The table below shows the results obtained.

Mass (g)	100	150	200
Weight in air	1.00	1.50	2.00
Weight I water	0.88	1.32	1.76
Weight in methylated spirit	0.91	1.36	1.82

i) Draw labeled sketch diagram to show how the reading in the table were obtained. (3 marks)

ii) For each mass, determine the up thrust in water in the spirit. (3 marks)

iii) Determine the average relative density of the spirit. (3 marks)

c) A weather balloon of volume $1.2m^3$ is tied to a rigid support while being filled with helium gas. The mass of the fabric making the balloon is 0.3kg. Determine the maximum tension on the string tying the balloon to the rigid support. (Density of air is $1.25kgm^{-3}$ and density of helium is $0.018kgm^{-3}$) (4 marks)

15. a) State the Newton's second law of motion. (1 mark)

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b) A matatu starts from rest and accelerates to cover a distance of 49m in 7 seconds. Determine:-

i) Its acceleration; (3 marks)

ii) Its velocity after 7 seconds. (2 marks)

c) A trolley moving on a horizontal bench of height 1.2m, strikes a barrier at the edge of the bench. The brass mass on the top of the trolley flies off on impact and lands on the ground 2.5m from the edge of the bench.

Determine:-

i) The time taken by the brass mass to reach the ground. (2 marks)

ii) The speed at which the trolley struck the barrier. (2 marks)

16. a) State what is meant by an ideal gas. (1 mark)

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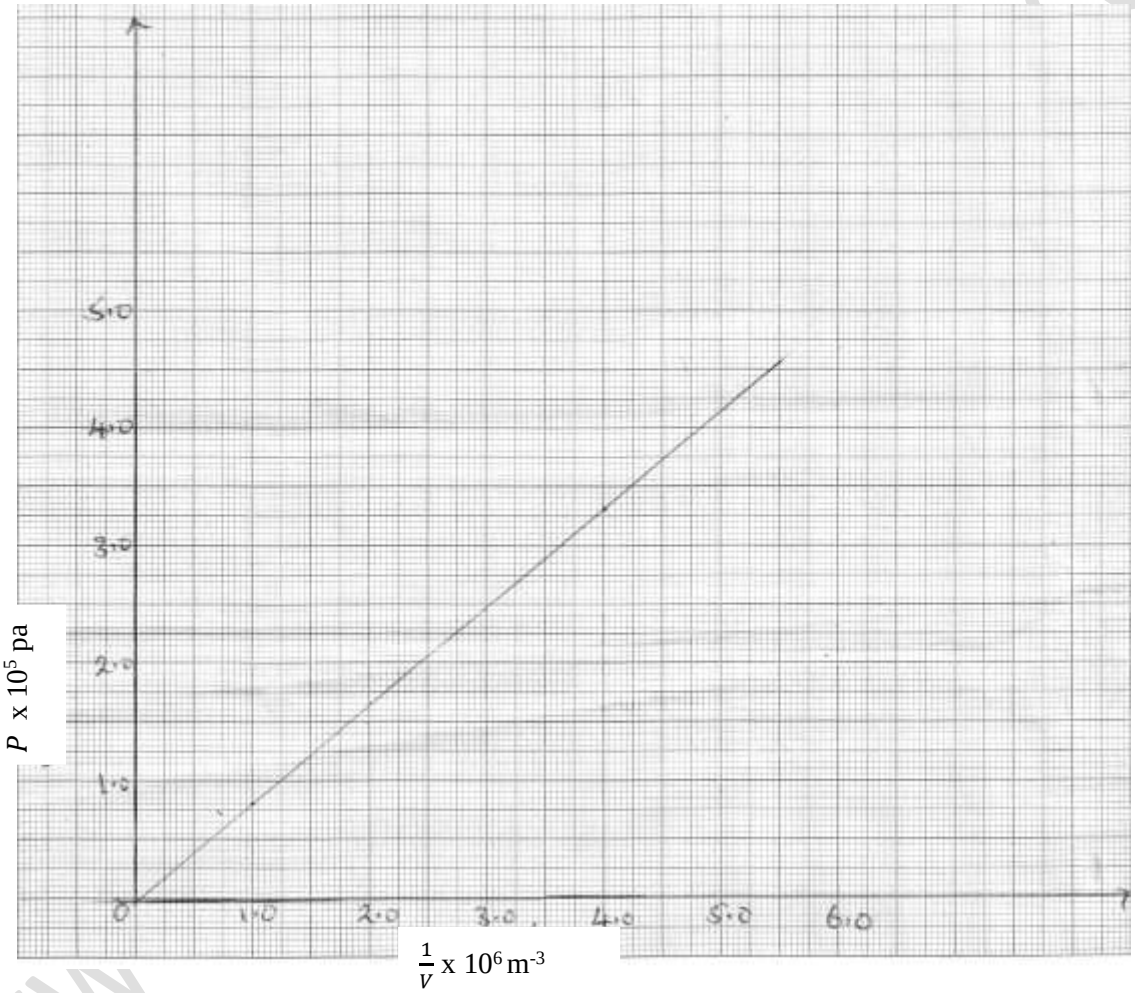
b) The pressure acting on a gas in a container was changed steadily while the temperature of the gas was maintained constant. The value of volume V of the gas was measured for various values of pressure. The graph shows the relation between the pressure, p, and the reciprocal of volume $\frac{1}{V}$.



i) Suggest how the temperature of the gas could be kept constant. (1 mark)

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ii) Given that the relation between pressure P and the volume V of the gas is given by: PV = k. When k is constant, use the graph to determine the value of k. (4 marks)

iii) What physical quantity does k represent? (1 mark)

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iv) State **one** precaution you would take when performing such an experiment. (1 mark)

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c) A gas occupies a volume of 4000 litres at a temperature of 37°C and normal atmospheric pressure. Determine the new volume of the gas if it heated at constant pressure to a temperature of 67°C. (Normal atmosphere pressure p = 1.01×10^5pa) (4 marks)

17. Oxygen is trapped in the horizontal tube AB closed at A and open at B by a column of mercury C, the temperature of the tube is controlled by circulating water round the outer jacket.

a) Why is the end B of the tube open? (1 mark)

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b) State what difference it will make if the experiment were performed with the capillary vertical. Explain. (2 marks)

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c) What would be the change in the reading of oxygen column if the tube is held vertically while maintained at the same temperature? Explain your answer. (2 marks)

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