Name…………………………..……………………….Class ……………ADM NO. …………..

PHYSICS

232/1

Theory

Paper 1

Time: 2 hours

PHYSICS PP1

LANJET JOINT EVALUATION 2022

Instructions to Candidates

(i)Write your name and class register number in the spaces provided above.

(ii)This paper consists of **TWO** sections: **A** and **B**.

(iii)Answer **ALL** the questions in sections **A** and **B** in the spaces provided.

(Iv)ALL working **MUST** be clearly shown.

(V)Mathematical tables and non-programmable silent electronic calculators may be used.

(Vi)**This paper consists of 10 printed pages**.

For Examiner's Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 12	25	
	13	10	
	14	11	
	15	12	
	16	11	
	17	10	
	Total Score	**80**	

This paper consists of 11 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no pages are missing

SECTION A: (25 Marks)

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

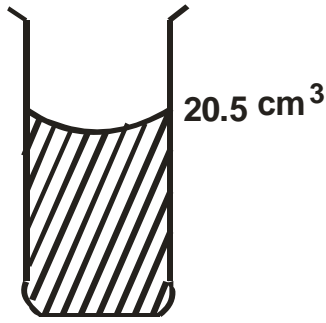1. The figure 1 below shows a measuring cylinder with a fluid to the level shown.

20.5 cm^3

Figure 1

Find the new level when a solid of mass 13.6g and a density 1250kgm^{-3} is fully immersed into the cylinder.

(2 marks)

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2. A girl stands inside a lift on the second floor of an 18 storey building. If the lift is ascending upwards at an acceleration of 3ms^{-2} and she weighs 60kg, determine the reaction of the lift at the girl's feet.   (2mks)

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3. Figure 2 below represents a car hydraulic braking system.

Foot pedal

Master piston   Slave piston

Force applied to brake pads
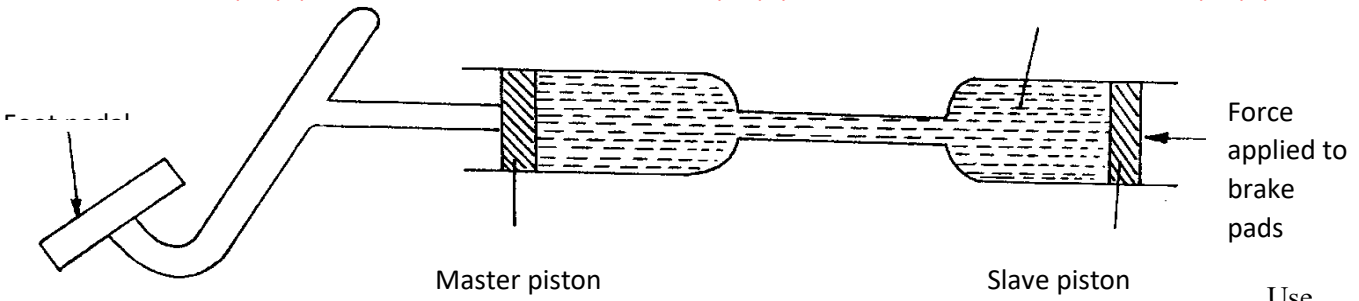
Use the information given in the diagram above to answer questions 3(a) and 3(b).

a) State one property the fluid should have.   (1mk)

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b) Explain briefly how the system operates.   (3mks)

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4. Figure 3 below shows a machine being used to raise a load. Use the information given in the figure to answer questions 4(a) and 4(b) below
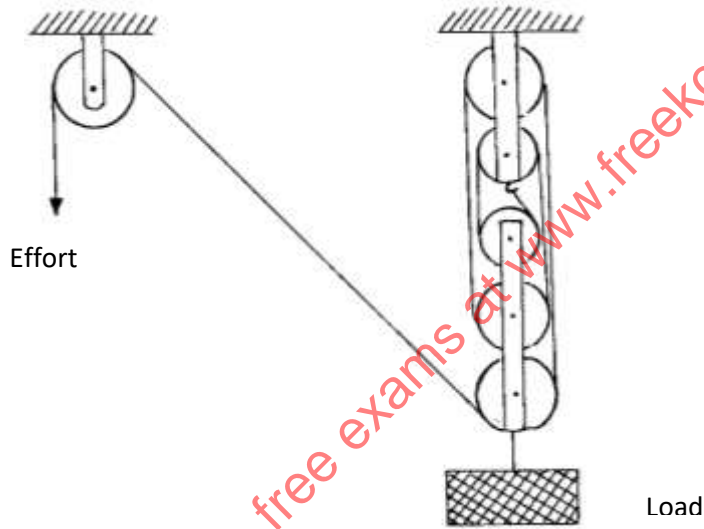
Effort

Load

a) Determine the velocity ratio (V.R) of the machine.   (1mk)

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b) If a load of 800N is raised by applying an effort of 272N, determine the efficiency of the machine.   (2mks)

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5. What happens to the motion of smoke particles in the smoke cell experiment when the setup is moved from an environment at 27^0c to an environment at 47^oC? (1mk)

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6. A uniform metre rule of mass 200g is pivoted at the 0 cm mark; calculate the force which would be applied vertically upward at the 65cm mark to keep the rule horizontal. (3mks)

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7. A piece of iron is heated. Explain what happens to its density. (2mks)

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.... B ....

....Figure 4 below shows two identical beakers A and B. Beaker A contains water at O^oC while B contains water and pieces of ice at O^oC. Both contents have the same mass.
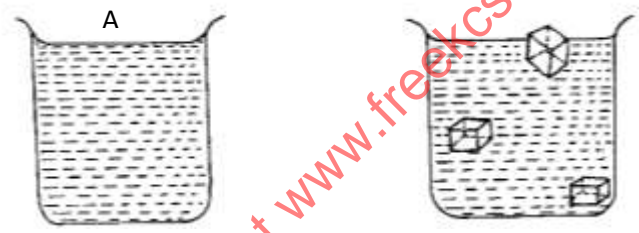

Fig. 4

Two identical metal blocks are removed from the same hot furnace and dropped into each of the beakers. Identify which of the two beakers would experience more evaporation and give a reason for your answer. (2mks)

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8. A force of 7.5N stretches a certain spring by 5.0cm. How much work is done in stretching this spring by 8.0 cm? (2mks)

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9. State the Pascal's principle of pressure transmission in fluid. (1mk)

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10. Figure 5 below shows a velocity time graph for a car in motion. If the mass of the car is 920kg, determine the maximum kinetic energy acquired for part of the journey shown   (2mks)
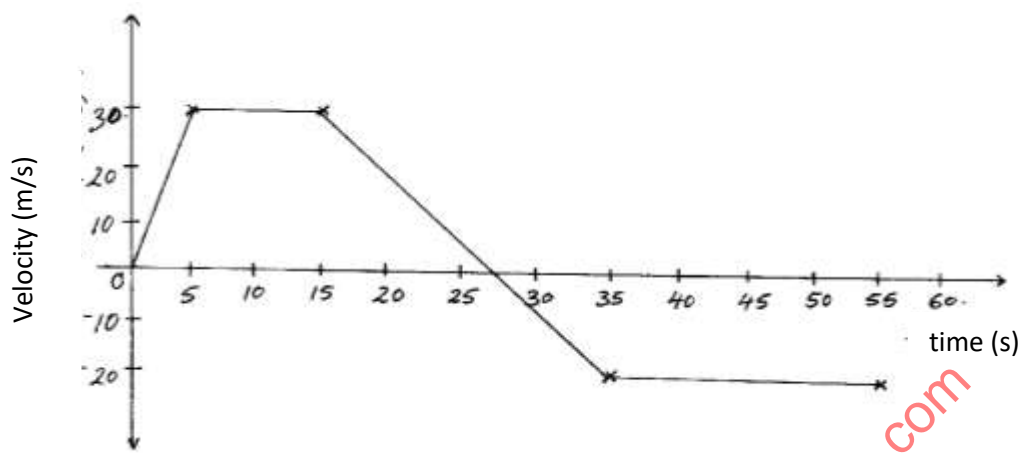

Fig. 5

11. A bullet is fired horizontally at a target, neglecting air resistance, give a reason why the horizontal acceleration of the bullet is zero.   (1mk)

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SECTION II (55 marks)

12. a)   Figure 6 above shows the velocity time graph of two identical spheres released from the surfaces of two   fluids A and B
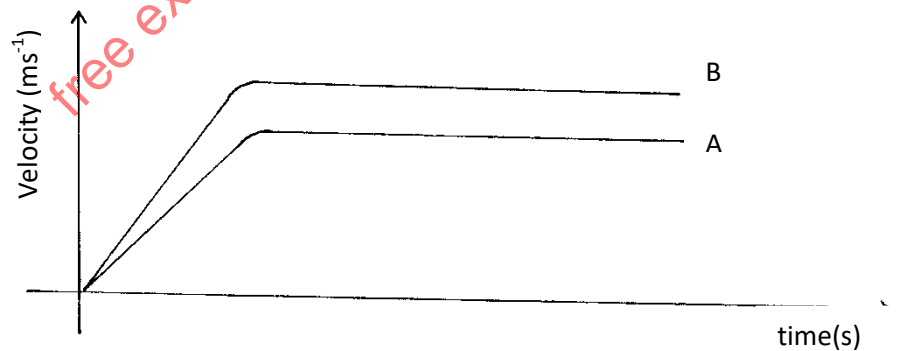

Fig. 6

(i) State with reason, the fluid with a higher viscosity.   (2mks)

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(ii) Mark on the diagram the terminal velocity on the sphere in each fluid.   (1mk)

b)   Water flows through a horizontal pipe of varying cross-section area as shown in figure 7 below.
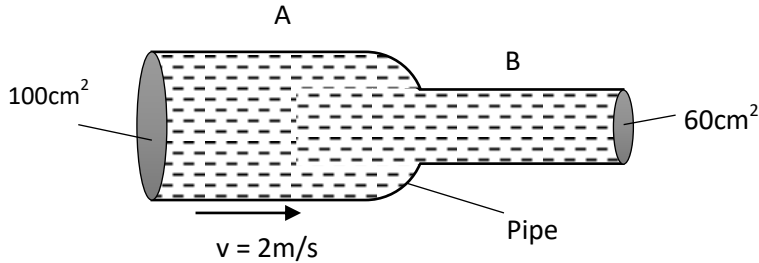

Fig. 7

The velocity of water in pipe A is 2m/s

(i) Determine the velocity of water in pipe B.   (3mks)

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(ii) State two assumptions taken in Bernoulli's fluid flow.   (2mks)

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(iii) Explain why a partially inflated balloon released at sea level would become fully inflated at a higher altitude.   (2mks)

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13. (a)   State Boyle's Law.   (1mk)

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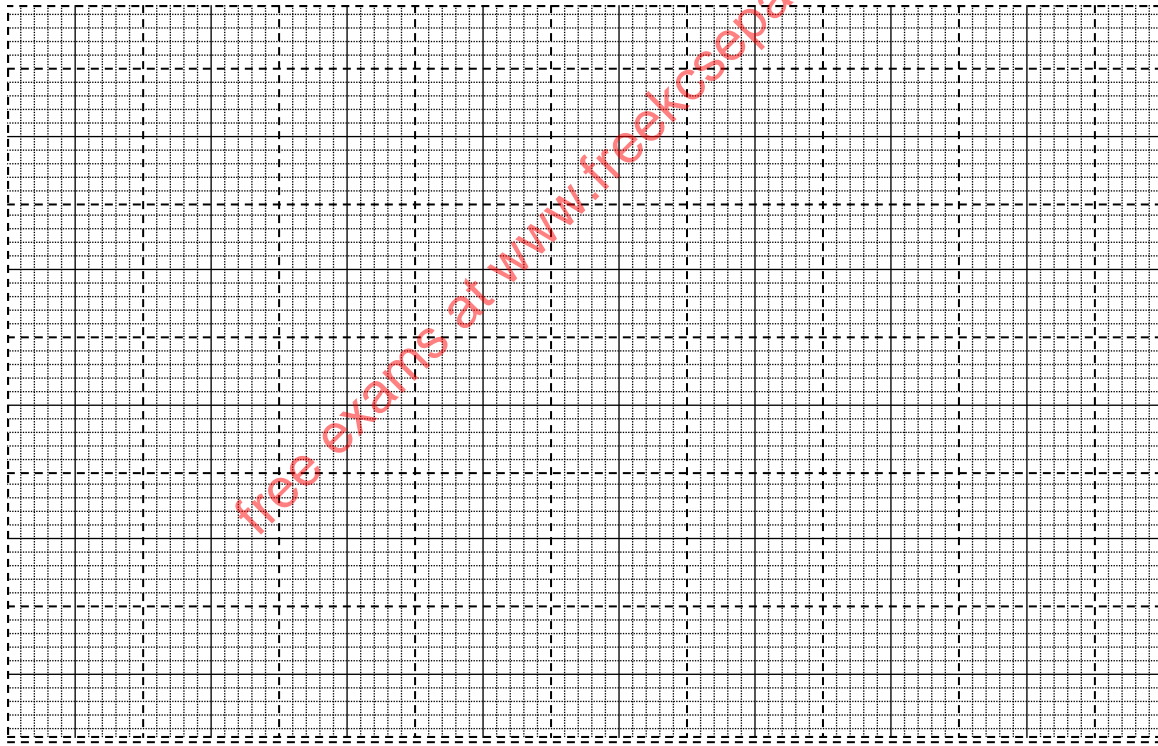...

(b)   The table below shows the results from Boyle's law experiment.

Pressure (atmospheres)	1.0	1.3	1.5	1.8	2.3	2.6	3.2	3.7
Length of air column , L(mm)	41.0	30.0	27.5	22.0	18.0	16.0	12.5	11.0
$\frac{1}{L}$ x 10^{-2}(mm)$^{-1}$								

(i)   Complete the table by filling in the values for the row $\frac{1}{L}$ x 10^{-2}(mm)$^{-1}$ (4mks)

(ii)   Plot a graph of pressure against $\frac{1}{L}$ (5mks)

(iii)   Estimate the pressure of the air when $\frac{1}{L}$ is zero.   (1mk)

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14. (a) State the Archimedes principle   (1mk)

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(b) A block of length 15cm and uniform cross section area 9cm^2 is suspended from a spring balance and completely immersed in oil of density 0.8g/cm^3. Given that the density of material or the block is 1.25g/cm^3, determine

(i)   The mass of the block.   (3 mks)

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(ii)   The reading of the spring balance   (2mks)

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(iii).The reading of the spring balance if the block was half immersed in the oil. (3mks)

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(c) With the aid if a well labelled diagram. Describe an experiment to verify the Archimedes principle.   (4mks)

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16. (a)   Define the term latent heat   (1mk)

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(b)   Figure 8 below shows a block of ice with two heavy weights hanging such that the copper wire / string connecting them passes over the block of ice.

Fig. 8
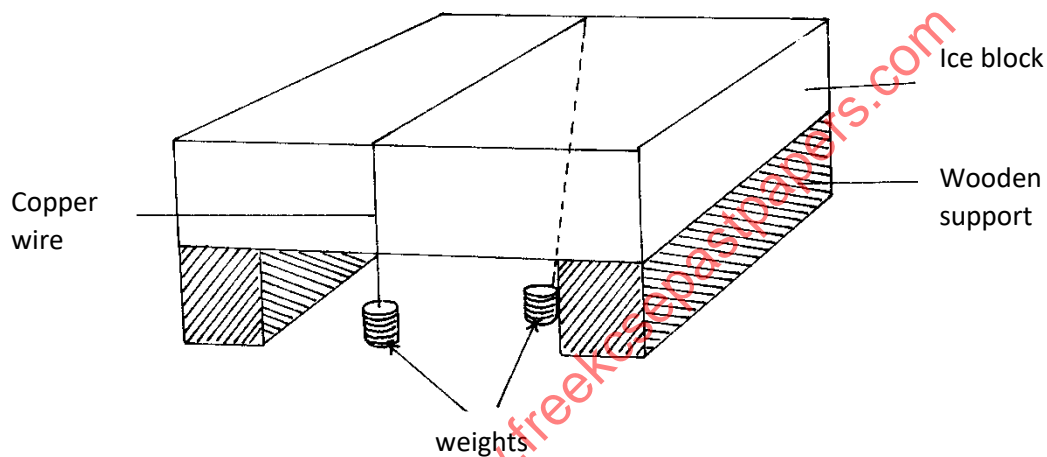
(i)   It is observed that the wire gradually cuts its way through the ice block, but leaves it as one piece. Explain   (3mks)

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(ii)   What change would be observed if the copper wire used in the experiment was replaced by a cotton thread? Explain your answer.   (2mks)

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(c)   3kg hot water was added to 9kg of water at 10^0C and the resulting temperature was 20^0C. Ignoring heat gained by the container, determine the initial temperature of the hot water. (Specific heat capacity of water = 4200J/KgK).
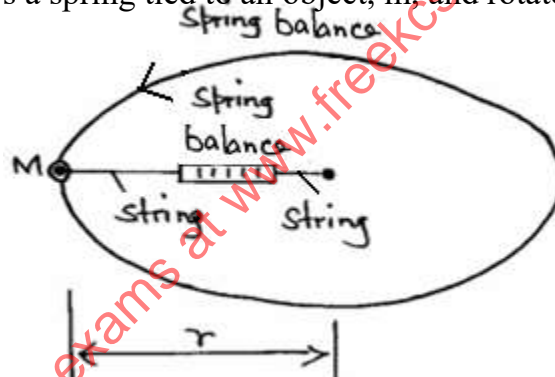   (3mks)

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(d)   What is the operating resistance of an electric heater rated 90W, 240V?   (2mks)

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17. The diagram below shows a spring tied to an object, m, and rotated in a circular path of radius, r.

(a)(i)What provides the force that keeps the object moving in a circular path. (1mark)

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(ii)   The speed of the object is constant but the body is accelerating. Explain.   (1mark)

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 (b) (i) If the object is whirled faster, what would happen to spring balance reading?
                                    (1 mark)

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ii) As the object is whirled round the string snaps and cuts off. Describe the subsequent path of the object.   (1 mark)

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c).If the mass M of object is 500g and r is 50cm. Determine the velocity of the body if the spring balance reads 81N.   (3 marks)

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d).Three masses are placed on a rotating turn table at distances 8cm, 10cm and 15cm respectively from the centre of rotation. When the frequency of rotation is varied it is noted that each mass slide off at a different frequency of rotation of the table as shown below.

Radius R(cm)	15	10	8
Sliding off frequency 'f' rev/s	0.75	0.98	1.3

i).State **two** factors that determine the frequency at which each mass slides off.   (2 marks)

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ii).The surface is made oily and then the masses are placed. Explain the changes on the frequency at which each mass slide off.   (1 marks)

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