

FOCUS A365

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FORM 3 TERM 1 PHYSICS PPI EXAMINATIONS 2018

NAME: _____ ADM NO: _____ CLASS: _____

INSTRUCTION TO CANDIDATES

- Write your name and index number in the spaces provided above
- This paper consist of TWO sections A & B
- Answer ALL the questions in section A and B in the space provided.
- ALL working MUST be clearly shown.
- Mathematical tables and silent electronic calculators may be used
Take Acceleration due to gravity $g=10\text{m/s}^2$

FOR EXAMINERS USE ONLY

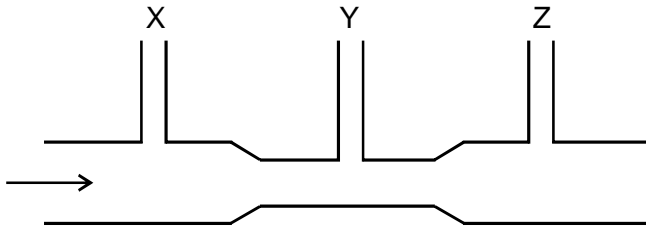
SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-11	25	
B	12	09	
	13	11	
	14	12	
	15	12	
	16	11	
	TOTAL SCORE	80	

SECTION A (25 marks)

Answer ALL the questions in the spaces provided.

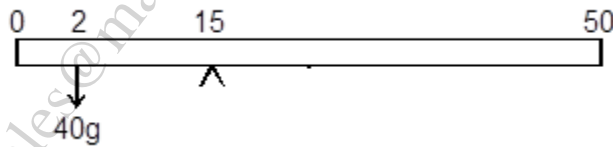
1. State the smallest measurement that can be made by the micrometer screw gauge. (1 mark)

2. Figure below shows a fluid flowing in a tube.



Show on the diagram the relative position of the levels of the liquid in section marked X, Y Z. (3 marks)

3. A uniform half metre rule is pivoted at the 15cm mark and it balances when a mass of 40g is hung from the 2cm mark. Calculate the mass of the rule. (3 marks)



4. Some water in a tin can was boiled for some time. The can was then sealed and cooled. After some time it collapsed. Explain this observation. (2 marks)

5. A paper windmill in a horizontal axis was placed above a candle as shown in figure below.



When the candle was lit the paper windmill began to rotate. Explain this observation. (2 marks)

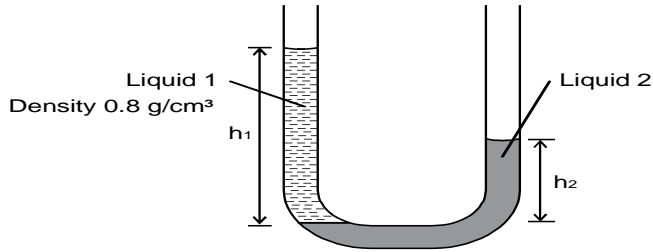
6. The weight of a solid in air is 5.0N. When it is fully immersed in a liquid of density 800kgm^{-3} , its weight is 4.04N.

Determine

- a) The upthrust in the liquid. (1 mark)

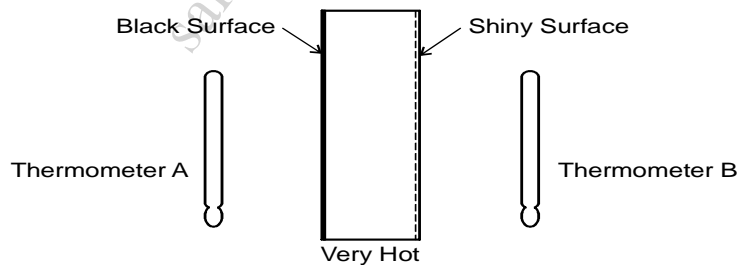
- b) The volume of the liquid. (3 marks)

7. Figure below shows a U tube manometer containing two liquids. Given that h_1 and h_2 are 22cm and 19cm respectively, find the density of the liquid 2. Give your answer to 2 significant figures. (3 marks)



8. Explain why the rate of diffusion of a gas decreases with decrease in temperature. (1 mark)
9. State the reason why steel is normally used to reinforce concrete in construction other than aluminium (1 mark)

10. Figure below shows a thick copper plate that is very hot, one side is black and the other is shiny. Two thermometers are placed at the same distance from each side as shown.



Neglecting heat loss to the surrounding, state with a reason which thermometer records a higher temperature after 10 minutes. (2 marks)

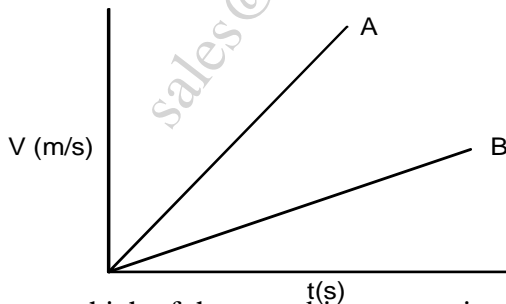
11. The work done in stretching a spring by 50mm is given as 0.08J. Calculate the spring constant.(3 marks)

SECTION B (55 marks)

Answer ALL the questions in this section in spaces provided.

12. a) Differentiate between speed and velocity. (1 mark)

b) Figure below shows velocity time graphs for two objects A and B drawn on the same axes.



State with a reason which of the two objects stops in a shorter distance when the same size of force is applied against each given that they are of equal masses.

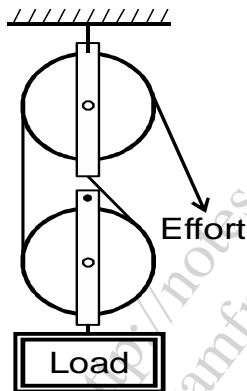
(2 marks)

c) An object moving at 26m/s starts to accelerate at 2m/s^2 so that its velocity becomes 48m/s . Find

i) The distance moved during this acceleration. (3 marks)

ii) The object is now braked so that it comes to rest in a time of 12 seconds. Find the braking force if its mass was 27000g . (3 marks)

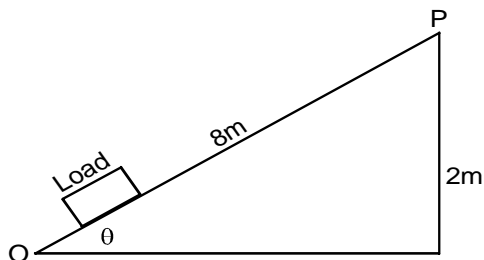
13. a) Figure below shows a pulley system used to lift a load.



Determine the velocity ratio.

(1 mark)

b) The figure below shows a loading ramp of length 8m and height 2m . Bags weighing 1000N each are conveyed from point O to P along the plane. Each bag experiences a friction force of 50N .



Show that the velocity ratio is given by $1/\sin \theta$

(3 marks)

c) State how you can increase for the arrangement

i) Velocity ratio

(1 mark)

ii) Mechanical advantage

(1 mark)

d) i) The total work done by the effort on the bags.

(3 marks)

ii) The efficiency of this system.

(2 marks)

14. a) Define specific heat capacity.

(1 mark)

b) To determine the specific heat capacity of a solid by the method of mixtures, a solid of known mass was heated in a furnace to a very high temperature then quickly transferred to a liquid in a well lagged calorimeter.

i) Give a reason why the solid was quickly transferred.

(1 mark)

ii) List two possible sources of error in this experiment.

(2 marks)

c) 50g of a metal was heated in a furnace to a temperature of 600°C. The metal was then quickly transferred to a copper calorimeter of mass 40g containing 20g of water at 70°C. It was observed that 5g of water vapourised. Given that the specific heat capacity of water and copper are 4200J/kgK, 390J/kgK respectively and specific latent heat of vaporization is 2260000 J/kg. Find

i) An expression for the heat lost by the metal given that its specific heat capacity is C_m (2 marks)

ii) The heat gained by water and calorimeter.

(3 marks)

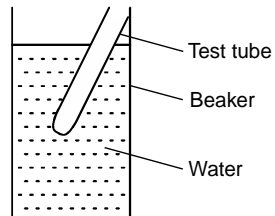
iii) The specific heat capacity of the metal.

(3 marks)

15. a) State Archimedes principle.

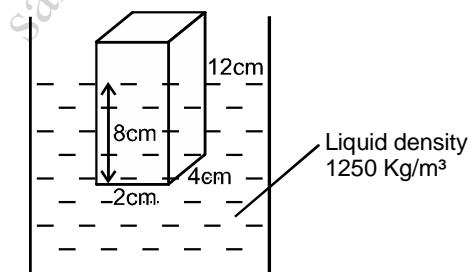
(1 mark)

b) Figure below shows a test tube floating in water in a tall beaker.



- i) State what can be done to make the test tube to float vertically upright. (1 mark)
- ii) Explain how the test tube may be calibrated to measure relative densities of liquids. (2 marks)
- iii) State what can be done to increase the sensitivity of such an instrument (1 mark)

c) Figure below shows a block of dimensions $2\text{cm} \times 4\text{cm} \times 12\text{cm}$ floating in a liquid of density 1250kg/m^3



Find

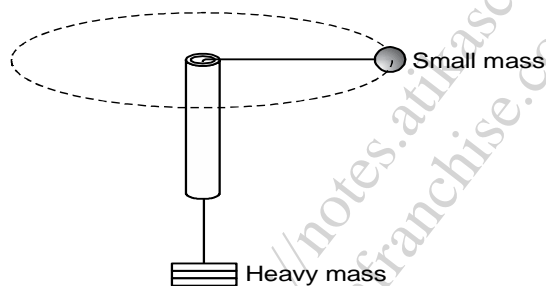
- i) The upthrust on the block. (3 marks)

ii) The weight of the block. (1 mark)

iii) The force needed to just submerge the block completely. (3 marks)

16. a) Define angular velocity. (1 mark)

b) Figure below shows a small mass being rotated in a horizontal circle through a plastic tube. It is observed that as the small mass moves is rotated at constant speed, the heavy mass remains at the same horizontal level.



i. State one adjustment that can be done to make the heavy mass move upwards. (1 mark)

ii. State the effect on the small mass if a heavier mass was used in place of the one above and the radius of rotation remains constants. (1 mark)

c) A stone of mass 200g tied to a long string 1m long and whirled round in a vertical circle at an angular speed of 6.28 rad/s.

i) Why is the stone said to be accelerating. (1 mark)

ii) Determine the linear velocity. (2 marks)

iii) Its periodic time. (2 marks)

iv) The critical speed of the stone if it is to describe a vertical circle. (2 marks)

d) State a factor that determines the angle at which a road should be banked at a bend. (1 mark)

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