NAME:.....ADM NO:.....

SCHOOL.....CANDIDATE'S SIGNATURE.....

DATE:.....

EMBU NORTH COMMON EVALUATION EXAMINATION 2ND TERM YEAR 2018

232/1

PHYSICS PAPER 1

TIME 2 HOURS

INSTRUCTIONS TO CANDIDATE:

(a) Write your name and admission number in the spaces provided above

(b) This paper consists of two sections ***A*** and ***B***

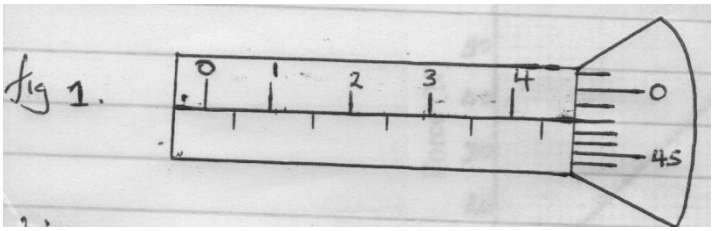
(c) Answer all questions in section ***A*** and ***B*** in the spaces provided

(d) All working must be clearly shown in the spaces provided

(e) Non-programmable silent electronic calculators and ***KNEC*** Mathematical table may be used.

SECTION A: 25 MARKS

1. The figure1 shows a micrometer screw gauge used by a student to measure the thickness of a wire.



If it has a zero error of -0.06mm, what is the actual thickness of the wire (2mks)

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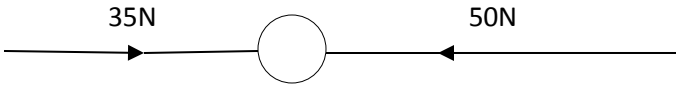
2. Using a scale of 1cm to represent 10N, draw a diagram to show direction and magnitude of the resultant force for two forces acting as shown below in ***Figure 2*** below. (1 mk)



3. When an inflated balloon is placed in a refrigerator, it is noted that its volume reduces. Use the kinetic theory of gases to explain this observation. (2mks)

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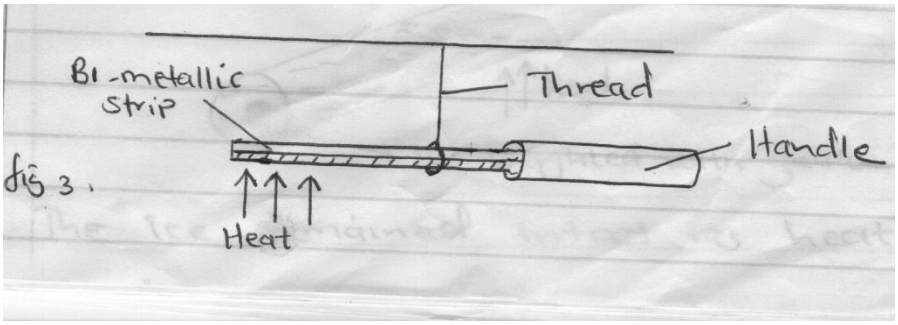
4. ***Figure 3*** below show a bimetallic strip with a wooden handle suspended horizontally using a thin thread.



The strip is heated at the point shown. Explain why the system tips to the right. (2mks)

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5. ***Figure 4*** shows a graph of force (**F**) against extension. (***E***)

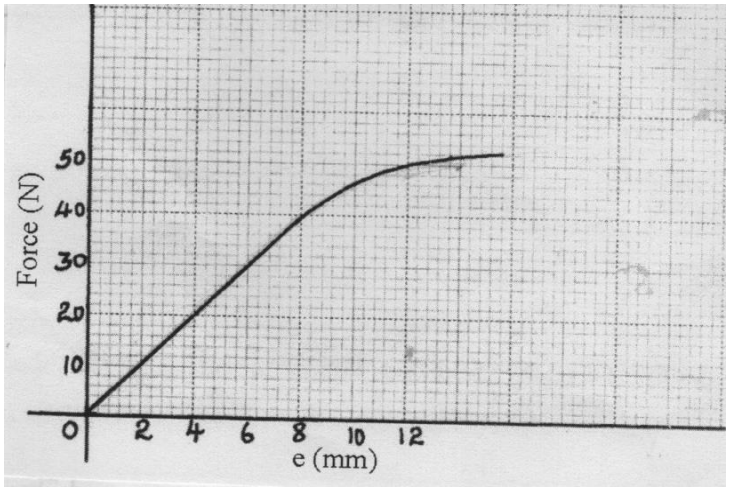

Fig 4

Determine the spring constant of the spring used. (2 mks)

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6. A pipe of radius 6mm is connected to another pipe of radius 9 mm. If water flows in the wider pipe at the speed of 2m/s, what is the speed in the narrower pipe? (3mks)

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7. Ice was placed inside a test tube and water poured into it and then heated as shown in ***figure*** 5 below.

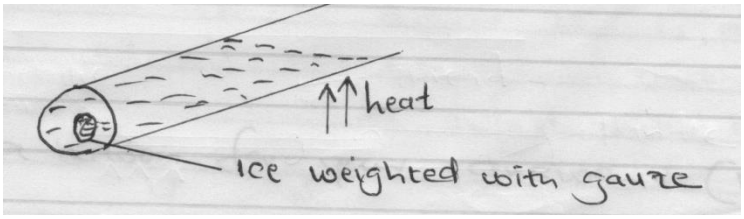

Fig 5

The ice remained intact as heating progressed. Explain this observation. (1mk)

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8. Use the diagram in ***figure 6*** to answer the questions that follow.

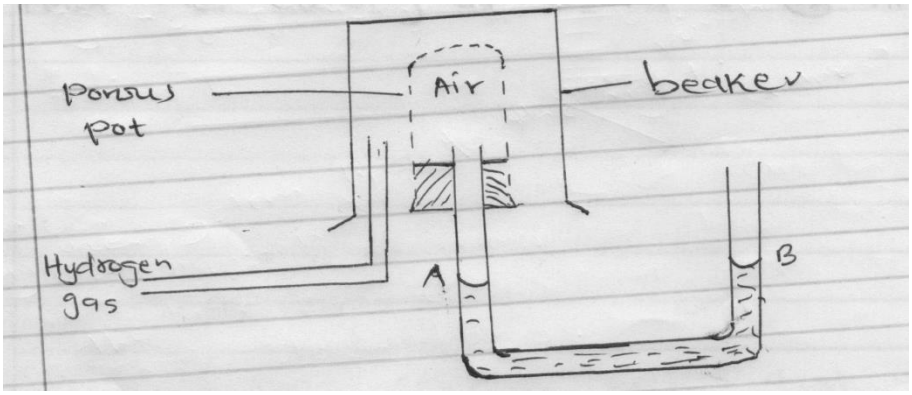

Fig 6

(i) State the aim of this experiment. (1mk)

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(ii) At the start of the experiment, the region below the beaker had no hydrogen gas. The hydrogen gas from a gas generator is now introduced for some time. State the observation made. (1mk)

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(iii) Give a reason for your answer. (1mk)

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9. A density bottle was used to measure the density of liquid and the following measurements were taken.
   - Mass of empty bottle- 26g
   - Mass of bottle filled with alcohol (of density 800Kg/m^3)=66g
   - Mass of bottle filled with liquid L =86g

   Find the density of liquid L. (3mks)

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10. One of the branches of Physics is Geometrical Optics. What does it entail? (1mk)

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11. A part from force, state the other factor that affect moments of a force. (1mk)

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12. The uniform bar in ***figure 7*** is pivoted at its midpoint. It is in equilibrium under the action of two identical balloons filled with equal volumes of different light gases at the same temperature.

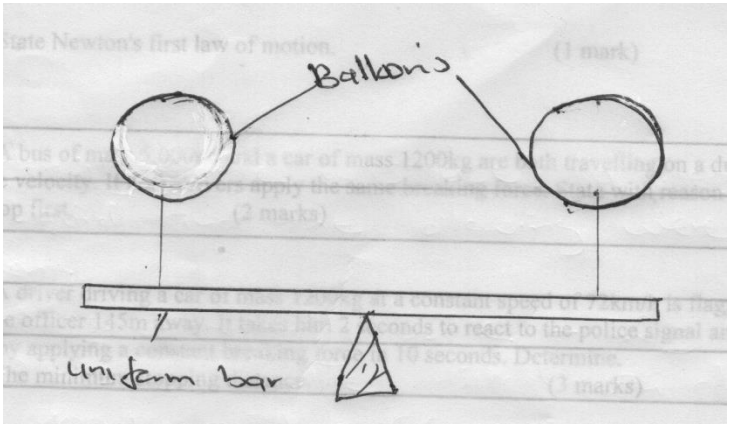

Fig 7

Explain why the bar may not remain in equilibrium if the temperature of the surrounding changes. (2mks)

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13. Calculate the average speed of a motor rated 200W when it raises a load of 40Kg. (2mks)

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SECTION B (55 MARKS)

14. a) State ***Newton's first law*** of motion. (1mk)

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b) A bus of mass 5,000kg and a car of mass 1200kg are both travelling on a dual carriage way at the same velocity. If both drivers apply same breaking force. State with reason which one will come to stop first. (2mks)

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c) A driver driving a car of mass 1200kg at a constant speed of 72Km/h is flagged down by a traffic police officer 145m away. It takes him 2 seconds to react to the police signal and brings the car to rest by applying a constant breaking force in 10 seconds. Determine.

(i) The minimum stopping distance. (3mks)

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(ii) State whether it will hit the traffic police officer or not. (1mk)

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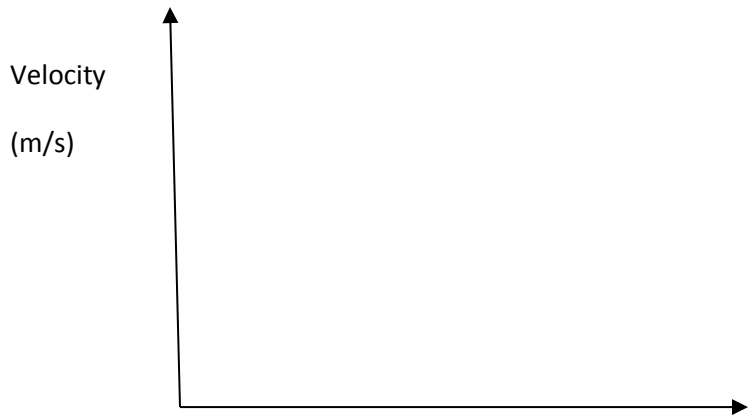
d) On the axes provided, sketch a velocity-time graph for a body projected vertically upwards. (1mk)



e) A stone is projected vertically upwards with a velocity of 15m/s

Determine:-

i) Time it takes to come back to the point of projection. (3mks)

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ii) Maximum height reached. (2mks)

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15. A) Define the term angular velocity. (1mk)

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b) A wooden block of mass 200g is placed at a distance of 9cm from the centre of a turn table. When the turn table is rotated at constant angular velocity, the block begins to slide off the table. If the frictional force between the block and the turn table is 1.2N, determine:

i. The co-efficient of friction between the block and the turn table. (2mks)

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ii. The linear speed of the block. (3mks)

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iii. If the angular velocity is increased by 2πrads/s, what wouyld be the force required to hold the block at the same place. (4 mks)

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iv. What is meant by the term "Banking" in roads? (1mk)

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16. (a) State *Archimede's principle*. (1mk)

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(b) In an experiment to determine the relative density of methylated spirit applying Archimedes Principle, the following apparatus 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 (N)	1.00	1.50	2.0
Weight in water(N)	0.88	1.32	1.76
Weight in spirit (N)	0.91	1.36	1.82

(i) Draw labeled sketch diagrams to show how the readings in the table were obtained. (1mk)

(ii) For each mass, determine the upthrust in water and the upthrust in the spirit. (2mks)

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

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17. (a) State **two** ways through which the rate of evaporation of a liquid may be increased. (2mks)

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(b) A metal of mass 10kg is heated to 120^0 C and then dropped into 2kg of water. The final temperature of the mixture is found to be 50^0C Calculate the initial temperature of the water. (Specific Heat capacity of the method and water is $450JKg^{-1}K^{-1}$ and $4200KKg^{-1}K^{-1}$respectively. (4 mks)

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(c) Give the property of water which makes it suitable for use as a coolant in machines. (1mk)

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(d) Formation of ice on roads during winter in cold countries is known to hamper vehicles. State two ways in which the melting point of ice may be lowered to solve this problem. (2mks)

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(f) Some ether is put in a combustion tube and two glass tubes inserted into the tube through a cork as shown in the figure 8. The combustion tube is then put into a smaller beaker containing some water and a thermometer dipped in the water.

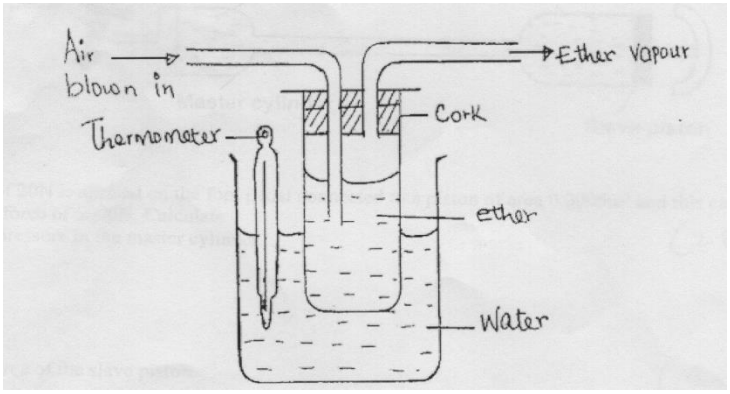

Fig 8

When the air is blown into the either, the reading in the thermometer lowers. Explain this observation. (2mks)

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(f) State two differences between heat and temperature. (2mks)

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18. (a) Figure 9 below represents a hydraulic brake. The radius of the master cylinder is **r** and that of the Slave cylinder is **R**.

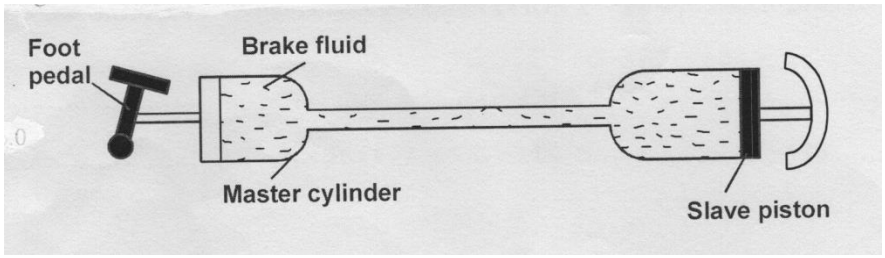

Fig 9

A force of 20N is applied on the foot pedal connected to a piston of area $0.0005m^2$ and this causes a stopping force of 5000N. Calculate.

i) The pressure in the master cylinder. (2mks)

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ii) The area of the slave piston. (2mks)

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iii) The velocity ratio. (2mks)

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iv) Derive an equation for the velocity ratio of the hydraulic brakes. (3 mks)

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(b) Give **two** reasons why the efficiency of a machine is not 100%. (2mks)

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