

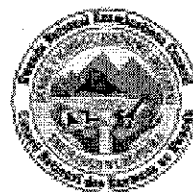
Physics III

014

06 Nov. 2007

8h30 -11h30

RWANDA NATIONAL EXAMINATIONS COUNCIL



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ORDINARY LEVEL NATIONAL EXAMINATION 2007

SUBJECT : PHYSICS III

TIME : 3 HOURS

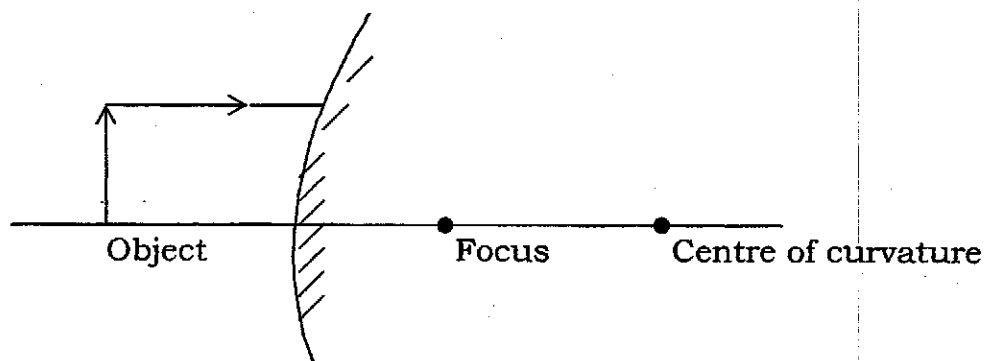
INSTRUCTIONS :

This paper has THREE sections A, B and C.

- Section A: Answer ALL questions. **(55 marks)**
- Section B: Answer any THREE questions. **(30marks)**
- Section C: Compulsory question. **(15marks)**
- **Calculators may be used.**

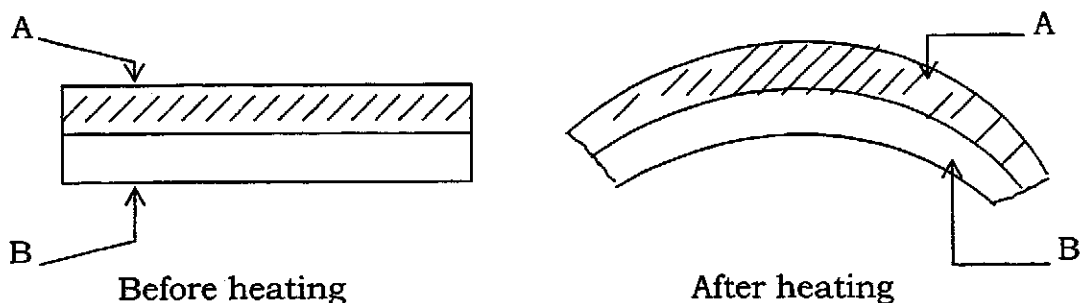
SECTION A: Answer all questions. (55 marks)

1. (a) What is the difference between density and relative density ? **(2marks)**
(b) Calculate the mass of 6cm^3 of copper. The density of copper is 9g/cm^3 . **(1mark)**
2. (a) What is meant by the term weight ? **(2marks)**
(b) Calculate the weight of a body whose mass is 80kg . ($g=10\text{N/kg}$). **(1mark)**
3. Air is used to fill tyres of vehicles. Why is air better than using water to fill the tyres ? **(3marks)**
4. A lady wearing high heeled shoes may damage a wooden floor. Why ? **(3marks)**
5. A uniform meter rule is freely pivoted at the 30 cm mark and it balances horizontally when a body of mass 40g is hung from the 2cm mark. Draw a force-diagram of the arrangement and calculate the mass of the meter rule. **(3marks)**
6. The diagram below shows a diverging mirror.
(a) Copy the diagram and complete it to show the formation of image in the mirror. **(2marks)**



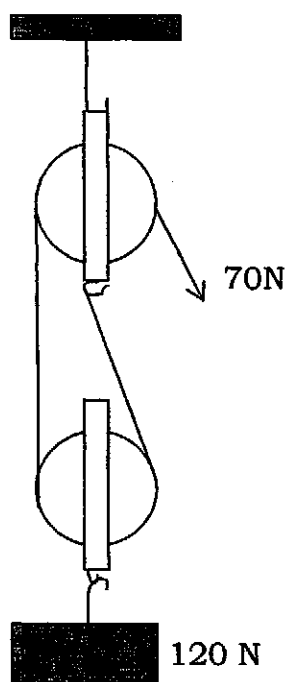
- (b) State the nature of the image formed in the diverging mirror. **(2marks)**
7. With the aid of a diagram explain what is meant by dispersion of white light. **(4marks)**
8. Convert (a) 5°C to Kelvin scale. **(2marks)**
(b) 373 K to Celsius scale. **(2marks)**

9. The diagrams below are of a bimetallic strip before heating and after heating.



- (a) Explain why the strip bends as it becomes hot. (2marks)
- (b) Why does the metal A bend outwards ? (1mark)
- (c) Draw the bimetallic strip when it has cooled down again. (1mark)
10. (a) Define heat capacity of a substance. (2marks)
- (b) A piece of iron of mass 100g cools from 90°C to 30°C .
How many joules of heat are given out ? Specific heat capacity of iron is 460 J/Kg.K . (2marks)
11. (a) Explain what is meant by uniform acceleration. (2marks)
- (b) A car is uniformly retarded and brought to rest from a speed of 90Km/h in 20 seconds. Find its acceleration. (2marks)
12. (a) In Kigali the boiling point of water is less than 100°C . Why ? (2marks)
- (b) With the aid of a diagram show that air of the atmosphere exerts a force. (2marks)

13. Observe the pulley system and answer questions below.



- (a) Determine (i) mechanical advantage
(ii) velocity ratio
(iii) efficiency.

(1mark)
(1mark)
(1mark)

- (b) Why is the pulley system not 100% efficient?

(1mark)

14. (a) State the law of magnetic poles.

(1mark)

- (b) How would you test that a material is a magnet?

(2marks)

- (c) State one property of magnets.

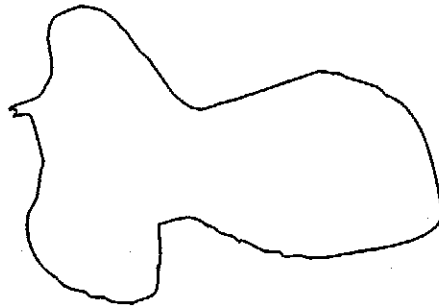
(1mark)

15. Two cells each having an e.m.f of 1.5V and an internal resistance of $3\ \Omega$ are connected in parallel. Find the current when the cells are connected to a $1\ \Omega$ resistor.

(4marks)

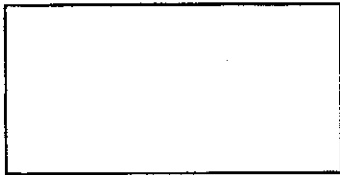
SECTION B: Answer any THREE questions. (30 marks)

16. (a) A thin sheet of cardboard is cut to the shape below. Describe with a diagram an experiment to find its centre of mass.

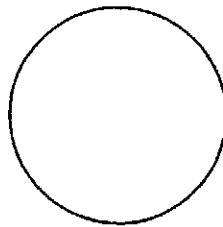


(5marks)

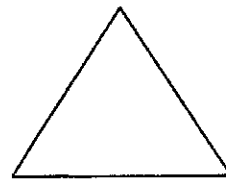
- (b) Copy and label with a dot the centre of mass of each of the three objects below.



Rectangular body



Circular body



Equilateral triangular body

(3mark

- (c) Explain why a mechanic would choose a long spanner to undo a tight nut.

(2mark

17. (a) List four sources of heat energy in Rwanda.

(2mark

- (b) List energy changes which take place when an electric bell is switched on.

(4mark

- (c) What energy changes will occur when we exert a force to lift a weight?

(2mark

- (d) Which is the energy source of most liquid and gaseous fuels ?

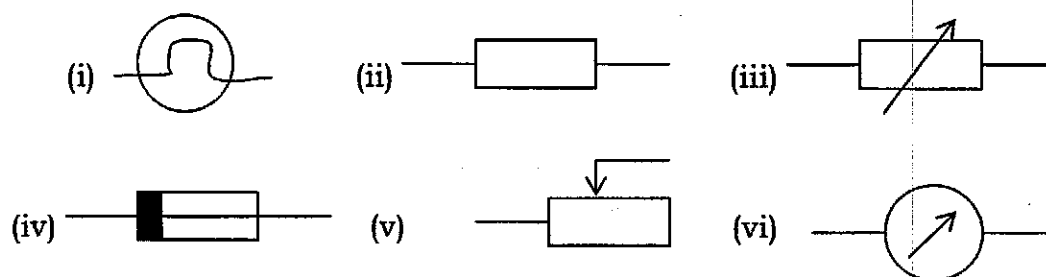
(1mark

- (e) Give an example where energy from the sun is converted to electrical energy.

(1mark

18. (a) (i) Draw a ray diagram to show the formation of an image by a diverging lens. **(2marks)**
 (ii) State the nature of the image. **(2marks)**
- (b) What is the function of an objective lens in the compound microscope? **(2marks)**
- (c) Which lens is used to correct short sightedness ? **(1mark)**
- (d) Find the position of the image of an object placed 8cm from a diverging lens of focal length 10 cm. **(3marks)**

19. (a) Identify the common electrical symbols below.

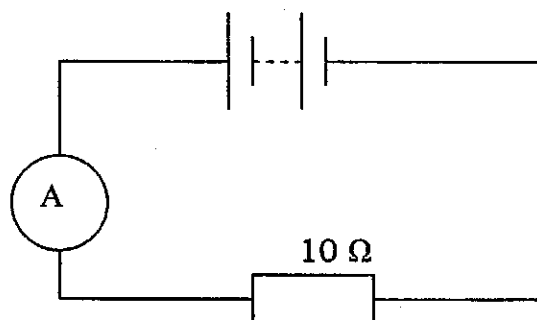


(3marks)

- (b) State Ohm's Law.

(2marks)

- (c)



What is the potential difference across the $10\ \Omega$ resistor in the figure above if the current is 3A ?

(2marks)

- (d) Why does an ammeter have a low resistance? **(1mark)**
- (e) What is meant by an electromotive force of a cell? **(2marks)**
20. (a) Differentiate between latent heat of fusion and latent heat of vaporization. **(3marks)**
- (b) What effect does increase in pressure have on melting point of a substance which expands on solidifying ? **(2marks)**

- (c) Explain why pieces of ice at 0°C added to a drink at room temperature are more effective in cooling the drink than an equal mass of water at 0°C . **(3marks)**
- (d) How much heat will change 20g of ice at 0°C to water at 0°C ?
Specific latent heat of fusion of ice is 336 J/g . **(2marks)**

SECTION C (15 marks)

21. This question is **compulsory** and must be answered on the graph paper provided at the end of your answer booklet. The table below shows the motion of a moving body.

Time (s)	0	1	2	3	4	5	6	10	15
Velocity (m/s)	0	5	10	15	15	15	15	30	0

- a) Use the above data and plot a graph of velocity on Y-axis against time on X-axis. **(8marks)**
- b) From your graph, determine :
- (i) The acceleration for the first 3 seconds **(2marks)**
 - (ii) The time the acceleration is constant **(1mark)**
 - (iii) The deceleration **(2marks)**
 - (iv) The distance moved by the body during the first 3 seconds. **(2marks)**

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