



EXAMINATION NO.: _____

THE MALAWI NATIONAL EXAMINATIONS BOARD

2019 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

PHYSICS

Subject Number: M164/I

Wednesday, 26 June

Time Allowed: 2 hours
8:00 – 10:00 am

PAPER I
(100 marks)

Instructions

1. This paper contains 11 printed pages. Please check.
2. Fill in your Examination Number at the top of each page.
3. This paper contains two sections A and B. In Section A there are ten short answer questions while in Section B there are three restricted essay questions.
4. Answer all the thirteen questions in the spaces provided.
5. Use of electronic calculators is allowed.
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page, tick against the number of the question you have answered.

Question Number	Tick if answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

1. a. State any two methods of studying physics.

(2marks)

- b. Explain any one application of physics in medicine.

(2 marks)

- c. Describe how the speed of a moving object can be measured using a tape measure and a stop watch.

(3 marks)

2. a. Figure 1 is a graph of voltage against current for two conductors A and B. Use it to answer the questions that follow.

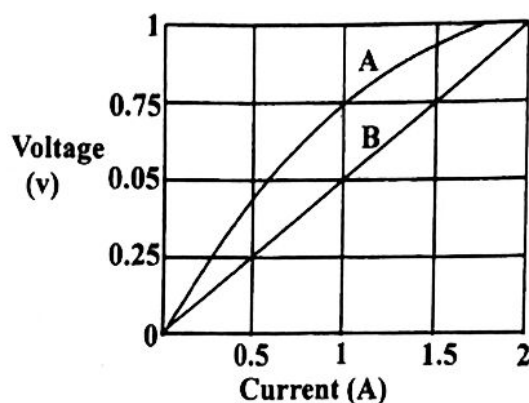


Figure 1

- (i) Which conductor obeys Ohm's law?

(1 mark)

- (ii) Calculate the resistance of conductor A.

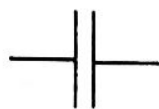
(2 marks)

2. (Continued)

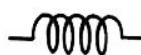
- b. Explain any **two** factors that determine the amount of heat produced when current flows through a conductor.

(4 marks)

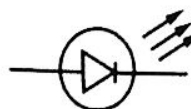
3. a. **Figure 2** is a diagram showing symbols for electric components. Use it to answer the questions that follow.



W



X



Y

Figure 2

- (i) Identify the components labelled W and X.

W: _____

X: _____

- (ii) What is the function of the component labelled Y?

(2 marks)

- b. Give any **one** characteristic of a digital signal.

(1 mark)

- c. Explain how temperature affects resistance of a wire.

(1 mark)

(3 marks)

4. a. State any **two** effects of force.

(2 marks)

- b. A machine with a velocity ratio of 5 requires **5000J** of energy to lift a load of **800N** through a vertical distance of **5m**. Calculate:-

- (i) the efficiency of the machine.

(2 marks)

- (ii) the mechanical advantage of the machine.

(3 marks)

5. **Figure 3** is a diagram showing a device which switches on and off electricity automatically in an electric appliance. Use it to answer the questions that follow.

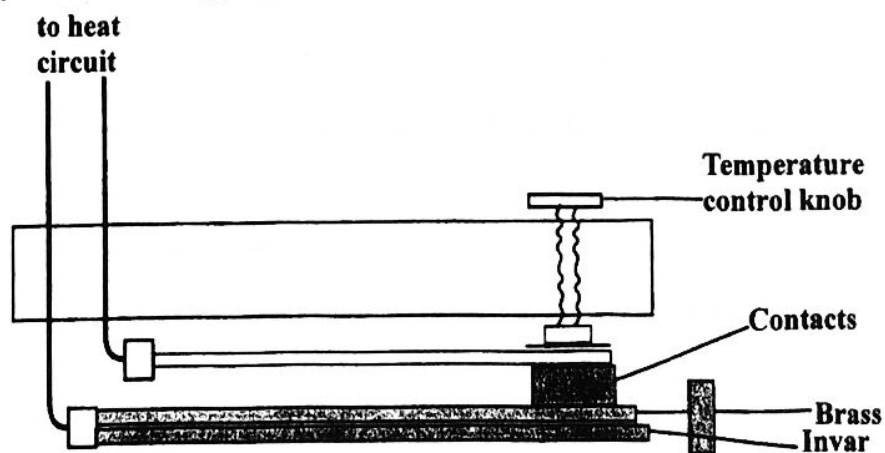


Figure 3

- a. Name the device.

(1 mark)

Continued/...

5. (Continued)

- b. Explain how the device works.

(4 marks)

- c. Mention any two electrical appliances which use the device.

(2 marks)

6. a. **Figure 4** is a circuit diagram with three identical bulbs of resistance of 1Ω each.

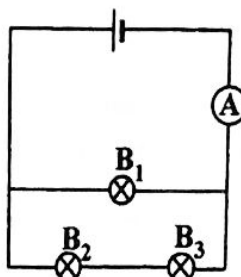


Figure 4

Calculate:-

- (i) the electric current passing through B_1 .

(2 marks)

- (ii) the total resistance in the circuit.

(3 marks)

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6. (Continued)

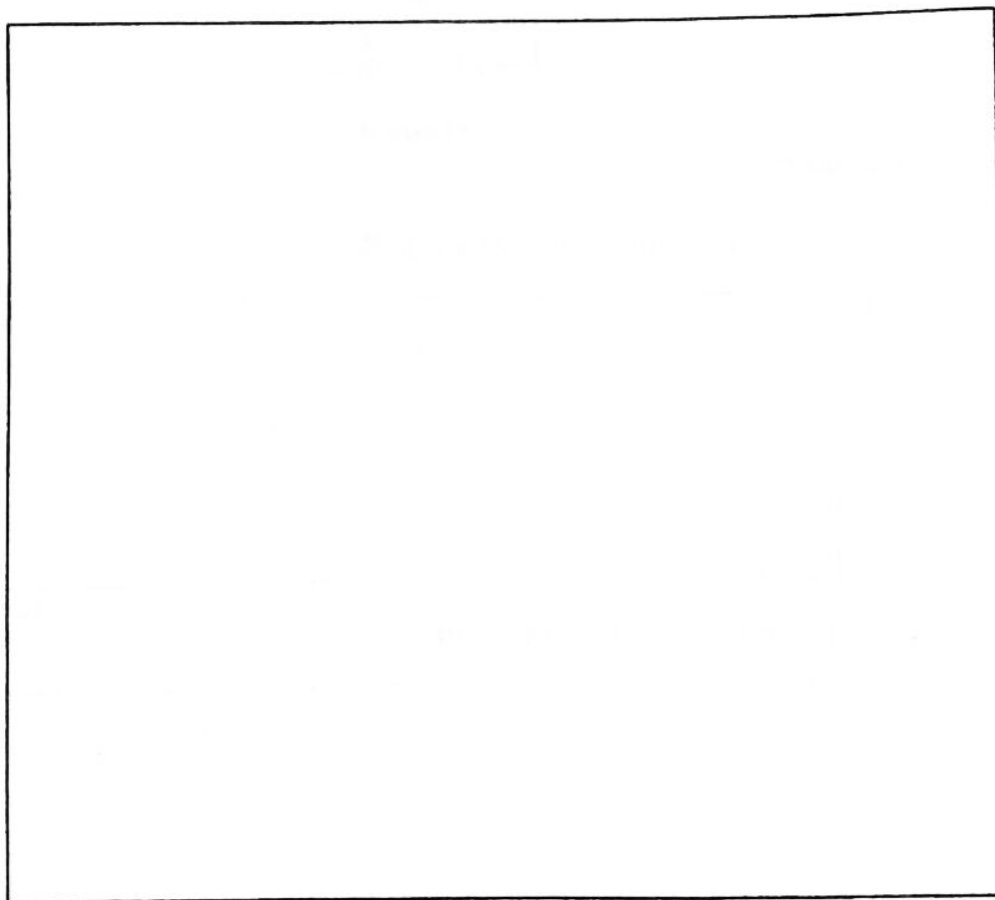
- b. With the aid of a diagram, describe the arrangement of dipoles in a fully magnetized steel bar.

(2 marks)

7. a. Give two properties of lenses.

(2 marks)

- b. An object 1cm high is placed 20cm in front of a convex lens with a focal length of 10cm. Using a ray diagram, find the image distance.



(5 marks)

Continued/...

8. a. **Figure 5** is a diagram showing a traditional musical instrument which consists of wooden bars of different lengths. Use it to answer the questions that follow.

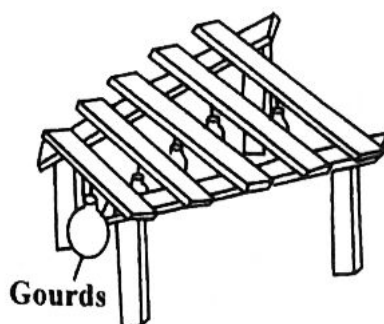


Figure 5

- (i) Name the instrument.

(1 mark)

- (ii) How does the instrument produce sound?

(1 mark)

- (iii) Why are wooden bars made of different lengths?

(1 mark)

- (iv) What is the purpose of putting gourds under each wooden bar?

(1 mark)

- b. **Figure 6** is a graph of amplitude against frequency for an oscillating system.

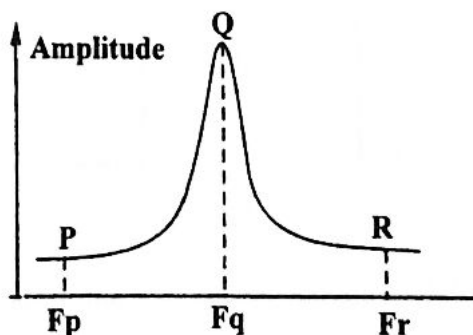


Figure 6

- (i) At what point is the system in resonance?

(1 mark)

- (ii) Give a reason for the answer in 8b (i).

(1 mark)

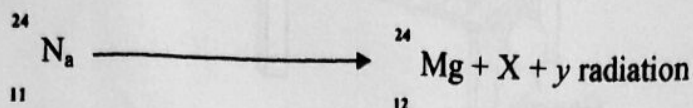
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8. (Continued)

- c. Why is resonance dangerous to a vibrating system?

 _____ (1 mark)

9. a. The following equation shows decay of sodium (Na) into magnesium and other nuclear radiations;



- (i) Name the particle X.

 _____ (1 mark)

- (ii) State any one property of X radiation.

 _____ (1 mark)

- b. Explain how nuclear radiations can be used to trace brain tumors.

 _____ (2 marks)

- c. **Figure 7** is a diagram showing a set up of an experiment investigating the fluid resistance to motion of objects. The ball bearings were released into the liquids at the same time. Use it to answer the questions that follow.

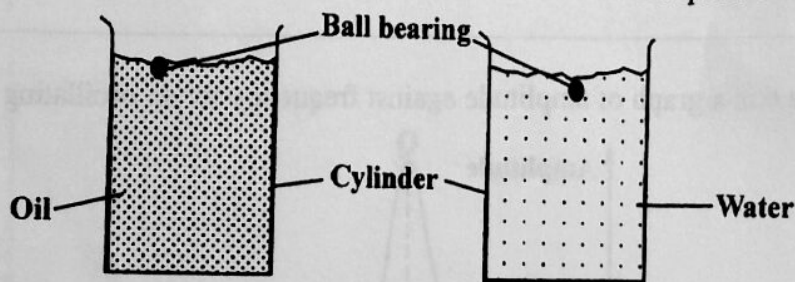


Figure 7

- (i) Which ball bearing reached the bottom of the cylinder first?

 _____ (1 mark)

- (ii) Mention any two variables that were kept constant in the experiment.

 _____ (2 marks)

10. a. Define "centre of gravity"

- b. State any **two** ways of increasing mechanical advantage of an inclined plane. (1 mark)

- b. **Figure 8** is a diagram showing two spheres connected by a straight rod of length 10cm and suspended in the air at the centre of gravity G. (2 mark)

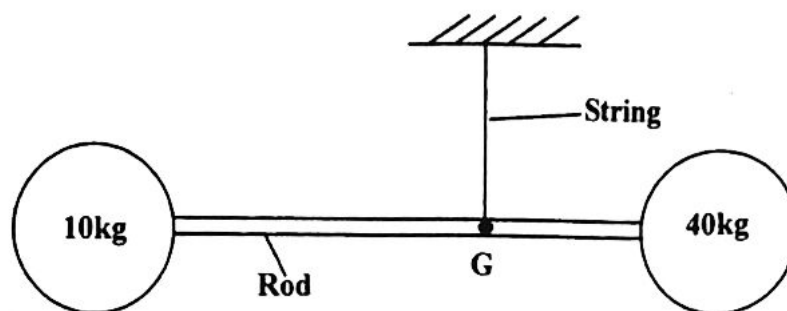


Figure 8

Calculate the position of the centre of gravity G from the 40kg mass.

(4 marks)

SECTION B (30marks)

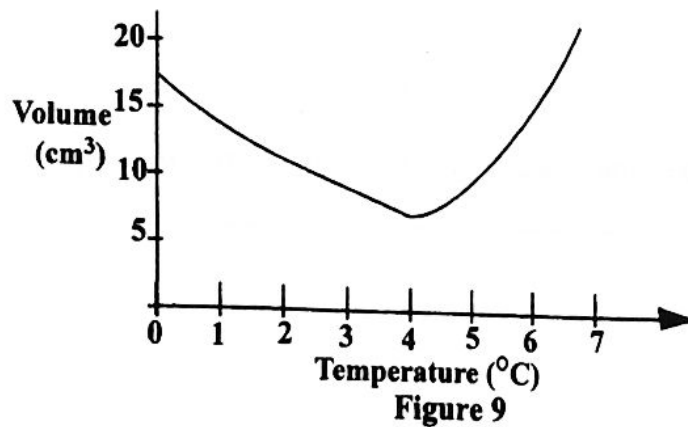
11. a. Explain how a terminal speed is reached by an object falling through a liquid.

- b. Explain how the action of flotation and sinking is achieved in submarine ships.

(4 marks)

12. a. Figure 9 is a graph showing the behavior of water when heated.

(6 marks)



Describe the behavior of water according to the graph.

(5 marks)

Continued/...

12. (Continued)

- b. Explain the effect on magnetism when a magnet is heated to red hot and suddenly cooled down.

(5 marks)

13. a. Explain how a liquid in a glass thermometer works to determine temperature of a substance.

(4 marks)

- b. Describe an experiment that could be carried out in order to show that liquid pressure increases with depth.

(6 marks)

END OF QUESTION PAPER**NB: This paper contains 11 printed pages**