EXAMINATION NO.: _____

SOUTH EAST EDUCATION DIVISION

2024 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATION

PHYSICS

Friday, 22nd March

Subject Number: M164/I
Time Allowed: 2 hours
8:00 - 10:00 am

PAPER I

(100 marks)

Instructions:

1. **This paper contains 14 printed pages. Please check.**
2. Before beginning, write your **Examination Number** at the top of each page of the question paper.
3. This paper contains **two** sections, **A** and **B.** In Section **A** there are **ten** short 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			

Turn over/…

SECTION A (70 marks)

Answer all the ten questions in this section in the spaces provided.

1. a. State any **one** example of a derived quantity.

_____

(1 mark)

b. How does parallax error occur during laboratory experiments.

_____

_____

(2 marks)

c. **Figure 1** is a diagram showing part A of a Vernier caliper.

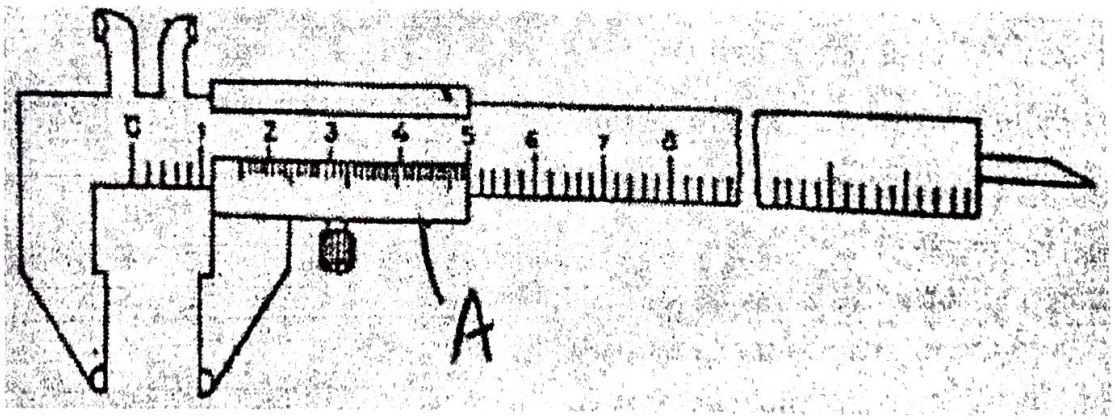

Figure 1

(i) Name the part labelled A.

_____

(1 mark)

(ii) State any **one** advantage of using a Vernier caliper over a simple ruler.

_____

(1 mark)

d. Give any **two** ways of presenting results of a scientific investigation.

_____

_____

_____

(2 marks)

Continued/...

2. a. Define absolute temperature.

_____

_____

(1 mark)

b. Calculate the temperature of a gas that occupies a volume of $500cm^3$ at 27°C when its volume has been raised to $800cm^3$ at a constant pressure.

(3 marks)

c. Explain in terms of the kinetic theory of matter why a plastic spoon melts when it is heated?

_____

_____

_____

(3 marks)

3. a. Give any **two** uses of radioactive substances.

_____

_____

(2 marks)

Continued/...

b. How much of the substance will remain after 40 minutes for a radioactive sample whose original mass is 100g and has a half-life of 20 minutes.

(3 marks)

c. Explain how a natural radioactivity occurs.

_____

_____

(2 marks)

4. **Figure 2** is a circuit diagram showing two resistors in parallel and one in series.

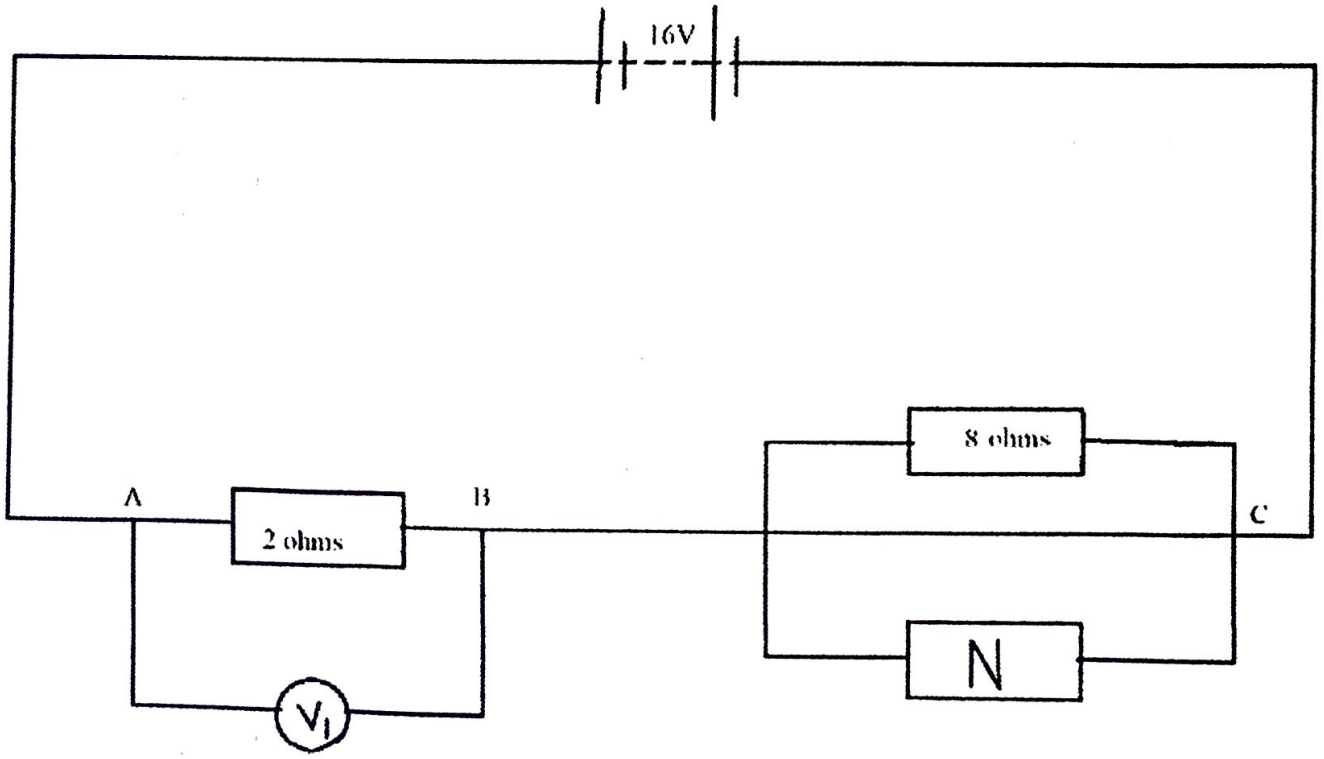

Figure 2

Continued/...

a. Calculate the total current passing through the circuit given that V_1 is 8v.

(2 marks)

b. Calculate the value of resistor N.

(3 marks)

c. How does the process of demagnetization through heating occur?

_____

_____

(2 marks)

5. An object 20cm high is placed 40cm in front of a converging lens of focal length 60cm.

a. Draw a ray diagram to locate the position of an image. (Hint:Use a scale of 1cm: 20cm).

(3 marks)

Continued/...

b. Describe any **two** characteristics of the nature of the image formed.

_____

_____

(2 marks)

c. Explain why an increase in temperature causes an increase in the speed of sound.

_____

_____

(2 marks)

6. a. State Newton's Second Law of Motion.

_____

_____

(2 marks)

b. Calculate the acceleration when a force of 24N is applied to a moving object of mass 3kg.

(2 marks)

Continued/...

c. (i). Define angular velocity.

_____

_____

(1 mark)

(ii). Calculate the angular velocity of a car tyre that revolves at 180 revolutions per minute.

(3 marks)

7. **Figure 3** shows diagrams **X** and **Y** representing two kinds of waves produced on a slinky spring.

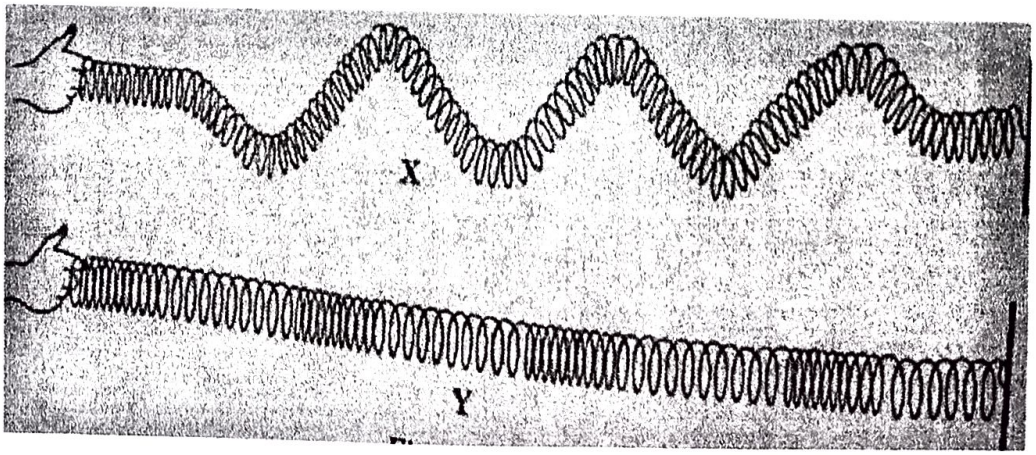

Figure 3

a. (i). What type of wave is represented by **X**.

_____

(1 mark)

Continued/...

(ii). Give any **two** differences between waves represented by **X** and **Y**.

_____

_____

_____

(2 marks)

b. Give any **one** property of an infrared wave.

_____

(1 mark)

c. Calculate the depth of the lake at a point when an echo sounder sends sound signals to the bottom of a lake and receive the sound echo after 5 seconds given that the speed of sound in water is 3000m/s.

(3 marks)

8. a. Define moment of force.

_____

_____

(1 mark)

b. Calculate the moment of a force when a force of 600N is applied on a spanner 25cm long used to remove a nut.

(3 marks)

c. (i). Explain the effect on the force constant when two identical spiral springs have been placed in parallel.

_____

_____

(1 mark)

(ii). Calculate the force required to move a stretchable material to a 0.2m distance given that the force constant of the material is 1500N/m.

(2 marks)

Continued/...

9. **Figure 4** is a diagram of a pulley being used to lift a mass of 15kg vertically through a height of 10m.

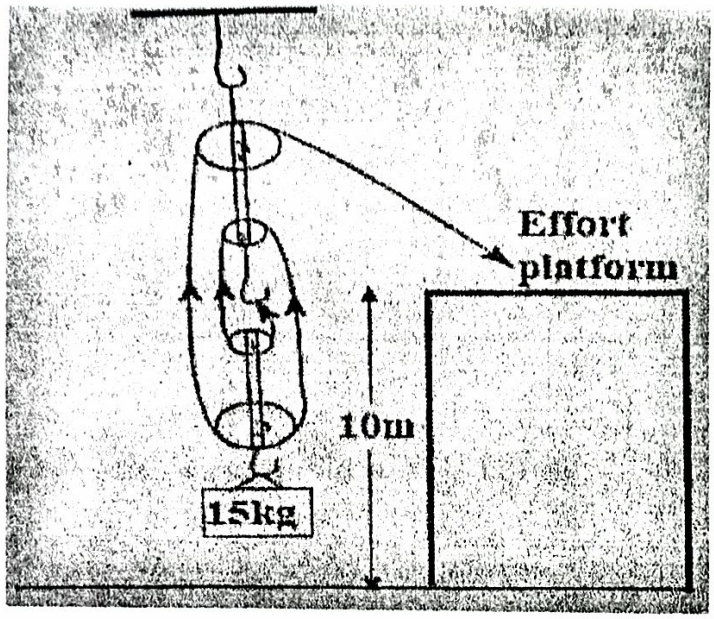

Figure 4

a. (i). What is the mechanical advantage of the pulley system.

_____

(1 mark)

(ii). Give a reason for the answer in 9 a (i).

_____

(1 mark)

b. Calculate the work done in lifting the mass to a height of 10m.

(2 marks)

Continued/...

c. Calculate the efficiency of the pulley.

(3 marks)

10. a. Give any **two** effects of atmospheric pressure.

_____

_____

(2 marks)

b. Explain how a mercury barometer works in order to determine the atmospheric pressure of a particular area.

_____

_____

_____

(3 marks)

c. Explain how thermal expansion is accommodated in bridges and railway tracks in order to prevent structural damage.

_____

_____

(2 marks)

Continued/…

SECTION B (30 MARKS)

Answer **all** the **three** questions in this section in an essay form in the spaces provided.

11. a. Describe an experiment which could be done to demonstrate the concept of inertia using a coin, cardboard and a plastic cup.

(5 marks)

b. Explain how a constant – volume gas thermometer works.

(5 marks)

Continued/…

12. a. Explain in terms of the band theory, why the electrical conductivity of insulators cannot be improved even if the temperature has been raised.

(5 marks)

b. With the aid of a diagram, describe the refraction of water waves as they travel from deep region to shallow region in a lake.

(5 marks)

Continued/...

13. a. Describe how a diode functions in a full – wave rectifier circuit.

(5 marks)

b. Describe how a falling object in air reaches its terminal speed.

(5 marks)

END OF QUESTION PAPER

NB: This paper contains 14 printed pages.