THE MALAWI NATIONAL EXAMINATIONS BOARD
2020 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

PHYSICS

Monday, 25 January 2021

Subject Number: M164/I

Time Allowed: 2 hours
8:00 – 10:00 am

PAPER I
(100 marks)

Instructions

1. This paper contains 15 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			
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6			
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9			
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11			
12			
13			

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Turn over

020

SECTION A (70 marks)

Answer all questions

1. a. (i) Define 'absolute zero'

_____

_____

_____ (1 mark)

   (ii) Convert 45 Kelvins to degrees Celsius.

                                                    (2 marks)

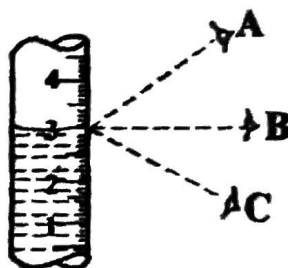   b. **Figure 1** is a diagram illustrating three students A, B and C taking a reading from a measuring cylinder.

Figure 1

   (i) Which student is likely to get a correct reading from the cylinder?

_____

                                                    (1 mark)

   (ii) Name the type of error which students that get wrong readings are likely to make.

_____

                                                    (1 mark)

1020
1.   a.   (Continued)

(ii)   State any two ways of correctly handling a material with the symbol in Figure 2.

_____

_____

_____

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                                                              (2 marks)

b.   Describe how atmospheric pressure is applied when using a drinking straw.

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                                                              (4 marks)

Figure 3 shows a circuit with some electronic devices in use.

Figure 3
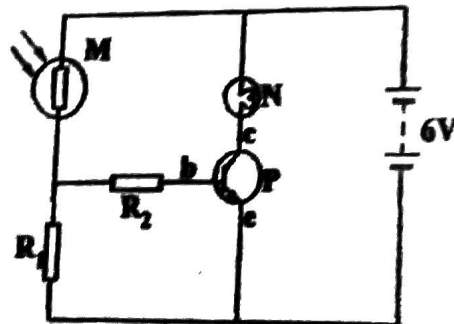
a.   Name the devices labelled M and N.

M_____

                                                              (1 mark)

N_____

                                                              (1 mark)

1.   b.   **(Continued)**

       (iii)   Calculate the relative error if student C gets a reading of 3.1 cm^3.

                                                                                     (2 marks)

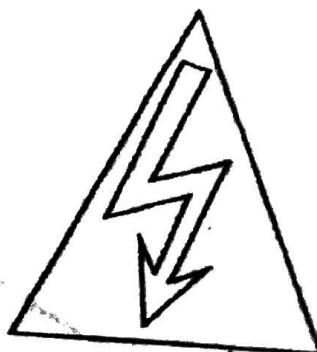2.   a.   Figure 2 shows a hazard symbol indicated on some materials found in a Physics laboratory.

Figure 2

     (i)   Give the meaning of the symbol.

_____

_____

                                                        (1 mark)

3. (Continued)

b. Explain how part P operates as a light operated switch in the circuit during bright light.

_____

_____

_____

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_____

(4 marks)

c. Name the logic gate which is also called the inverter.

_____

(1 mark)

4. a. Give any two types of nuclear radiations.

_____

_____

(2 marks)

b. Explain how radioactivity is used in archaeology.

_____

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_____

_____

(2 marks)

4.   (Continued)

c.   Calculate the velocity with which a ball hits the ground when released from a roof 9m high from the ground. Hint: Use $g = 10m/s^2$

(3 marks)

5.   a.   Table 1 shows atomic numbers and numbers of neutrons of different atoms W, X, Y and Z which are not their real chemical symbols.

Table 1

Atom	W	X	Y	Z
Atomic number	6	7	6	8
Number of neutrons	6	7	8	8

(i)   Identify two atoms that are isotopes.

_____

_____

(2 marks)

(ii)   Explain the answer to 5 a (i).

_____

_____

_____

_____

(2 marks)

5. a. (Continued)

(iii) Express atom Y in its nuclear notation.

(1 mark)

b. Give any two factors which affect the melting point of a substance.

_____

_____

(2 marks)

6. a. Define 'density'

_____

_____

(1 mark)

b. Explain how an increase in temperature affects the density of a substance.

_____

_____

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_____

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(3 marks)

6.   (Continued)

c.   Calculate the altitude at which pure water will boil at 94°C.

(3 marks)

7.   a.   Give one difference between scalar and vector quantities.

_____

_____

_____

(1 mark)

7. (Continued)

b. Figure 4 is a record of a complete motion of a trolley joined to a ticker-tape with dots showing the position of the trolley at regular intervals of time.
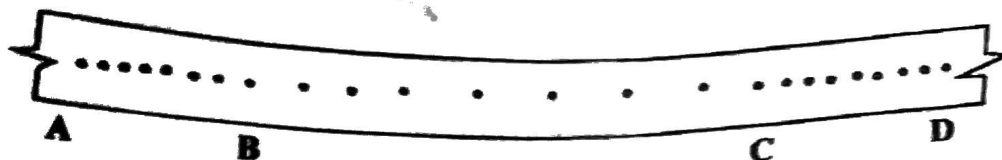
A   B   C   D

Figure 4

Describe the motion of the trolley from start to finish (A to D).

_____

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(3 marks)

c. Explain how a seat belt in a vehicle reduces injury to the driver.

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(3 marks)

8. a. State the energy-work theory.

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(1 mark)

8.   (Continued)

b.   Give any three properties of electromagnetic waves.

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                                                                (3 marks)

c.   Describe how the shrink fitting method could be applied to make tight fits.

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                                                                (3 marks)

9.   a.   Give two effects of balanced forces on objects.

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_____
                                                                (2 marks)

9. (Continued)

b. Give any two differences between mass and weight.

_____

_____

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_____

(2 marks)

_____

c. Outline the energy changes that take place in a burning stick of matches.

_____

_____

_____

_____

_____

(3 marks)

_____

10. Figure 5 is a graph of displacement against time of an object.
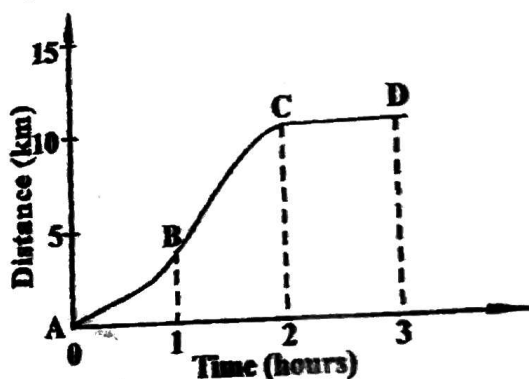
Figure 5

a. Describe the motion of the object from:

(i) A to B

_____

(1 mark)

(ii) B to C

_____

(1 mark)

10. a. (Continued)

    (iii) C to D

_____ (1 mark)

b. Calculate the average speed of the object from A to C.

(2 marks)

c. Explain how Newton's third law of motion is used when one is walking.

_____

_____

_____

_____

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_____

(2 marks)

SECTION B

Answer all questions

11. a. Describe how a falling object in air reaches terminal speed.

_____

_____

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(5 marks)

b. Using a truth table, describe how on OR gate works.

_____

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(5 marks)

12.   a.   With the aid of a well labelled diagram, explain why a diode does not conduct electricity when reverse biased.

(6 marks)

b.   Describe how a thermometer can be graduated into a degrees celsius (°C) scale.

_____

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(4 marks)

13.   a.   With the aid of a well labelled diagram, describe the refraction of water waves as they travel from shallow to a deep region.

(5 marks)

b.   With the aid of a diagram, describe an experiment that could be done to show that sound requires a medium to travel through.

(5 marks)

END OF QUESTION PAPER

NB: This paper contains 15 printed pages.