Candidate Name	Centre Number	Candidate Number

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

PHYSICS **4023/2**

PAPER 2 Theory 2 hours 15 minutes

JUNE 2025 SESSION

Additional materials:
Electronic calculator
Answer booklet

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top.

At the end of the examination fasten the answer booklet used securely to the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question.

This question paper consists of two compulsory sections, **A** and **B.**

FOR EXAMINER'S USE

Section A	
Section B	**9**
	10
	11
	12
Total	

This question paper consists of 18 printed pages.

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Section A

*Answer **all** questions.*

Write your answers in the spaces provided on the question paper.

1 **(a)** Define

(i) *acceleration,*

_____

_____ [1]

(ii) *average speed.*

_____

_____ [1]

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(b) **Fig .1.1** shows the speed of a bus from the time the driver saw an obstacle on the road and applied the brakes till the bus came to a stop.

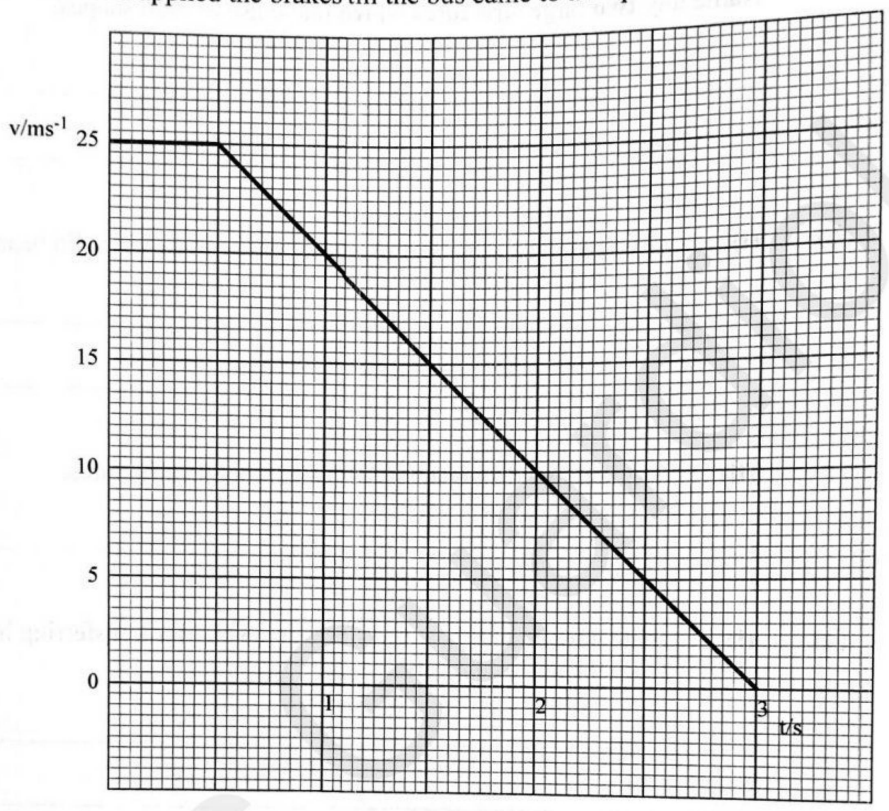


Fig. 1.1

Calculate the average speed of the car.

[3]

2 **(a)** Arch shapes in construction help to distribute pressure to other areas.
Name any **two** large structures which make use of arch shapes.

_____

_____ [2]

_____

(b) **(i)** Give **two** advantages of using hollow beams over solid beams.

_____

_____ [2]

_____

(ii) Explain **one** disadvantage of using wood in structures.

_____ [1]

3 **(a)** **(i)** State a method of heat transfer responsible for transferring heat from the sun to the earth.

_____

_____ [1]

(ii) Explain why other methods of heat transfer are not involved in this transfer.

_____

_____

_____ [2]

(b) Describe how blankets keep people warm.

_____

_____

_____ [2]

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4 (a) **Fig. 4.1** shows how the resistance, R, of a thermistor varies with temperature, θ.

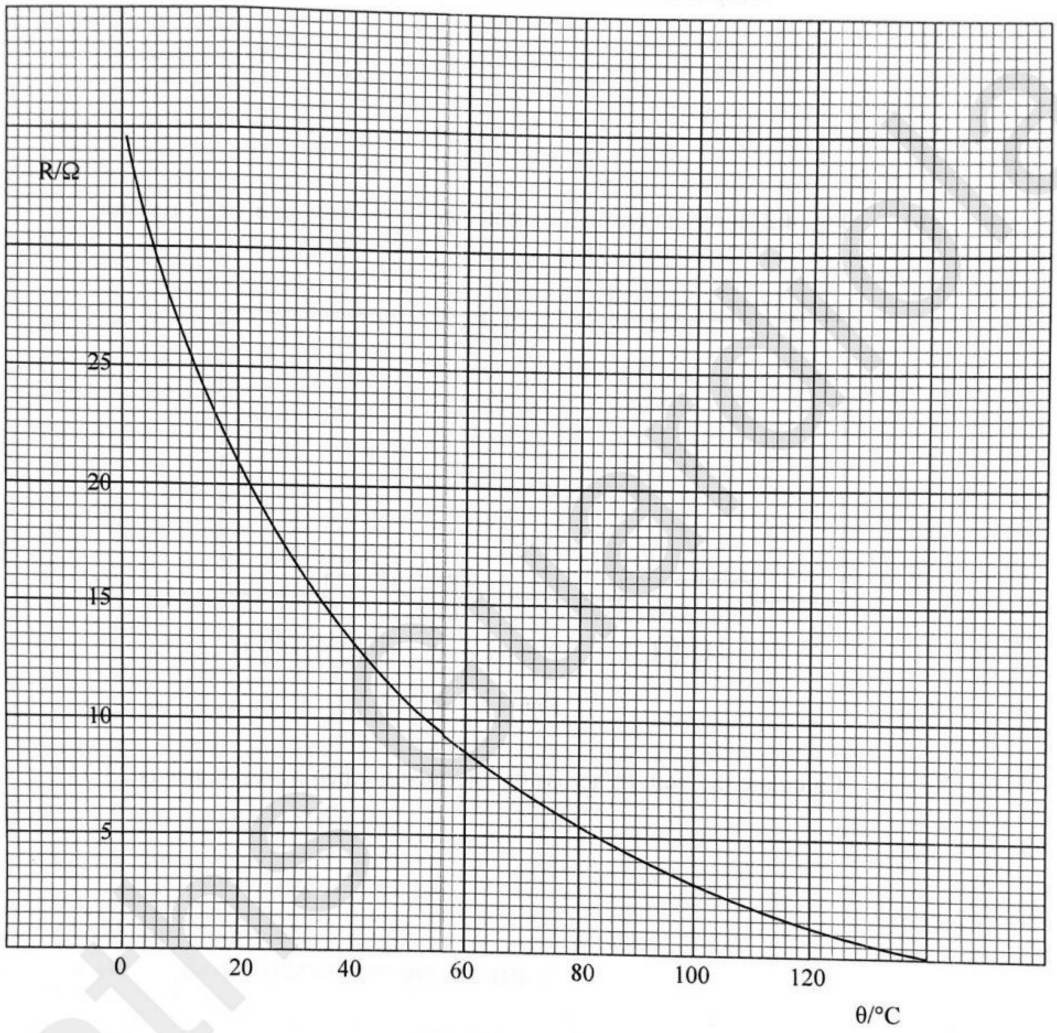


Fig. 4.1

(i) Describe the variation of the resistance, R, with temperature, θ illustrated in **Fig. 4.1**.

_____

_____ [1]

(ii) Determine, from the graph, the resistance of the thermistor when the temperature is 80 °C.

_____

_____ [1]

(b) **Fig. 4.2** shows a thermistor connected in series with a 10 Ω resistor.

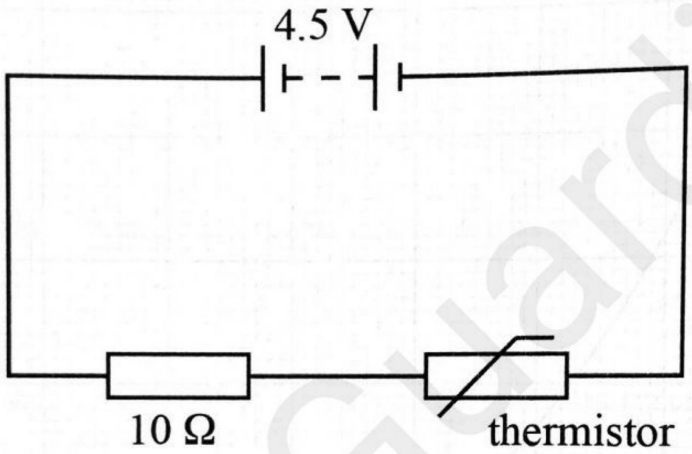


Fig. 4.2

Calculate the voltage across the thermistor when its resistance is 22.0 Ω.

[3]

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5 (a) **Fig. 5.1** shows a strain gauge.

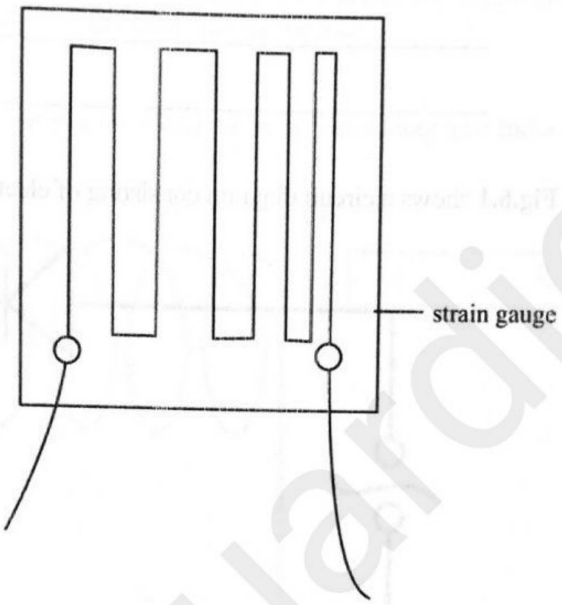


Fig. 5.1

(i) State the type of wire that is used to make a strain gauge.

_____

_____ [1]

(ii) Explain the choice given in **a(i)**.

_____

_____ [1]

(iii) Describe what happens to the resistance when a strain gauge is stretched.

_____

_____

_____

_____ [2]

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(iv) Name **one** practical use of a strain gauge.

_____

_____ [1]

6 (a) **Fig.6.1** shows a circuit diagram consisting of electronic components.

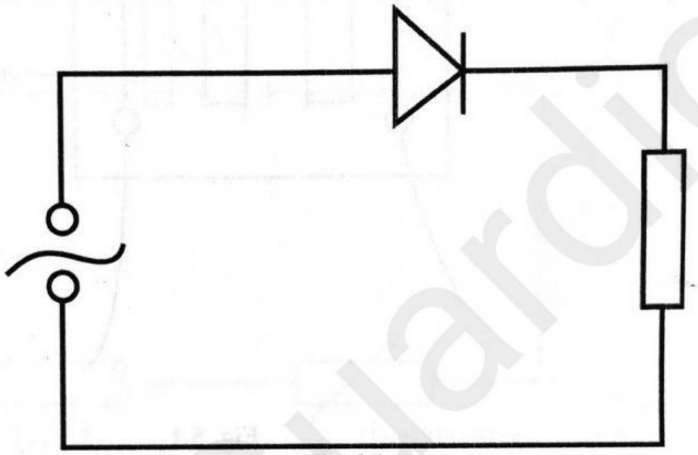


Fig.6.1

(i) Name the process being demonstrated in **Fig.6.1.**

_____

_____ [1]

(ii) Draw a potential difference against time graph that appears across the load.

[3]

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(iii) Add a component to the circuit in **Fig .6.1** for smoothening the potential difference across the load. [1]

7 (a) **Fig. 7.1** shows an experiment used to study electromagnetic induction.

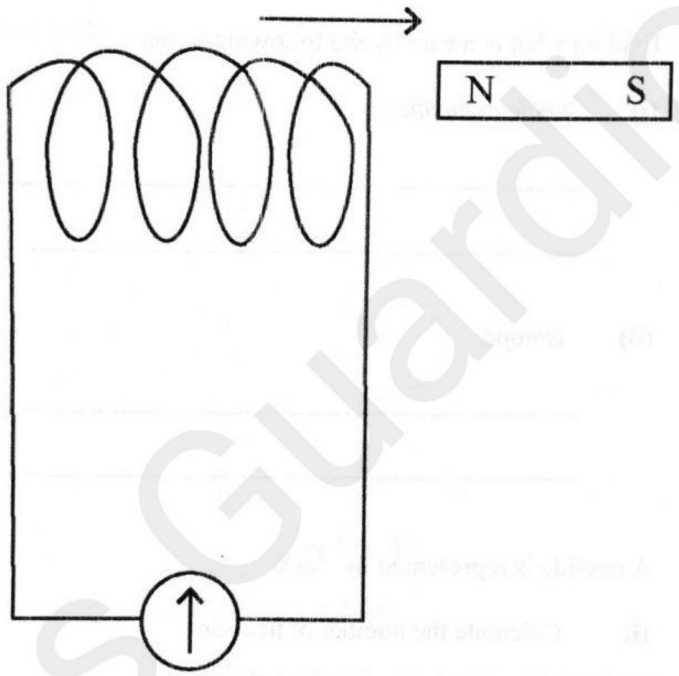


Fig. 7.1

(i) Give **two** ways of increasing the electromotive force induced.

_____

_____ [2]

(ii) Describe what is observed in **Fig.7.1** when the coil is moved towards the magnet.

_____

_____ [1]

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(iii) Give any **two** practical applications of electromagnetic induction.

_____

_____ [2]

8 **(a)** Explain what is meant by the following terms

(i) *nucleon number,*

_____

_____ [1]

(ii) *isotope.*

_____

_____ [1]

(b) A nuclide is represented by $^{233}_{91}X$.

(i) Calculate the number of neutrons.

[2]

(ii) Write another representation of an isotope of **X**.

_____

_____ [1]

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Section B

*Answer any **three** questions from this section.*
Write your answers on the separate answer booklet provided.

9 **(a)** **(i)** Explain the term *stability of an object*. [1]

(ii) State **two** ways in which the stability of an object can be increased. [2]

(iii) A force, F, is used to displace a cone, as shown in **Fig. 9.1**.

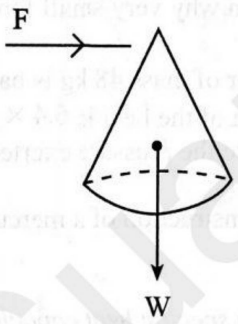


Fig. 9.1

Explain how the cone regains its stability. [1]

(iv) Explain why the luggage compartment of a bus should be at the bottom. [2]

(b) **Fig. 9.2** shows a wooden log of mass 1 tonne being pulled by a tractor on a rough surface.

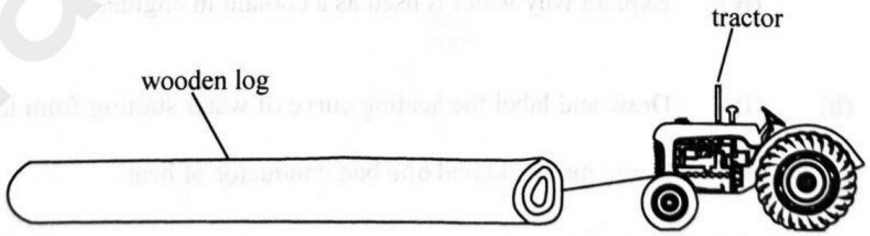


Fig. 9.2

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(i) Draw a diagram to show the forces acting on the wooden log. [2]

(ii) Suggest why the force exerted by the tractor when pulling the wooden log on a rough surface is greater than when pulling the wooden log on a smooth surface. [1]

(iii) Calculate the acceleration of the wooden log when the force exerted by the tractor is 80 000 N and the frictional force is 65 000 N. [$g = 10\ m/s^2$] [3]

(c) (i) State the direction in which the pressure of a fluid acts. [1]

(ii) Explain why very small forces are required during use of a needle. [1]

(iii) A dancer of mass 48 kg is balancing on heels on a dancing floor. The area of the heel is $6.4 \times 10^{-5}\ m^2$. Calculate the pressure exerted to the floor by the heels. [3]

(d) Describe the construction of a mercury barometer. [3]

10 (a) (i) Define *specific heat capacity*. [1]

(ii) In an experiment to measure the specific heat capacity of steel, a mass of 500 g of steel rivet is placed in a calorimeter and heated using a 50 W electrical heater. After a period of two minutes, the temperature of the rivet rises from 10 °C to 35 °C.

Calculate the specific heat capacity of steel. [3]

(iii) State one assumption made in calculating the specific heat capacity of the steel rivet. [1]

(iv) Explain why water is used as a coolant in engines. [2]

(b) (i) Draw and label the heating curve of water starting from ice. [4]

(ii) Name **one** good and **one** bad conductor of heat. [2]

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(c) The pie chart in **Fig.10.1** shows percentages of main energy sources, used in a mining town.

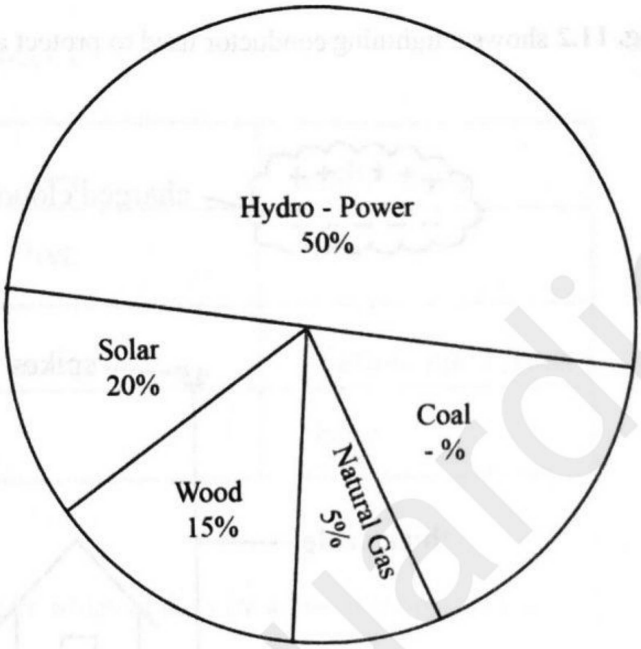


Fig.10.1

(i) Determine the percentage of energy supplied by coal. [1]

(ii) State which sources are renewable. [2]

(iii) Give **two** advantages and **two** disadvantages of using solar lighting system. [4]

11 (a) (i) Explain the term *dispersion of light*. [1]

(ii) Copy and complete **Fig. 11.1** for a colour spectrum formed by a narrow beam of white light.

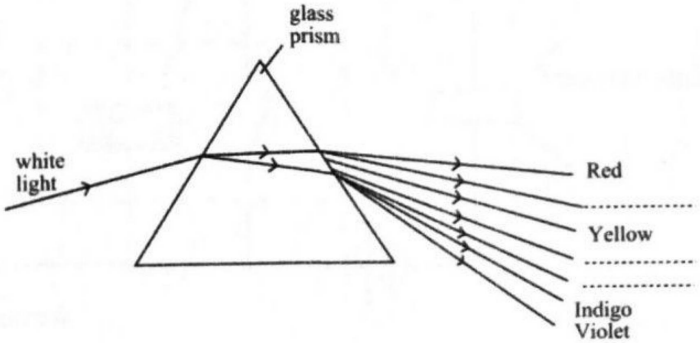


Fig. 11.1

[3]

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(iii) Explain why red light is at the top of the spectrum. [2]

(b) **Fig. 11.2** shows a lightning conductor used to protect a hut against lightning.

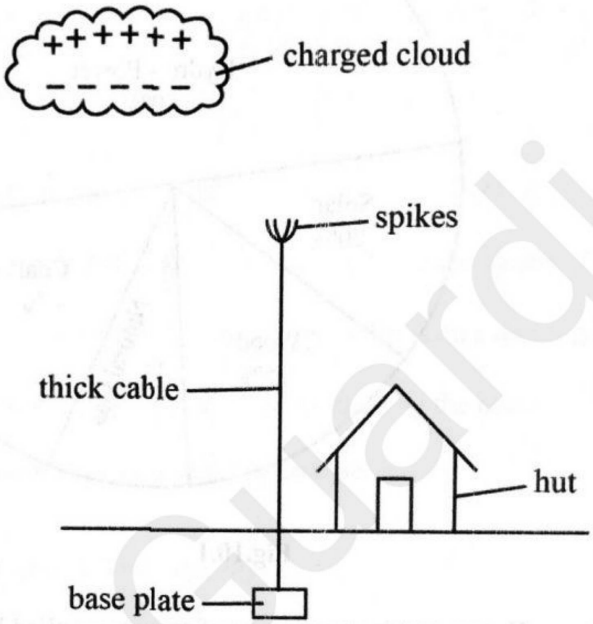


Fig. 11.2

(i) State, with a reason, a suitable material for the cable in **Fig. 11.2**. [2]

(ii) Describe, briefly, how the charge on the cloud is produced. [2]

(iii) Explain why

1. a thick cable is used instead of a thin cable,

2. there are spikes at the top of the conductor. [2]

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(c) **(i)** Copy and complete **Table. 11.1** which shows the three wires connected to a three pin plug and their colour codes.

Table.11.1

wire	colour code
live	
	Yellow and Green
	Blue

[3]

(ii) State on which of the wire a fuse is connected to. [1]

(iii) A filament lamp is connected to a 240 V supply. At maximum brightness a current of 12 A flows through the lamp.

1. Calculate the resistance of the lamp at maximum brightness.

2. Explain why the resistance of the filament lamp **cannot** be assigned a fixed value when current is flowing. [4]

12 **(a)** **Fig. 12.1** shows an electric relay circuit.

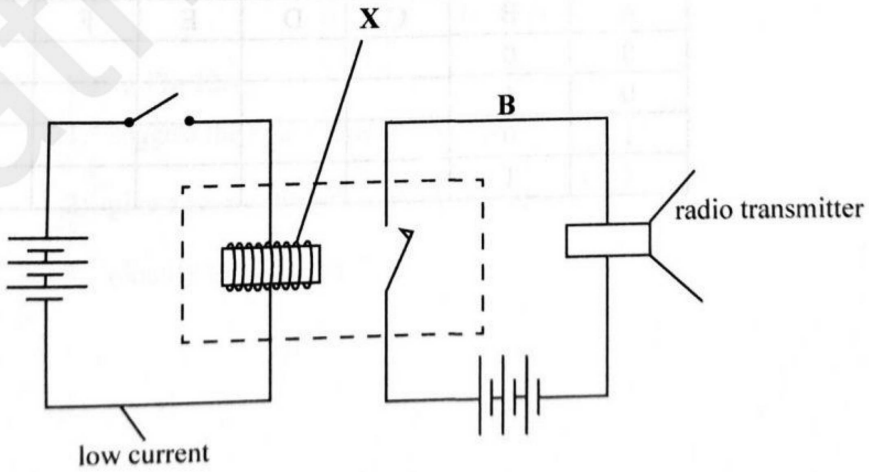


Fig. 12.1

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(i) Identify component X. [1]

(ii) Name materials used to make component X. [2]

(iii) Explain why the materials in **(ii)** are used. [2]

(iv) Suggest why a radio transmitter is connected to circuit B. [1]

(b) Fig. 12.2 shows a combination of logic gates.

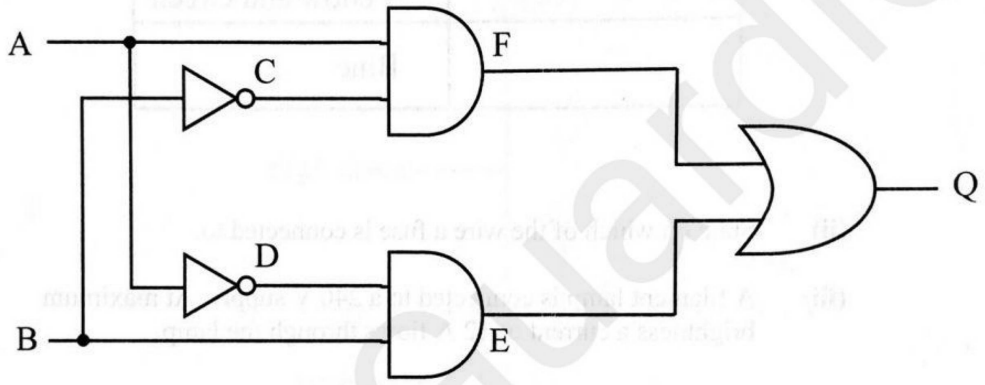


Fig. 12.2

(i) Copy and complete **Table 12.1** for the combination of logic gates in **Fig. 12.2**.

Table.12.1

A	B	C	D	E	F	Q
0	0					
0	1					
1	0					
1	1					

[4]

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(ii) **Fig. 12.3** shows a combination of logic gates.

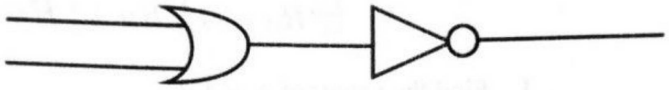


Fig. 12.3

Name a single logic gate which performs the same function as that of the combination in **Fig.12.3**. [1]

(iii) Suggest any **one** use of logic gates. [1]

(c) (i) Describe how radioactive materials are stored. [2]

(ii) **Fig. 12.4** shows a paper milling machine.

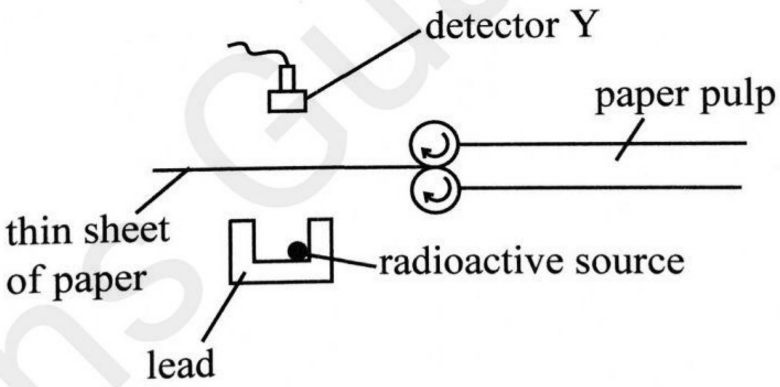


Fig. 12.4

Using **Fig 12.4**,

1. suggest the type of radiation used,

...

2. give a reason for your answer in **(ii) 1**,

...

3. identify the detector Y. [3]

...

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(iii) Radium-226, underwent radioactive nuclear transformation as shown in the following equation:

$$^{226}_{88}Ra \longrightarrow ^{A}_{B}Rn + ^{4}_{2}He + \ energy$$

1. Find the values of A and B.
2. Name any **one** use of the energy released in a radioactive nuclear transformation from the equation in **c(iii).** [3]

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