**NAME: ……………………………… INDEX NUMBER: ………….…………………….. SCHOOL…………………….. SIGNATURE:…………................. DATE:……………….**

**232/2**

**PHYSICS**

**PAPER 2**

**FORM 4**

**TIME: (2 HOURS)**

**DECEMBER EXAM 2021**

**KENYA CERTIFICATE OF SECONDARY EDUCATION**

**PHYSICS**

**Instructions to candidates**

1. Write your **name, index number, school** and **stream** in the spaces provided **above**.
2. Sign and write the date of examination in the spaces provided **above**.
3. Answer **ALL** the questions in the spaces provided in the question paper
4. Marks are given for clear record of the observations actually made, their suitability, accuracy and the use made of them.
5. Candidates are advised to record their observations as soon as they are made
6. **Silent non-programmable** electronic calculators may be used.

*For Examiners use only*

|  |  |  |  |
| --- | --- | --- | --- |
| **SECTION** | **QUESTIONS** | **MAX. SCORE** | **CANDIDATE’S SCORE** |
| A | 1-13 | 25 |  |
| B | 14 | 08 |  |
| 15 | 13 |  |
| 16 | 08 |  |
| 17 | 12 |  |
| 18 | 14 |  |
| **TOTAL SCORE** | | **80** |  |

*This paper consists of 12 printed pages.*

*Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing*

**SECTION A (25 MARKS)**

**Answer ALL the questions in this section in the spaces provided**

1. State one major difference between a primary cell and a secondary cell (1mk)

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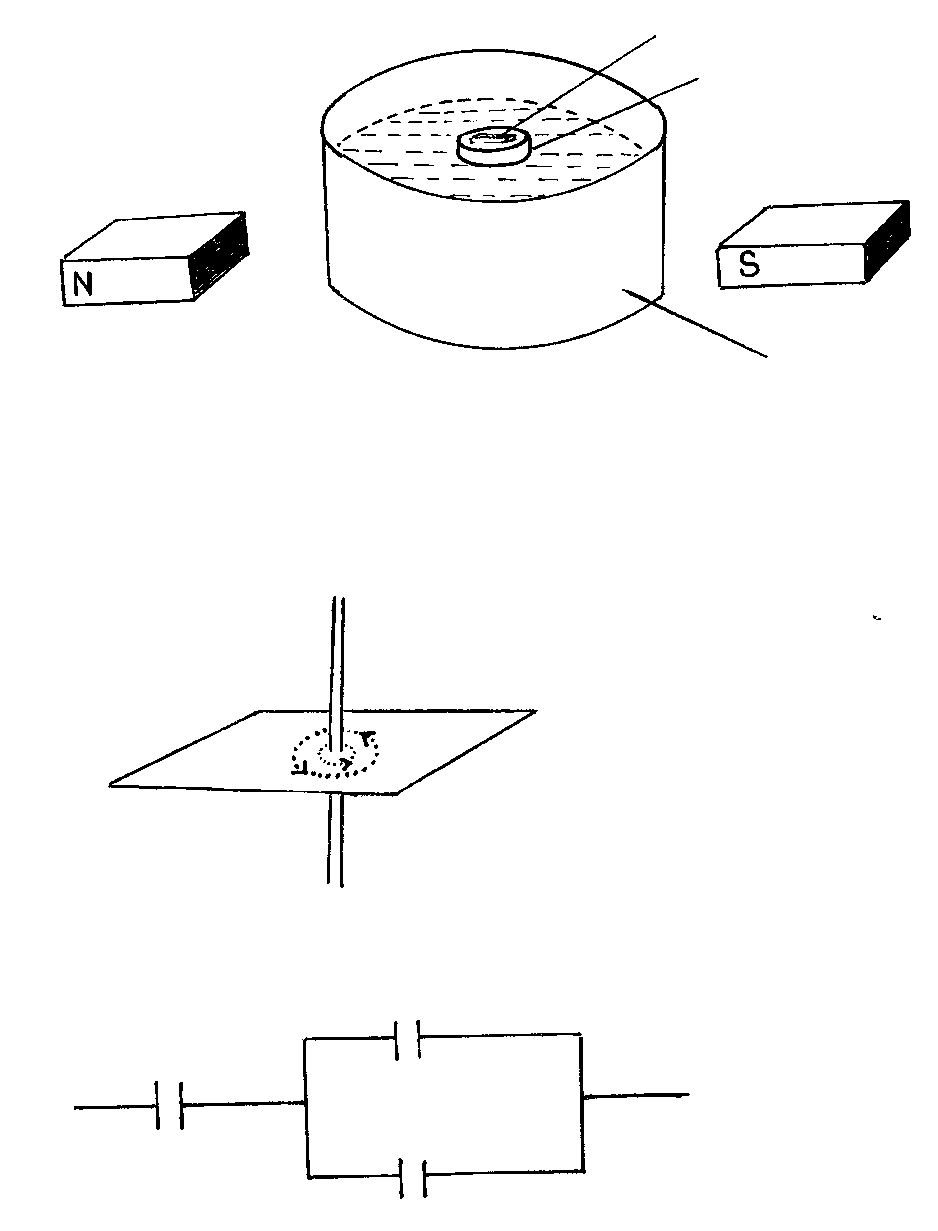
2. A bar magnet was placed in Petri dish and made to float on water in a metallic dish

placed in a strong magnetic field as shown below:- (1mk)

Magnet

Petri dish

Water



S

N

Fig. 1

Metallic dish

State the direction in which the small bar magnet in the Petri dish will rest.

……………………………………………………………………………………………………

3. A positively charged rod is brought near the cap of a lightly charged electroscope.

The leaf divergence first reduces and as the rod comes nearer, it diverges more.

State the charge on the electroscope (1mk)

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4. Explain the behaviour of the leaf in Q3 above. (2mks)

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5. An object 10cm high is placed 30cm in front of a concave mirror. The image is 45cm

in front of the mirror. Determine its magnification and size of the image. (3mks)

6. Fig 2 below, shows magnetic field around a current carrying conductor.

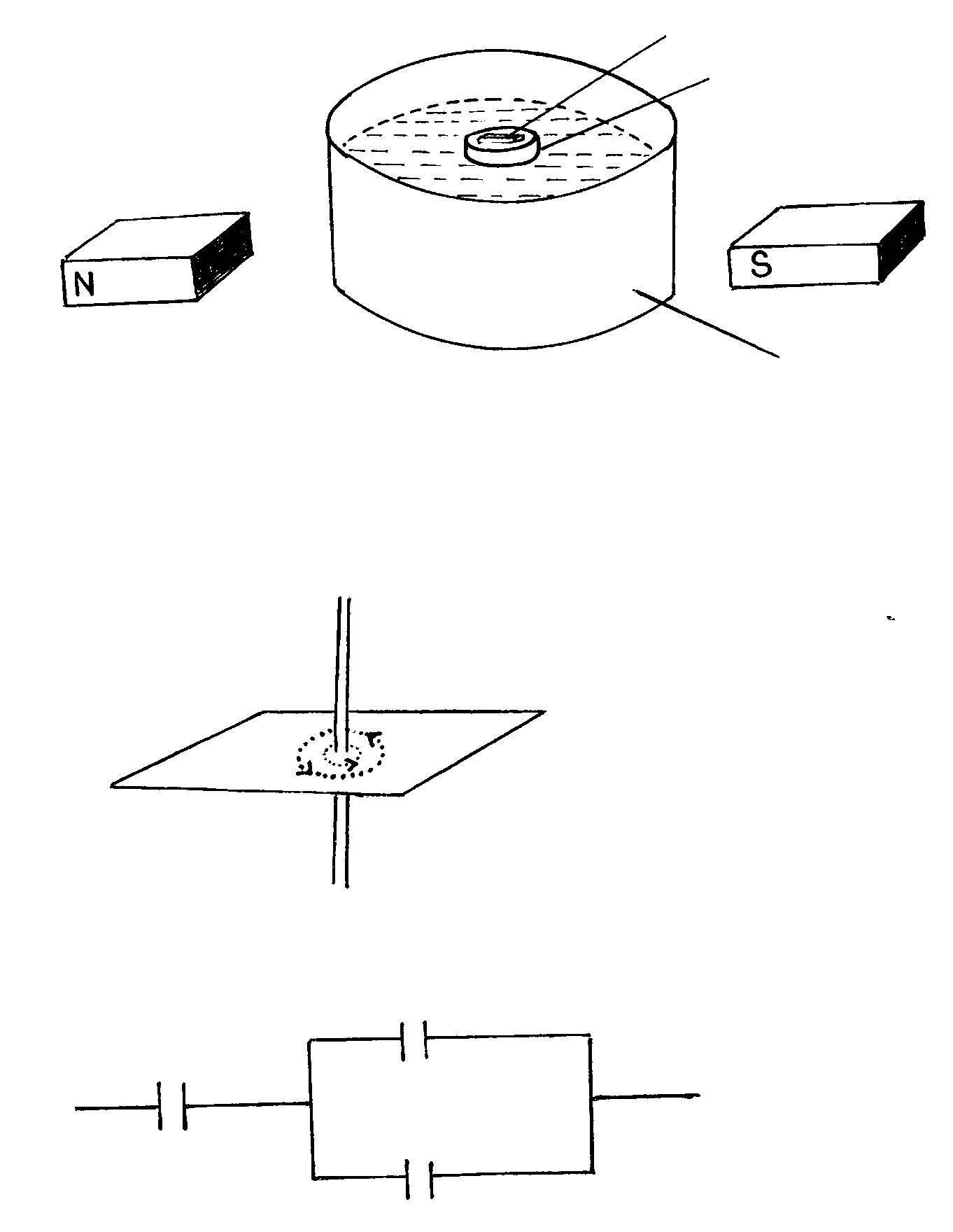


Fig.2

Conductor

Cardboard

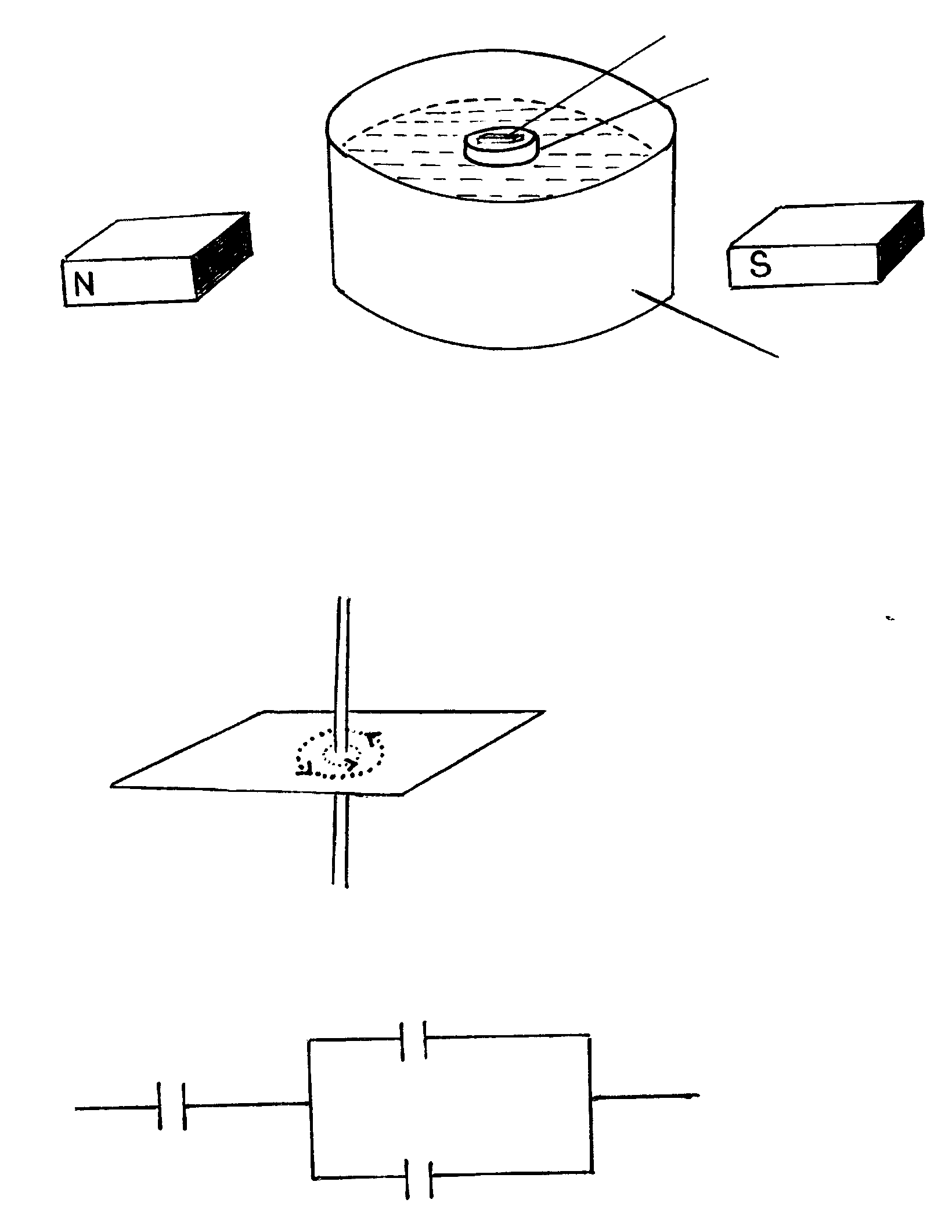
Indicate on the diagram the direction of the current (1mk)

7. Briefly explain how a p-type semiconductor is formed (2mks)

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8. Determine the effective capacitance of the following circuit. (2mks)

2μf



25μf

3μf

Fig. 3

9. A transformer of 480 turns in the primary coil is used to connect a 9.0 volt a.c. electric

device to a 240V a.c mains supply. Determine the number of turns in the secondary coil. (2mks)

10. State two uses of infrared radiation. (2mks)

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11. A house has a lighting circuit operated from a 240 Volts mains supply. Three bulbs rated 100W 240V, ten bulbs rated 40W 240V and eight bulbs rated 60W 240V are switched on at the same time. Determine the most suitable fuse for this circuit. (3mks)

12. An object is placed 20cm in front of a concave lens of focal length 15cm. State two characteristics of the image formed. (2mks)

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13. A ray of light is incident on the surface of water at an angle as shown in figure 4 below.

600

Water

Fig.4

Determine the angle through which it emerges on the water surface. (Take refractive

index of water = 4/3) (3mks)

**SECTION B (55 MARKS)**

**Answer ALL questions in this section in the spaces provided.**

14. a) Fig 5 shows plane waves in a ripple tank. The water is deeper in section A & C than

in section B.

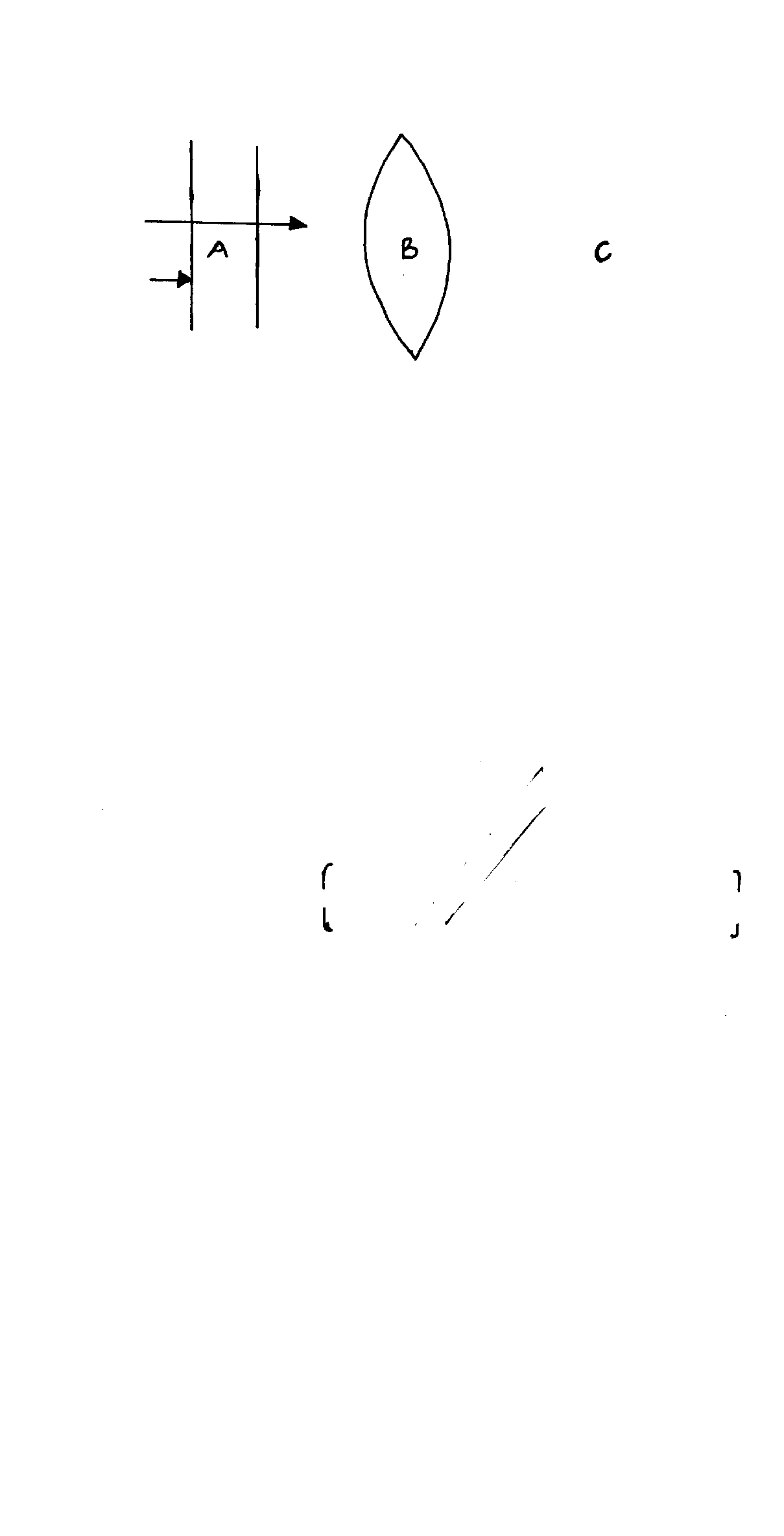


Fig. 5

Shallow

Deep

Deep

Draw the waves after passing section B. (2mks)

b) State two conditions necessary for production of interference. (2mks)

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c) A tube is closed at one end. It is in resonance with a tuning fork of frequency 256Hz sounded above the open end. Given that the velocity of sound in air is 334m/s determine the wavelength of the wave generated by the tuning fork (2mks)

d) State two factors affecting the velocity of sound in air. (2mks)

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15. a) i) State what is meant by photoelectric effect. (1mk)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

ii) (I) You are provided with highly polished Zinc Plate, electroscope, source of ultra – Violet rays, and materials for charging the electroscope. Draw a set up of the apparatus to show how photoelectric effect may be demonstrated in a laboratory. (2mks)

(II) Explain how the set up can be used to determine the nature of photoemission

taking place. (3mks)

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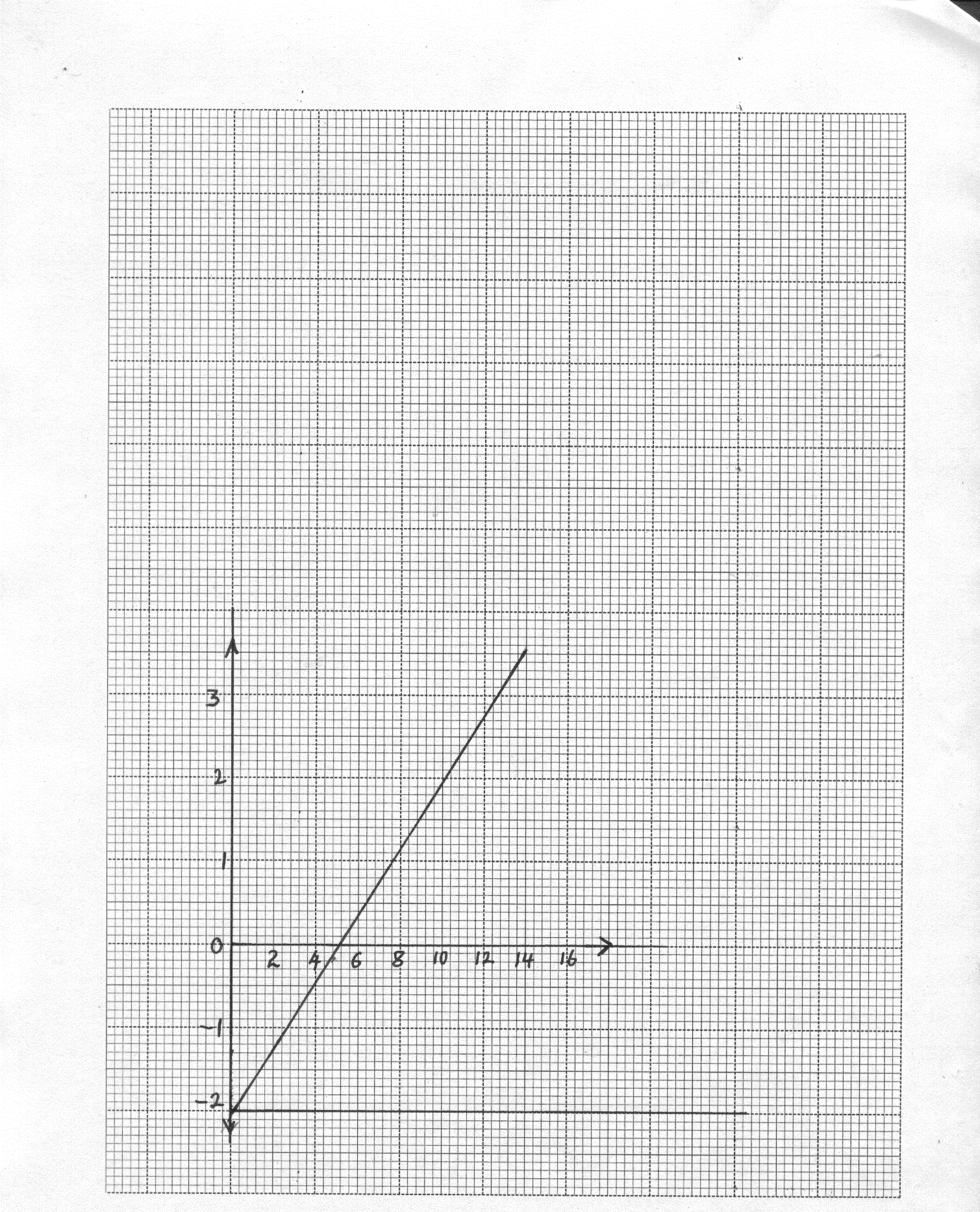
(b)(i) State two factors that affect photo- electric emission. (2mks)

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(ii) When a certain photoelectric surface is illuminated with light of different frequencies,

the corresponding stopping potential was measured.

The graph below shows how frequency (f) varies with stopping potential, Vs.



Vs (V)

f x 1014 Hz

Fig. 6

-

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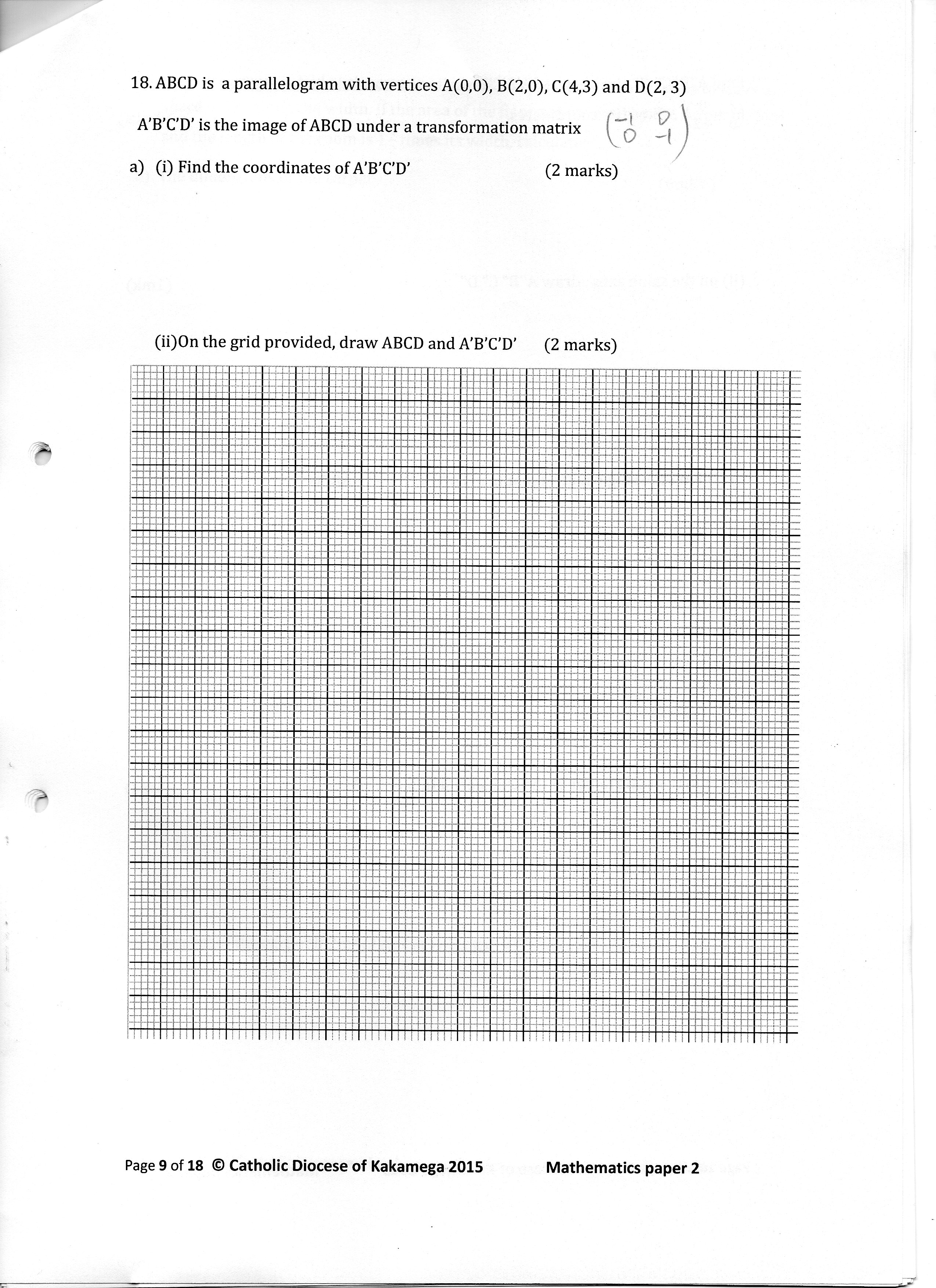
Given that eVs = hf - φ, determine the values of h and φ from the graph. (5mks)

*(electronic charge = 1.6 x 10-19C)*

16. The current in a wire varied with voltage as shown in the following table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Voltages(V) | 1.05 | 1.40 | 1.80 | 2.20 | 2.60 |
| Current (mA) | 150 | 200 | 250 | 300 | 350 |

(a) Plot a graph of V against current. (5mks)

 Hhhhhh

(b) From your graph, determine the resistance of the wire. (3mks)

17. (a) A radio active element has an initial count rate of 3200 counts per minute on a scaler.

The count rate falls to 200 counts per minute in 4 hours.

(i) Determine the half – life of the element. (2mks)

(ii) If the initial number of atoms in another sample of the same element is 4.0 x 1023, how

many atoms will have decayed in 30hrs. (3mks)

(b) What are the values of m and n in the nuclear equation given below. (2mks)

m

230 + 2α + 2β

n 90

m = ­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

n = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(c) Fig. 6 below shows an expansion cloud chamber.

Dark screen

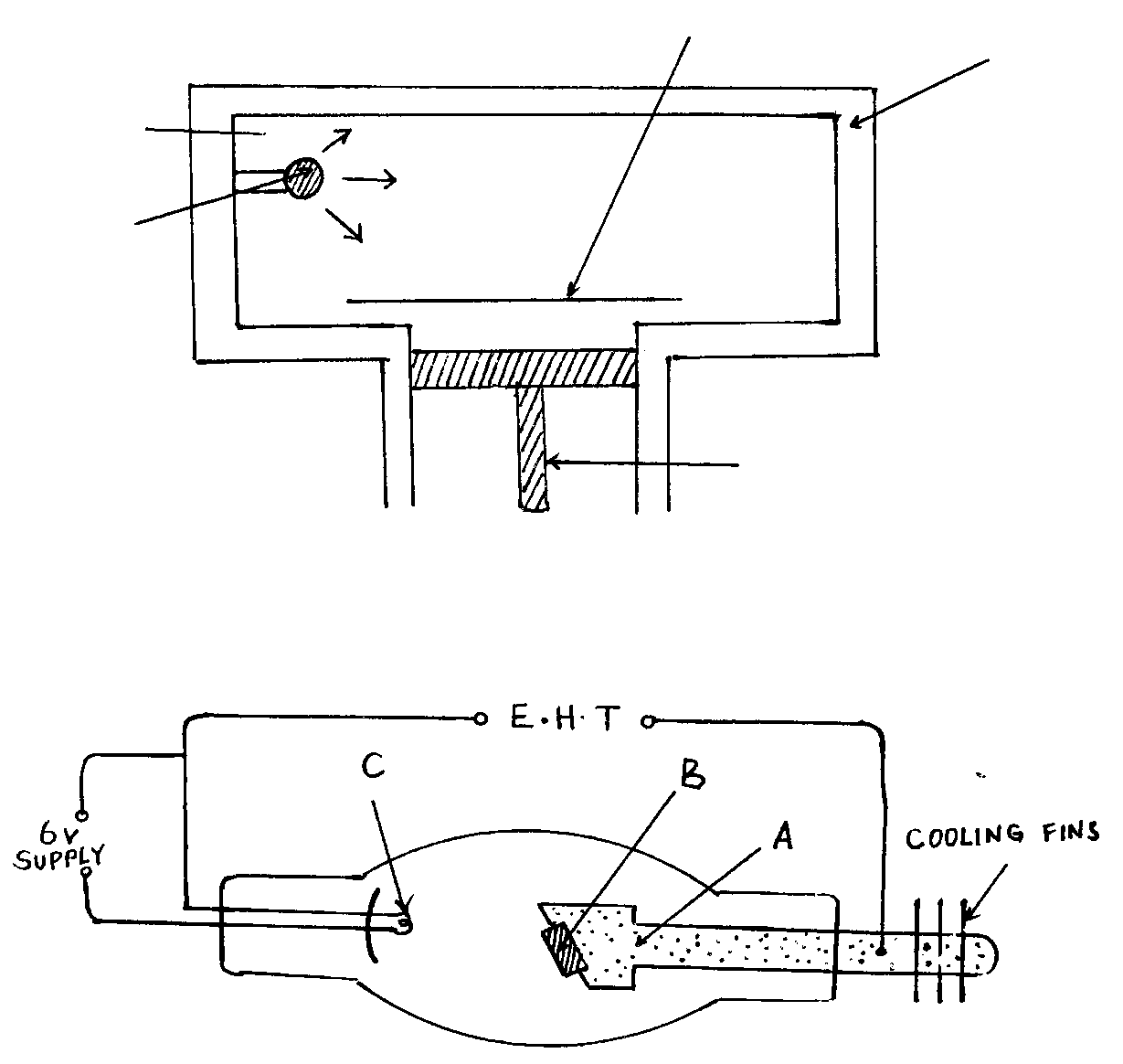


Fig.6

Piston

Glass

Radioactive source

Vapour

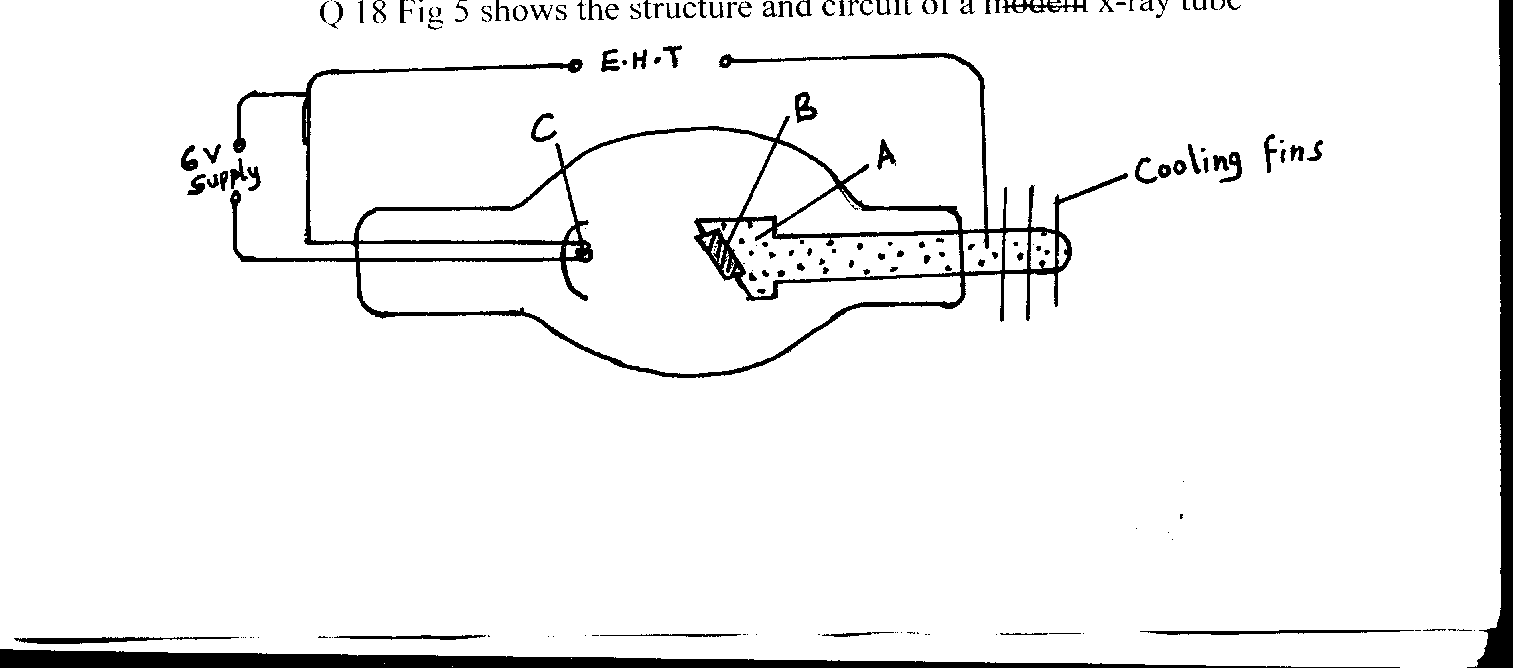
(i) State the purpose of the vapour. (1mk)

…………………………………………………………………………………………………………………………………………………………………………………………………………

(ii) Explain how the radiations emitted by the radioactive source in the chamber are detected (4mks)

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18. Fig 7 shows the structure and circuit of a modern x-ray tube .



(a)(i) Show on the diagram, the path of x-rays produced. (1mk)

(ii) Name and state the use of the parts marked; (6mks)

A

…………………………………………………………………………………………………………………………………………………………………………………………………………

B

…………………………………………………………………………………………………………………………………………………………………………………………………………

C

…………………………………………………………………………………………………………………………………………………………………………………………………………

(b) Briefly describe how the tube produces the x-rays. (3mks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

( c) State how the setting of the tube would be done to facilitate:

(i) production of x –rays with higher penetration ability. (1mk)

(ii) production of x-rays in larger quantity. (1mk)

(d) State energy changes that occur in the tube during x-ray production. (1mk)

…………………………………………………………………………………………………………………………………………………………………………………………………………

(e) State the reason why it is necessary to evacuate the tube. (1mk)

…………………………………………………………………………………………………………………………………………………………………………………………………………