NAME…… ADM NO …… CLASS……

Signature……

Date……

232/2

PHYSICS

FORM FOUR

PAPER 2

(THEORY)

2 HOURS

GOLDLITE EXAMINATIONS
FORM 4 JUNE 2022 PRE-MOCKS

Instructions to candidates

(a) Write your name and Admission number in the spaces provided above.

(b) Sign and write the date of examination in the spaces provided above.

*(c) This paper consist of **two** section **A** and **B.***

*(d) Answer **all** the questions in section **A** and **B** in the spaces provided.*

*(e) All working **must** be clearly shown.*

(f) Mathematical tables and electronic calculators may be used.

(g) This paper consists of 13 printed pages.

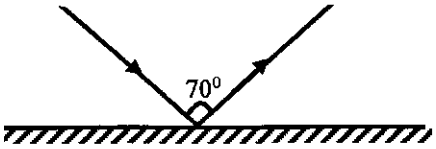
(h) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For examiners use only.

Question	*Maximum score*	*Candidate's score*
1-12	*25*	
13-17	*55*	
Total	*80*	

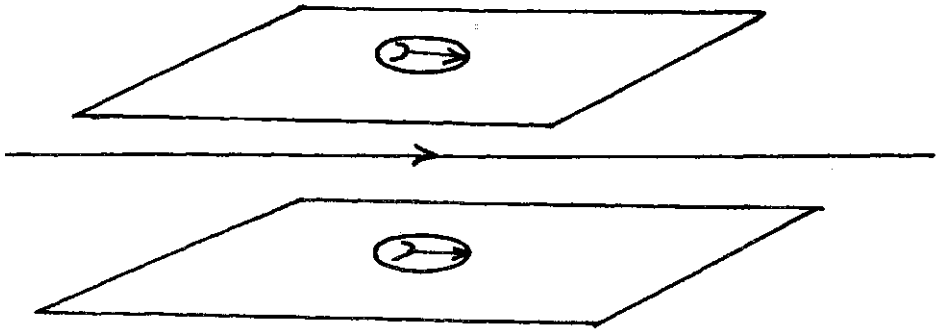
SECTION A (25 MARKS)
ANSWER <u>ALL</u> QUESTIONS IN THIS SECTION IN THE SPACES PROVIDED.

1. Figure 1 shows a ray of a light incident on a plane mirror.
Figure 1

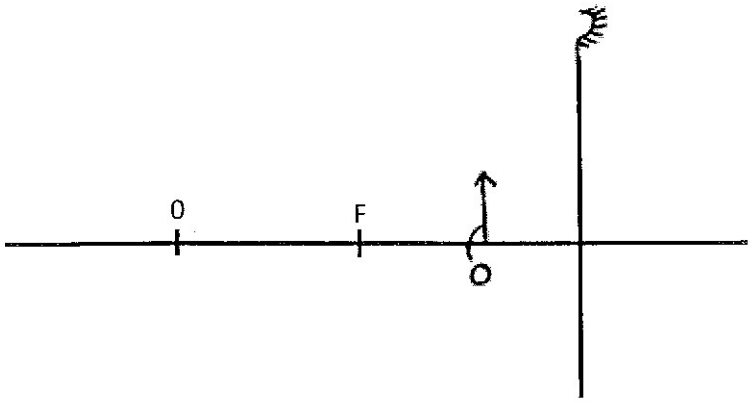


The plane mirror is then rotated clockwise through an angle of 200 keeping the incident ray fixed. Determine the new angle of reflection by drawing. (2mks)

2. The figure below shows a current carrying conductor passing between two cardboards. Show the direction of the deflection on each compass on the cardboard. (2mks)



3. An object O is placed in front of a concave mirror and on the principal axis, as shown in the figure **below**. Complete the light ray diagram to locate the position of the image. (3mks)



4. Give a reason why lecture theatre halls are covered with soft perforated materials. (1mk)

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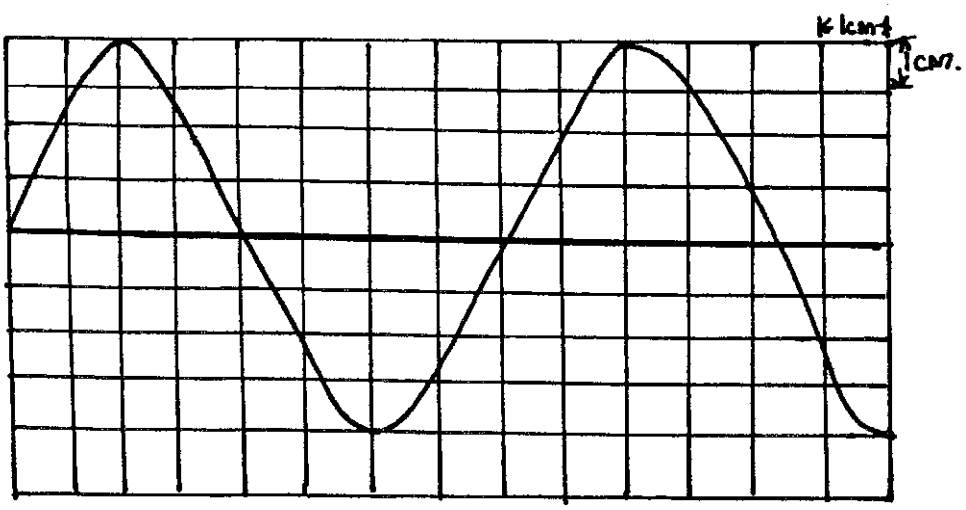
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5. State one factor which does not change as water waves move from shallow deep end. (1mk)

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_____

6. The figure below show a CRO screen display trace when the Y-amplification control and time base settings are 100mV and 0.8ms/cm respectively.

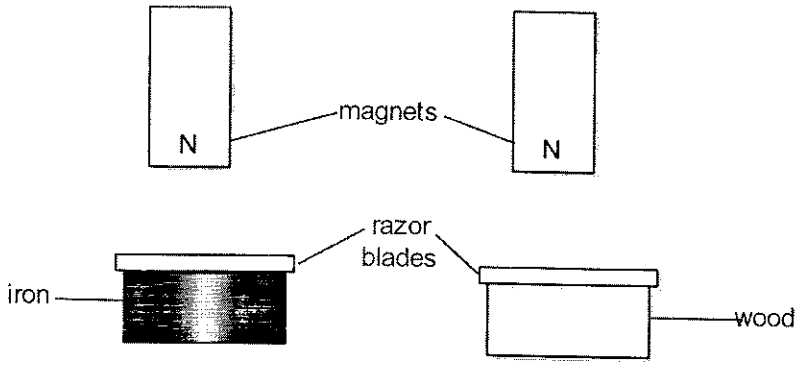


Calculate:

a. The peak potential difference.
(2mks)

b. The frequency of the signal.
(2mks)

7. Two similar razor blades were placed on a wooden block and the other on an iron block as in figure 7.
Figure 7.



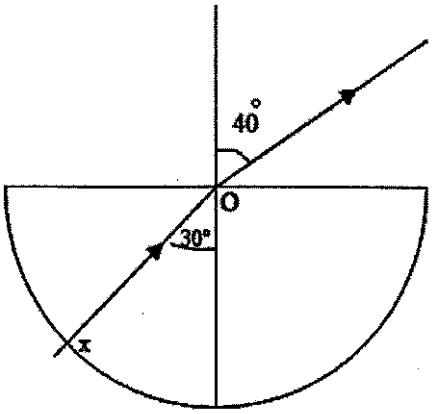
It was observed that the razor blade on the wooden block is attracted by the magnet while that on the iron block was not. Explain.
(2mks)

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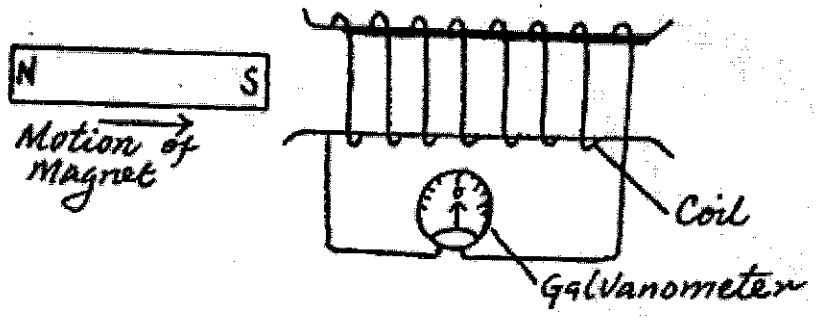
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8. The figure below represents a ray of light falling normally on the curved surface of a semi-circular plastic block at X, meeting the opposite face at an angle of incidence of 30^0 and emerging into the air at an angle of $40^{0.}$



Calculate refractive index of the plastic.
(3mks)

9. A bar magnet is moved into a coil of insulated copper wire connected to a centre-zero galvanometer, as shown in the figure below.



Show on the diagram the direction of induced current in the coil.
(1mk)

10. Determine the cost of using an electric heater rated 3kW for 12 hours given that the cost of electricity per kilowatt hour is sh 8.00.
(2mks)

11. An electric heater rated 240V, 3000W is to be connected to a 240V mains supply, through a 10A fuse. Determine whether the fuse is suitable or not.
(3mks)

12. The chart below shows an arrangement of different parts of the electromagnetic spectrum

Radio	A	Infrared	Visible	B	X-Rays	Gamma Rays

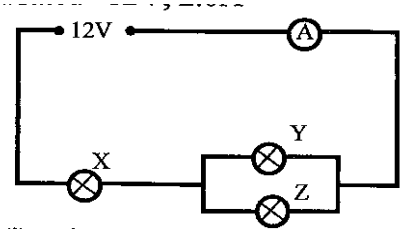
State one use of the radiation represented by B.
(1mk)

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SECTION B (55MARKS)

13. (a) The figure below shows how a student set up a circuit using 3 identical bulbs X, Y and Z each rated “12V, 2.0A”



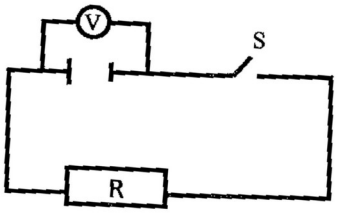
i. When operating normally, calculate the resistance of one of the bulbs.
(2mks)

ii. Calculate the effective resistance of the three bulbs.
(2mks)

iii. What will be reading of the ammeter?
(2mks)

iv. Draw a circuit diagram showing the three bulbs connected in such a way that they would all work at the same brightness especially if they are not identical. (2mks)

(b) When the switch S is kept open in the circuit shown below the voltmeter reads 1.5V. When the switch is closed, the readings drops to 21.3V and the current through the resistor is 0.5A.



i. What is the e.m.f of the cell?
(1mk)

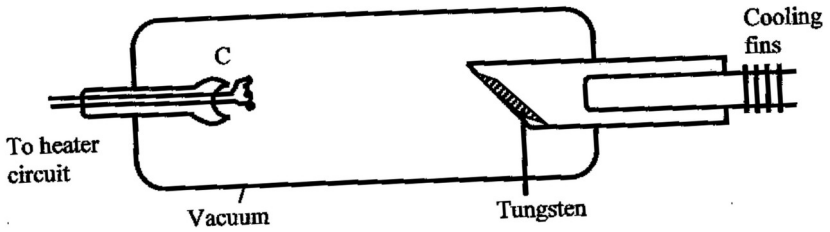
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ii. What is the terminal voltage of the cell?
(1mk)

_____

iii. Calculate the value of R
(2mks)

14. The Figure below is of an x-ray tube



a. Explain how x-rays are produced by the tube.
(4mks)

_____

_____

_____

_____

b. Explain briefly the energy changes that take place when the x-ray tube is operating. (3mks)

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c. Why is it necessary to maintain a vacuum inside the tube?
(2mks)

_____

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_____

d. The accelerating voltage of an x-ray tube is 12V. Calculate the speed of the electron on reading the anode. (Charge to mass ratio of an electron $\frac{e}{me}$ = $1.76X10^{11}$ (3mks)

15. (a) A strong positive charged rod is brought close to the cap of a charged electroscope from a high position. It is observed

i. State the charge on the electroscope.

(1mk)

_____

ii. Explain this observation.

(2mks)

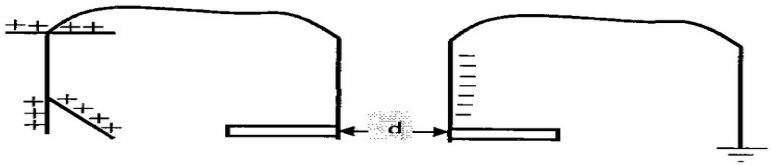
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(b) A parallel- plate capacitor is connected to an electroscope as shown in fig 7. Below

Figure 7



State and explain the behavior of the leaf when the distance (d) between the plates is increased

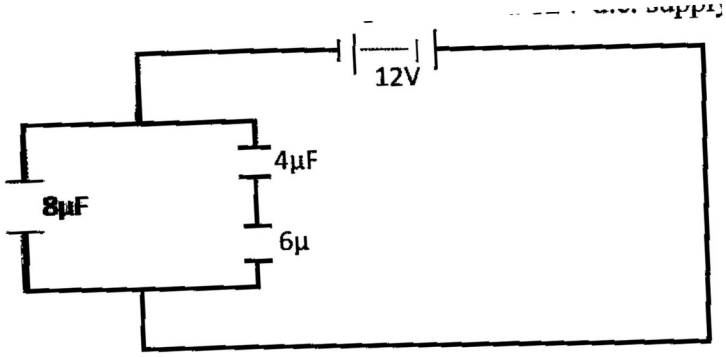
(2mks)

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(c) Figure 8 shows an arrangement of capacitors to a 12V d.c. supply



Determine

i. Effective capacitance
(3mks)

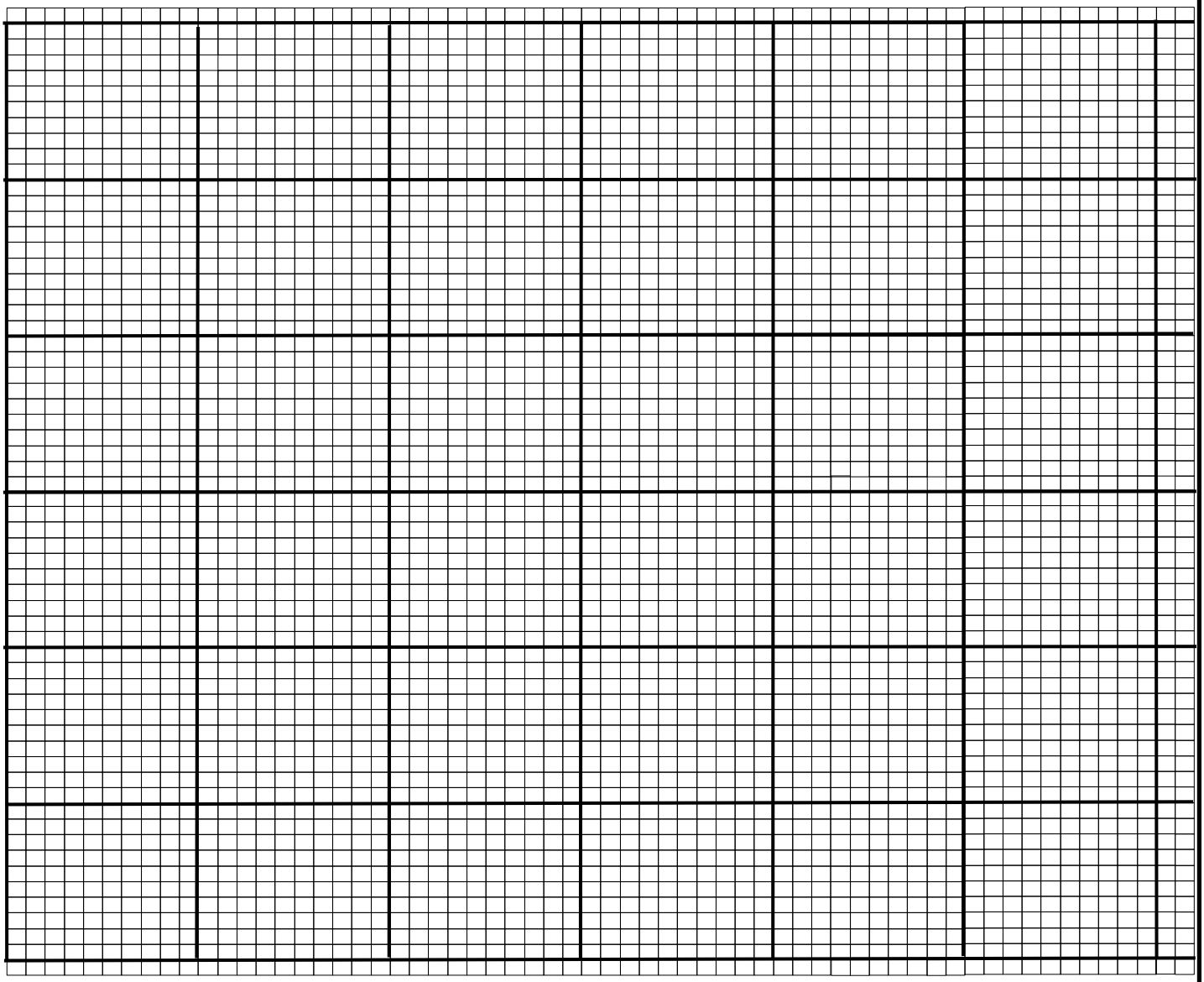
ii. Charge across the 8μF capacitor.
(3mks)

16. (a) **Define the term** monochromatic light
(1mk)

(b) The table below shows values of stopping potentials, V_2 and their curves pending frequencies for a metal surface monochromatic light is shone on it.

Stopping potentials, Vs	1.2	0.88	0.60		0.78
0.12Frequency (xx 10^{14}Hz)	7.5	6.7	6.0	5.2	4.8

i. Plot a graph of stopping potentials. Vs against frequency.
(4mks)



From the graph **determine**

ii. Thresh hold frequency
(1mk)

iii. The Planck's constant, h (take $=1.6^{-19}$ x10C)
(2mks)

iv. The work function
(2mks)

17. (a) Study **figure 8** and answer the following questions.

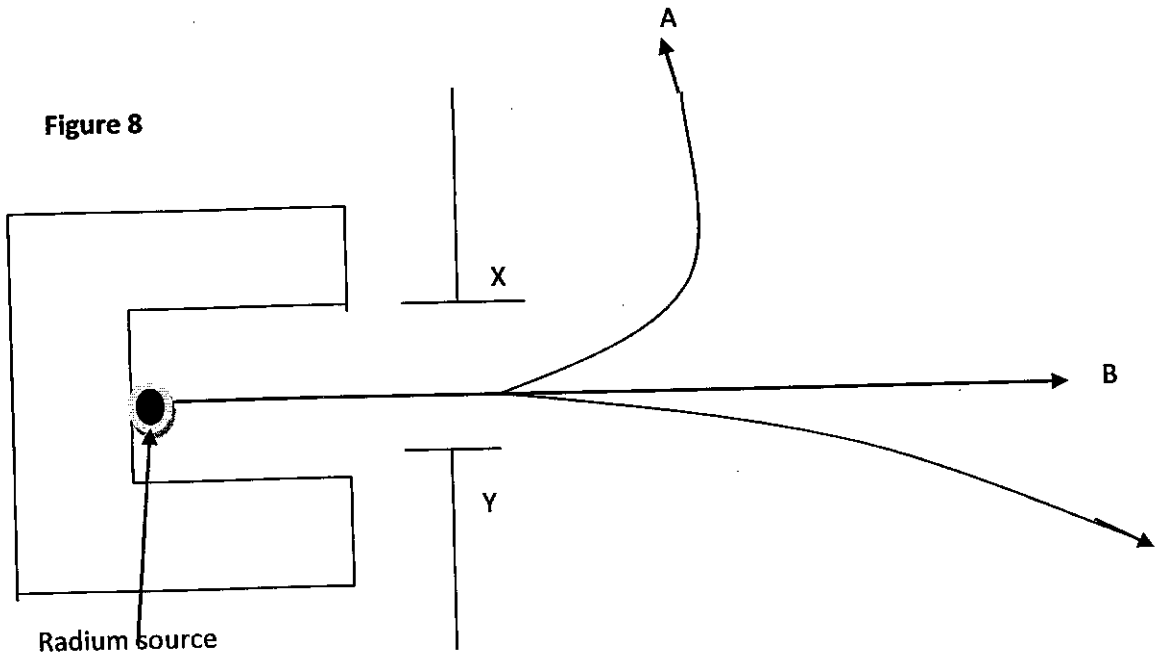


Figure 8

i. State the charge on plate X
(1mk)

ii. Identify the radiation A and B
(1mk)

A_____

_B_____

__

iii. A nuclear reaction is represented by the following equation.

$$\text{¿}\text{ɔ}2\text{¿}a\,x \longrightarrow {}^{234}_{b}\int y + \text{Alpa particle}$$

Determine the value of a and b.
(2mks)

iv. ●
A radioactive source has an activity of 810c/s and after 63 hours the count rate falls to 110c/s. If the background count is 10c/s, determine the half –life of the source. (3mks)

(b)(i) Draw using appropriate symbols the circuit diagram of a junction diode in reverse bias.
(1mk)

(ii) Extrinsic semiconductors are made through a process called doping. Explain how doping produces an n-type semi-conductor.
(2mks)

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_____

_____

(iii) Distinguish between a semiconductor and a conductors.
(2mks)

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