Name: …… Index No. ……

Candidate's Sign. ……..……..…….....

Date: **……**

232/2

PHYSICS

Paper 2

TIME: 2 HOURS

Physics
Paper 2
Time: 2 Hours

INSTRUCTIONS TO THE CANDIDATES:

- Write your **name** and **index number** in the spaces provided above
- This paper consists of ***two*** sections **A** and **B.**
- Answer ***all*** questions in section **A** and **B** in the spaces provided.
- All working ***must*** be clearly shown in the spaces provided.
- Mathematical tables and electronic calculators may be used.

For Examiners' Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-13	25	
B	14	09	
	15	14	
	16	13	
	17	09	
	18	10	
	TOTAL	**80**	

This paper consists of 8 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A (25MARKS)

Answer all the questions in the spaces provided

1. Define the term accommodation as used in the human eye. (1mk)

……

2. The diagram in **fig 1**below shows a coin placed at the bottom of a tank so that it is beyond the view of the eye. Sketch the rays to show how the coin can be brought into view when water is added into the tank to a suitable level. (2mks)

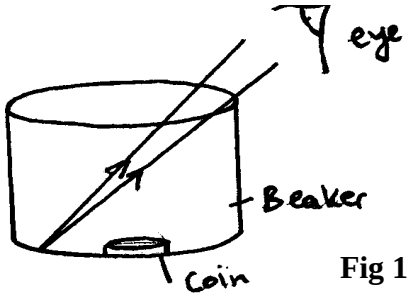


Fig 1

3. Two pins are hanging form a magnet as shown in the diagram below figure 2. (2mks)

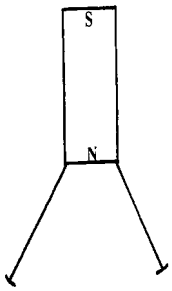


Fig 2

Explain why the nails do not hang vertically downwards.

……..

……

4. (i) Arrange the following waves in order of decreasing wavelength; x-rays, infrared, microwaves and visible light. (1mk)

……..

(ii) State **one** application of visible light. (1mk)

……

5. The figure below shows a metre rule in equilibrium with the magnet and weight W. The soft iron core is fixed to the bench.

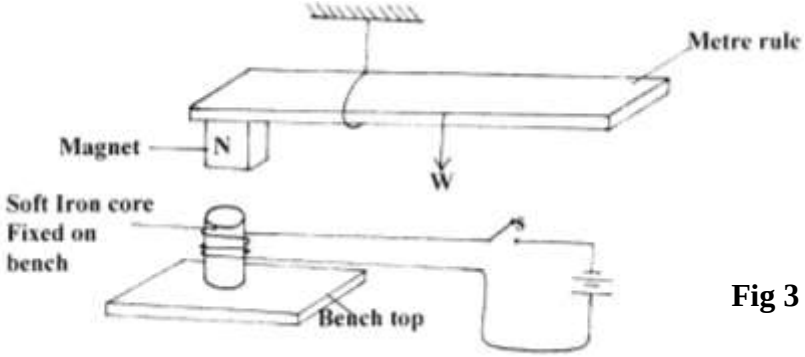


Fig 3

State and explain the effect on the metre rule when the switch S is closed. (2mks)

……..

……

6. Determine the reading of the ammeter in figure 4 below. (2mks)

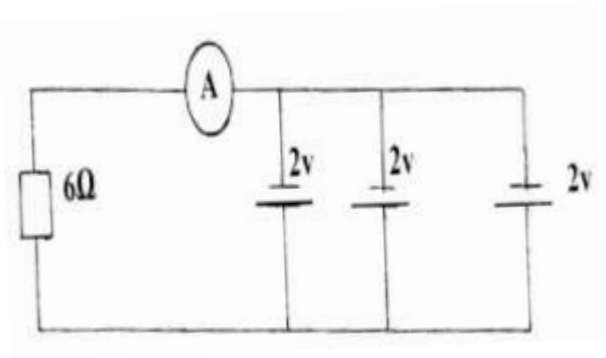


Fig 4

7. An electric bulb is rated 75W,240V. Determine the resistance of the bulb. (3mks)

8. Figure 5 shows the image, **I**, formed by a concave mirror. Locate using ray diagrams the position of the object. (2mks)

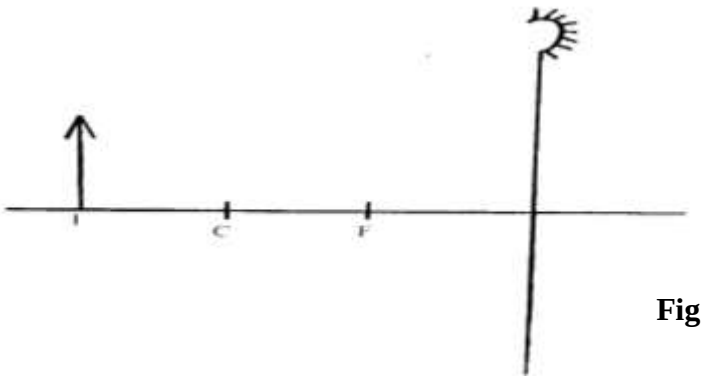


Fig 5

9. State **two** factors that affect the capacitance of a parallel- plate capacitor. (2mks)

……..

……

10. The diagram below shows the trace signed on the CRO.
Given that the time based is set at 100ms/div. determine the frequency of the signal. (2mks)

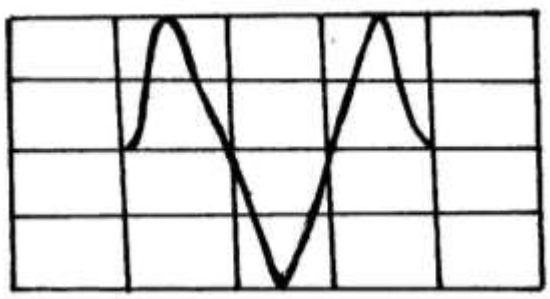


Fig 6

11. Other than temperature state any other **one** factors that affect the resistance of an ohmic conductor.
…… (1mk)

12. A sharp point of a pin is held in the bare hands and brought near the cap of a positively charged electroscope. State and explain the observation made on the electroscope. (2mks)
……..
……

13. Differentiate between local action and polarization as defects in a simple chemical cell. (2mks)
……..
……

SECTION B (55 Marks)

Answer all the questions in this section in the spaces provided

14. (a)Distinguish between transverse and longitudinal waves. (2mks)
……..
……

(b) The figure below shows an arrangement used to observe interference pattern of red light.

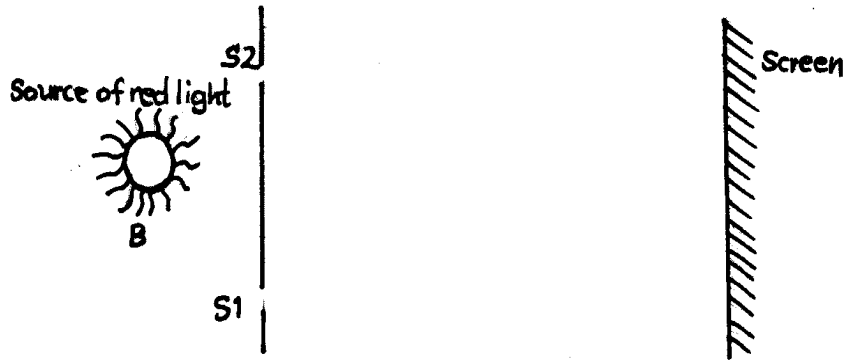


Fig 7

S_1 and S_2 are slits; **B** is a source of light images or fringes that are formed on the screen. State what happens to the separation of fringes when;

(i) Slit separation is increased (1mk)
……..

(ii) Green light is used(1mk)
……..

(iii) State with a reason what is observed on the screen (2mks)
……
……..

(c) Explain why interference pattern is due to both diffraction and interference. (2mks)
……..
……

15. (a) A ray of light makes a glancing angle of incidence i=60^o with a flat glass surface as shown in

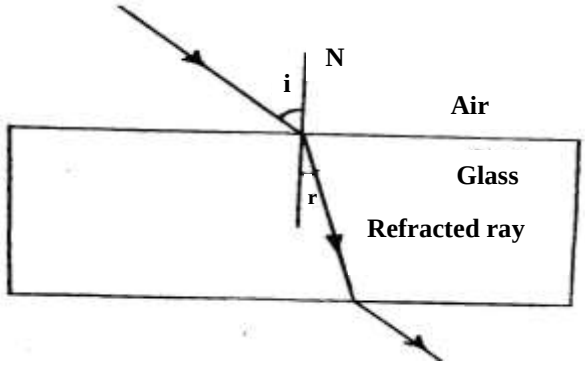


Figure 8

Given that the critical angle for glass is 42^o determine;

(i) The refractive index of glass (2mks)

(ii) The angle of refraction **r** (3mks)

(iii) Given that speed of light in air 3.0 x 10^8 m/s, find the speed of light in glass (2mks)

(b) A microscope is focused on a mark on a horizontal surface. A rectangular glass block 30mm thick is placed on the mark. The microscope is then adjusted 10mm upwards to bring the mark back to focus.

Determine the refractive index of the glass. (3mks)

(c) State the conditions necessary for the total internal reflection to occur (2mks)

……..

……

(d) An Eskimo walking along an iceland observed an inverted image in the sky of a polar bear standing distance away. Explain. (2mks)

……..

……

16. (a) Define the following:

(i) Photoelectric effect (1mk)

……..

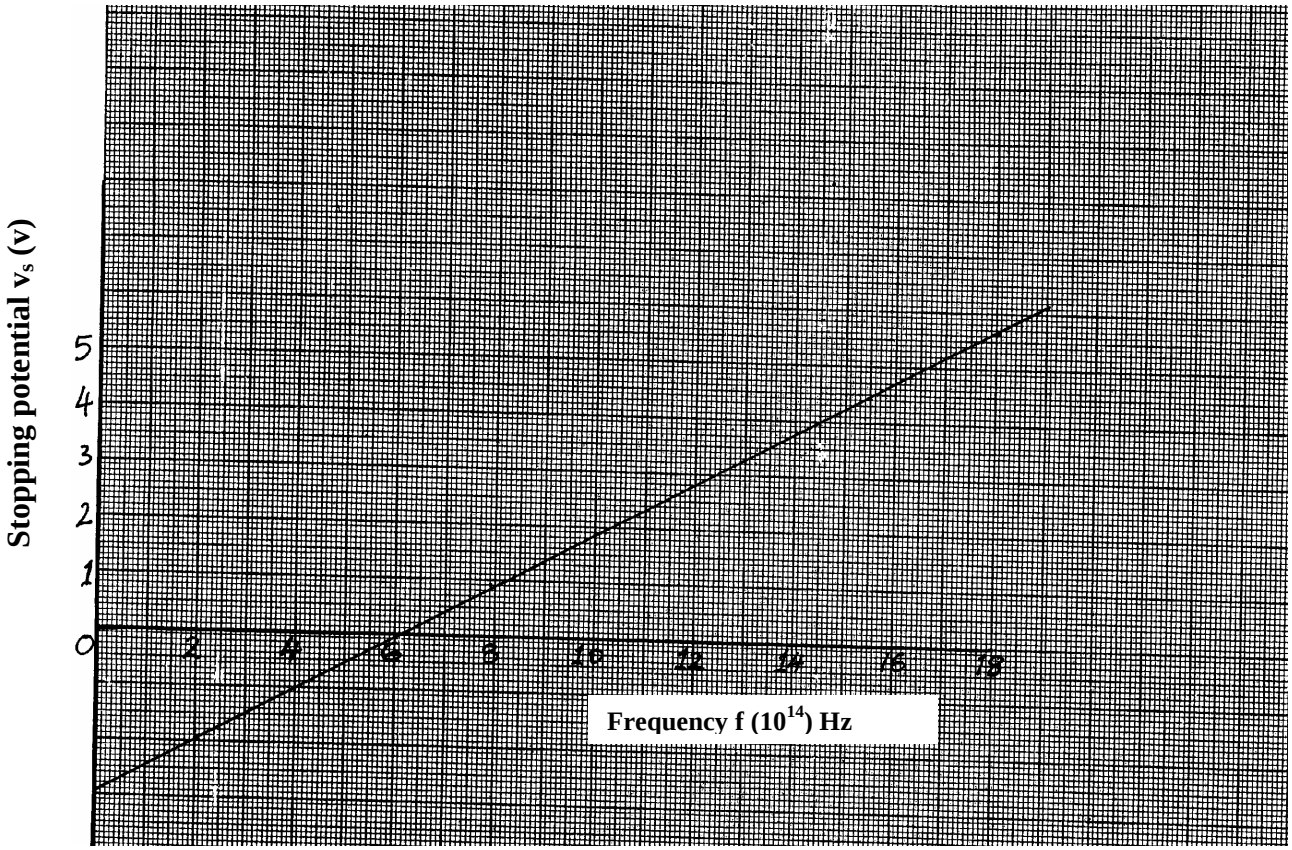
……

(ii) Threshold wavelength (1mk)

……..

……

(b) The graph below shows the stopping potential and corresponding frequencies of photocell.



From the graph determine

(i) The threshold wavelength (3mks)

(ii) The plank's constant (3mks)

(iii) The work function of the metal (3mks)

(b) The figure below shows the wiring in a modern mains appliance

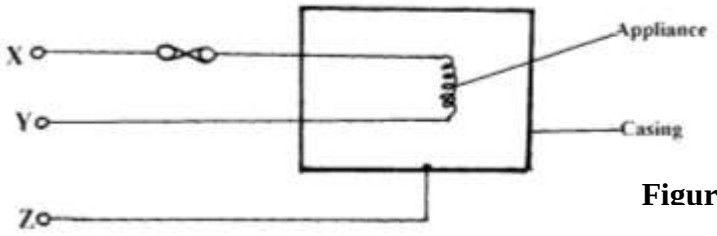


Figure 9

Identify the wires **Y** and **Z** (2mks)

Y……

Z……

7. (a) Distinguish between intrinsic and extrinsic semiconductors. (2mks)

……..

……

(b) (i) A junction diode is used as a rectifier. Draw a simple circuit to show two junction diodes and a centre tapped transformer can be used to produce a full wave rectified a.c (3mks)

(ii) Name **two** other uses of junction-diode. (2mks)

……..

……

(c) The graph in the figure 10 below shows a forward bias characteristics of a p-n junction.

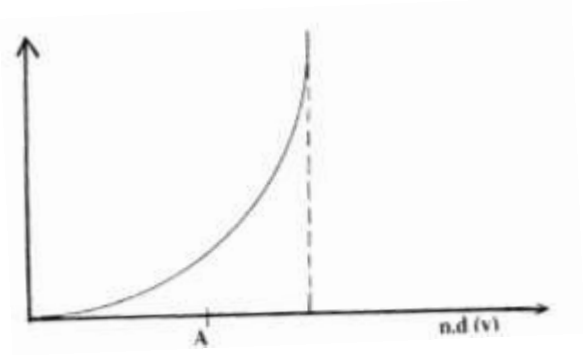


Figure 10

The depletion layer decreases from O to A. Explain what is meant by depletion layer. (1mk)

……..

……

(d) What is the advantage of rectifying using four diodes instead of two. (1mk)

……..

8. (a) Define the term half life of radioactive material (1mk)

……..

(b) A radioactive source and a detector are used to check the level of fruit juice in a carton. Cartons of fruit juices pass between the detector and radio active source, as shown in the figure below, the radioactive source emits β - particles.

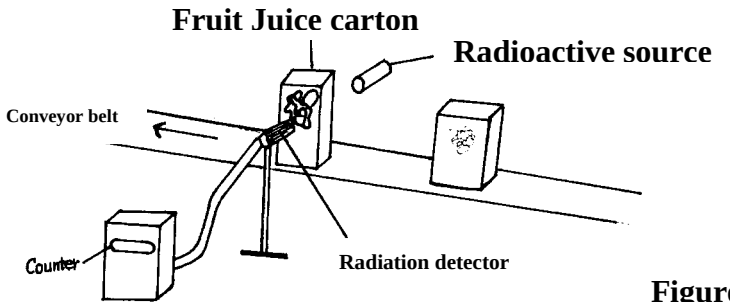


Figure 11

(i) State the name of a suitable conductor of the β-particles (1mk)

……..

(ii) Explain why the level of detected radiation falls when a full carton of juice goes past the detector. (1mk)

……

(iii) Explain why a source emitting α-particles is not suitable for use (1mk)

……..

(c) The half life of an isotope is 4 days. If its initial mass is 32mg, what mass of the isotope will decay after 12 days. (3mks)

(d) Fig 12 below shows the paths taken by three radiations, **x,y** and **z** from a radiation source through an electric field.

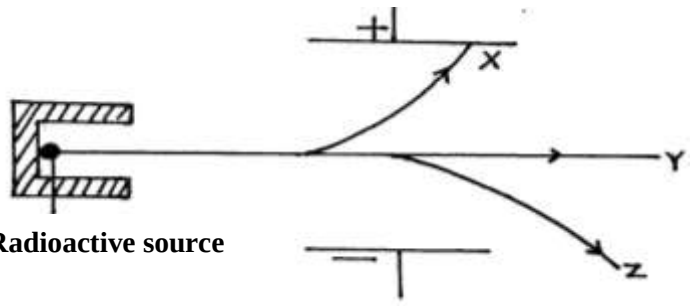


Figure 12

Identify the radiations **Y** and **Z** (2mks)

Y ……..

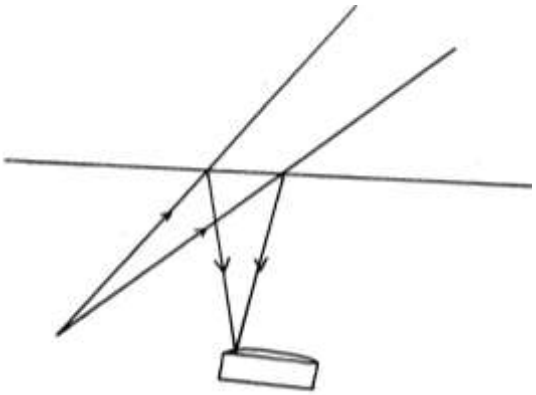
Z ……

(e) State any **two** applications of ratio isotopes (2mks)

……..

……

PHISICS 233/2 MAKING SCHEME

1. This is the relaxation of the ciliary muscles to increased forced length of focus distant or contraction of the ciliary muscles to reduce tension in lens to focus wear object
2. 

3. Ends of the nails furthing away from the holes of the magnet have the same polarity i.e south pole hence repel each other

4. (i) X-rays, visible light, infrared, microwaves

(ii) -Enable the eye to see

- Used in ordinary photography / optical fibres and laser amplification

5. The metrerule is attracted to the soft inner core; when the switch is closed current flows through the circuit the core gets magnetized with end near magnet being south pole

6. $I = {}^{V}/_{R} = {}^{2}/_{6} = 0.333A$

7. $P = \frac{V^2}{R}$ $R = \frac{V^2}{P} = \frac{(240)^2}{75}$

$= 768\ \Omega$

8. Rays from the tip parallel to the principle axis, reflection through principal force. And ray through c reflected along the same path.

-Position of images

9.

- Area of overlap of the plate
- Distance of separation of the plates
- Type of dielectric material between the plates

10. Total line = 3 x100 = 3000ms

Total number of cycles = 1.5

$T = \frac{300}{1.5} = 200ms$

$F = \frac{1}{200 \times 10^{3}} = 5HZ$

11.

- Length of the material
- Nature of the material
- Cross section area

12

13. Local actions is the eating away of the zinc plate as it reacts with the electrolyte while polarization is the formation of the hydrogen bubbles around the copper plate which creates back emf

14. (a) Transverse waves direction of propagation of perpendicular to the vibration of molecules / particles while longitudinal waves the distance of propagation is parallel to the vibration of molecules / particles

(b) (i) Distance between dark and bright fringes will decrease

(ii) Accernaty dark and green / bright fringes will be observed on the screen

15. (a) (i) $\frac{u}{\text{Sinr}} = 1 \quad = \frac{1}{\sin 42}$

$= 1.4945$

(ii) $1.4945 = \frac{\sin 60^0}{\text{Sin r}}$

$\text{Sin r} = \frac{\sin 60^0}{1.4945}$

$r = 35.4140$

(iii) $u = \frac{\text{speed in air}}{\text{Speed in glass}}$

$\text{Speed in glass} = \frac{3.0 \times 10^8}{1.4945}$

$= 2.007 \times 10^8 \text{m/s}$

(b) $u = \frac{\text{Reel depth}}{\text{Apparer depth}}$

$\frac{30\text{mm}}{20\text{mm}}$

$= 1.5$

(c) - The angle of incidence in the dencer medium must be greator than the critical angle
- The light must travel from dense to less dense medium

(d)The air near the surface is cooler than air above Rays from the bear are gradually refracted away from the usual hence totally internally reflected when it is at the boundary at an angle greater than the critical angle hence the image of the beer is inverted.

(iii) Bright thing are as a result of constructive interface while dark things are as a result of destructive interface.

(c) The double spits act as coherent sources of light. The waves scatters as a result of diffraction then overlap.

16. (a) (i) Emision of electrons from surface of metal by shining light of surfficient energy on them.

(ii) Maximum wavelength beyond which no photoelectricity occurs

(b) (i) $F = 6.4 \times 10^{14}\text{Hz}$

$X = \frac{3.0 \times 10^8}{6.4 \times 10^{14}}$

$= 0.46875 \times 10^{-6\text{m}}$

(ii) From the vertical intercept $^{Wo}/_{e} = 3.0e\sqrt{}$

$Wo = hf_o$

$h = 3 \frac{\times 1.6 \times 10^{-19}}{6.4 \times 10^{14}}$

$= 7.5 \times 10^{-34}\text{js}$

(iii) $Wo = 7.5 \times 10^{-34} \times 6.4 \times 10^{14}$

$= 4.8 \times 10^{-20}$

(b) Y – Neutral wire

Z – Earth wire

17. (a) Intrinsic semiconductors are poor semiconductors while Extrinsic semiconductors are those whose conductivity have been enhanced by dopping / addition of impurities

(b) (i)

(ii) – half wave rectification
- Full wave rectification
(c) The region accupied by uncovered fixed ions
(d) A smaller transformer can be used since does not require centre tapping

18. (a) Time taken for a radiation substance to reduce to half its ariginal mass
(b) (i) Geiger muller tube
(ii) Some of the better particles can observed by the dense obstacle since beta particle have low penetration power
(iii) Alpha particles have very low penetrating power and will be stopped completely by paper
(c) $N = No (½)^{T}/t$
$= 32 (½)^{12}/_{4}$
$= 4g$ remaining

Mass decayed = 32-4
= 28mg

(d) Y- Gamma radiation
X – Beta radiations
(e) Carbon daty
- Medicine – killing cancer cells, sterilization of medical equipment