232/2 MS
PHYSICS
Paper 2
MARCH 2021

THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education

PHYSICS

Paper 2

MARKING SCHEME

(CONFIDENTIAL)

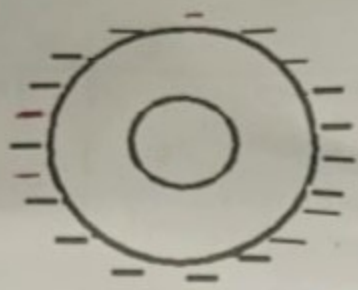
THIS MARKING SCHEME IS THE PROPERTY OF THE KENYA NATIONAL EXAMINATIONS COUNCIL AND IT MUST BE RETURNED TO THE KENYA NATIONAL EXAMINATIONS COUNCIL AT THE END OF MARKING.

This marking scheme consist s of 11 printed pages.

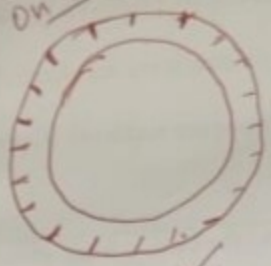
SECTION A: (25 marks)

1.	The image size increases √~~becomes larger~~/bigger/magnified	(1 mark)
2.	a) Gold leaf √/leaf b) ~~Pocket~~ Protect the surrounding of the metal rod and leaf from damage or drought√/Protecting the leaf from damage/draught/external effects.	(1 mark) (1 mark)
3.	– The e.m.f. across it's terminals√/voltage/p.d across – The relative density of the electrolyte √/density of acid/electrolyte (Not liquid)	(2 marks)
4.	~~From the relation $v = \lambda f$~~, the speed increases√ since the wavelength λ increases but the frequency is the same because source is the same√	(2 marks) Second mark scored if 1st mark is ✓ (No mark for contradiction)
5.	$\eta = \frac{1}{\sin c}$ √ $= \frac{1}{\sin 42^\circ}$ √ $= \frac{1}{0.669}$ $= 1.495$√ Accept 2d.p (1.49/1.50/1.494).	(3 marks)
6.	B√ The two cells series provide√ a higher electromotive force/potential difference /current/voltage.	(2 marks)

7. (1 mark)



OR

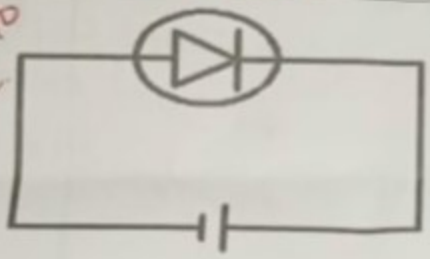


*Uniformly distributed and must be on the surface

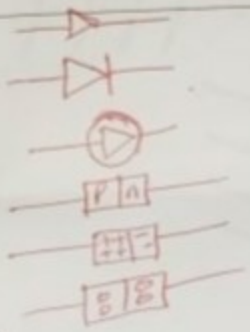
8. There is greater√ magnetic force at the ends due to increased√ field lines at the ends of the bar magnet than at the center of the bar magnet (2 marks)

or due to higher concentration of field lines at the ends.

9. (2 marks)

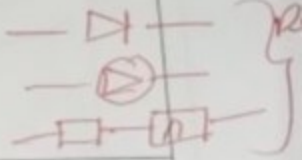


Biasing lead to the 1st mark



NB No mark if biasing wrong

Reject Incomplete Circuits



10. (3 marks)

$f = \frac{3\times10^8}{\lambda}$ √

$= \frac{3\times10^8}{800}$ √

$= 0.00375\times10^8\ Hz$

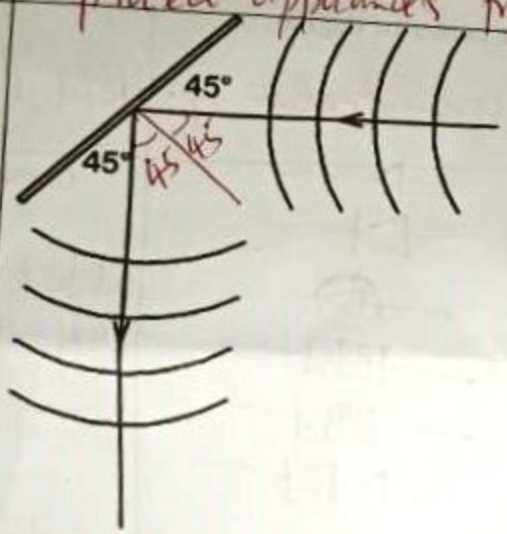
$= 3.75\times10^5\ Hz$ √

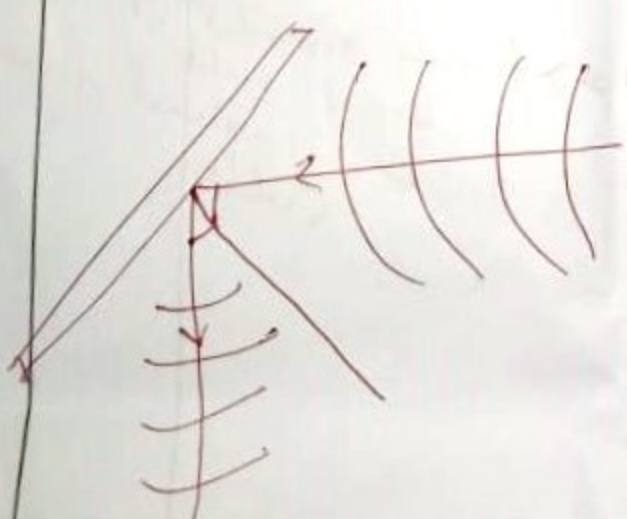
$f = \frac{c}{\lambda}$ √1 / $c = \lambda f$

* $v = \lambda f$ only awarded at correct subst.

* Award implied formula at subst.

* Wait for correct subst. Award full marks.

11.	– Electrons are produced by thermionic emission√ – The electrons are accelerated by a high voltage√ – Electrons are suddenly stopped to produce x- rays√	(2 marks)
12.	To disconnect the circuit when excess current flows. √	(1 mark)
13.	 √-curved correctly √-angle of reflection	(2 marks)



SECTION B: 55 MARKS

14. (a) (2mark)

- Stepping up the voltage ✓1 / Stepping down current. ✓
- Use of good conductor cables / thick cables. ✓

(b)

The electric cooker has a power output of 2500W, ~~and~~ When operates at a potential of 250V, ie P=VI / Electric cooker gives out/dissipates energy at a rate of 2500 Js when operated at 250V. (1 mark)

(c)

Total power = $1500+2500+500+(60\times3)$

$= 4680$ W√ ✓

Total current required = $\frac{4680}{240} = 19.5A$ √✓

$\frac{1500}{240} = 6.25$

$\frac{500}{240} = 2.08$

$\frac{2500}{240} = 10.42$

$\frac{3\times60}{240} = \frac{0.75}{19.5A}$ ✓1 NO

OR Stud: NO ✓

Hence fuse blows and disconnects the current when it exceeds 10 A√ ✓1

ie all appliances can't be connected at the same time. ✓ (3 marks)

OR Max current rating for all appliances connected is higher than fuse

(ii) ~~V = IR √~~

$I = \frac{P}{V}$ ✓1

$= \frac{2500}{240}$

R= $240 \div \left(\frac{2500}{240}\right)$ √✓

$= \frac{240\times240}{2500}$

$= 23.04\Omega$ √✓

$P = I^2R$ ✓1

$2500 = \left(\frac{240}{240}\right)^2 R$ ✓1

$R = 23.04\Omega$ ✓

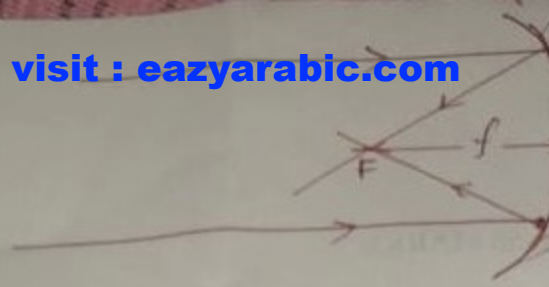
$P = \frac{V^2}{R}$ ✓1

$R = \frac{V^2}{P}$

$= \frac{240^2}{2500}$ ✓1

$= 23.04\Omega$ ✓1

3 marks



OR

- using the metre rule measure the distance between the screen and the mirror.

15. a) – Using the mirror focus a distant object onto the screen ✓1 use the mirror to focus the image of distant object. 3 mark

– Adjust the distance between the screen & the mirror to obtain a sharp image ✓1

– Measure the distance between the screen & the mirror – this is the focal length of the mirror

✓1 using a metre rule ✓1

(b) $\frac{1}{f}=\frac{1}{u}+\frac{1}{v}$ √ ✓1 $\frac{1}{V}=\frac{4-5}{40}$ ✓1

$\frac{1}{V}=\frac{1}{10}-\frac{1}{8}$ √ ✓1 $v=-40$cm ✓1

OR $u=-8$

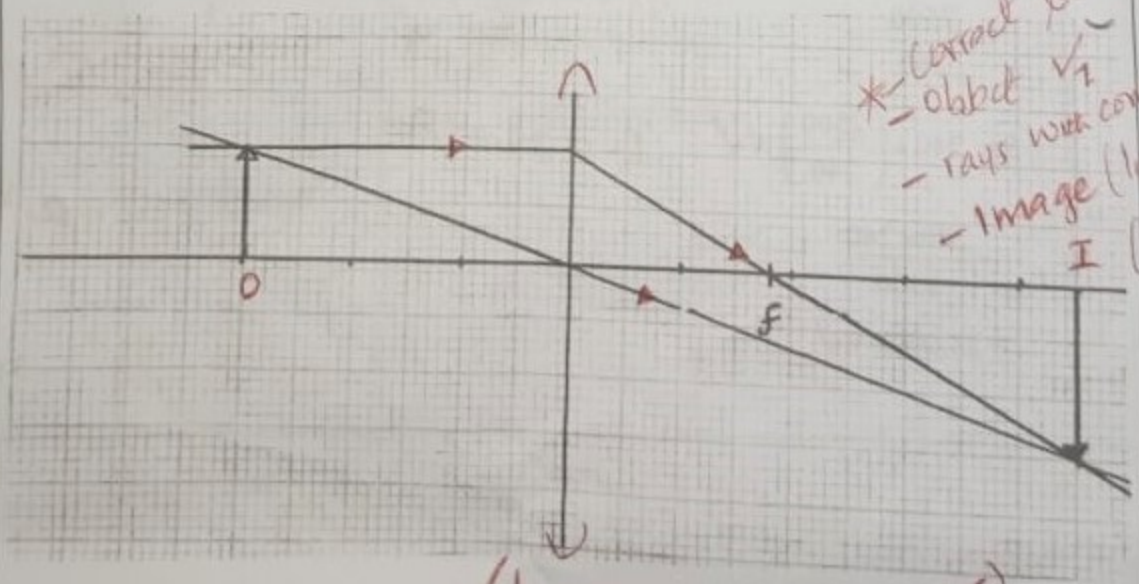
$\frac{1}{u}+\frac{1}{v}=\frac{1}{f}$ ✓1

$\frac{1}{-8}+\frac{1}{V}=\frac{1}{-10}$ ✓1

$V=40$cm ✓1 (Sign must indicate virtual/behind the mirror). (3 marks

OR Diagram:
- Choose scale ✓1
- correct rays
- correct image post ✓1
- correct dist ✓1 (40 ± 2 cm).

(c) (i)



- Correct lens used ✓1
- Object
- rays with correct arrows
- Image (Inverted/real) ✓1 3 mark

(ii) I) image height = 15 ± 1 cm ✓1

II) image distance = 45 cm ± 1 ✓1

(No ET)

1 mar

1 mar

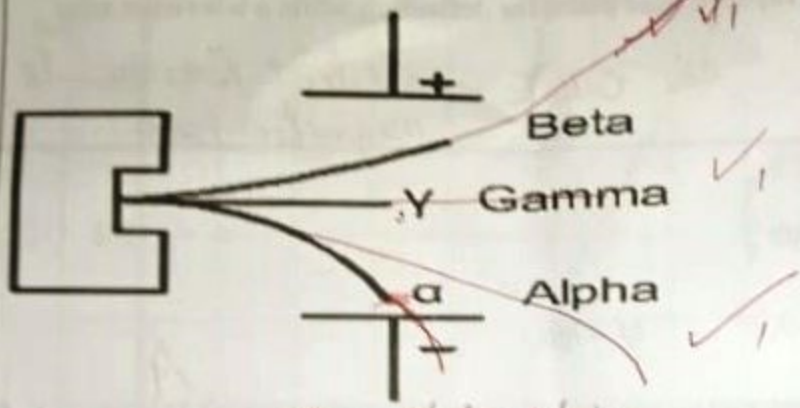
16 a) - Sterilization of surgical equipment√ ✓1
- Treatment of malignant growths√ ✓1 / Radiotherapy / killing cancerous cells / treating cancer / treating thyroid gland

2 marks
1 marks

(b) $x = 4$ ✓½
$y = 2$ ✓½

3 marks

(c) (i)



✓1 * Dont award when passing through the plate.
* β Deflected Partially and moves further
* α Deflected later and doesn't move further.
✓1
✓1
Absorb/stop ✓1

(ii) (I) To shield the radiations from moving to the other directions ie ~~direct them to one side~~√

1 mark

(II) ~~To remove air particles & reduce collisions for clear vision of the effect of the field~~√ Prevent collisions of clear vision on the effect of the field / minimise loss of KE / Prevent ionisation

1 mark

d (i) Gamma rays, X-rays, microwaves, radio waves ✓1

1 mark

(ii) 64 $\xrightarrow[24\text{ day}]{}$ 32 $\xrightarrow[48\text{ day}]{}$ 16 $\xrightarrow[72]{}$ 8 √

→ 3 half lives → 8g left √

$N = N_0(\frac{1}{2})^{T/t_{1/2}}$

$\frac{T}{t_{1/2}} = \frac{72}{24} = 3$ ✓

$N = 64 \times (\frac{1}{2})^3$

$= 64 \times \frac{1}{8}$ ✓

$= 8g$ ✓

2 marks

17 a) (i) (3marks)

- The heating coil√/cathode ✓
- Grid√
- The anodes√

(ii) the cathode ray tube uses plates for deflection while a television tube uses coils√ OR CRT – electric fields while TV uses magnetic fields 1 mark

b) (i) $eVs = hf - hfo$ √ 2 marks

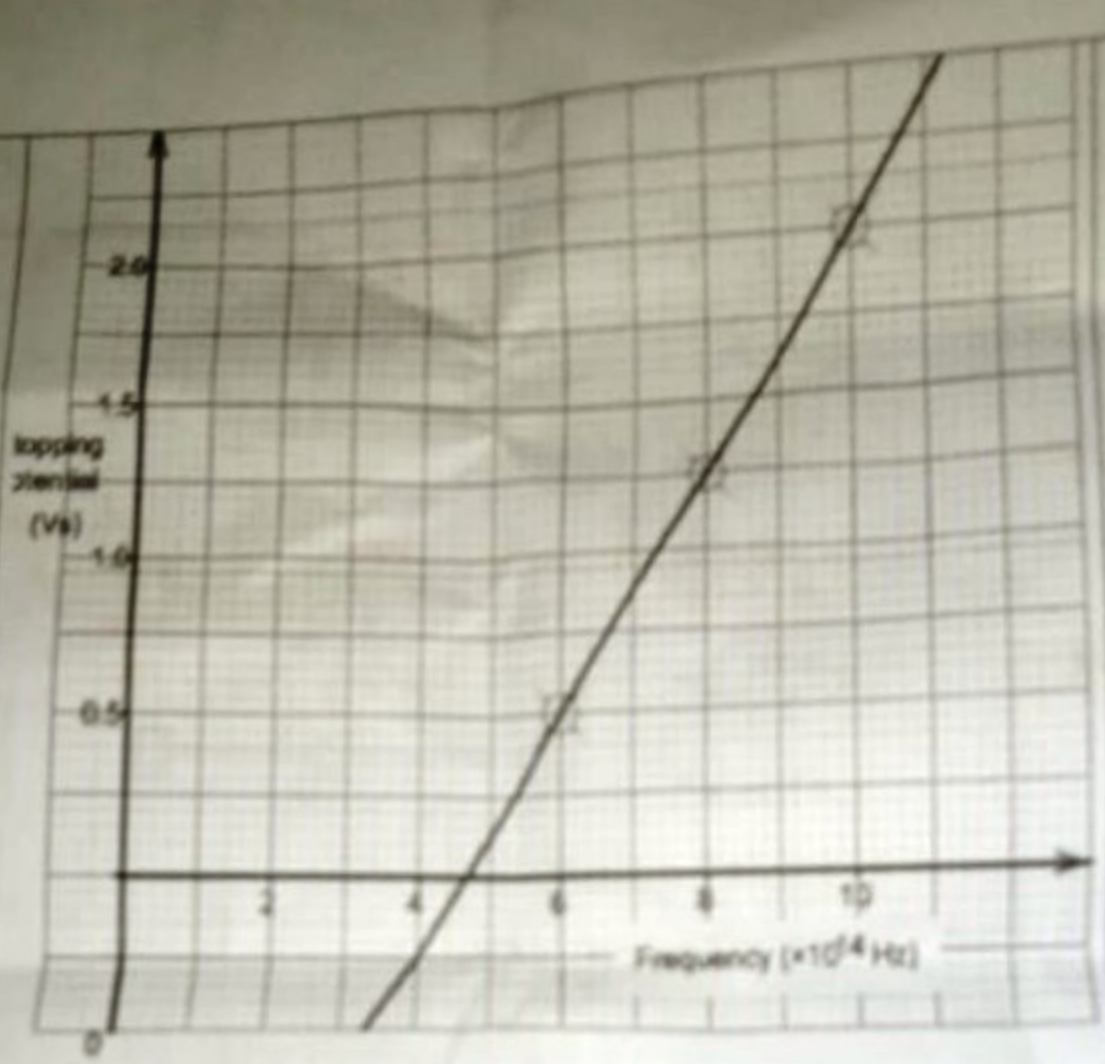
at $Vs = O$, $hf = hfo$ √

$f = fo$ which is obtained by extrapolating the graph to obtain the √1 value of fo

when $Vs = o$

$4.6 \times 10^{14} Hz \pm 0.1$ ✓1.

Second mark check is stud has used graph (extrapolates/put a mark) ✓1



OR $hf = hfo + eVs$ ✓1

$h = \frac{eVs}{f - fo}$

Read off Vs and f ✓1

Subst. ✓1

= Ans ✓1

(ii)

$Vs = \frac{hf}{e} - \frac{hfo}{e}$

$\frac{h}{e}(f - fo)$

$\therefore \frac{h}{e} = gradient$ ✓1

$= \frac{1.25 - 0.5}{(8-6)\times10^{14}}$ ✓1

$= \frac{0.75}{2}\times10^{-14}$

$= 0.375\times10^{-14}$

$\therefore h = 3.75\times10^{-15}\times1.6\times10^{-19}$ ✓1

$= 6.0\times10^{-34}\ Js$ ±(0.8) ✓1

OR $E = hf$ ✓

$h = \frac{E}{f}$

$= \frac{1.6\times10^{-19}}{f}$ ✓1

Read f from graph = Ans ✓1

$f = (4.6\times10^{14} - 1.0\times10^{14})$. Range of f

Range $(1.6\times10^{-34} - 3.478\times10^{-34})$ Js

(4 ~~4~~ marks)

(iii)

$Wo = hfo$ √

$= 6.0\times10^{-34}\times4.3\times10^{14}$ ✓1

$= 25.8\times10^{-24}$ 2.76×10^{-19} J ✓1

$25.8\times10^{-23}\ J$ √

ET.

$W_o = hf_o - eV_s$ ✓

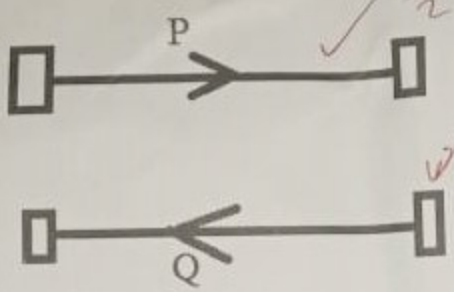
=

(3 marks)

18 (a)

(2 marks)

b(i)



(1 mark)

(ii) the two conductors repel√

(1 mark)

(iii) As the current flows a magnetic field develops around each conductor√ such that the direction of the fields such that the fields repel√ another pushing the conductors away from each other√

3 marks

C(i) By laminating the core

(1 Mark)

(ii) $\frac{N_s}{N_p} = \frac{V_s}{V_p}$

$\frac{N_s}{600} = \frac{24}{120}$

$N_s = 120 turns$

(3 mark)