232/2 MS
PHYSICS
Paper 2
MARKING SCHEME
MARCH 2021

THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education

PHYSICS

Paper 2

MARKING SCHEME

(CONFIDENTIAL)

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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 iff 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 electromagnetic force/potential difference /current/Voltage.	(2 marks)

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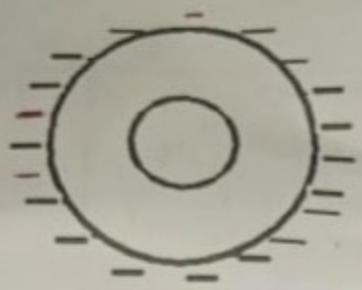
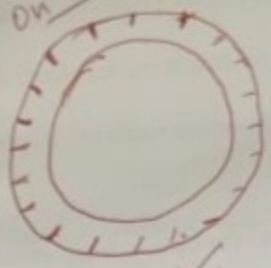
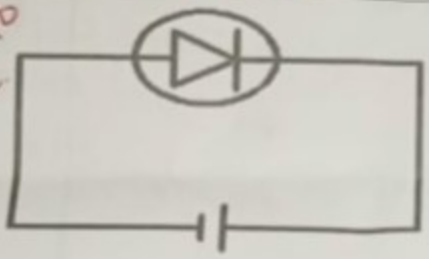
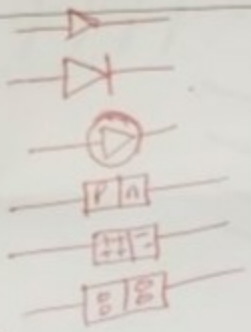
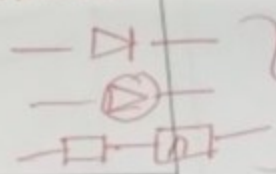
7.	 OR  *Uniformly distributed and must be on the surface ✓1 ✓1	(1 mark)
8.	There is greater√ magnetic force at the ends due to increased√ field lines at the ends of the bar magnet than at the center of the bar magnet or due to higher concentration of field lines at the ends. / higher flux density	(2 marks)
9.	  Biasing tied to the 1st mark	(2 marks) NB No mark √ biasing mark Reject incomplete circuits 
10.	$f = \frac{3\times10^8}{\lambda}$ √ $= \frac{3\times10^8}{800}$ √ $= 0.00375\times10^8\ Hz$ $= 3.75\times10^5\ Hz$ √ $f = \frac{c}{\lambda}$ ✓1 / $c = \lambda f$ *- $v = \lambda f$ only awarded at correct subst. *- Award implied formula at subst. $\frac{v}{\lambda}$ for correct subs award mark.	(3 marks)

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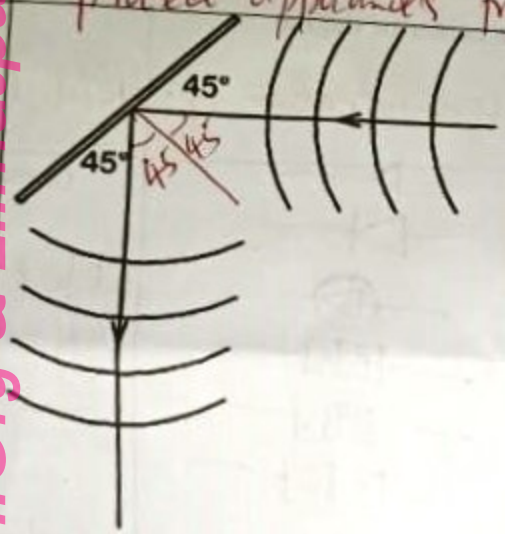
11. – Electrons are produced by thermionic emission√
– The electrons are accelerated by a high voltage√
– Electrons are suddenly stopped to produce x- rays√ (2 marks)

12. To disconnect the circuit when excess current flows. √ (1 mark)

13.



√-curved correctly

√-angle of reflection

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SECTION B: 55 MARKS

14. (a) (2mark)

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

(b) (1 mark)

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.

(c) (3 marks)

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

$= 4680$ W√ ✓

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

OR Stud: NO ✓

$\frac{1500}{240} = 6.25$ ✓1

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

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

$\frac{3\times60}{240} = \frac{0.75}{19.5A}$ ✓1 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. ✓

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

(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

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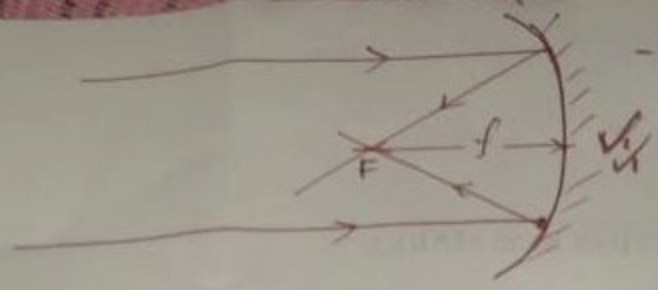
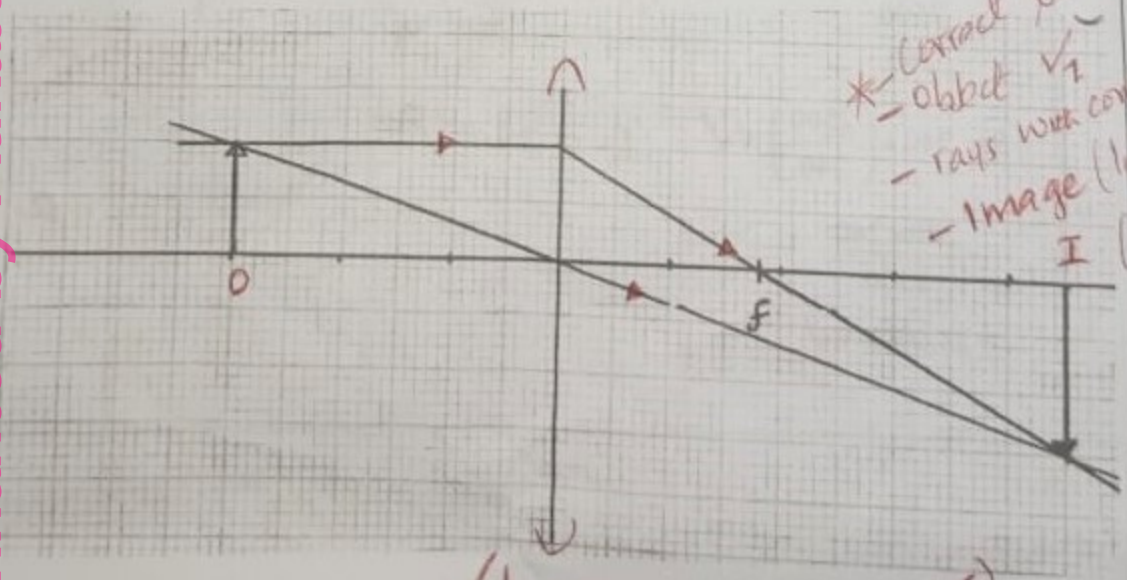
OR



- using the metre rule ✓1 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 a distant object. – Adjust the distance between the screen & the mirror to obtain a sharp image ✓1 – Measure the distance between the screen & the mirror – using a metre rule ✓1 this is the focal length of the mirror	3 marks
	(b) $\frac{1}{f}=\frac{1}{u}+\frac{1}{v}$ ✓1 $\quad \frac{1}{V}=\frac{4-5}{40}$ $\frac{1}{V}=\frac{1}{10}-\frac{1}{8}$ ✓1 $\quad v=-40$ cm ✓1 OR Diagram: choose scale ✓1 correct rays ✓1 correct image post ✓1 correct dist ✓1 (40 ± 2.0 cm). 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 (Sol must include virtual/behind the mirror).	(3 marks)
	(c) (i)	3 marks



* correct lens used
- object ✓1
- rays with correct arrow ✓1
- image (inverted/real)
(choose scale when lens wrong even)

	(ii) I) image height = 15 ±1 ✓1 II) image distance = 45 cm ±1 ✓1 (No ET)	1 mark 1 mark

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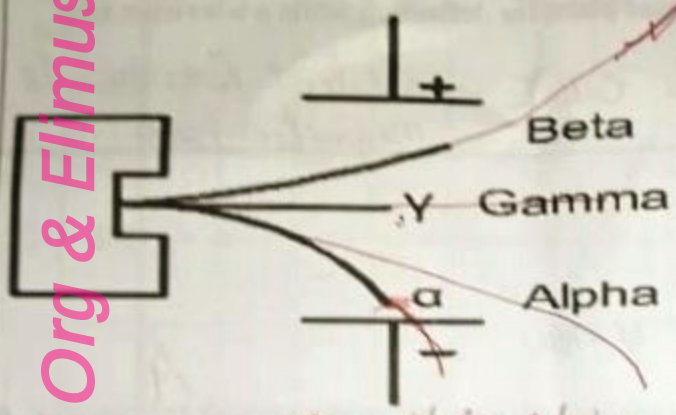
16	a) - Sterilization of surgical equipment√ ✓1 Treatment of malignant growths√ ✓1 / Radiotheraphy / killing cancerous cells / treating cancer) / ironing thyroid glad	2 marks
	(b) $x = 4$ ✓½ $y = 2$ ✓½	1 marks
	(c) (i)  ✓1 ✓1 ✓1 * Dont award when passing Through the plate. * β Deflected earlier and moves further * α Deflected later and doesnt move further.	3 marks
	(ii) (I) To shield the radiations from moving to the other directions ie ~~direct them to one side~~√ / prevent / absorb / stop ✓1 (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 1 mark
	d (i) Gamma rays, X-rays, microwaves, radio waves ✓1 (ii) 64 $\xrightarrow[\text{24 day}]{}$ 32 $\xrightarrow[\text{48 day}]{}$ 16 $\xrightarrow[\text{72}]{}$ 8 √ → 3 half lives → 8g left √ $N = N_0(1/2)^{T/t_{1/2}}$ $\frac{T}{t_{1/2}} = \frac{72}{24} = 3$ ✓ $N = 64 \times (1/2)^3$ $= 64 \times 1/8$ ✓ $= 8g$ ✓	1 mark 2 marks

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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 √ value of fo ✓1

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

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OR $hf = hfo + eVs$ ✓1

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

Read Vs ✓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 marks)

(iii)

$Wo = hfo$ √

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

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

$25.8\times10^{-23}\ J$ √

$W_o = hf_o - eV_s$ ✓

=

(3 marks)

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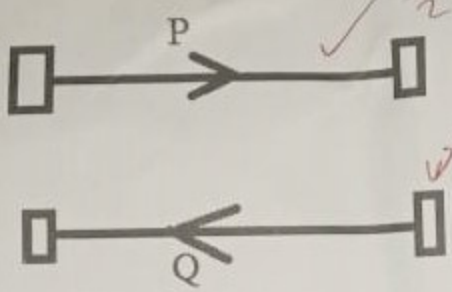
18 (a)

(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)