# FORM 3 PHYSICS PAPER 2
## TERM 3 2023
## MARKING SCHEME

1.  - One picture can be taken at a time ;
    - It has long exposure time / picture of moving objects cannot be taken
    - (ANY ONE ) ;

2.  - A lead accumulator give large current over a long time compared to a dry cell;
    - A lead acid accumulator can be recharged while dry cell cannot be renewed / recharged

3.  Any <u>two</u>
    - Virtual ;
    - Erect / upright;
    - Enlarged ;

4.  Light travels in a straight line✓
    .

5. Polarisation✓.Hydrogen gas produced causes insulation at the cathode .It increases the internal resistance of the cell✓
.

6.  None✓
    Each of them retained their magnetism✓

7.  Image formation takes place with regular✓1 reflection not with diffuse reflection
    { Plane mirror-regular reflection
    { Sheet of paper-irregular diffuse reflection     ✓1

8.  1.375 Ampres; ✓

9. (i)    White light is a spectrum✓; The velocities of the colours that form the spectrum is

    different in a given transparent material medium✓;

(ii) The white light will not be separated✓
Since the direction of travel of the colours will be the same ✓;

10.Soft iron became induced magnet and attracts back the razor✓
Wood is non-magnetic material hence does not attract the blade✓.

11. T = 2000 s ;
$$f = \frac{1}{T}$$

$$= \frac{1}{2000} ;$$
$$= 5.0 \times 10^{-4} \text{ Hz } ;$$

12.

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

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

$$= \frac{240 \times 240}{2000}$$

$$= \frac{24 \times 24}{20}$$

$$= 576\Omega$$

## SECTION B

13a) i) For a metallic Conductor, the Current flowing through is directly proportional to the p.d across its ends provided temperature ( and other physical condition) are kept constant

ii) p.d across parallel network = IR

$$= 0.2 \times 4 = 0.8 \text{ v} \checkmark$$

Current though $1\Omega$

$$= \frac{0.8}{1} = 0.8A \checkmark$$

( or by ratios)

Total Current

$$= 0.8 + 0.2 = 1 \text{ A}$$

Total Resistance

$^4/_5 + 2 + 1$

$$0.8 + 3 = 3.8 \ \Omega \checkmark$$

V = IR ( whole cut )

2 E = 1 ( 3.8)

E = 1.9 volts$\checkmark$

Or by using division of p.d

b) The leaf collapsed / Electroscope discharged $\checkmark$

The red hot charcoal ionizes the air around which neutralizes $\checkmark$

The negative charges on the electroscope$\checkmark$

c) Graph

| i) $(A^{-1})^1/_1$ | 1.25 | 1.43 | 2 | 2.7 | 4.17 | |
|---|---|---|---|---|---|---|
| R ($\Omega$) 1.6 | 2.1 | 2.5 | 3.6 | 5.0 | 8.0 | $\checkmark$ |

14.a) i) Light must be traveling from a denser medium to a less dense /rarer medium$\checkmark$

ii) The angle of incidence must be greater than the critical angle$\checkmark$

b) i) Refractive index of perpex $=$ Sin 90°$\checkmark$

$$\text{Sin } 42.5°$$

$$= 1/\sin 42.5°$$

$$= \underline{\mathbf{1.48}}\checkmark$$

ii)     $\sin C = {}_1\eta_2\checkmark$

$= {}_1\eta_a \times {}_a\eta_2\checkmark$
$= \frac{1}{2.4} \times 1.48$
$= 0.6167$
$\underline{\mathbf{C = 38.07°}}\checkmark$

Graph with y-axis labelled (unclear) and x-axis numbered 1–8, showing plotted points and a straight line of best fit.

Handwritten marking notes on graph:

Labelling both axes correctly with units ;
Appropriate scale ; uniform and covers more than half page
plotting 6 pts correctly
4 – 5 pts.
0 – 3 pts.
Straight line.

$$\text{gradient} = \frac{1}{E}$$

$$= \frac{3.4 - 1.6}{6.5 - 2.8}$$

$$\frac{1}{E} = \frac{1.8}{3.7}$$

$$\frac{1}{E} = 0.4865 \checkmark$$

$$E = 2.05 \text{ volts}$$

∴ Accept 2 ± 0.05.
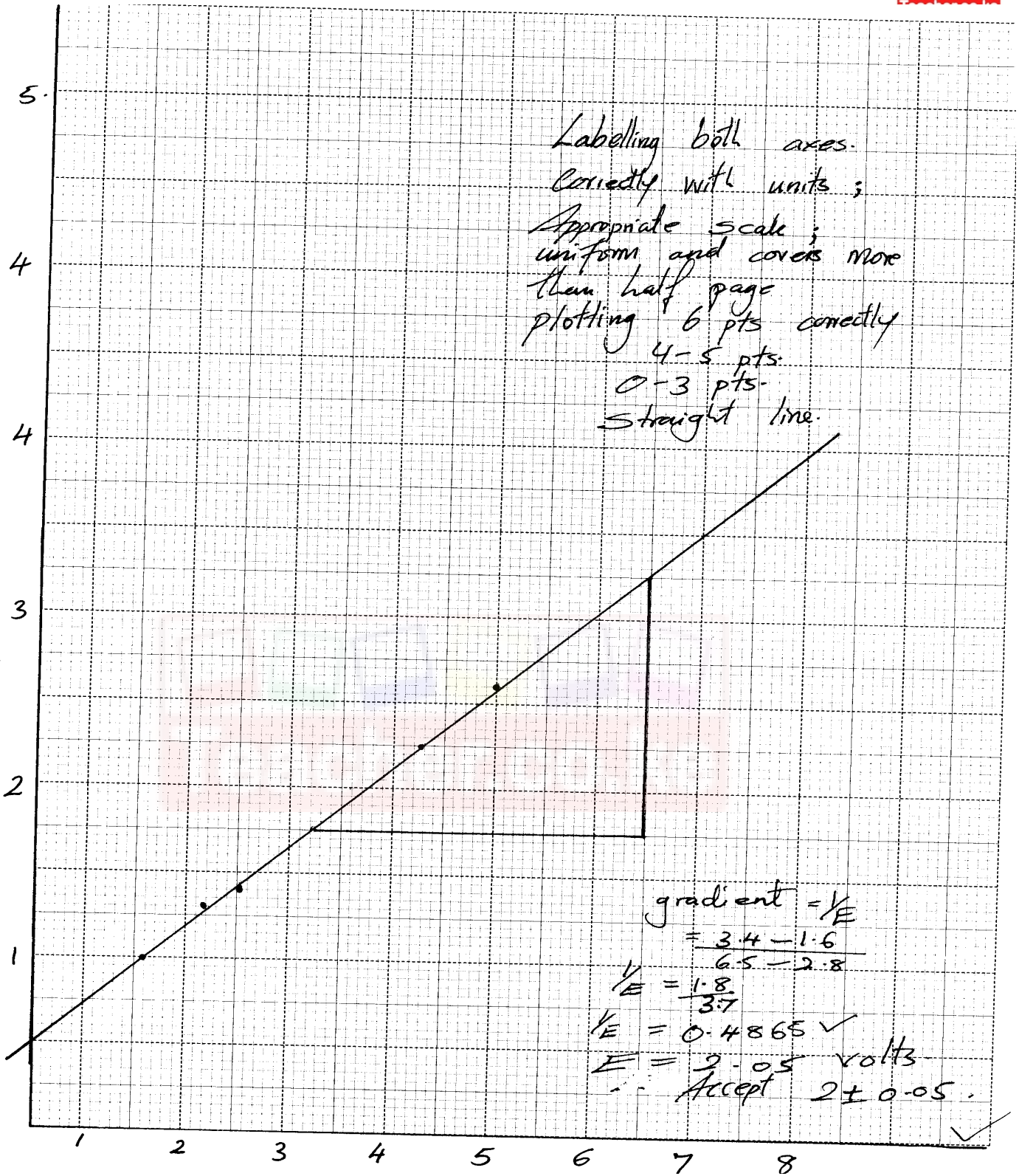
Labelling both axes correctly with units✓
Appropriate scale✓
Uniform and covers More than half page✓
Plotting 6 pts corrects✓✓ 4-5 pts✓ 0-3pts no mark
Straight line, positive gradient and cutting y-axis at positive value✓ ;
Gradient = $^{1}/_{E}$

$$= \frac{3.4 - 1.6}{6.5 - 2.8}$$

$$^{1}/_{E} = \frac{1.8}{3.7}$$

$^{1}/_{E}$ = 0.4865✓
E = 2.058 volts
Accept 2 ± 0.05✓

15. (a)

(i) -They leave the surface of a charge body at right angles✓;

-the electric field lines are directed away from positive charges and towards the negative

charges; ✓

-The closer the field lines the stronger the field at that point✓,

(ii) -The moving clouds get charged through friction; ✓

When a charged cloud pass over a lightning arrestor it induces on opposite charge in it✓;

Because of the structure of the arrestor at the top (sharp spikes) it releases charges into the air

which discharges the charged cloud as shown in the diagram✓;                    (1mark)
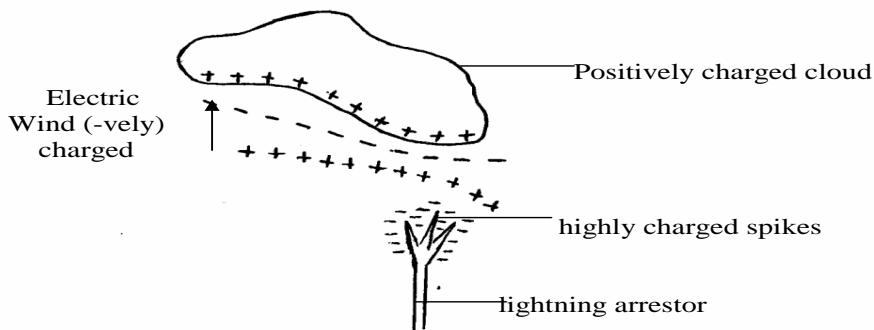


The arrestor acts as an easy way of discharging the clouds because it is a good conductor; ✓

(b)

(i) Is the charge stored per unit voltage ✓.

Capacitance, C=<u>Charge</u> ✓

Voltage;

(ii) The type of dielectric materials between the plates✓

(i)      $C = \dfrac{E.d;}{A}$ ✓

Can be in words                    Where C – Capacitance

E – Dielectric constant

d – Separation distance

A – Area of overlap

(c) Charge store $= CV$

$= 2 \times 10^{-6} \times 200$

$= 4.0 \times 10^{-4}$ ✓

Charge stored when both capacitor and connected is the same

$= 4.0 \times 10^{-4}$

Total capacitance

$C_1 = 2.0 \times 10^{-6} + C_2$ ✓

Hence

$4.0 \times 10^{-4} = (2.0 \times 10^{-6} + C_2)80;;$ ✓

$4.0 \times 10^{-4} = 160 \times 10^{-4} + 80C_2$

$C_2 \quad = 4.0 \times 10^{-4} - 160 \times 10^{-6}$

$= 400 \times 10^{-6} - 160 \times 10^{-6}$
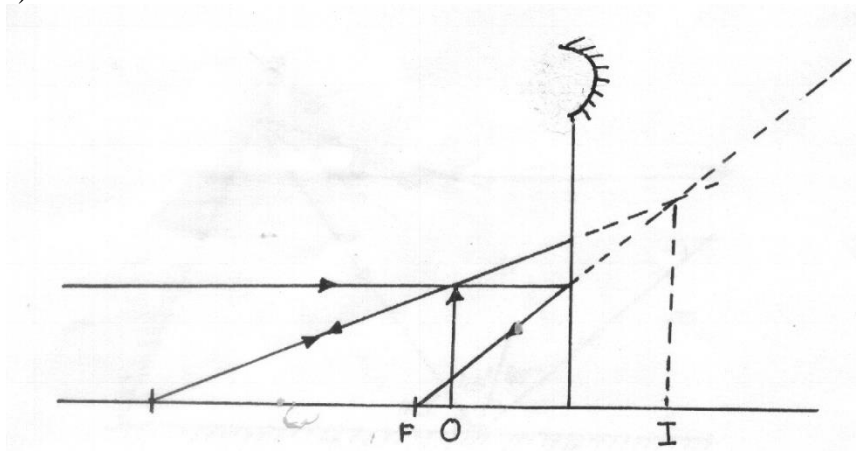
$= 40 \times 10^{-6}$

$= 4.0 \times 10^{-5} F;$ ✓

16.a)  i)      Point on principal axis to which all rays originally close and parallel to the
principal axis converge to or from which they appear to diverge from after reflection
from the mirror ✓.

ii)      Distance between the pole of the mirror and principal focus ✓

b)

c)     i)     Focus image of distant object on the screen.

         ii)     Measure distance between screen and mirror

         iii)     Repeat the procedure several times

         iv)     Determine the average value of d

         v)     Focal length of mirror f = d
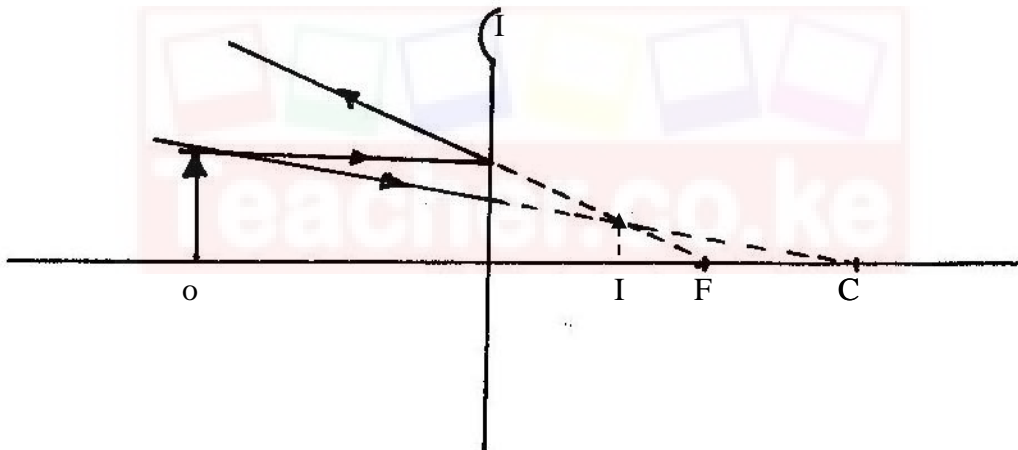
***d)For convex mirror, its formula is***

$$\frac{1}{f}=\frac{1}{u}-\frac{1}{v} \quad and\, M=\frac{V}{u}\, ✓$$

***Multiply terms in*** $\frac{1}{f}=\frac{1}{u}-\frac{1}{v}\, by\, V$ ✓

$$\frac{v}{f}=\frac{v}{u}-1$$

✓

$$\therefore M=\frac{v}{f}+1$$

e)



✓✓✓

Ray parallel to principal focus diverged but seem to diverge from F ;

Ray seeming to pass through C are  undeviated ;

Position of image

Characteristics

    Virtual✓

    upright✓

    between F and  O✓

    smaller ✓