

PHYSICS, NOV 2012 PAPER 4.
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Question 1

Measurements and observations

M1 Readings (6 observations)

Write the number of readings as a ringed total by the results table [3]
 Check a value of the V^2 . Tick if correct.
 If incorrect, write in correct value and - 1.
 Check a value for $\sin^2 \theta$. Tick if correct.
 If incorrect, write in correct value and - 1.
 Ignore small rounding errors.
 6 sets of readings scores 3 marks.
 5 sets of readings scores 2 marks.
 4 sets of readings scores 1 marks etc.
 If help given by supervisor then - 1, excessive help the - 2.
 If help was given from the supervisor then write 'SR' in a ring at the top of the front page of the candidate's script. Also, please indicate the type of help given in a written comment by the table of results.

M2 Repeated measurements of t and finding average t/s [1]

M3 Quality of results [1]
 Judge by scatter of points about the lines of best fit.

Presentation of Results

R1 Column headings [1]
 Every column must be headed with a quantity and a correct unit
 Allow θ in $^\circ$ or a solidus notation occupying two lines. $\theta/^\circ$
 Do not allow θ° or just θ (with not unit).

R2 Consistency of raw readings given in the table of results. [1]
 Apply to raw values of t and θ only.
 All readings of a particular quantity must be given to the same degree of precision (e.g. if one value of t is measured to 2.p then all values of t should be given to 2 d.p.).
 Write \checkmark_c at the foot of the column for each correct column of raw readings.
 Ring any inconsistency noted, write X_c at the foot of the column, and - 1.

R3 SF in calculated quantities [1]
 Apply to V^2 and $\sin^2 \theta$

Physics Practical Test

Graphical Work

Apply G1, G2, G3 to first graph only

- G1 Axes
 V^2 against $\sin^2 \theta$ [1]
 Each must be labelled with a correct symbol for description. Ignore units
 Scales must be such that the plotted occupy more than half the graph grid
 in both the x and y directions
 Do not allow > 3 large squares between scale markings on an axis.
 Do not allow awkward scales (e.g. 3; 10; 7; 10; 8; 10 etc.)
- G2 Plotting of points [1]
 Count the number of plots on the grid and write this value by the line and ring it
 Do not allow plots in the margin area
 5 plots only will lose this mark
 Check one suspect plot. Circle this plot. Tick if correct.
 If incorrect, mark the correct position with a small cross and use an arrow to indicate where
 the plots have been
 Allow errors to half a small square.
 If 4 plots have been done then no checking is required.
- G3 Line of best fit [1]
 Only a drawn straight line through linear trend is allowable for this mark
 This mark can only be awarded for 5 or more plots on the grid.
 There must be a reasonable balance of points about the line which has been drawn.
 Do not allow a line which is greater than half a small square thickness
- G4 Measurement of gradient [1]
 Ignore units
 Hypotenuse of Δ must be $>$ half length of line drawn
 Check the read-offs. Work to half a small square.
 Do not allow half $\Delta x / \Delta y$.

Physics Practical Test

Paper number

Analysis

- A1 Gradient = k [1]
- A2 $k = \text{gradient}$; correct units $\frac{\text{m}^2}{\text{s}^2}$
(A) value and correct unit only [1]
- A3 Correct method to find C; correct unit $\frac{\text{m}^2}{\text{s}^2}$ or $\frac{\text{cm}^2}{\text{s}^2}$ or $\frac{\text{mm}^2}{\text{s}^2}$. [1]
- A4 Correct read-off for $\theta = 15^\circ$
finding $\sqrt{\text{CRO}}$ [2]
- A5 validity and plausible description e.g. graph shows that the physical equation is consistent within experimental error, for the tested range. [1]

Marks in total

Special cases

S1 Wrong trend/ or else something went wrong $M_1(-1)$; $G_3(-1)$

S2

S3

S3 OR DATA $R_1(-1)$ $A_3(-1)$

S4

S5

Physics Practical Test

Paper number

Question 2

M1 Readings (6 sets) [4]
 Write the number of readings as a ringed total by the results table
 Check a value for $1/I$. Tick if correct.
 If incorrect, write in correct value and - 1.
 Check a value of R. Tick if correct. *32, 3.5*
 If incorrect, write in correct value and - 1. *1.6*
 Ignore small rounding errors.
 6 sets of readings scores 4 marks.
 5 sets of readings scores 3 marks.
 4 sets of readings scores 2 marks etc. *1.2*
 If help given by supervisor then - 1, excessive help the - 2.
 If help is given from the supervisor then write 'SR' in a ring at the top of the front page of the candidate's script. Also, please indicate the type of help given in a written comment by the table of results

M2 Quality of results [1]
 Judge by scatter of points (about the lines of best fit.)

M3 Justification of sf of $1/I$ to be related to Raw $I/\pm 1$ no. of sf of I . [1]

Presentation of Results

R1 Column headings [1]
 Every column must be headed with a quantity and a correct unit
 Allow $1/I / A^{-1}$, I^{-1}/A^{-1} or a solidus notation occupying two lines. *1/I / A^{-1}*
 Do not allow $I^{-1}A$ or just I^{-1} (with not unit).

R2 Consistency of raw readings given in the table of results. [1]
 Apply to raw values of I only.
 All readings of a particular quantity must be given to the same degree of precision (e.g. if one value of I is measured to 2 d.p. then all values of I should be given to 2 d.p.).
 Write \checkmark_c at the foot of the column for each correct column of raw readings.
 Ring any inconsistency noted, write X_c at the foot of the column, and - 1.

R3 sf in $\frac{1}{I}$ for calculated quantities [1]

Physics Practical Test

Graphical Work

Apply G1, G2, G3 to first graph only

- G1 Axes [1]
 Each must be labelled with a correct symbol for description. Ignore units
 Scales must be such that the plotted occupy more than half the graph grid
 In both the x and y directions
 Do not allow > 3 large squares between scale markings on an axis.
 Do not allow awkward scales (e.g. 3; 10; 7; 10; 8; 10 etc.)
- G2 Plotting of points [1]
 Count the number of plots on the grid and write this value by the line and ring it
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 This mark can only be awarded for 5 or more plots on the grid.
 There must be a reasonable balance of points about the line which has been drawn.
 Do not allow a line which is greater than half a small square thickness
- G4 Measurement of gradient [1]
 Ignore units
 Hypotenuse of Δ must be $>$ half length of line drawn
 Check the read-offs. Work to half a small square.
 Do not allow half $\Delta x/\Delta y$. *Substitute into the grad eqn*

Physics Practical Test

Paper number

Analysis

A1 Gradient = $\frac{1}{E} = E^{-1} = \frac{\Delta \frac{1}{I}}{\Delta R}$ [1]

A2 $E = \frac{1}{\text{Gradient}}$; correct unit ($\approx 3.0V$) [1]

A3 Units of E/V L $2.0 \pm 0.1 A, 0.5 V$
 $2.0 \pm 0.1 A, 0.5 V$ [1]

A4 Determining r/E correct method of finding intercept [1]

A5 value for $r = E \times$ intercept and correct unit [1]

Special cases

S1

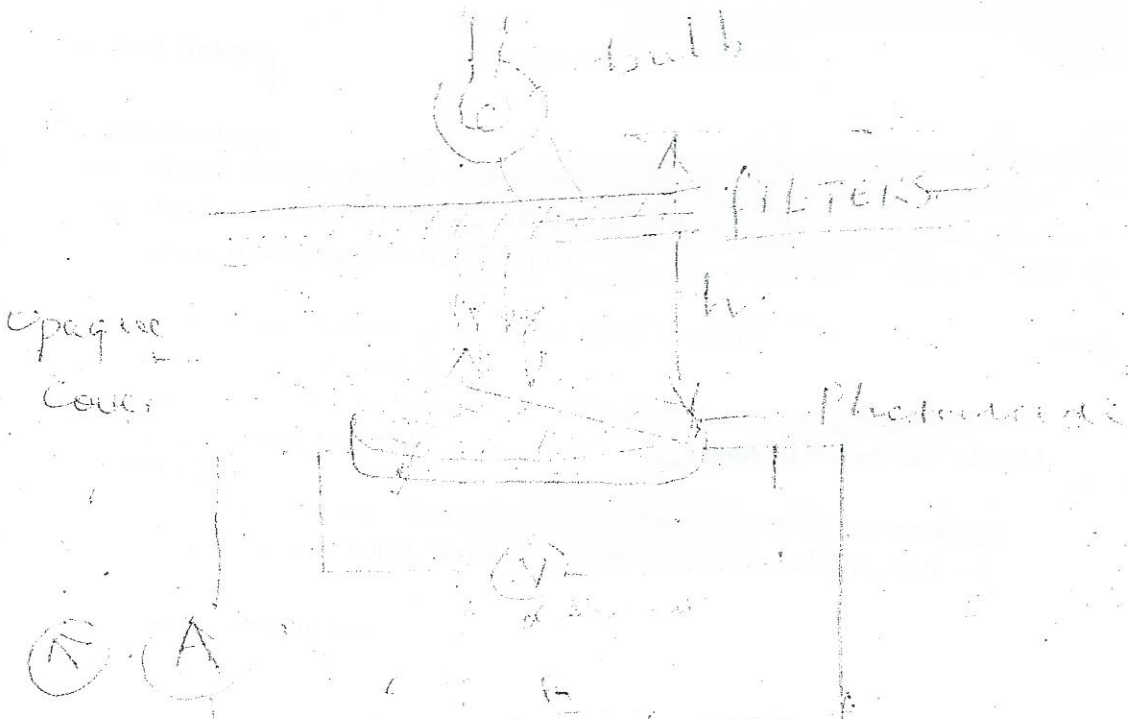
S2

S3 $1.0 \pm 0.1 A, 0.5 V$ $1.0 A, 0.5 V$
 $1.0 A, 0.5 V$ $A_3 (1)$

S4

S5

- A1 Workable arrangement [1]
- Diagrams showing bulb, disc, voltmeter/ Ammeter/ Galvanometer etc/AW [1]
- A2 - correct set up without light source [1]
- B1 For fixed Bulb and surface area exposed etc. + EM components [1]
- Same
- B2 Vary height/ intensity/ AW *make measurements of* [1]
- ~~B3~~ For fixed height and area vary the power and measure V or I/AW [1]
- B4 For fixed height and intensity + EM components [1]
- B5 Vary the surface area of the diode and measure I/V AW [1]
- B6 For fixed height/ intensity and surface area of diode [1]
- Vary the filter _____ er and take measurements of I, V, AW. [1]
- [1]
- C1 correct methods of varying the variables *Area* [1]
- Intensity*
- C2 measurability of surface area, intensity, height, AW *(calculations)* [1]
- feasibility of*
- C3 precautions - plausible *no short circuit* [1]
- dark room*
- D1 - use of high sensitive measuring instruments.
- Precision measuring instruments
- Nano-ammeter
- Coulombmeter etc; AW; [2]



10/19
max [14]