GCE

Edexcel GCE

Physics (6735/01)

Summer 2005

advancing learning, changing lives

Mark Scheme (Results)

Edexcel GCE
Physics (6735/01)

Contents

Notes on the Mark Schemes

1. *Alternative responses:* There was often more than one correct response to a particular question and these published mark schemes do not give *all* possible alternatives. They generally show only the schemes for the most common responses given by candidates. They are **not** model answers but indicate what the Examiners accepted in this examination.

2. *Error carried forward:* In general, an error made in an early part of a question is penalised there but not subsequently, i.e. candidates are penalised once only, and can gain credit in later parts of a question by correct reasoning from an earlier incorrect answer.

3. *Quantity algebra:* The working for calculations is presented using quantity algebra in the mark schemes for Units PHY1, PHY2, PHY3 (Topics), PHY4, PHY5/01, and PHY6 but candidates are not required to do this in their answers.

4. *Significant figures:* Use of an inappropriate number of significant figures in the theory papers will normally be penalised only in "show that" questions where too few significant figures has resulted in the candidate not demonstrating the validity of the given answer. Use of an inappropriate number of significant figures will normally be penalised in the practical tests. In general candidates should nevertheless be guided by the numbers of significant figures in the data provided in the question.

5. *Unit penalties:* A wrong or missing unit in the answer to a calculation will generally lose one mark unless otherwise indicated.

6. *Quality of written communication:* Each theory paper will usually have 1 or 2 marks for the quality of written communication. The mark will sometimes be a separate mark and sometimes be an option in a list of marking points.

Within the schemes:

- / indicates alternative marking point
  ( ) brackets indicate words not essential to the answer
  [ ] brackets indicate additional guidance for markers

- The following standard abbreviations are used:

a.e.	arithmetic error (–1 mark)
e.c.f.	error carried forward (allow mark(s))
s.f.	significant figures (–1 mark only where specified)
no u.e.	no unit error

6735/01 Unit Test PHY5

1.(i) Calculation of equivalent capacitance

Use of $C_1 + C_2$ OR 4 μF ✓

(ii) Charge stored

EITHER	OR	
• Hence same voltage across 4 μF and parallel combination/12 V	• Combined capacitance $\frac{1}{C_1}+\frac{1}{C_2}$ / 2 μF	✓
• Use of $Q = VC$ (12 V × 4 μF)	• Use of $Q = VC$ (24 V × 2 μF)	✓
• = 48 μC	• = 48 μC	✓

4

2.(a)(i) Definition of law

EITHER

Equation given and all symbols defined ✓✓

[For each symbol incorrectly defined –1 mark; 3 incorrect get zero, not –1]

OR

Force proportional to product of masses ✓

Force inversely proportional to square of distance between the masses ✓ **2**

(ii) Derivation

Set $mg = \frac{GMm}{r^2}$ hence $g = \frac{GM}{r^2}$ ✓ **1**

(iii) Graph

Starting point [R, g] ✓

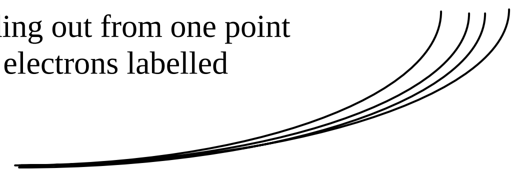
(R, g) and ($2R$, $\frac{g}{4}$) plotted ✓

($3R$, $\frac{g}{9}$) and ($4R$, $\frac{g}{16}$) ~ plotted ✓ **3**

[Ignore the line joining origin to (R, g)]

(b)(i)	<u>Equipotential surface</u>		
	Surface containing all points at the same (gravitational) <u>potential</u> (energy)	✓	**1**
(b)(ii)	Drawing of equipotential surfaces		
	Three concentric circles drawn	✓	
	Increasing separation	✓	**2**
(c)	Explanation		
	The weight / g must remain constant OR uniform gravitational field	✓	
	(For this to be true) changes in height must be small	✓	**2**
			11

3.(a)	Direction of field lines		
	Downwards	✓	**1**
(b)(i)	Calculation of force		
	Use of V/d i.e. 250 V/0.05 m [if 5 used mark still awarded]	✓	
	Use of $\frac{V}{d}\,e$ [Mark is for correct use of 1.6×10^{-19} C]	✓	
	$= 8.0 \times 10^{-16}$ N	✓	**3**
(ii)	Direction and explanation		
	(Vertically) upwards / towards AB	✓	
	No (component of) force in the horizontal direction OR because (the force) does no work in the horizontal direction	✓	**2**
(c)	Calculation of p.d.		
	Use of $\Delta E_K = \frac{1}{2} m\upsilon^2$ / $\frac{1}{2}\, 9.11 \times 10^{-31}$ (kg) $\times (1.3 \times 10^7)^2$	✓	
	Use of Ve / $V \times 1.6 \times 10^{-19}$ (C)	✓	
	= 480 V	✓	**3**
(d)	Beam of electrons		
	Diagram showing:		
	Spreading out from one point	✓	
	fastest electrons labelled	✓	**2**
			11



4.(a) Investigation

Name or describe apparatus for measuring B, eg Hall probe/search coil (with pre-calibrated meter) ✓

Probe positioned so the B field is perpendicular to the Hall slice/probe ✓

Appropriate method for measuring r **perpendicular** to wire described or shown on diagram OR repeat readings for each r
OR keep current constant ✓

Vary distance r and measure B (and r) each time OR reference to graph plotting ✓ **4**

(b)(i) Relationship shown by graph

(B) inversely proportional (to *r)* / B proportional to $1/r$ / Br = constant ✓ **1**

(ii) Finding *I*

Gradient measured / corresponding values of B and $1/r$ read from graph / 2.95 – 3.00 (10^{-7}) (T m) [Ignore incorrect powers of 10] ✓

Use of $B = \left(\frac{\mu I}{2\pi}\right)\frac{1}{r}$ ie $3 \times (10^{-7})$ T m = $\frac{\mu I}{2\pi}$ ✓
[Ignore incorrect powers of 10]

= I = 1.48 – 1.50 A ✓ **3**

8

5. Explanation

AC/changing current in the primary	✓	
Produces a changing *B* field	✓	
B field carried through core (to secondary)	✓	
Changing *B* field over secondary induces emf	✓	
Rate of change of flux linkage is less through secondary OR emf induced across sec. is less because it has less turns than primary OR explanation in terms of the turns ratio formula	✓	
Quality of written communication	✓	**6**