Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Electricity

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Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Mark Schemes

Q1.

(a) The amount of energy is transferred from **chemical energy** to **electrical energy** (for every coulomb of charge)✔

Alternative first mark:

*The work done in moving (1 coulomb of) charge **whole** way round circuit*

5.30 J of energy per coulomb of charge✔

2

(b) 5.30 – 1.05 = 4.25 (V) seen

or

4.25 V across 640 Ω resistor seen

or

use of $V = IR$✔

Allow use of $V = IR$ to find the current in the 320 Ω resistor. (I = 3.28 × 10^{-3} (A))

$(I = \frac{4.25}{640} =) \ 6.6(4) \times 10^{-3}$ (A)

Where candidates assume voltmeter has resistance 320 Ω , their answer = 6.56 x 10^{-3} A. Do not credit this.

2

(c) Use of $V = IR$ seen (finds total resistance of circuit)
Or
Use of $V = IR$ for parallel section seen ✔

R_T = 798 (Ω) *(expect to see 757 (7 mA) or 803 (6.6 mA) or 807 (6.56 mA)*

Allow their R_T or their total resistance of the parallel section

Use of $R_T = R_1 + R_2$ **or** $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$ seen (finds resistance of voltmeter)✔

(R =) 312.6 (Ω) or 313 (Ω) or 310 (Ω) seen ✔

I = 3.28 × 10^{-3} (A) *(evidence for this may be seen in (b))*

Alternatively:

Use of $V = IR$ seen (finds current in 320 Ω resistor)✔

Allow their I_T and their current in the 320 Ω resistor.

Use of $I_T = I_1 + I_2$ seen (finds current in voltmeter)✔

(R =) 312.6 (Ω) or 313 (Ω) or 310 (Ω) seen ✔

Answer is:

316 Ω where I = 6.6 mA

282 Ω where I = 7 mA

320 Ω where I = 6.56 mA

Must see working to support their answer.

No workings = zero marks.

3

(d) Use of $P = V^2 / R$ ✔

*Allow their V along with R from **part (c)***

Allow V = 5.3 with their R

Alternative 1st MP

*Use of $V = IR$ **and** $P = I^2R$ **or***

$V = IR$ ***and*** $P = VI$ ✔

(P =) 0.090 (W)✔

Answer = 0.094 (W) where R = 300 Ω

Condone 1 sf answer where R = 300 Ω is used.

2

(e) Current in circuit changes (as voltmeter position changes) / ratio of the voltage dropped across each resistor changes as voltmeter position changes. ✔

Because resistance in the circuit decrease / changes✔

Allow maximum of 1 mark for the reading will only be the emf if the voltmeter is across both resistors. ✔

2

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Q2.

(a) arrow between block and belt pointing upwards along the belt

1

(b) (F =) 19$g$sin23° to give 72.8 (N) ✔

Allow 2 sf answer.

1

(c) uses $F = \frac{\Delta(mv)}{\Delta t}$

*Allow for MP1 use of appropriate kinematic equation for a **AND** use of $F = ma$*

F = 12 (N) ✔

their (b) + 12 (N) ✔

Expect 82 or 85 (N)

3

(d) uses V and I to get total input power or energy ✔

P_{input} *of motor = 110 × 5.0 = 550 W*

E_{input} *= 550 ×* $\frac{8.0}{0.32}$ *= 13 750 J*

uses efficiency equation ✔

P_{useful} *to belt = 550 × 0.28 = 150 W*

E_{useful} *= 3850 J, from 154 ×* $\frac{8.0}{0.32}$ *, or 13 750 × 0.28*

determines power or energy to move one block ✔

P_{block} *= 22 or 23 W*

E_{block} *= 560 or 580 J*

divides (total) useful power or energy by individual power or energy to give answer of 6 blocks ✔

Allow ecf for MP4 only for their (c)

4

[9]