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

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Mark Schemes

Q1.

(a) attempts to calculate energy stored during 2.6 hr period

OR

attempts to calculate average output power during 12 hr period using their energy stored $_1$ ✔

Correctly rounded answer gains both marks. (Calculator value is = 2.16666667)

For $_1$ ✔ stored energy = 93.6 kJ

For $_1$ ✔ condone use of t in hours. (2.6 hr = 9360 s; 12 hr = 43200 s)

2.2 (W) $_2$ ✔

If no other mark given, award 1 mark for calculating charge transfer during 2.6 hr period as 18.7 kC

2

(b) Max 2 from: ✔ ✔

microwaves are transverse; sound are longitudinal;

microwaves have higher frequency than sound;

microwaves can be polarised but sound can't;

microwaves can travel through a vacuum but sound can't/requires a medium **OR** sound are mechanical waves but microwaves are EM waves

Apply list principle. Do not allow reference to applications e.g. cooking food.

For first point, allow weak descriptions in terms of parallel and perpendicular oscillations/vibrations with direction of energy transfer.

2

(c) fixed/constant phase difference $_1$ ✔

same frequency $_2$ ✔

For $_1$ ✔ do not accept "in phase" or fixed path difference.

For $_2$ ✔ condone "same wavelength".

Ignore reference to other features e.g. amplitude or type of wave.

2

(d) evaluates **AM** from $\mathbf{AM}^2 = 8.00^2 + 0.34^2$

Downloaded from www.merit-minds.com

OR evaluates **BM** from $\mathbf{BM}^2 = 8.00^2 + 2.14^2$ ✔

$8.28 - 8.01 = 0.27\ (\text{m})$ ✔

No credit for using double-slit equation.

*Expect 8.01 (m) for **AM** and 8.28 (m) for **BM***

2

(e) statement that path difference = $\lambda/2$ **OR** uses wavelength = 2 × their **part (d)** answer $_1$ ✔

Evaluates $\frac{340}{\text{correct } \lambda}\ (\text{Hz})$ $_2$ ✔

For $_1$ ✔ expect to see 0.54 or 0.60 m for wavelength

*For $_2$ ✔ expect 570 Hz (from 0.3 m) **OR** 630 Hz (from 0.27 m) **OR** 620 Hz (from 0.274 m).*

If no other mark given, allow 1130 Hz or 1260 Hz. for 1 mark.

No credit for using double-slit equation.

2

[10]

Q2.

(a) $R = \frac{V^2}{P} = \frac{6.2^2}{4.5} = 8.5(4)(\Omega)$ ✔

Condone use of W for P.

1

(b) Calculation of current in lamp (0.73 A)

OR

Calculation of current in 12 Ω resistor (0.52 A)

OR

Calculation of parallel pair resistance (5.0 Ω) ✔

*Allow ecf from **(a)***

Allow alternative methods

Calculation of total circuit current (1.2(4) A)

OR

Calculation of total circuit resistance (7.5 Ω)

OR

Expression of potential divider arrangement

$\frac{\varepsilon - 6.2}{r} = \frac{6.2}{\text{external } R}$ OR

Downloaded from www.merit-minds.com

$\frac{\varepsilon}{} = \frac{6.2}{}$

Give full credit to answers that use 9Ω :

Expected values for this method are

Lamp current = 0.69 A

Current in 12 Ω resistor = 0.52 A

Parallel pair resistance = 5.1(4) Ω

Total circuit resistance = 7.6(4) Ω

Total circuit current = 1.2(1) A

emf = 9.2(1) V

(emf = terminal pd + Ir = 6.2 + (1.24 × 2.5))

9.3(1) V ✔

3

(c) Evidence of calculation of A (= π (d / 2)^2 = 2.84 × 10^{-8}) ✔

Use of their A in the resistivity equation = RA/l ✔

To give 5.1 × 10^{-8} (Ω m) ✔

Allow POT errors in MP1 and MP2

Allow answers that round to 5.10 × 10^{-8} (Ω m)

3

(d) Resistance increases ✔

Reduces current through lamp

and lamp dimmer ✔

OR

Greater pd across plugs as potential divider

and lamp dimmer ✔

Do not condone explanations that confuse current and potential difference.

Do not condone "current across" or "pd through".

2

(e) (Resistance increases)

Reduces current in circuit / battery

OR

Increases (external) circuit resistance ✔

Reduces pd dropped across internal resistance of cell / increases terminal pd so lamp brighter ✔

Award MAX 1 for arguments dealing with initial dimming of bulb when wire attached.

Downloaded from www.merit-minds.com

Condone "pd across lamp and resistor / parallel section" for "terminal pd".

Condone "lost volts".

2

[11]

Downloaded from www.merit-minds.com