PHYSICS PAPER 232/2 2009
MARKING SCHEME

1. Infinite / Very many / Several / Uncountable ✓ (1m

2.

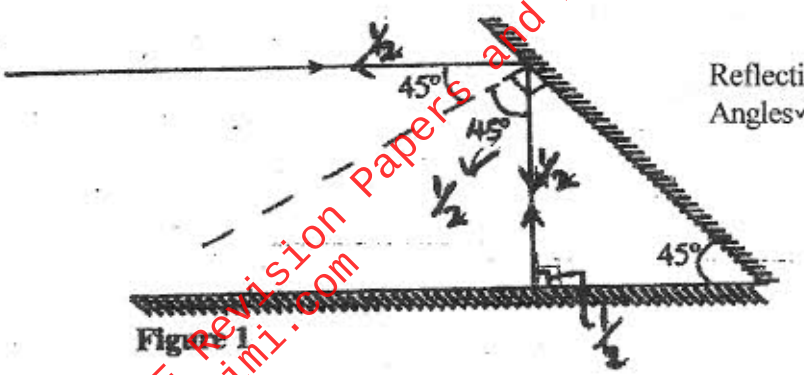

Figure 1

(2 marks)

Reflection ✓
Angles ✓

3. Negative ✓ (1mark)

4. Allow for gassing / release H_2 and O_2 produced at electrodes /
Allow escape of gases i.e. H_2 and O_2 ✓ (1mark)

5.
- Increase magnitude of current
- Increase number of turns (per unit length) /increase number of coils
- Use of u-shaped iron core (Each 1 mark × 2) (2 marks)

6. $T = 0.5s$ ✓

$f = \frac{1}{T} = \frac{1}{0.5} = 2Hz$ ✓

1sec. = 2 waves ✓✓
$f = 2Hz$ ✓

$f = \frac{\text{No. of waves}}{\text{Time}}$ ✓

$= \frac{2.5}{1.25} = 2Hz$ ✓

(3 marks)

7. $\eta = \frac{V_a}{V_m}$

$V_m = \frac{V_a}{\eta} = \frac{3\times10^8}{1.33} = 2.256\times10^8 m/s$ ✓

At least allow 1dp. (3 mark)

8. 1A ✓ (1mark)

9. (L_q)cm ✓ (1mark)

10. (i) Movement of magnetic causes flux linkage to ✓ change;
emf is induced in the coil which causes current to flow ✓ (2marks)

(ii) When current flows from Q to P a North Pole is created which opposes the approaching North Pole ✓

or The induced emf which causes a current to flow creates a magnetic field which opposes the change causing it (Lenz's law) ✓ (1 mark)

11. Increase in p.d increases (heating effect)✓ current in the filament thus produces more electrons✓ by thermionic emission and hence results to more intense X-rays
(last mark depends on first two) (3 marks)

12. Let d = x

$$\frac{2(x)}{0.5} = \frac{2(x+17)}{0.6}\checkmark$$

$$0.5(2d+34) = 2d \times 0.6$$

$$0.2d = 17$$

$$d = 85m\checkmark$$

$$V = \frac{2d}{t} = \frac{2\times 85}{0.5}\checkmark = 340m/s$$

$$V = \frac{2d}{t}$$

$$= \frac{17\times 2}{0.1}\checkmark\checkmark = 340\ m/s\checkmark$$

or

$$V = \frac{17}{0.05}\checkmark\checkmark = 340\ m/s\checkmark$$

$$x = \frac{1}{2}tv$$ (3 marks)

$$x = \frac{1}{2}\times 0.5v = 0.25v\cdots(i)$$

or

$$x + 17 = \frac{1}{2}\times 0.6v = 0.3v$$

$$x + 17 = 0.3v\cdots(ii)$$

$$0.25v + 17 = 0.3v\checkmark$$

$$17 = 0.05v\checkmark$$

$$v = \frac{17}{0.05} = 340\ m/s\checkmark$$

13. Diode in fig(a) is forward biased while in (b) is reverse biased ✓

or Battery in (a) enhances flow of elections across the barrier while in (b) the barrier potential is increased ✓ (1mark)

SECTION B

14. (a) - Capacitance decreases ✓
- Because area of overlap decreases ✓ (2 marks)

(b) (i) For parallel arrangement : $CP = 5 + 3 = 8\mu F$ ✓ (3 marks)

$$CT = \frac{1}{4} + \frac{1}{8} = \frac{12}{32}$$

$$CT = \frac{32}{12} = \frac{8}{3}\mu F\checkmark = 2.667\checkmark$$

(ii) $Q = CV$

$$= \left(\frac{8}{3}\times 12\right)\mu C\checkmark$$

$$= 32\mu F = 3.2\times 10^{-5}F\checkmark$$ (2 marks)

(iii) (2 marks)

$$V = \frac{Q}{C} = \frac{32\times 10^{-6}}{4\times 10^{-6}} = 8v\checkmark$$

$$= 12 - 8 = 4v\checkmark$$

$$Q_B = \frac{5}{8}\times 32 = 20\mu C\checkmark$$

$$V_B = \frac{20\mu C}{5\mu F} = 4v\checkmark$$

$$V_B = \frac{Q}{C}$$

$$= \frac{32\mu C}{8\mu F\checkmark} = 4v\checkmark$$

15. (a) Increase in current causes increase in temperature✓; Rise in temperature causes rise in resistance✓ (2 marks)

(b) $R_x = \frac{v}{I}\checkmark = \frac{2.5}{1.2}\checkmark = 2.08\Omega$ ✓ (3marks)

(c) 1V✓ (directly read from graph) (1mark)

(d) $P_Y = VI$
$= 0.8 \times 3$ ✓
$= 2.4W$ ✓ (2 marks)

16. (a) (i)

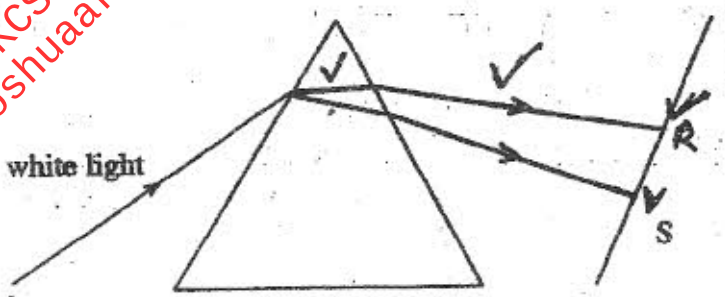

Figure 10

Dispersion ✓
Refraction ✓
Display of spectrum ✓ (3 marks)

(ii) Highest reading near red end✓; Red close to IR whih possesces more heat energy ✓ (2marks)

(b) App. depth = 11.5 − 3.5 = 8cm ✓ (4 marks)

$$\eta = \frac{\text{Real depth}}{\text{Apparent depth}}\checkmark = \frac{11.5}{8}\checkmark = 1.4375\checkmark$$

(allow at least 1d.p)

17. (a) Beta particle✓ (1mark)

(b) (i) Ionises the gas ✓ (1 mark)

(ii) Due to more collisions; further ionisation takes place resulting✓ in ions being attracted to the electrodes hence higher discharge✓

or

Ions are attracted to electrodes✓ and collision with other molecules cause avalanche of ions which on attraction to the electrodes cause the discharge✓ (2 marks)

(c) (i) $X = 92 - 56 = 36$ ✓
$Y = 236 - [141 + 3(1)] = 92$ ✓ (2 marks)

(ii) Small decrease in mass / Mass effect /Loss in mass / Reduction in mass / Change in mass (1 mark)

(iii) Each of neutrons produced at each collision causes further collision ✓ with uranium atom causing chain ✓ reaction

Neutron produced in each collision ✓ causes further collision producing more neutrons and process continues ✓ (2 maks)

18. (a) (i) Electrons are emitted from Zinc plate thus reducing the charge on the leaf ✓ (2marks)

(ii) Any electrons that would have been emitted is re-attracted back to the electroscope ✓ (1 mark)

(iii) Photon of the IR radiation having lower frequency that UV has insufficient energy to cause electrons ✓ to be emitted (1 mark)

(b) (i) The number of electrons emitted per unit time will increase/ more electrons are emitted. ✓ (1 mark)

(ii) K. E of electrons will increase / electron gains high / great / increased K.E (1mark)

(c) (i) (2 marks)

$v = f_0\lambda_0$ ✓

$f_0 = \frac{v}{\lambda_0} = \frac{3\times10^8}{8\times10^{-7}} = 3.75\times10^{14}$ Hz ✓

(ii) (3 marks)

$W_0 = h_0 f_0$ ✓

$E_e v = \frac{6.63\times10^{-34}\times3.75\times10^{14}}{1.6\times10^{-19}}$ ✓

$= \frac{2.48625\times10^{-19}}{1.6\times10^{-19}}$

$= 1.55eV$ ✓

(iii) (2 marks)

$K.E_{max} \times \frac{1}{2}mv^2 = hf - hf_0$ ✓

$= h(8.5 - 3.75)\times10^{14}$

$= 6.63\times10^{-34}\times4.75\times10^{14}$

$= 3.149\times10^{-19}$ J ✓

19. (a) (i) Attach to identical dippers to same vibrator, switch on and circular waves produced are coherent

Use one straight vibrator with two identical or slits to produce coherent waves

(2 marks)

(ii) Constructive interference - bright ✓½
Destructive interference - dark ✓½

(1 mark)

(b) Constructive interference: - When two waves arrive at a point in phase i.e. when a crest and crest or trough and trough meet (or) path difference is a whole wavelength

Destructive interference: - Occurs when crest and trough meet to give reduced (flow) intensity (or) path difference is a half-odd number of wavelength (2 marks)

(c) (1mark)

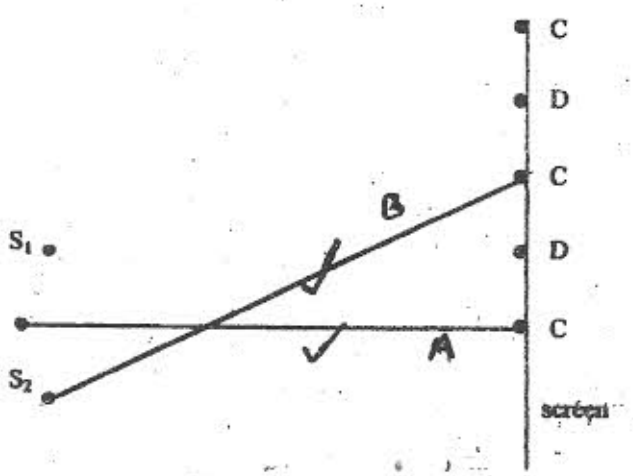

Figure 12