

Name of the Student: \_\_\_\_\_

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

**Q1.**

(a) (i)  $T = 40(\text{ms})$  **(1)**

$$f\left(\frac{1}{T}\right) = 25 \text{ Hz (1)}$$

(allow C.E. for value of T)

(ii) peak voltage  $(= 3 \times 15) = 45 \text{ (V)}$  **(1)**

$$\text{rms voltage} = \frac{45}{\sqrt{2}} = 32 \text{ V (1)}$$

(31.8 V)

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(b) (i)  $I_{\text{rms}} = \frac{31.8}{540} = 59\text{mA}$  **(1)**

(58.9mA)

(use of 32 V gives 59(.2) mA)

(allow C.E. for value of  $V_{\text{rms}}$  from (a))

(ii)  $V_{\text{rms}} = 59 \times 10^{-3} \times 90 = 5.3(1) \text{ V}$  **(1)**

$$(allow C.E. for value of  $I_{\text{rms}}$  from (i)) [or  $V_2 = V_1 \frac{R_2}{R_1 + R_2}$ ]$$

2

(c)  $V_{\text{peak}} = 5.31 \times \sqrt{2} = 7.5(1) \text{ (V)}$  **(1)**

best choice: 5 V per division **(1)**(allow C.E. for incorrect  $V_{\text{rms}}$  and for suitable reason)reason: others would give too large or too small a trace **(1)**

3

**[9]****Q2.**

$$(a) (i) \text{ (use of } \theta = \frac{\lambda}{d} \text{ gives) } \frac{\theta_{\text{reflector}}}{\theta_{\text{refractor}}} = \frac{d_{\text{refractor}}}{d_{\text{reflector}}} \text{ (1)}$$

$$= \left( \frac{0.9}{1.52} \right)^2 = 0.59(2) \quad (1)$$

- (ii) use of, energy collected per sec  $\propto$  area  $\propto d^2$  (1)

$$\frac{P_{\text{refl}}}{P_{\text{refl}}} = \left( \frac{d_{\text{refl}}}{d_{\text{refl}}} \right)^2 = \left( \frac{1.52}{0.9} \right)^2 = 2.85 \quad (1)$$

3

- (b) (i) correct diagram showing four parallel co-axial rays, with outer rays brought to focus at a point closer to mirror than inner rays (1)

- (ii) (use of) parabolic mirror (1)

2

- (c) (i) correct diagram showing two mirrors, one concave, one convex (1)

- (ii) mirror blocks light so less light hits objective mirror (1)  
light diffracted passing secondary mirror affects image (1)

3

[8]