

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

Max. Marks : 22 Marks

Time : 22 Minutes

Mark Schemes

**Q1.**

- (a) time elapsed =  $8.5 \pm 0.2$  (ms) (1)  
 distance travelled = 3 (m) (1) (allow C.E. if  $d = 1.5$  (m))

$$\text{speed of sound} = \frac{3}{8.5 \times 10^{-3}} = 350 \text{ m s}^{-1} \text{ (353) (1)}$$

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- (b) connect oscilloscope across ac source (or diagram or ac to Y plates) (1)  
 adjust time base to give trace (1)  
 adjust voltage sensitivity (1)  
 sinusoidal trace shown (1)  
 how to measure  $T$  from trace (1)

$$f = \frac{1}{T} \text{ (1)}$$

max 5

[8]

**Q2.**

- (a)  $\theta = 90^\circ$  (or  $270^\circ$  or  $\frac{\pi}{2}$  or  $\frac{3\pi}{2}$ ) (1)

1

- (b)  $\Phi = BA \cos\theta$  (1)  
 $= 2.5 \times 10^{-3} \times 35 \times 10^{-3} \times 20 \times 10^{-3} \times \cos 30^\circ = 1.5 \times 10^{-6} \text{ Wb}$  (1)

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- (c)  $\Phi_{\max} = 2.5 \times 10^{-3} \times 35 \times 10^{-3} \times 20 \times 10^{-3} \text{ (Wb) (1)}$  ( $= 1.75 \times 10^{-6}$ )  
 flux linkage =  $650 \times 1.75 \times 10^{-6} = 1.1(4) \times 10^{-3} \text{ (Wb turns) (1)}$

2

[5]

**Q3.**

- (a) (i) uud (1)

- (ii)  $u\bar{d}$  (1)

2

- (b) (i)  $\frac{mv^2}{r} = Bev$  [or  $r = \frac{mv}{Be}$ ] (1)

$$m = 1.67 \times 10^{-27} \text{ (1)}$$

$$r \left( \frac{mv}{Be} \right) = \frac{1.67 \times 10^{-27} \times 1.5 \times 10^7}{0.16 \times 1.6 \times 10^{-19}} \text{ (1)}$$

$$= 0.98 \text{ m (1)}$$

(ii) pion path more curved than proton path (1)

(iii) path more curved  
[or radius (of path) smaller] (1)  
for both paths (1)

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[9]