

Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Mark Schemes

Q1.

- (a) the square root of the mean of the squares of all the values of the voltage in one cycle **(1)**

or the equivalent dc/steady/constant voltage that produces the same heating effect/power **(1)**

1

- (b) (i) peak voltage = $230 \times \sqrt{2}$ **(1)**

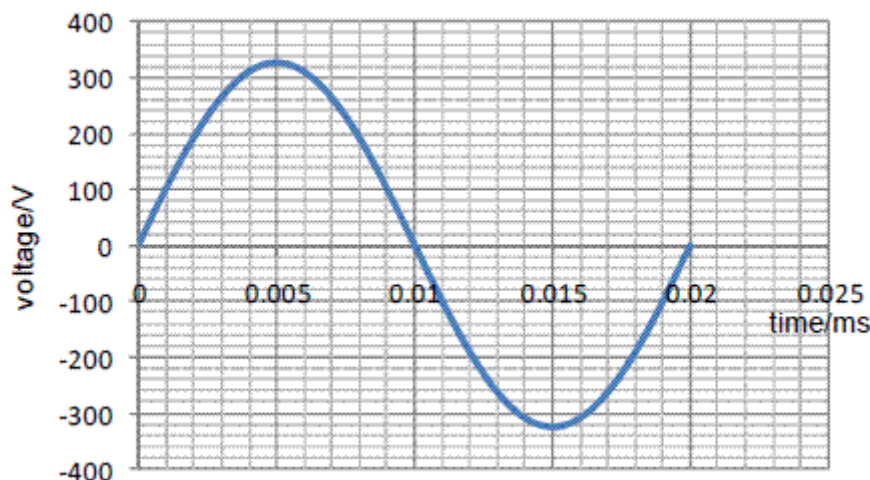
peak voltage = 325 V (or 324 V) **(1)**

2

- (ii) average power = $230 \times 0.26 = 60$ W **(1)**

1

- (c)



shape and symmetrical with consistent values of x at $y = 0$ and consistent $y_{\max}$ (must be at least one cycle) **(1)**

appropriate scale y-axis **(1)**

correct peak values (to within one 2 mm square) **(1)**

correct period (accept 0.02 or 20) **(1)**

4

[8]

Q2.

Q3.

- (i) 10.0 (V) **(1)** 1
- (ii) $V_{\text{rms}} = 10.0/\sqrt{2} = 7.1$ (V) **(1)** 1
- (iii) time period = $3 \times 2 = 6$ (ms) **(1)** 1
- (iv) frequency = $1/0.006$ or $1/6$ **(1)**
frequency = 167 **(1)** (Hz) 2

[5]

Q4.

- (a) flux linkage ($= N \phi = BAN \cos \theta$)
 $= 2.8 \times 10^{-2} \times 1.9 \times 10^{-3} \times 50 \times \cos 35^\circ$ **(1)**
 $= 2.2 \times 10^{-3}$ (Wb turns) **(1)**
 answer must be to **2 sf** only **(1)** 3
- (b) (i) reasonable sine curve drawn on axes, showing just one cycle, starting at emf = 0 **(1)** 1
- (ii) the flux linkage in these positions is **zero** **(1)** 1
- (iii) induced emf $\propto$ (or $=$) rate of change of flux (linkage) **(1)**
 flux (linkage) through the coil changes as it is rotated **(1)**
 from maximum at $\theta = 0, 180^\circ$ to zero at 90° and 270° **(1)**
 rate of change is greatest when plane of coil is parallel to B [or reference to $\varepsilon = BAN\omega \sin \omega t$, or $\varepsilon = BAN\omega \sin \theta$] **(1)**
 because coil then cuts flux lines perpendicularly [or $\varepsilon = BAN\omega \sin \omega t$ shows ε is greatest when $\omega t = 90^\circ$ or 270°] **(1)**

max 3

[8]