These are answers to the exam questions, not complete solutions. Answers provided to questions requiring explanations do not represent complete solutions, and would not necessarily receive the full marks allocated on the exam paper. Many marks are given on the exam for ‘working’ (i.e. for showing that you understand the relevant physics), and a numerical answer alone is usually not sufficient to gain full marks.

1. (a) (i) 11 cm. (ii) 114 W. (iii) Explanation required.

(b) (i) $2.9 \times 10^2$ K. (ii) Explanation required.

2. (a) (i) $7.59 \times 10^8$ kg. (ii) Explanation required. (iii) $1004$ kg m$^{-3}$.

(b) (i) $9.0 \times 10^{-3}$ m/s. (ii) Explanation required.

(c) (i) Explanation required. (ii) Pressure in both A and B decreases (radius of curvature of both bubbles increases).

3. (a) (i) Sketch and explanation required. (ii) Sketch and explanation required. (iii) Description required. (iv) Sketch and explanation required.

(b) (i) Zero. Explanation required. (ii) Sketch required. (iii) Sketch required. (iv) Explanation required.

4. (a) (i) Zero. (ii) Diagram required. (iii) $V_1 = q / C_1; V_2 = q / C_2$ (q is same for both). (iv) Proof required.
(b) (i) $1.2 \times 10^{-3}$ s.  
(ii) Explanation required.

5. (a) From the eye’s perspective, force on positive ions is to the right; force on negative ions is to the left.

(b) Explanation required. Direction of induced electric field is to the left on the diagram.

(c) (i) Proof required.  
(ii) Proof required.

6. (a) (i) Black end is the south pole. Explanation required.  
(ii) The ring swings away from the magnet.  
(iii) Current would be in the opposite direction. Ring will swing away from the magnet (i.e. in the same direction as before).

(b) (i) Zero.  
(ii) Zero. Explanation required.  
(iii) $I_{net} = nIL$.  
(iv) Proof required.  
(v) 0.15 T.

7. (a) $Z = 28$; $A = 60$.

(b) (i) $1 \times 10^{16}$.  
(ii) $4 \times 10^7$.  
(iii) Explanation required.

(c) Explanation required.

(d) (i) 3.7 cm.  
(ii) 31.6 cm.