Section A - Multiple Choice

1. A
2. B
3. E
4. B
5. A
6. D
7. D
8. D
9. B
10. D
11. D
12. C
13. B
14. E
15. D
16. A
17. C
18. B
19. D
20. B

Section B – Problems

1. (a) $\left(0\boldsymbol{i} - 2.34\times10^{6}\,\boldsymbol{j}\right)$ ***N/C***
   (b) $\left(4.68\text{ N}, 90°\right)$

2. (a) -4.95 J
   (b) 1.50×10^{4} V
   (c) 8.94×10^{3} m/s
   (d) Had to assume that the initial potential energy was zero.

3. (a) 2.63×10^{14} m/s^2
   (b) $3.19\text{x}10^{-3}$ m
   (c) 2.73 mm
   (d) 13.7 cm

4. (a) 3.0 Ω
   (b) 1.5 A CW
   (c) 28.5 W
   (d) 2.25 W

5. (a) $I_1 = -0.5$ A $I_3 = -1.5$ A (Opposite directions to what is indicated.)
(b) 6 V
(c) 3 V
(d) No current flows through battery.

6A (a) 1.5 μF
(b) 17.3 V
(c) 1.73×10^{-5} C
(d) 5.42×10^{-7} A

7A (a) i. $\vec{B}$ into page ($-z$ direction)
$\vec{E}$ to right ($+x$ direction)
ii. 2.00×10^{5} m/s
iii. 2.40×10^{-25} kg
iv. No change. $\vec{F}_E$ and $\vec{F}_B$ would each change direction; they would remain equal in magnitude and opposite in direction from each other. $\vec{F}_{NET}$ still 0.

7B $\left(-6.20\times10^{-5}\,\boldsymbol{i} - 1.35\times10^{-5}\,\boldsymbol{j}\right)\ \boldsymbol{T}$

8. (a) 0.520 N (+z direction)
(b) $1.05\times10^{-2}\ \text{A}\cdot\text{m}^2$ $(+y$ direction$)$
(c) $2.10\times10^{-2}\ \text{N}\cdot\text{m}$ $(-z$ direction$)$
(d) clockwise, if viewed such that +z axis comes toward your eye.

9A (ii) 0.508 V

9B 1.00 m/s, current upward through resistor.