

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) $(0\mathbf{i} - 2.34 \times 10^6 \mathbf{j}) \text{ N/C}$
(b) $(4.68 \text{ N}, 90^\circ)$
2. (a) -4.95 J
(b) $1.50 \times 10^4 \text{ V}$
(c) $8.94 \times 10^3 \text{ m/s}$
(d) Had to assume that the initial potential energy was zero.
3. (a) $2.63 \times 10^{14} \text{ m/s}^2$
(b) $3.19 \times 10^{-3} \text{ m}$
(c) 2.73 mm
(d) 14 cm
4. (a) 3.0Ω
(b) 1.5 A CW
(c) 28.5 W
(d) 2.25 W

5. (a) $I_1 = -0.5 \text{ A}$ $I_3 = -1.5 \text{ A}$ (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) $1.73 \times 10^{-5} \text{ C}$
(d) $5.42 \times 10^{-7} \text{ A}$
- 7A (a) i. \vec{B} into page ($-z$ direction)
 \vec{E} to right ($+x$ direction)
ii. $2.00 \times 10^5 \text{ m/s}$
iii. $2.40 \times 10^{-25} \text{ kg}$
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 $(-6.20 \times 10^{-5} \mathbf{i} - 1.35 \times 10^{-5} \mathbf{j}) \mathbf{T}$
8. (a) 0.520 N ($+z$ direction)
(b) $1.05 \times 10^{-2} \text{ A} \cdot \text{m}^2$ ($+y$ direction)
(c) $2.10 \times 10^{-2} \text{ N} \cdot \text{m}$ ($-z$ 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.