Polytechnic Tutoring Center

Midterm Review – PH 1223 Fall 2021

Disclaimer: This mock exam is only for practice. It was made by tutors in the Polytechnic Tutoring Center and is not representative of the actual exam given by the Academic Department.

1. A 5 µC point charge is located at the origin, and a -4 µC point charge is located on the x-axis at the point x = 3 m. What is the force on a 6 µC point charge located on the x-axis at the point x = 1 m?

    a) 0.809 N   b) 0.647 N   c) 0.485 N   d) 0.324 N   e) 0.114 N

2. If an electron experiences a force of 2×10^{-15} N as it accelerates between two metal plates, what is the magnitude of the electric field between the plates?

    a) 25.0 kN/C   b) 12.5 kN/C   c) 62.5 kN/C
   d) 50.0 kN/C   e) 37.5 kN/C

3. Two point charges of 11 nC each are placed at two of the corners of an equilateral triangle with sides of length 30 cm. What is the electric potential at the unoccupied corner of the triangle? Assume the potential is zero infinitely far away.

    a) 659 V   b) 912 V   c) 479 V   d) 240 V   e) 779 V

4. If a point charge of 3 µC is located at the origin, how much work would it take to move a point charge of 4 µC from the point on the y-axis where y = 5 m to the point on the y-axis where y = 2 m?
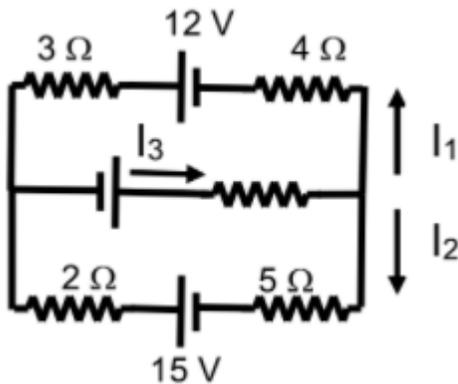
    a) 64.7 mJ   b) 43.1 mJ   c) 32.4 mJ   d) 21.6 mJ   e) 75.5 mJ

5. What is the equivalent capacitance for the circuit shown, given that each capacitor C has a value of 13 nF?
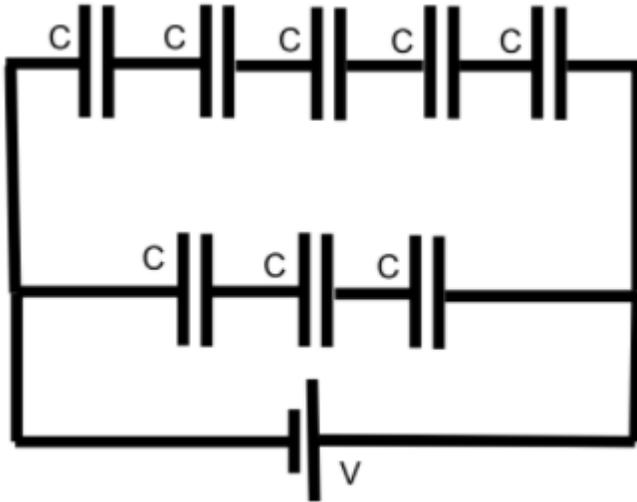
a) 4.11 nF   b) 6.93 nF
c) 9.60 nF   d) 11.2 nF
e) 8.00 nF

6. In the circuit below, given that current I_1 is 3 A, find the current I_2.

a) 5.43 A   b) 4.43 A   c) 2.43 A

d) 3.43 A   e) 6.43 A

7. A circular wire with radius of 8 cm is centered at the origin and carries a current of 2 A in the clockwise direction as shown. A long straight wire carrying a current of 6 A in the negative x direction is parallel to the x-axis and intersects the y-axis at the point y = 25 cm. What is the magnitude of the magnetic field at the origin?

a) 6.98 μT   b) 10.9 μT   c) 23.5 μT   d) 18.8 μT
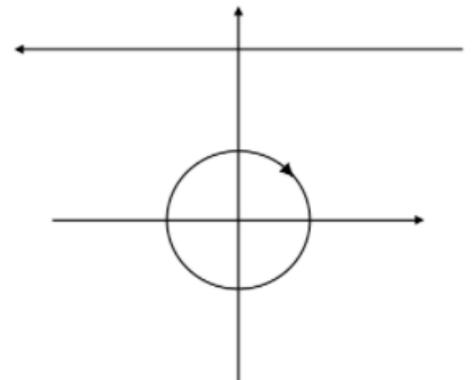
e) 14.8 μT

8. A circular wire coil with 50 turns and radius of 15 cm lies flat in a horizontal plane, where there is a magnetic field directed perpendicular to the plane surface. The magnetic field strength changes uniformly from 300 mT to 750 mT over a time period of 8 s. If the total resistance of the coil is 12 Ω, what is magnitude of the induced current in the coil while the magnetic field is changing?

     a) 46.0 mA   b) 83.1 mA   c) 16.6 mA   d) 66.3 mA   e) 29.5 mA

9. What is the amplitude of the electric field wave at a distance of 4 m from a 75 W light bulb. Assume that the bulb emits light uniformly in all directions.

     a) 11.2 N/C   b) 22.4 N/C   c) 19.1 N/C   d) 16.8 N/C   e) 13.4 N/C

10. What is the frequency of an X-ray that has a wavelength of 0.9 nm?

     a) 4.29×10^{17} Hz   b) 7.50×10^{17} Hz   c) 2.11×10^{17} Hz
     d) 6.00×10^{17} Hz   e) 3.33×10^{17} Hz