NAME:

PHYS 2326 University Physics II – Class number -49903

9:00 AM – 12:15 PM

EXAM – 1, JULY 16, 2013

CHAPTERS: 23, 24, 25, 26

Chapter-23

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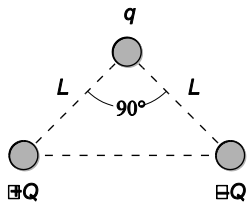
1. Three point charges are positioned on the x axis. If the charges and corresponding positions are +32 μC at x = 0, +20 μC at x = 40 cm, and –60 μC at x = 60 cm, what is the magnitude of the electrostatic force on the +32-μC charge?

   a. 84 N
   b. 12 N
   c. 36 N
   d. 50 N
   e. 48 N

ANS: (ch-23, b)

2. If Q = 25 μC, q = 10 μC, and L = 40 cm in the figure, what is the magnitude of the electrostatic force on q?



   a. 28 N
   b. 22 N
   c. 20 N
   d. 14 N
   e. 10 N

ANS: (ch-23, c)

3. Charge of uniform density 4.0 nC/m is distributed along the x axis from $x = -2.0$ m to x = +3.0 m. What is the magnitude of the electric field at the point x = +5.0 m on the x axis?

a. 16 N/C
b. 13 N/C
c. 19 N/C
d. 26 N/C
e. 5.0 N/C

ANS: (ch-23, b)

4. A particle (mass = 4.0 g, charge = 80 mC) moves in a region of space where the electric field is uniform and is given by E_x = –2.5 N/C, $E_y = E_z = 0$. If the velocity of the particle at t = 0 is given by v_x = 80 m/s, $v_y = v_z = 0$, what is the speed of the particle at t = 2.0 s?

a. 40 m/s
b. 20 m/s
c. 60 m/s
d. 80 m/s
e. 180 m/s

ANS: (ch-23, b)

Chapter-24.

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5. A long nonconducting cylinder (radius = 12 cm) has a charge of uniform density ($5.0\ nC/m^3$) distributed throughout its column. Determine the magnitude of the electric field 5.0 cm from the axis of the cylinder.

   a. 25 N/C
   b. 20 N/C
   c. 14 N/C
   d. 31 N/C
   e. 34 N/C

   ANS: (ch24, c)

6. Charge of uniform density ($80\ nC/m^3$) is distributed throughout a hollow cylindrical region formed by two coaxial cylindrical surfaces of radii 1.0 mm and 3.0 mm. Determine the magnitude of the electric field at a point which is 4.0 mm from the symmetry axis.

   a. 7.9 N/C
   b. 10 N/C
   c. 9.0 N/C
   d. 8.9 N/C
   e. 17 N/C

   ANS (ch-24, c)

7. Charge of uniform linear density (4.0 nC/m) is distributed along the entire x axis. Determine the magnitude of the electric field on the y axis at y = 2.5 m.

a. 36 N/C
b. 29 N/C
c. 43 N/C
d. 50 N/C
e. 58 N/C

ANS (ch-24, b)

8. The field just outside the surface of a long conducting cylinder which has a 2.0-cm radius points radially outward and has a magnitude of 200 N/C. What is the charge density on the surface of the cylinder?

a. 2.7 nC/m^2
b. 1.8 nC/m^2
c. 3.5 nC/m^2
d. 4.4 nC/m^2
e. 0.90 nC/m^2

ANS: (ch-24, b)

Chapter-25

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9. A proton (mass = 1.67×10^{-27} kg, charge = 1.60×10^{-19} C) moves from point A to point B under the influence of an electrostatic force only. At point A the proton moves with a speed of 50 km/s. At point B the speed of the proton is 80 km/s. Determine the potential difference $V_B - V_A$.

a. +20 V
b. –20 V
c. –27 V
d. +27 V
e. –40 V

ANS: (ch25, b)

10. Through what potential difference must an electron (starting from rest) be accelerated if it is to reach a speed of 3.0×10^7 m/s?

a. 5.8 kV
b. 2.6 kV
c. 7.1 kV
d. 8.6 kV
e. 5.1 kV

ANS (CH-25, b)

11. A particle (charge = Q) is kept in a fixed position at point P, and a second particle (charge = q) is released from rest when it is a distance R from P. If Q = +2.0 mC, q = –1.5 mC, and R = 30 cm, what is the kinetic energy of the moving particle after it has moved a distance of 10 cm?

a. 60 kJ
b. 45 kJ
c. 75 kJ
d. 90 kJ
e. 230 kJ

ANS: (CH-25, b)

12. A charge of +3.0 μC is distributed uniformly along the circumference of a circle with a radius of 20 cm. How much external energy is required to bring a charge of 25μC from infinity to the center of the circle?

a. 5.4 J
b. 3.4 J
c. 4.3 J
d. 2.7 J
e. 6.8 J

ANS: (CH-25, b)

Chapter- 26

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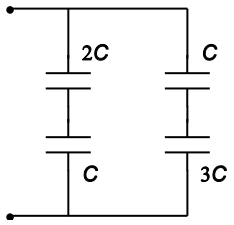
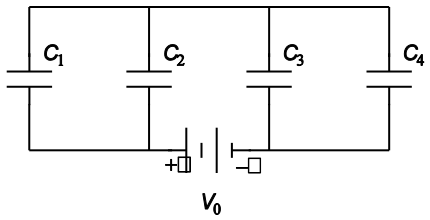
13. Determine the equivalent capacitance of the combination shown when C = 12 nF.



a. 34 nF
b. 17 nF
c. 51 nF
d. 68 nF
e. 21 nF

ANS : (ch-26, b)

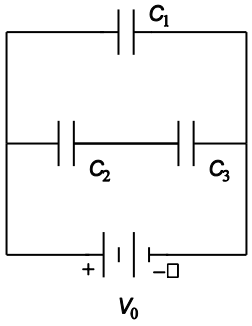
14. What is the total energy stored by C_3 when C_1 = 50 μF, C_2 = 30 μF, C_3 = 36 μF, C_4 = 12 μF, and V_0 = 30 V?



a. 6.3 mJ
b. 25 mJ
c. 57 mJ
d. 1.6 mJ
e. 14 mJ

ANS (CH-26, a)

15. What is the potential difference across C_2 when C_1 = 5.0 μF, C_2 = 15 μF, C_3 = 30 μF, and V_0 = 24 V?

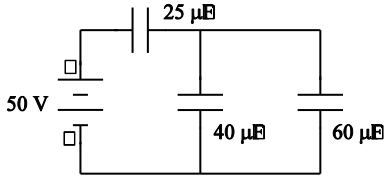


a. 21 V
b. 19 V
c. 16 V
d. 24 V
e. 8.0 V

ANS: (CH26, c)

BONUS:

Determine the energy stored in the 40-μF capacitor.



a. 2.4 mJ
b. 1.6 mJ
c. 2.0 mJ
d. 2.9 mJ
e. 4.0 mJ

ANS (CH-26, c)