24-07
0.52-35%

Question 533
In figure 2, the magnitude of the electric field at point A, due to an infinite line charge density of 9.0*10**(-6) C/m, is 7.2*10**4 N/C. If the point A is at a distance R from the line charge, what is R?

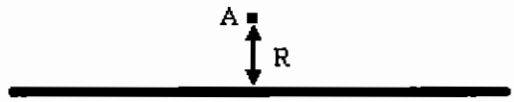

Figure (2)

(a) 1.2 m.
(b) 0.3 m.
(c) 3.4 m.
(d) 25 m.
(e) 2.3 m.

24-07
0.56-61%

Question 534
A very long uniform line of charge having a linear charge density of 6.8 micro-C/m lies along x-axis. A second line of charge has a linear charge density of -3.40 micro-C/m and is parallel to x-axis at y = 0.5 m. What is the net electric field at point where y= 0.25 m on y-axis?
(a) 7.3*10**2 N/C along -y-axis.
(b) 7.3*10**5 N/C along +y-axis.
(c) 4.8*10**4 N/C along -y-axis.
(d) 4.8*10**6 N/C along +y-axis.
(e) 3.4*10**6 N/C along +y-axis.

24-8 Applying Gauss' Law: Planar Symmetry

24-08

Question 535
Two infinite non-conducting parallel surfaces carry uniform charge densities of 0.20 nano-C/m**2 and -0.60 nano-C/m**2. What is the magnitude of the electric field at a point between the two surfaces?
(a) 17 N/C
(b) 34 N/C
(c) 90 N/C
(d) 45 N/C
(e) 23 N/C

24-08

Question 536
Fig. 7 shows two parallel plates, infinite and non-conducting, with surface charge densities of 8.9*10**(-4)C/m**2 and 8.9*10**(-4)C/m**2. B, a ball with negligible mass, carries a positive charge of 6.0*10**(-8) C and is attached to point A with a non-conducting string of length 10 cm. At equilibrium, the tension in the string is:

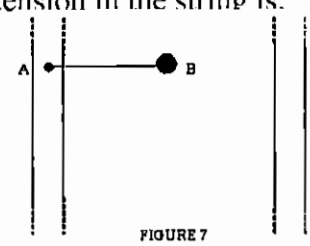

FIGURE 7

(a) 3.0 N.
(b) Zero.
(c) 6.0 N.
(d) 1.5 N.
(e) 0.3 N.

24-08

Question 537 0.41-70%

As shown in figure (3), a small, nonconducting ball of mass m = 1.0*10**(-6) kg and charge q = 2.0*10**(-8) C, distributed uniformly through its volume, hangs from an insulating thread that makes an angle theta = 20 degrees with a vertical, uniformly charged nonconducting sheet (shown in cross section). Considering the weight of the ball and assuming that the sheet extends far vertically and into and out of the page, calculate the surface charge density of the sheet.

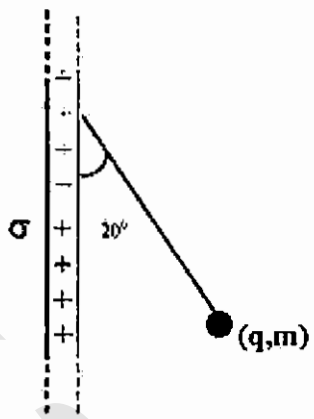

Figure 3

(a) 4.0*10**(-9) C/m**2.
(b) 8.7*10**(-9) C/m**2.
(c) 5.0*10**(-9) C/m**2.
(d) 2.5*10**(-9) C/m**2.
(e) 3.2*10**(-9) C/m**2.

24-08

Question 538 0.43-57%

Figure 4 shows cross-sections through two large, parallel non-conducting sheets with identical distributions of negative charge. The surface charge density for each sheet is 7.00*10**(-15) C/m**2. What is the electric field at point A ?

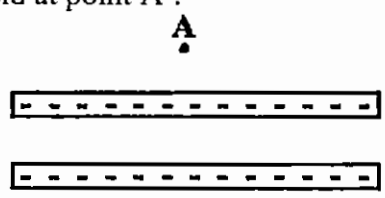

Figure 4

(a) 7.91*10**(-4) N/C upward
(b) 3.96*10**(-4) N/C downward
(c) 3.96*10**(-4) N/C upward
(d) 7.91*10**(-4) N/C downward
(e) 0

24-08

Question 539 0.36-36%

A small insulating sphere of mass m = 20.0*10**(-9) kg and charge q = + 1.00 nano-Coulomb is hanging at equilibrium above a charged insulating sheet. What is the surface charge density of the sheet ?

(a) - 3.47 nano-Coulomb/m**2
(b) + 1.73 nano-Coulomb/m**2
(c) + 3.47 nano-Coulomb/m**2
(d) + 2.50 nano-Coulomb/m**2
(e) - 1.73 nano-Coulomb/m**2

24-08

Question 540 0.42-35%

Figure 4 shows two large, parallel, non-conducting sheets, each with fixed uniform charge density: sigma1 = + 2.2*10**(-6) C/m**2 sigma2 = - 4.3*10**(-6) C/m**2. The ratio of the magnitude of the electric field at point A to that at point B is:

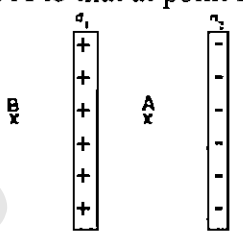

Figure 4

(a) 1.5
(b) 0.6
(c) 4.4
(d) 2.2
(e) 3.1

24-08

Question 541 0.34-65%

For the two infinite dielectric sheets, see figure (5), find the magnitude of the electric field at a point P. Consider that each sheet has a positive surface charge density of 10**2 C/m**2.

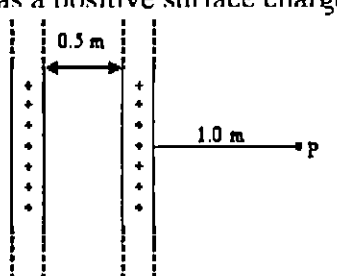

Figure (5)

(a) 2.2*10**13 N/C.
(b) 0.5*10**13 N/C.
(c) 1.1*10**13 N/C.
(d) Zero.
(e) 1.7*10**13 N/C.

24-08
0.41-62%

Question 542
Figure 7 shows portions of two large, parallel, nonconducting sheets, A and B. The surface charge densities are: sigma 1 = -4.5 micro-C/m**2 and sigma 2 = -6.5 micro-C/m**2. Find the electric field at any point between the two sheets.

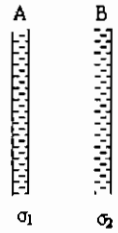

Figure 7

(a) 1.4*10**5 N/C towards A.
(b) 1.1*10**5 N/C towards B.
(c) zero.
(d) 1.1*10**5 N/C towards A.
(e) 1.4*10**5 N/C towards B.

24-08
0.33-61%

Question 543
A 40 N/C uniform electric field points perpendicularly toward a large neutral conducting sheet, as shown in figure 8. The surface charge densities (in C/m**2) on the right, sigma-R and left, sigma-L, respectively are:

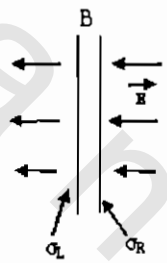

Figure 8

(a) + 7.0*10**(-10) ; -7.0*10**(-10).
(b) - 7.0*10**(-10) ; +7.0*10**(-10).
(c) + 3.5*10**(-10) ; -3.5*10**(-10).
(d) zero ; zero.
(e) - 3.5*10**(-10) ; +3.5*10**(-10).

24-08
0.30-66%

Question 544
Two large flat non-conducting sheets have equal but opposite surface charge densities. The distance between them is 2.0 cm. An electron released from rest from the negative plate strikes the positive plate after 15 nano-seconds. What is the magnitude of the surface charge density on each sheet?
(a) 3.0 nano-Coulomb/m**2
(b) 18 nano-Coulomb/m**2
(c) 7.5 nano-Coulomb/m**2
(d) 4.5 nano-Coulomb/m**2
(e) 9.0 nano-Coulomb/m**2

24-08
0.55-56%

Question 545
A charged, isolated, large non-conducting plate is placed on the XY-plane. At 1.5 m from the plate, on Z-axis, the electric field measured was 10**4 N/C and directed into the plate. What is the charge density on the plate?
(a) 1.8*10**(-7) C/m**2.
(b) 3.2*10**(-7) C/m**2.
(c) -3.2*10**(-7) C/m**2.
(d) -1.8*10**(-7) C/m**2.
(e) zero.