Physics 210 week 3 Practice Multiple Choice

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Two infinite, uniformly charged, flat surfaces are mutually perpendicular. One of the sheets has a charge density of +60 pC/m^2, and the other carries a charge density of −80 pC/m^2. What is the magnitude of the electric field at any point not on either surface?
   a. 1.1 N/C
   b. 5.6 N/C
   c. 7.9 N/C
   d. 3.8 N/C
   e. 4.0 N/C

____ 2. 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

____ 3. Each 2.0-m length of a long cylinder (radius = 4.0 mm) has a charge of 4.0 nC distributed uniformly throughout its volume. What is the magnitude of the electric field at a point 5.0 mm from the axis of the cylinder?
   a. 9.9 kN/C
   b. 8.1 kN/C
   c. 9.0 kN/C
   d. 7.2 kN/C
   e. 18 kN/C

____ 4. A long nonconducting cylinder (radius = 6.0 mm) has a nonuniform volume charge density given by αr^2, where α = 6.2 mC/m^5 and r is the distance from the axis of the cylinder. What is the magnitude of the electric field at a point 2.0 mm from the axis?
   a. 1.4 N/C
   b. 1.6 N/C
   c. 1.8 N/C
   d. 2.0 N/C
   e. 5.4 N/C

____ 5. 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 2.0 mm from the symmetry axis.
   a. 7.9 N/C
   b. 9.0 N/C
   c. 5.9 N/C
   d. 6.8 N/C
   e. 18 N/C

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6. Charge of uniform density (40 pC/m^2) is distributed on a spherical surface (radius = 1.0 cm), and a second concentric spherical surface (radius = 3.0 cm) carries a uniform charge density of 60 pC/m^2. What is the magnitude of the electric field at a point 4.0 cm from the center of the two surfaces?
   a. 3.8 N/C
   b. 4.1 N/C
   c. 3.5 N/C
   d. 3.2 N/C
   e. 0.28 N/C

____ 7. A 4.0-pC point charge is placed at the center of a hollow (inner radius = 2.0 cm, outer radius = 4.0 cm) conducting sphere which has a net charge of 4.0 pC. Determine the magnitude of the electric field at a point which is 6.0 cm from the point charge.
   a. 35 N/C
   b. 25 N/C
   c. 30 N/C
   d. 20 N/C
   e. 10 N/C

____ 8. The axis of a long hollow metallic cylinder (inner radius = 1.0 cm, outer radius = 2.0 cm) coincides with a long wire. The wire has a linear charge density of –8.0 pC/m, and the cylinder has a net charge per unit length of –4.0 pC/m. Determine the magnitude of the electric field 3.0 cm from the axis.
   a. 5.4 N/C
   b. 7.2 N/C
   c. 4.3 N/C
   d. 3.6 N/C
   e. 2.4 N/C

____ 9. A point charge of 6.0 nC is placed at the center of a hollow spherical conductor (inner radius = 1.0 cm, outer radius = 2.0 cm) which has a net charge of –4.0 nC. Determine the resulting charge density on the inner surface of the conducting sphere.
   a. +4.8 μC/m^2
   b. –4.8 μC/m^2
   c. –9.5 μC/m^2
   d. +9.5 μC/m^2
   e. –8.0 μC/m^2

Answer Section

MULTIPLE CHOICE

1. ANS: B PTS: 1
2. ANS: C PTS: 1
3. ANS: D PTS: 1
4. ANS: A PTS: 1
5. ANS: D PTS: 1
6. ANS: B PTS: 1
7. ANS: D PTS: 1
8. ANS: B PTS: 1
9. ANS: B PTS: 1