

## 24-5 Gauss' Law and Coulomb's Law

24-05

Question 520

The electric field everywhere on the surface of a hollow sphere of radius 11 cm is measured to be equal  $3.8 \times 10^{**4}$  N/C and points radially inward towards the center of the sphere. How much charge is enclosed by this surface?

- (a)  $3.7 \times 10^{**8}$  C.
- (b)  $-5.1 \times 10^{**8}$  C.
- (c)  $-3.3 \times 10^{**8}$  C.
- (d)  $-3.7 \times 10^{**8}$  C.
- (e)  $5.1 \times 10^{**8}$  C.

24-05

Question 521

0.49-54%

A positive point charge  $q$  sits at the center of a hollow spherical shell. The shell, with radius  $R$  and negligible thickness, has net charge  $-2q$ . The electric field strength outside the spherical shell (at  $r > R$ ) will be:

- (a)  $3 \cdot k \cdot q / r^{**2}$  radially inwards.
- (b)  $k \cdot q / r^{**2}$  radially inwards.
- (c)  $3 \cdot k \cdot q / r^{**2}$  radially outwards.
- (d)  $k \cdot q / r^{**2}$  radially outwards.
- (e) zero.

## 24-5 A Charged Isolated Conductor

24-06

Question 522

A spherical conducting shell of inner radius  $r_1$  and outer radius  $r_2$  has a net charge of 2 micro-C. If a point charge of -4.0 micro-C is placed at the geometrical center of the spherical shell, what is the charge on the outer surface of the spherical shell?

- (a) -4.0 micro-C
- (b) +4.0 micro-C
- (c) -2.0 micro-C
- (d) zero
- (e) +2.0 micro-C

24-06

Question 523

An isolated conducting spherical shell has an inner radius of 4.0 cm and outer radius of 5.0 cm. A charge  $8.0 \times 10^{**(-6)}$  C is put on the shell. What is the ratio of the charge on the inner surface of the shell to the charge on the outer surface?

- (a) 7/10.
- (b) 5/4.
- (c) 8/5.
- (d) Zero.
- (e) 1.

24-06

(.49-43%)

Question 524

A point charge of  $-50e$  lies at the center of a hollow spherical metal shell that has a net charge of  $-100e$ , as seen in figure (4). Calculate the charge on the (a) shell's inner surface, and (b) on its outer surface. [ $e$  is the magnitude of the charge on the electron.]

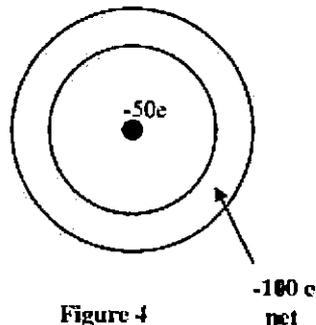


Figure 4

- |     |            |               |
|-----|------------|---------------|
| (a) | (a) $50e$  | (b) $-150e$ . |
| (b) | (a) $50e$  | (b) $-100e$ . |
| (c) | (a) $-50e$ | (b) $-100e$ . |
| (d) | (a) Zero   | (b) $-150e$ . |
| (e) | (a) $-50e$ | (b) $150e$ .  |

24-06

Question 525

An isolated conductor of arbitrary shape has a net charge of  $-15 \cdot 10^{-6}$  C. Inside the conductor is a cavity within which is a point charge  $q = -5.0 \cdot 10^{-6}$  C. What is the charge on the cavity-wall,  $q(\text{in})$ , and what is the charge on the outer surface of the conductor,  $q(\text{ou-})$ ? [See figure (3)].

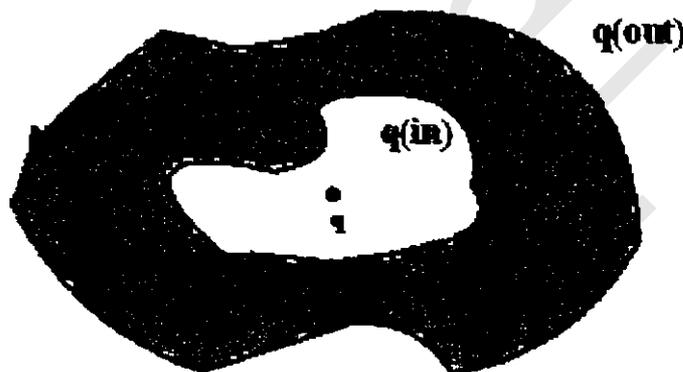


Figure 3

- |     |  |  |
|-----|--|--|
| (a) | $q(\text{in}) = -5.0 \cdot 10^{-6}$ C; | $q(\text{out}) = -10 \cdot 10^{-6}$ C. |
| (b) | $q(\text{in}) = 5.0 \cdot 10^{-6}$ C;  | $q(\text{out}) = -15 \cdot 10^{-6}$ C. |
| (c) | $q(\text{in}) = 5.0 \cdot 10^{-6}$ C;  | $q(\text{out}) = -20 \cdot 10^{-6}$ C. |
| (d) | $q(\text{in}) = -5.0 \cdot 10^{-6}$ C; | $q(\text{out}) = -15 \cdot 10^{-6}$ C. |
| (e) | $q(\text{in}) = 5.0 \cdot 10^{-6}$ C;  | $q(\text{out}) = -10 \cdot 10^{-6}$ C. |