Ch—02 Electrostatic Potential and Capacitance
Daily Practice Problem 06

Q1. When 1.0×10^{12} electrons are transferred from one conductor to another of a capacitor, a potential difference of 10 V develops between the two conductors. Calculate the capacitance of the capacitor.

Q2. A capacitor of unknown capacitance is connected across a battery of V volts. The charge stored in it is 360 μC. When potential across the capacitor is reduced by 120 V, the charge stored in it becomes $120\mu C$ Calculate:

(1) The potential V and the unknown capacitance C
(2) (ii) What will be the charge stored in the capacitor, if the voltage applied had increased by 120 V?

Q3. A charge of + 2.0 x 10⁻⁸ C is placed on the positive plate and a charge of —1.0 x 10⁻⁸ C on the negative plate. of a parallel plate capacitor of capacitance 1.2×10^{-3} μF. Calculate the potential difference developed between the plates.

Q4. The negative plate of a parallel plate capacitor is given a charge of -20 x 10⁻⁸ C. Find the charges appearing on the four surfaces of the capacitor plates.

Q5. Two parallel plate air capacitors have their plate areas 100 and 500 cm² respectively. If they have the same charge and potential and the distance between the plates of the first capacitor is 0.5 mm, what is the distance between the plates of the second capacitor?

Q6. Figure shows the variation of voltage V across the plates of two capacitors A and B versus increase in charge Q stored in them. Which of the capacitors has higher capacitance? Give reason for your answer.
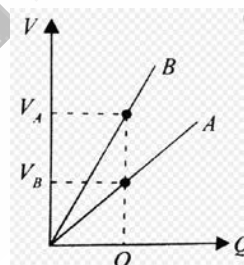
Q7. A solid conducting sphere of radius 10 cm is enclosed by a thin metallic shell of radius 20 cm. A charge q = 20 μC is given to the inner sphere. Find the heat generated in the process. The inner sphere is connected to the shell by a conducting wire.

Q8. Two conducting spheres of radii 6 cm and 12 cm each, having the same charge 3 x 10^{-8} C, are kept very far apart. If the spheres are connected to each other by a conducting wire, find

(i) the direction and amount of charge transferred and

(ii) final potential of each sphere

Q9. A sphere of radius 0.03 m is suspended within a hollow sphere of radius 0.05 m. If the inner sphere is charged to a potential of 1500 volt and outer sphere is earthed, find the capacitance and the charge on the inner sphere.

Q10. The thickness of air layer between the two coatings of a spherical capacitor is 2 cm the capacitor has the same capacitance as the sphere of 1.2 m diameter. Find the radii of its surfaces.

ANSWERS

1. $1.6 \times 10^{-8} \ F$

2. (i) $2 \ \mu F$ (ii) $600 \ \mu$ C

3. $12.5 \ V$

4. On surface 1= $-10 \times 10^{-8} \ C$

On surface 2= $+10 \times 10^{-8} \ C$

On surface 3= $-10 \times 10^{-8} \ C$

On surface 4= $-10 \times 10^{-8} \ C$

5. 2.5 mm

6. A

7. 9 J

8. (i) 10^{-8} C (ii) 3000 V

9. $1.25 \times 10^{-8} C$

10. a=10 cm, b=12cm