1. A parallel plate capacitor consist of two square plates each of side 25 cm , 3.0 mm apart. If a p.d. of 200 V is applied, calculate the charge on the plates with (i) air (ii) paper of dielectric constant 2.5, filling the space between them.
    (Answer : (i) 37 nC (ii) 93 nC)

2. A parallel plate capacitor has a capacitance of 1.5 µF with air between the plates. The capacitor is connected to a 12 V battery and fully charged. When a dielectric is placed between the plates, a potential difference of 5.0 V is measured across the plates. What is the dielectric constant of the material?
    (Answer : 2.4)

3. A capacitor is made of two parallel plates , each with an area of 146 cm^2. The plates are separated 0.58 mm from each other. Half of the area is filled with paper and half is filled with air (See Figure 2.27). Calculate the capacitance of the capacitor.
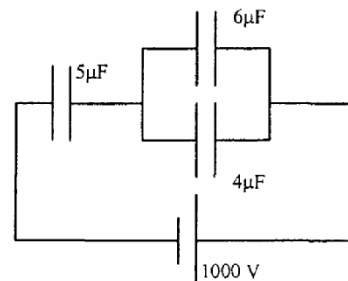

paper — air — Figure 2.27
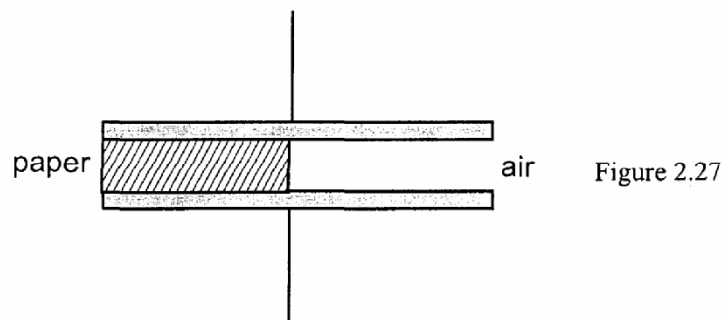
(Answer: 0.50 nF)

4. Calculate the equivalent capacitance in Figure 2.28a and 2.28b.
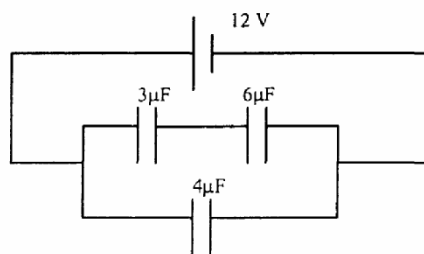
(a)
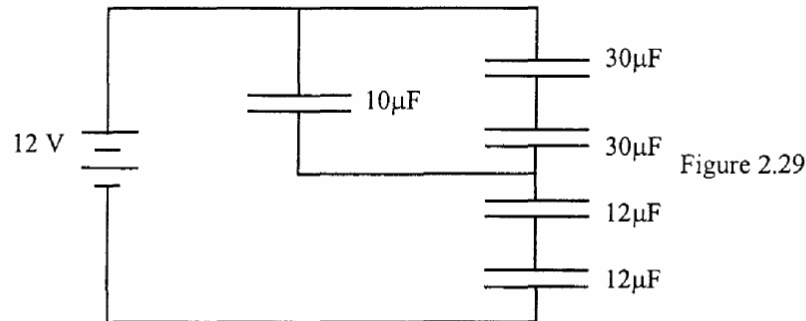
(b)

Figure 2.28

(Answer : (a) 6μF, (b) 3.33μF)

5. In Figure 2.29, calculate
    a) the equivalent capacitance in the circuit.
    b) the voltage across the 10μF capacitor in the circuit.

Figure 2.29

(Answer: a) 4.84μF b) 2.32 V)

6. Four capacitors are connected across terminals a and b as shown in Figure 2.30.
    (a) Calculate the equivalent capacitance across ab
    (b) If a steady voltage of 100V is connected across ab, find
        (i) the charge on the 5μF capacitor.
        (ii) the voltage across the 10μF capacitor.

Figure 2.30
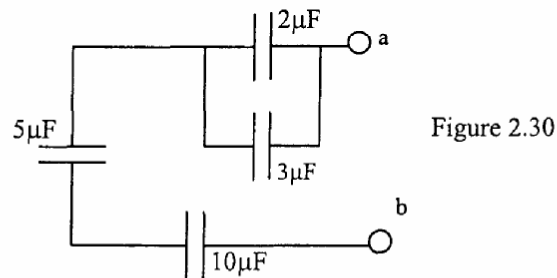
(Answer : (a) 2μF (b) (i) 200μC (ii) 20V)

7. Compute the energy stored in a 60 pF capacitor
    a) when charged to a pd of 2 kV
    b) when the charge on the plate is 30 nC.
(Answer : (a) 120 ⬜J (b) 7.5 ⬜J)

8. A parallel plate capacitor having area 40 cm^2 and spacing of 1 mm is charged to a
    potential difference of 600V. Find
    (a) The capacitance
    (b) The magnitude of charge on each plate
    (c) The stored energy
    (d) The electric field between the plate
(Answer: (a) 35pF (b) 21nC (c) 6.3μJ (d) 6.0x10^{5}V/m)

9. A parallel plate capacitor is made up of two parallel plates of area 600cm^2 separated at
    5mm by a layer of wax paper of dielectric constant of 2.0. Compute

(a) the capacitance of the above capacitor
(b) the energy stored in the capacitor when it is connected across a p.d. of 6V.
(Answer : (a) 212.4 pF (b) 3.82 nJ)

10. With reference to the capacitive circuit in Figure 2.31, find:
   (a) the total electrical energy stored in the 5μF and 4μF capacitors.
   (b) the electric charge stored in the 3μF capacitor.
(Answer : (a) 160μJ (b) 36μC)

Figure2.31