1. One plate of a parallel plate capacitor (5 μF) has a fixed charge 10 μC. The charge q (in μC) on the other plate is varied with time t(in seconds) as q = 2t. The pontential difference (in volts) between the plates will vary as

A) |1–0.2t| B) |1+0.2t|

C) 0.5t D) 0.2t

2. A parallel plate capacitor of capacitance C is charged to a potential V and another capacitor of capacitance 3C is charged to a potential 3V. The charging batteries are now disconnected and the capacitors are connected to each other such that the positive terminal of one is connected to the negative of the other. Energy dissipated in the circuit after connection is

A) $6CV^2$ B) $3CV^2$

C) $(3/2)CV^2$ D) $12\ CV^2$

3. A capacitor whose plates have charges +2Q and –Q is connected to an uncharged capacitor of same capacity C. The two plates of uncharged capacitor will have

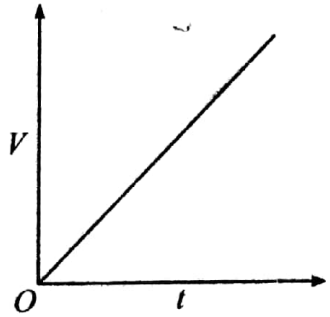
A) equal and opposite charge $\frac{3}{4}Q$.

B) $\frac{2}{3}Q$ and $-\frac{4}{3}Q$ charge

C) $\frac{3}{4}Q$ and $\frac{3}{8}Q$ charge

D) None of these

4. Which of the following statements is true ?



A) the capacitor of a parallel plate capacitor depends on the metal used to make the plates

B) if the current charging a capacitor is kept constant, the potential difference V across the capacitor varies with time t according to graph of figure.

C) ampere hour is unit of capacitance

D) a parallel plate capacitor of 1 F capacitance may be placed in an almirah

5. The capacitance of a capacitor does not depend on
   A) the shape of the plates
   B) the size of the plates
   C) the charges on the plates
   D) the separation between the plates

6. A capacitor of 2μf is charged to a potential of 4V using a battery. And then the battery is disconnected and the charged capacitor is connected to an uncharged capacitor of 4μf capacitance. When the equilibrium is established the total energy stored in the capacitors is

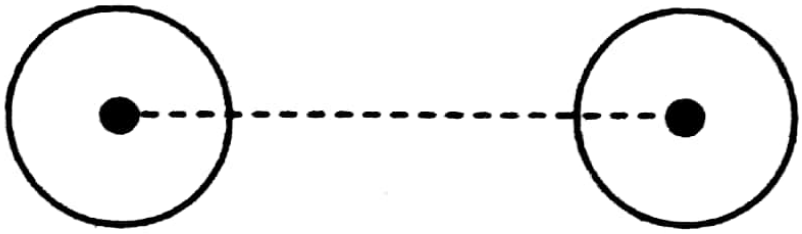
   A) 16 μJ B) $\frac{16}{3}$μJ C) $\frac{32}{3}$μJ D) $\frac{32}{9}$μJ

Answer Key

1. A	***2. A***	***3. A***	***4. B***
5. C	***6 B***		

Example 12

Two long straight wires with the same cross section are arranged in air parallel to one another. The distance between the axis of the wire is η times larger then the radius of cross - section of wire. Capacitance of the wires per unit length would be – [Take $\eta >> 1$]



Top view of the arrangement

A) $\frac{2\pi \epsilon_0}{l n \eta}$

B) $\frac{\pi \epsilon_0}{2 l n \eta}$

C) $\frac{\pi \epsilon_0}{l n \eta}$

D) Information is insufficient

The dielectric constant of the space between the spherical shells of a spherical capacitor of inner and outer radii a and b , varies as a function of radial distance x according to the relation $k = \frac{k_0}{x}$, where k_0 is a positive constant . The capacitance

of such a capacitors beween the shells will now become

A) $\frac{4\pi\varepsilon_o k_o}{\ln\left(\frac{b}{a}\right)}$ B) $\frac{2\pi\varepsilon_o k_o}{\ln\left(\frac{b}{a}\right)}$ C) $\frac{\pi\varepsilon_o k_o}{\ln\left(\frac{b}{a}\right)}$ D) $\frac{8\pi\varepsilon_o k_o}{\ln\left(\frac{b}{a}\right)}$