

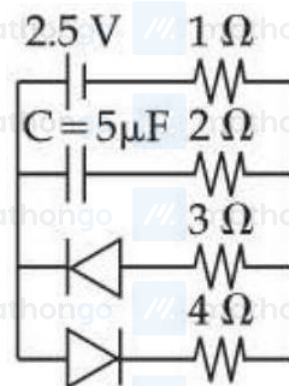
**Q1. 21 January Shift 1**

A parallel plate capacitor has capacitance  $C$ , when there is vacuum within the parallel plates. A sheet having thickness  $(\frac{1}{3})^{\text{rd}}$  of the separation between the plates and relative permittivity  $K$  is introduced between the plates.

The new capacitance of the system is :

- (1)  $\frac{4KC}{3K-1}$  (2)  $\frac{3CK^2}{(2K+1)^2}$  (3)  $\frac{3KC}{2K+1}$  (4)  $\frac{CK}{2+K}$

**Q2. 21 January Shift 2**



The charge stored by the capacitor  $C$  in the given circuit in the steady state is \_\_\_\_\_  $\mu\text{C}$ .

- (1) 5 (2) 12.5 (3) 10 (4) 7.5

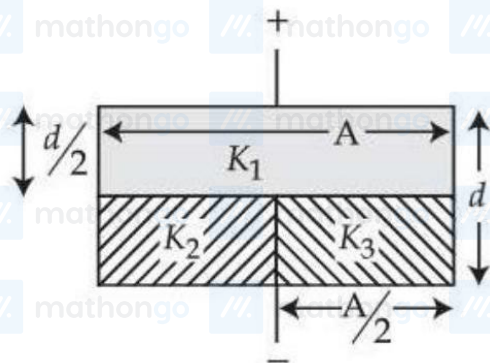
**Q3. 22 January Shift 2**

A capacitor  $P$  with capacitance  $10 \times 10^{-6} \text{ F}$  is fully charged with a potential difference of 6.0 V and disconnected from the battery. The charged capacitor  $P$  is connected across another capacitor  $Q$  with capacitance  $20 \times 10^{-6} \text{ F}$ .

The charge on capacitor  $Q$  when equilibrium is established will be  $\alpha \times 10^{-5} \text{ C}$  (assume capacitor  $Q$  does not have any charge initially), the value of  $\alpha$  is \_\_\_\_\_.

**Q4. 23 January Shift 1**

The space between the plates of a parallel plate capacitor of capacitance  $C$  (without any dielectric) is now filled with three dielectric slabs of dielectric constants  $K_1 = 2$ ,  $K_2 = 3$  and  $K_3 = 5$  (as shown in figure). If new capacitance is  $\frac{n}{3}C$  then the value of  $n$  is \_\_\_\_\_.



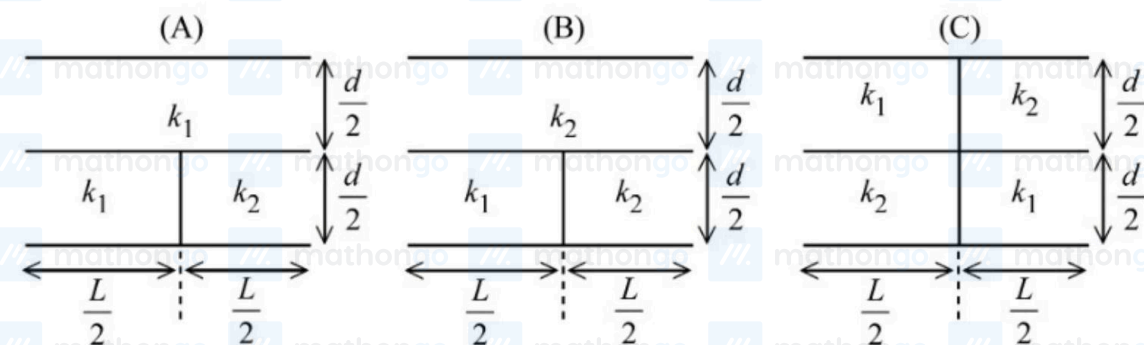
## Q5. 23 January Shift 2

A parallel plate capacitor with plate separation 5 mm is charged by a battery. On introducing a mica sheet of 2 mm and maintaining the connections of the plates with the terminals of the battery, it is found that it draws 25% more charge from the battery. The dielectric constant of mica is \_\_\_\_.

- (1) 1.0 (2) 2.5 (3) 2.0 (4) 1.5

## Q6. 24 January Shift 2

Three parallel plate capacitors each with area  $A$  and separation  $d$  are filled with two dielectric ( $k_1$  and  $k_2$ ) in the following fashion. Which of the following is true? ( $k_1 > k_2$ )



- (1)  $C_C > C_A > C_B$  (2)  $C_C > C_B > C_A$  (3)  $C_A > C_C > C_B$  (4)  $C_B > C_C > C_A$

## Q7. 28 January Shift 2

Identify the correct statements :

- A. Effective capacitance of a series combination of capacitors is always smaller than the smallest capacitance of the capacitor in the combination.
- B. When a dielectric medium is placed between the charged plates of a capacitor, displacement of charges cannot occur due to insulation property of dielectric.
- C. Increasing of area of capacitor plate or decreasing of thickness of dielectric is an alternate method to increase the capacitance.
- D. For a point charge, concentric spherical shells centered at the location of the charge are equipotential surfaces.

Choose the correct answer from the options given below :

- (1) B and D Only (2) A, B and C Only (3) C and D Only (4) A, C and D Only

## ANSWER KEYS

1. (3) 2. (3) 3. 4 4. 8 5. (3) 6. (3) 7. (4)