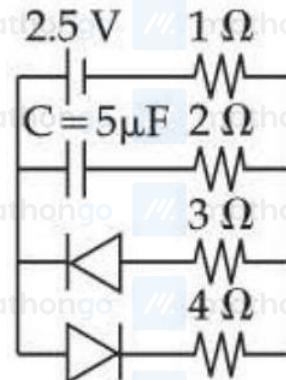


**Q1. 21 January Shift 1**

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

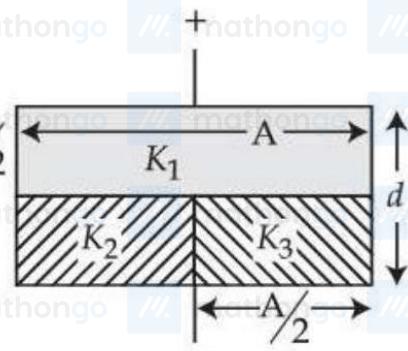
**Q3. 22 January Shift 2**

A capacitor  $P$  with capacitance  $10 \times 10^{-6} \text{ F}$  is fully charged with a potential difference of  $6.0 \text{ V}$  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  $\alpha \times 10^{-5} C$  (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**

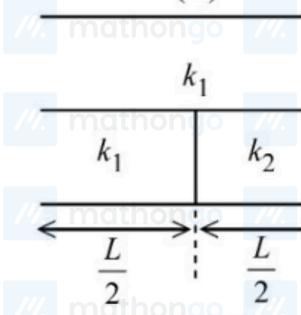
A parallel plate capacitor with plate separation 5 mm is charged by a battery. On introducing a mica sheet of 2 mm and maintaining the connections of the plates with the terminals of the battery, it is found that it draws 25% more charge from the battery. The dielectric constant of mica is \_\_\_\_.

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

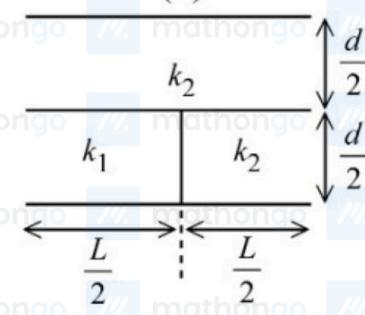
**Q6. 24 January Shift 2**

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? ( $k_1 > k_2$ )

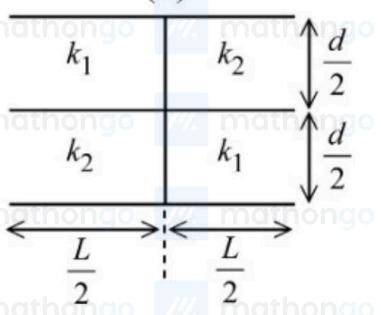
(A)



(B)



(C)



- (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)