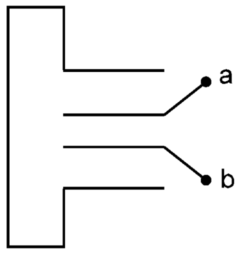
293. Four metallic plates each with a surface area A of one side and placed at a distance d from each other. the plates are connected as shown in the fig. Then the capacitance of the system between a and b is -



(A) $\frac{3 \epsilon_0 A}{d}$ (B) $\frac{2 \epsilon_0 A}{d}$

(C) $\frac{2 \epsilon_0 A}{3d}$ (D) $\frac{3 \epsilon_0 A}{2d}$

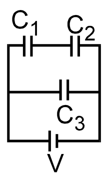
294. Two identical parallel plate capacitors are placed in series and connected to a constant voltage source of V_0 volt. If one of the capacitors is completely immersed in a liquid with dielectric constant K, the potential difference between the plates of the other capacitor will change to -

(A) $\frac{K+1}{K}V_0$ (B) $\frac{K}{K+1}V_0$ (C) $\frac{K+1}{2K}V_0$ (D) $\frac{2K}{K+1}V_0$

295. A number of capacitors each of capacitance 1 μF and each one of which get punctured if a potential difference just exceeding 500 volt is applied, are provided. Then an arrangement suitable for giving a capacitor of 2 μF across which 3000 volt may be applied requires at least-

(A) 18 component capacitors (B) 36 component capacitors
(C) 72 component capacitors (D) 144 component capacitors

296. In the given circuit $C_1 = C$, $C_2 = 2C$, $C_3 = 3C$. If charge at the capacitor C_2 is Q. Then the charge at the capacitor C_3 will be -



(A) $\frac{3Q}{2}$ (B) $\frac{9Q}{2}$

(C) $\frac{Q}{3}$ (D) $\frac{Q}{6}$

297. A capacitor of 2 μF is charged to its maximum emf of 2V and is discharged through a resistance of $10^4\Omega$. Current in the circuit after 0.02 s will be-

(A) 10^{-4}A (B) 1.4×10^5 A
(C) 7.4×10^{-5}A (D) 3.7×10^{-5}A

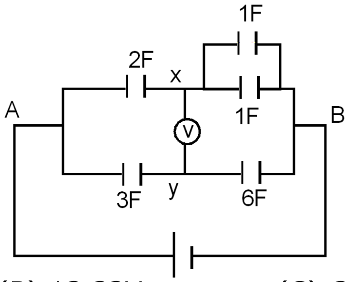
298. A battery charges a parallel plate capacitor of thickness (d) so that an energy $[U_0]$ is stored in the system. A slab of dielectric constant (K) and thickness (d) is then introduced between the plates of the capacitor. The new energy of the system is given by -

(A) KU_0 (B) $K^2 U_0$ (C) $\frac{U_0}{K}$ (D) U_0/K^2

299. Two spheres of radii R_1 and R_2 have equal charge are joint together with a copper wire. If the potential on each sphere after they are separated to each other is V, then initial charge on any sphere was $(k = \frac{1}{4\pi \epsilon_0})$ -

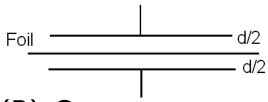
(A) $\frac{V}{k}(R_1 + R_2)$ (B) $\frac{V}{2k}(R_1 + R_2)$ (C) $\frac{V}{3k}(R_1 + R_2)$ (D) $\frac{V}{k}\frac{(R_1R_2)}{(R_1+R_2)}$

300. Calculate the reading of voltmeter between X and Y then (V_x-V_y) is equal to -



(A) 10 V (B) 13.33V (C) 3.33 V (D) 10.33 V

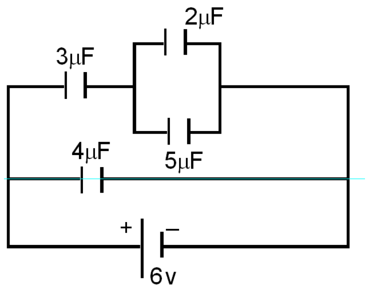
301.* A sheet of aluminium foil of negligible thickness is placed between the plates of a capacitor of capacitance C as shown in the figure then capacitance of capacitor becomes



(A) 2C (B) C (C) C/2 (D) zero

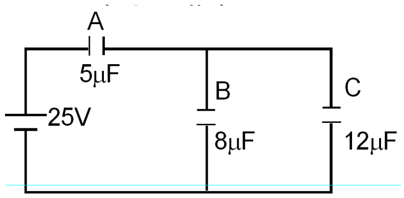
302. In above problem if foil is connected to any one plate of capacitor by means of conducting wire then capacitance of capacitor becomes -
(A) 2C (B) C (C) C/2 (D) zero

303. A circuit is shown in the figure below. Find out the charge of the condenser having capacity 5μF



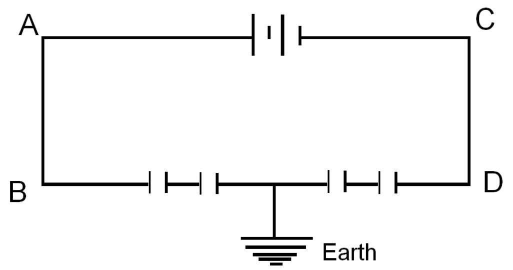
(A) 4.5 micro coulomb
(B) 6.0 micro coulomb
(C) 9.0 micro coulomb
(D) 30 micro coulomb

304. Three capacitors A , B and C are connected to a battery of 25volt as shown in the figure. The ratio of charges on capacitors A



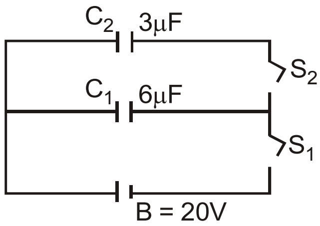
(A) 5 : 2 : 3 (B) 5 : 3 : 2
(C) 2 : 5: 3 (D) 2 : 3 : 5

305. Four equal capacitors , each with a capacitance (C) are connected to a battery of E.M.F 10volts as shown in the adjoining figure. The mid point of the capacitor system is connected to earth. Then the potentials of B and D are respectively -



(A) +10volts , zero volts (B) +5volts , –5 volts
(C) –5 volts, +5volts (D) zero volts, 10 volts

306. In the circuit shown here $C_1 = 6\mu F$, $C_2 = 3\mu F$ and battery $B = 20V$. The Switch S_1 is first closed. It is then opened and afterwards S_2 is closed. What is the charge finally on C_2

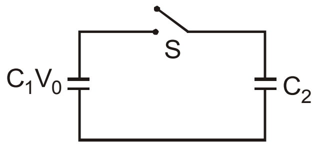


(A) 120μC (B) 80μC (C) 40μC (D) 20μC

307. A capacitor of capacity C_1 is charged to the potential of V_0. On disconnecting with the battery, it is connected with a capacitor of capacity C_2 as shown in the adjoining figure. The ratio of energies before and after the connection of switch S will be

(A) $(C_1 + C_2)/C_1$ (B) $C_1/(C_1 + C_2)$

(C) C_1C_2 (D) C_1/C_2



308. A charge of 2×10^{-2} C moves at 30 revolution per second in a circle of diameter 0.80 m. The current linked with the circuit will be -

(A) 0.1 A (B) 0.2 A (C) 0.4 A (D) 0.6 A

309 The current in a copper wire is increased by increasing the potential difference between its end. Which one of the following statements regarding n, the number of charge carriers per unit volume in the wire and v the drift velocity of the charge carriers is correct -

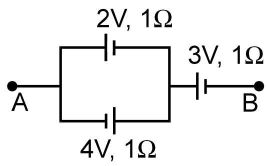
(A) n is unaltered but v is decreased (B) n is unaltered but v is increased
(C) n is increased but v is decreased (D) n is increased but v is unaltered

310. Consider two conducting wires of same length and material, one wire is solid with radius r. The other is a hollow tube of outer radius 2r while inner r. The ratio of resistance of the two wires will be -

(A) 1 : 1 (B) 1 : 2 (C) 1 : 3 (D) 1 : 4

311. The potential difference between points A and B is -

(A) 2 V (B) 6 V
(C) 4 V (D) 3 V



312. If a copper wire is stretched to make its radius decrease by 0.1%, then the percentage increase in resistance is approximately -

(A) 0.1% (B) 0.2% (C) 0.4% (D) 0.8%

313. The number of dry cells, each of e.m.f. 1.5 volt and internal resistance 0.5 Ω that must be joined in series with a resistance of 20 ohm so as to send a current of 0.6 ampere through the circuit is -

(A) 2 (B) 8 (C) 10 (D) 12

314. The sides of a rectangular block are 2cm, 3cm and 4 cm. The ratio of maximum to minimum resistance between its parallel faces is -

(A) 4 (B) 3 (C) 2 (D) 1

315. A long resistance wire is divided into 2n parts. Then n parts are connected in series and the other n parts in parallel separately. Both combinations are connected to identical supplies. Then the ratio of heat produced in series to parallel combinations will be -

(A) 1 : 1 (B) 1 : n^2 (C) 1 : n^4 (D) n^2 : 1

316. Two bulbs 100 W, 250 V and 200 W, 250 V are connected in parallel across a 500 V line**.** Then-

(A) 100 W bulb will fused
(B) 200 W bulb will fused
(C) Both bulbs will be fused
(D) No bulb will fused

317.* Two tungston lamps with resistance R_1 and R_2 respectively at full incandescence are connected first in parallel and then in series, in a lighting circuit of negligible internal resistance. It is given that $R_1 > R_2$.

Which lamp will glow more brightly when they are connected in parallel ?

(A) Lamp having lower resistance
(B) Lamp having higher resistance
(C) Both the lamps
(D) None of the two lamps

318.* In the previous question which lamp will glow more brightly when they are in connected in series ?

(A) Lamp having lower resistance
(B) Lamp having higher resistance
(C) Both the lamps
(D) None of the two lamps