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Daily Practice Problems

PHYSICS

Topic: Capacitance

Q.1 A parallel plate capacitor is charged and kept connected with the battery. If now a dielectric slab is inserted between the plates to fill the entire space between the plates then what will be the change in the charge, potential difference and electric field intensity between the plates respectively -

(1) increases , constant, increases

(2) increases, constant , constant

(3) increases , constant , decreases

(4) constant, decreases , decreases.

Q.2 A parallel plate air capacitor is connected to a battery. The quantities charge, voltage electric field, and energy associated with this capacitor are given by Q_0, V_0 , E_0 and U_0 respectively. A dielectric slab is now introduced to fill the space between the plates with battery still in connection. The corresponding quantities now given by Q , V, E, and U are related of the previous one as -

(1) $Q > Q_0$ (2) $V > V_0$

(3) $E > E_0$ (4) $U \geq U_0$

Q.3 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 -

(1) KU_0 (2) $K^2 U_0$

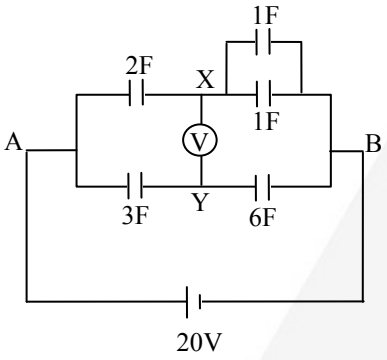
(3) $\frac{U_0}{K}$ (4) U_0/K^2

Q.4 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 ($k = \frac{1}{4\pi\epsilon_0}$) –

(1) $\frac{V}{k}(R_1 + R_2)$ (2) $\frac{V}{2k}(R_1 + R_2)$

(3) $\frac{V}{k}(R_1 + R_2)$ (4) $\frac{V}{k}\frac{(R_1R_2)}{R_1+R_2}$

Q.5 Calculate the reading of voltmeter between X and Y then ($V_X - V_Y$) is equal to -



(1) 10 V (2) 13.33V

(3) 3.33 V (4) 10.33 V

Q.6 The capacitance of two capacitors was compared with the aid of an electrometer. The capacitors were charged to potential of V_1 = 300V and V_2 = 100V and were connected in parallel. The potential difference between the plates measured by the electrometer was 250V. The capacitance ratio is -

(1) 3 : 1 (2) 1 : 3

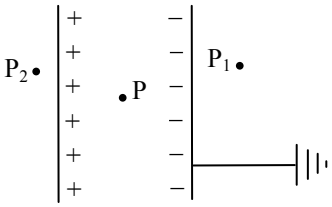
(3) 1 : 2.5 (4) 2.5 : 1

Q.7 Three capacitors 2, 3 and 4μF are connected in series with 6V battery. When the current stops, the charge on the 3μF capacitor is

(1) 5.5 μC (2) 4.4 μC

(3) 3.3 μC (4) 2.2 μC

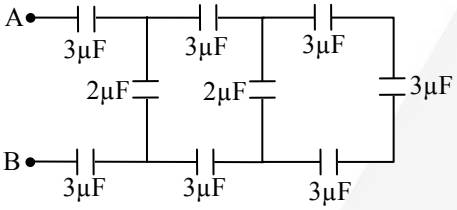
Q.8 There are two metallic plates of a parallel plate capacitor. One plate is given a charge +q while the other is earthed as shown . Points P , P_1 and P_2 are taken as shown in adjoining figure. Then the electric intensity is not zero at -



(1) P only (2) P_1 only

(3) P_2 only (4) P , P_1 and P_2

Q.9 The resultant capacitance between (A) and (B) in the following figure is -



(1)1μF (2) 3μF

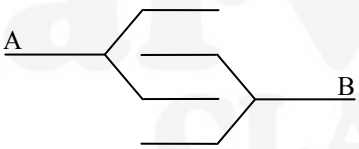
(3) 2μF (4) 1.5μF

Q.10 The diameter of the plate of a parallel plate condenser is 6 cm. If its capacity is equal to a sphere of diameter 200 cm, the separation between the plates of the condenser is -

(1) 4.5×10^{-4}m (2) 2.25×10^{-4}m

(3) 6.75×10^{-4} m (4) 9×10^{-4} m

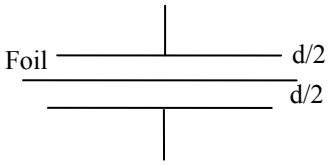
Q.11 Four metallic plates of each with a surface area of one side (A) , are placed at a distance (d) from each other. The alternate plate are connected to point (A) and (B) as shown in the fig. The capacitance of the system is



(1) $\frac{\epsilon_0 A}{d}$ (2) $\frac{2\epsilon_0 A}{d}$

(3) $\frac{3\epsilon_0 A}{d}$ (4) $\frac{4\epsilon_0 A}{d}$

Q.12 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

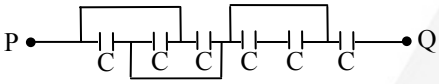


(1) 2C (2) C (3) C/2 (4) zero

Q.13 In above problem if foil is connected to any one plate of capacitor by means of conducting wire then capacitance of capacitor becomes -

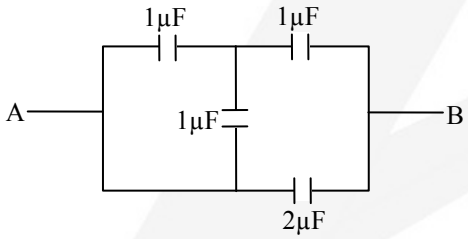
(1) 2C (2) C (3) C/2 (4) zero

Q.14 For circuit, the equivalent capacitance between P and Q is -



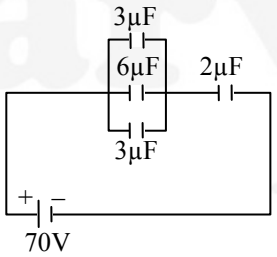
(1) 6C (2) 4C (3) 3C/2 (4) 3C/4

Q.15 The figure shows a circuit consisting of four capacitors. The effective capacitance between A and B is –



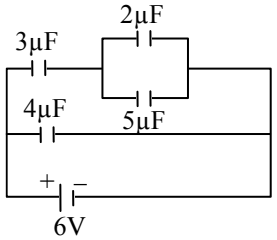
(1) $\frac{5}{6}$ μF (2) $\frac{7}{6}$ μF (3) $\frac{8}{3}$ μF (4) 1μF

Q.16 The p.d. across the capacitance of 2μF in the figure along with is -



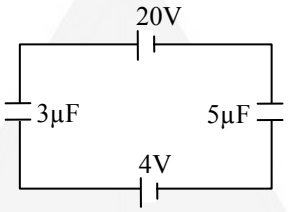
(1) 10V (2) 60V (3) 28 V (4) 56V

Q.17 A circuit is shown in the figure below. Find out the charge of the condenser having capacity 5μF-



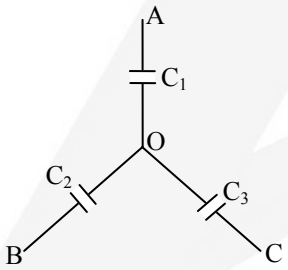
(1) 4.5 μC (2) 6.0 μC (3) 9.0 μC (4) 30 μC

Q.18 In the circuit shown in the following fig. The p.d across 3μF capacitor is -



(1) 4 V (2) 6 V (3) 10 V (4) 16 V

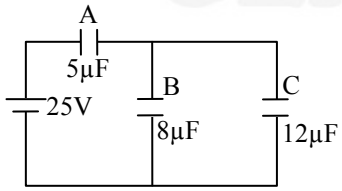
Q.19 Three capacitors of capacitors C_1 , C_2 , C_3 are connected as shown in the figure. The points A , B and C are at potential V_1 , V_2 and V_3 respectively. Then the potential at O will be –



(1) $\frac{V_1+V_2+V_3}{2}$ (2) $\frac{V_1V_2+V_2V_3+V_3V_1}{V_1+V_2+V_3}$

(3) $\frac{V_1C_1+V_2C_2+V_3C_3}{C_1+C_2+C_3}$ (4) zero

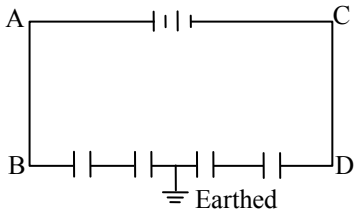
Q.20 Three capacitors A , B and C are connected to a battery of 25volt as shown in the figure. The ratio of charges on capacitors A , B and C will be -



(1) 5 : 2 : 3 (2) 5 : 3 : 2

(3) 2 : 5: 3 (4) 2 : 3 : 5

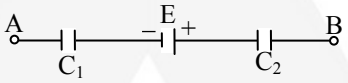
Q.21 Four equal capacitors , each with a capacitance (C) are connected to a battery of E.M.F 10volts as shown in the adjoining figure. The mid point of the capacitor system is connected to earth. Then the potentials of B and D are respectively-



(1) +10 volt , zero volt (2) +5 volt , –5 volt

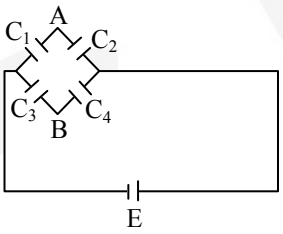
(3) –5 volt, +5 volt (4) zero volt, 10 volt

Q.22 A circuit has a section AB as shown in the fig. With E = 10V , C_1 = 1.0μF, C_2 = 2.0μF and the potential difference $V_A - V_B$ = 5V. The voltage across C_1 is -



(1) zero (2) 5V (3) 10V (4) 15V

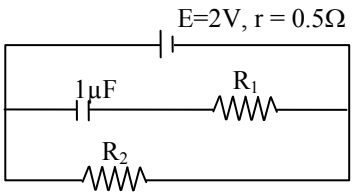
Q.23 The potential difference between points (A) and (B) of the circuit is-



(1) $(C_2 - C_1)$ E (2) $(C_4 - C_3)$ E

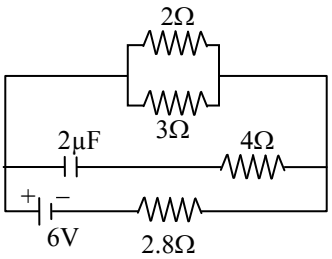
(3) $\frac{(C_2C_3 - C_1C_4)E}{(C_1 + C_2 + C_3 + C_4)}$ (4) $\frac{(C_2C_3 - C_1C_4)E}{(C_1 + C_2)(C_3 + C_4)}$

Q.24 A 1μF capacitor is connected in the circuit shown below. The e.m.f of the cell is 2 volts and internal resistance is 0.5 ohm. The resistors R_1 and R_2 have values 4 ohm and 1 ohm respectively. The charge on the capacitor must be-



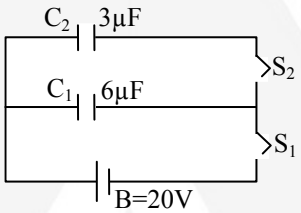
(1) 2μC (2) 1μC (3) 1.33μC (4) zero

Q.25 In the figure shown, the capacity of the condenser C is 2μF. The current in 2Ω resistor is-



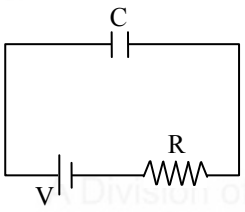
(1) 9 A (2) 0.9 A (3) $\frac{1}{9}$ A (4) $\frac{1}{0.9}$ A

Q.26 In the circuit shown here C_1 = 6μF, C_2 = 3μF 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 ?



(1) 120μC (2) 80μC (3) 40μC (4) 20μC

Q.27 As in figure shown, if a capacitor C is charged by connecting it with resistance R, then energy is given by the battery will be -



(1) $\frac{1}{2}CV^2$ (2) More than $\frac{1}{2}CV^2$

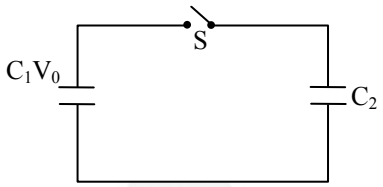
(3) Less than $\frac{1}{2}CV^2$ (4) Zero

Q.28 A parallel plate capacitor has plate area A and separation d. It is charged to a potential difference V_0. The charging battery is disconnected and the plates are pulled apart to three times the initial separation. The work required to separate the plates is -

(1) $\frac{3\varepsilon_0 AV_0^2}{d}$ (2) $\frac{\varepsilon_0 AV_0^2}{2d}$

(3) $\frac{\varepsilon_0 AV_0^2}{3d}$ (4) $\frac{\varepsilon_0 AV_0^2}{d}$

Q.29 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 -



(1) $(C_1 + C_2)/C_1$ (2) $C_1/(C_1 + C_2)$

(3) C_1C_2 (4) C_1/C_2

Q.30 Condenser A has a capacity of 15μF when it is filled with a medium of dielectric constant 15. Another condenser B has a capacity of 1μF with air between the plates. Both are charged separately by a battery of 100 V. After charging, both are connected in parallel without the battery and the dielectric medium being removed. The common potential now is -

(1) 400 V (2) 800 V

(3) 1200 V (4) 1600V

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.	2	1	1	2	3	1	1	1	1	2
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	3	2	1	4	3	2	3	3	3	1
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	2	3	4	3	2	3	2	4	1	2