PHYSICS

NEET

CRASH COURSE

CAPACITANCE

SMART ACHIEVERS

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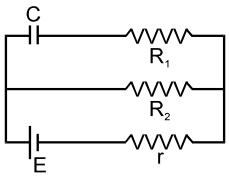
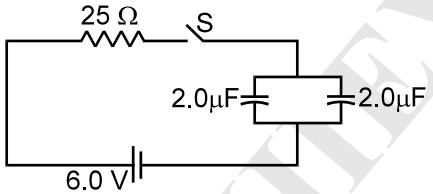
CAPACITANCE

Q.1 The magnitude of charge in steady state on either of the plates of condenser C in the adjoining circuit is-



(1) CE (2) $\frac{CER_2}{(R_1+r)}$ (3) $\frac{CER_2}{(R_2+r)}$ (4) $\frac{CER_1}{(R_2+r)}$

Q.2 The charge on each of the capacitors 0.20 ms after the switch S is closed in figure is :

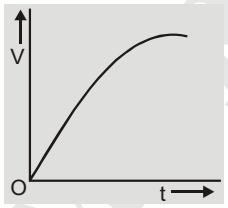


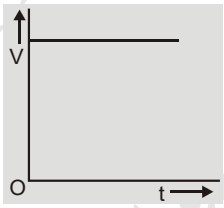
(1) 24 μC (2) 16.8 μC (3) 10.37 μC (4) 4.5 μC

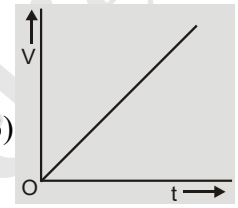
Q.3 Time constant of a series R-C circuit is

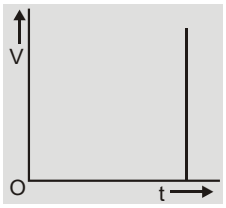
(1) +RC (2) –RC (3) R/C (4) C/R

Q.4 If a current, that charges a capacitor, is constant, then graph representing the change in voltage across the capacitor with time t is-

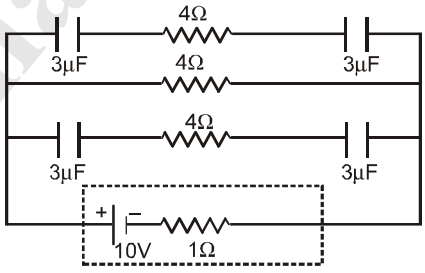
(1) 

(2) 

(3) 

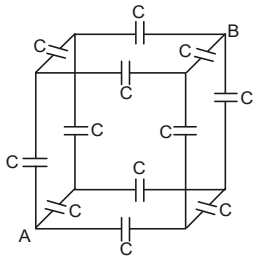
(4) 

Q.5 In the circuit given, charge (in μC) on each capacitor in steady state will be



(1) 12 (2) 10 (3) 8 (4) 6

Q.6 Each edge of the cube contains a capacitance C. The equivalent capacitance between the points A and B will be –



(1) $\frac{6C}{5}$ (2) $\frac{5C}{6}$ (3) $\frac{12C}{7}$ (4) $\frac{7C}{12}$

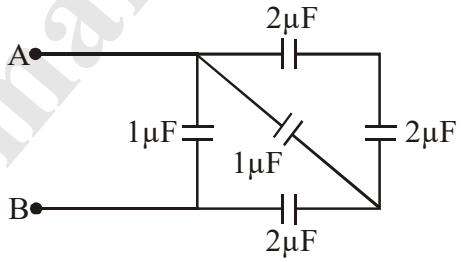
Q.7 The capacity of a spherical conductor is 1μF. Then its diameter would be :
(1) 1.8 metre (2) 1.8×10^4 metre (3) 1.8×10^3 metre (4) 18 metre

Q.8 The capacity of a conductor does not depend upon :
(1) charge (2) voltage
(3) nature of the material (4) all of these

Q.9 A parallel plate capacitor is connected to a battery and inserted a dielectric plate between the place of plates then which quantity increase.
(1) potential difference (2) electric field
(3) stored energy (4) E. M . F of battery

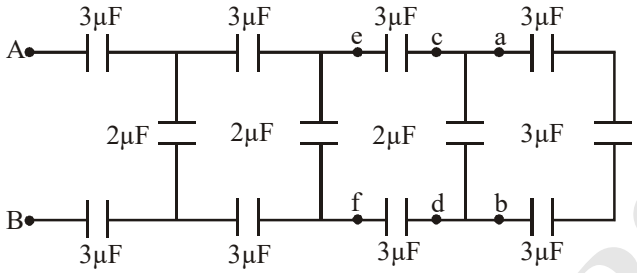
Q.10 A parallel plate capacitor is charged by a battery after charging the capacitor, battery is disconnected and decrease the distance between the plates then which following statement is correct ?
(1) electric field is not constant (2) potential difference is increased
(3) decrease the capacitance (4) decrease the stored energy

Q.11 Total capacity of the system of capacitors shown in the following figure between the points A and B is :



(1) 1 μF (2) 2 μF (3) 3 μF (4) 4 μF

Q.12 The resultant capcitance between A and B in the figure is :

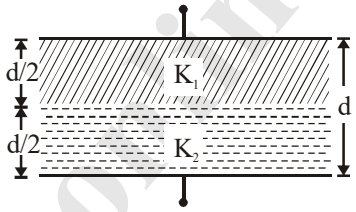


(1) 1μF (2) 10 μF (3) 50 μF (4) 1.5

Q.13 A parallel plate condenser with plate area A and separation d is filled with two dielectric materials as shown in the given below. The dielectric constants are K_1 and K_2 respectively The capacitance will be :

(1) $\frac{\varepsilon_0 A}{d}(K_1 + K_2)$ (2) $\frac{\varepsilon_0 A}{d}\left(\frac{K_1 + K_2}{K_1 K_2}\right)$

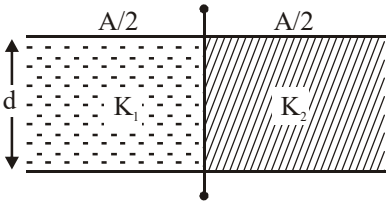
(3) $\frac{2\varepsilon_0 A}{d}\left(\frac{K_1 K_2}{K_1 + K_2}\right)$ (4) $\frac{2\varepsilon_0 A}{d}\left(\frac{K_1 + K_2}{K_1 K_2}\right)$



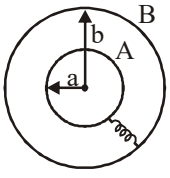
Q.14 A parallel plate condenser is filled with two dielectrics as shown in figure. Area of each plate is A metre^2 and the separation is d metre. The dielectric constants are K_1 and K_2 respectively. Its capacitance in farad will be :

(1) $\frac{\varepsilon_0 A}{d}(K_1 + K_2)$ (2) $\frac{\varepsilon_0 A}{d}\left(\frac{K_1 + K_2}{2}\right)$

(3) $\frac{\varepsilon_0 A}{d}2(K_1 + K_2)$ (4) $\frac{\varepsilon_0 A}{d}\left(\frac{K_1 + K_2}{2}\right)$

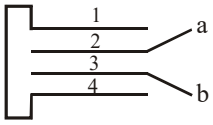


Q.15 Two spherical conductors A and B of radii a and b (b > a) are placed concentrically in air. The two are connected by a copper wire as shown in figure. Then the equivalent capacitance of the system is :



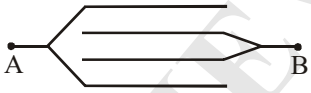
(1) $\frac{4\pi\varepsilon_0 ab}{(b-a)}$ (2) $4\pi\varepsilon_0(a + b)$ (3) $4\pi\varepsilon_0 b$ (4) $4\pi\varepsilon_0 a$

Q.16 Four metallic plates, each with a surface area of one side A, are placed at a distance d from each other. The plates are connected as shown in the adjoining figure. Then the capacitance of the system between a and b is :



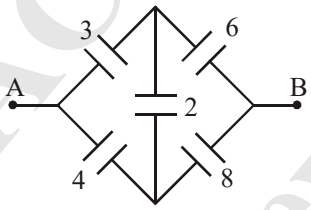
(1) $\frac{3\varepsilon_0 A}{d}$ (2) $\frac{2\varepsilon_0 A}{d}$ (3) $\frac{2}{3}\frac{\varepsilon_0 A}{d}$ (4) $\frac{3}{2}\frac{\varepsilon_0 A}{d}$

Q.17 Four metallic plates each with a surface area of one side A, are placed at a distance d from each other. The two outer plates are connected to one point A and the two other inner plates to another point B as shown in the figure. Then the capacitance of the system is :



(1) $\frac{\varepsilon_0 A}{d}$ (2) $\frac{2\varepsilon_0 A}{d}$ (3) $\frac{3\varepsilon_0 A}{d}$ (4) $\frac{4\varepsilon_0 A}{d}$

Q.18 The effective capacitance between A and B in the figure shown is (all capacitances are in μF) :



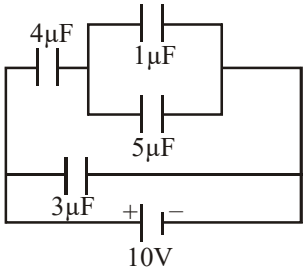
(1) 21 μF (2) 23 μF (3) $\frac{3}{14}$ μF (4) $\frac{14}{3}$ μF

Q.19 By inserting a plate of dielectric material between the plates of a parallel plate capacitor connected to a fixed battery, the energy is increased five times. The dielectric constant of the material is
(1) 1/25 (2) 1/5 (3) 5 (4) 25

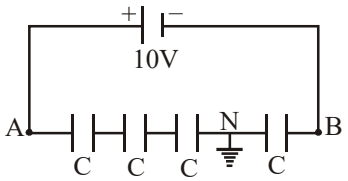
Q.20 A metallic plate of thickness (t) and face area of one side (A) is inserted between the plates of a parallel plate air capacitor with a separation (D) and face area (A). Then the equivalent capacitance is

(1) $\frac{\epsilon_0 A}{d}$ (2) $\frac{\epsilon_0 A}{(d \times t)}$ (3) $\frac{\epsilon_0 A}{(d - t)}$ (4) $\frac{\epsilon_0 A}{(d + t)}$

Q.21 For the circuit shown in the figure, the charge on 4 μF capacitor is :
(1) 30 μC (2) 40 μC
(3) 24 μC (4) 54 μC

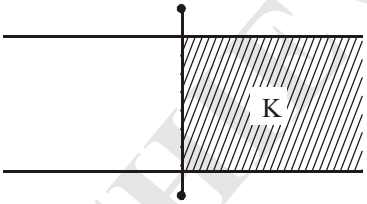


Q.22 Four identical capacitors are connected in series with a 10 V battery as shown. The point N is earthed. The potentials of points A and B are :



(1) 10 V, 0 V (2) 7.5 V, – 2.5 V (3) 5 V, – 5V (4) 7.5 V, 2.5 V

Q.23 A dielectric is placed in between the two parallel plates of a capacitor as shown in figure, the dielectric constant of the dielectric being K. If the initial capacity is c, then the new capacity will be :

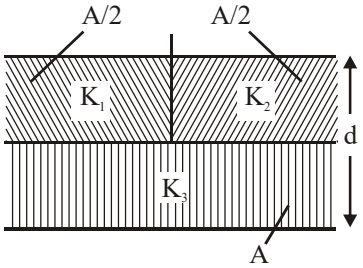


(1) KC (2) (K + 1)C (3) C(K+ 1)/2 (4) (K – 1)C

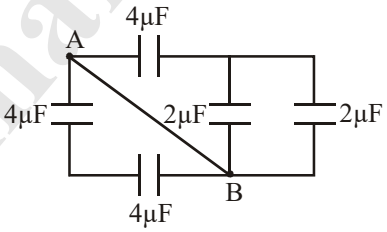
Q.24 A parallel plate capacitor of area A, plate separation d and capacitance C is filled with three different dielectric materials having dielectric constants K_1, K_2 and K_3 as shown. If a single dielectric materials is to be used to have the same capacitance C in this capacitor, then its dielectric constant K is given by : (A = Area of plates) :

(1) $\frac{1}{K}=\frac{1}{K_1}+\frac{1}{K_2}+\frac{1}{2K_3}$ (2) $\frac{1}{K}=\frac{1}{K_1+K_2}+\frac{1}{2K_3}$

(3) $K=\frac{K_1K_2}{K_1+K_2}+2K_3$ (4) $K = K_1 + K_2 + 2K_3$



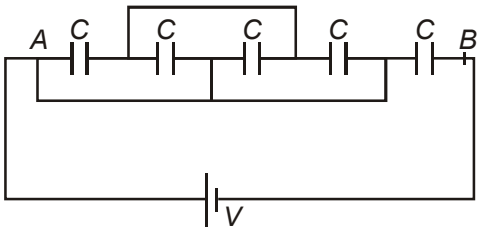
Q.25 In the circuit as shown in the figure :



The effective capacitance between A and B is :

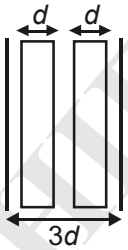
(1) 3 μF (2) 2 μF (3) 4 μF (4) 8 μF

Q.26 Consider the figure, equivalent capacitance between A and B is



(1) C (2) $\frac{4C}{5}$ (3) $\frac{5C}{4}$ (4) $\frac{2C}{3}$

Q.27 Two conductors of thickness d are inserted inside a parallel capacitor of thickness $3d$ and capacitance C_0. The capacitance of new arrangement is



(1) C_0 (2) $2C_0$ (3) $3C_0$ (4) $\frac{C_0}{3}$

Q.28 A parallel plate capacitor has rectangular plates of 400cm^2 and are separated by a distance of 2mm with air as medium. What charge will appear on the plates. If a 200volt potential difference is applied across the condenser?

(1) 3.54×10^{-6} C (2) 3.54×10^{-8} C (3) 3.54×10^{-10} C (4) 1770.8×10^{-13} C

Direction for following questions (1 – 19) :

A. Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. Assertion is true but Reason is false.

D. Assertion and Reason both are false.

Q.29 **Assertion:** Increasing the charge on the plates of a capacitor means increasing the capacitance.
Reason : Because $Q = CV \Rightarrow Q \propto C$.

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

Q.30 **Assertion:** The capacitance of a capacitor depends on the shape, size and geometrical placing of the conductors and its medium between them.
Reason : when a charge q passes through a battery of emf E from the negative terminal to an positive terminal, an amount qE of work is done by the battery.

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

Q.31 **Assertion:** a dielectric slab is inserted between the plates of an isolated charged capacitor. The charge on the capacitor will remains the same.
Reason : Charge on a isolated system is conserved.

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

ANSWER KEY

Q.1	3	Q.2	3	Q.3	1	Q.4	3	Q.5	1
Q.6	1	Q.7	2	Q.8	3	Q.9	3	Q.10	4
Q.11	2	Q.12	1	Q.13	3	Q.14	2	Q.15	3
Q.16	4	Q.17	2	Q.18	4	Q.19	3	Q.20	3
Q.21	3	Q.22	2	Q.23	3	Q.24	2	Q.25	3
Q.26	1	Q.27	3	Q.28	2	Q.29	4	Q.30	2
Q.31	1								