PHYSICS

BOOKS - MARVEL PHYSICS (HINGLISH)

ELECTROSTATICS

Mcqs

1. A plane surface of area $200cm^2$ is kept in a uniform electric field of intensity 200 N/C. if the angle between the normal to the surface and field is 60°, the electric flux through the surface is

A. $0.5Nm^2/C$

B. $4.5Nm^2/C$

C. $2Nm^2/C$

D. $3Nm^2/C$

Answer: C

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2. An electron experiences a force equal to its weight, when placed in an electric field. The intensity of the field will be

A. $10 \times 10^{-31} N/C$

B. $5.5 \times 10^{-11} N/C$

C. $15 \times 10^{11} N/C$

D. $2 \times 10^{-11} N/C$

Answer: B

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3. The electric potential due to the nucleus of the hydrogen atom at a distance of $5.3 \times 10^{-11} m$ is 27.2 V. what is the potential due to the helium nucleus at the same distance?

A. 27.2 V

B. 54.4 V

C. 13.6 V

D. 27.2 V

Answer: B

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4. Two charged particles each having a charge +q and mass m are kept at a distance d. if they are in equilibrium under the gravitational force and the

electric force between them, then the ratio $\frac{q}{m}$ or specific charge of each particle is

A. $\sqrt{\frac{4\pi\varepsilon_0}{G}}$

B. $\sqrt{4\pi\varepsilon_0 G}$

C. $4\pi\varepsilon_0 G$

D. $\frac{G}{4\pi\varepsilon_0}$

Answer: B

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5. The force between two points charges +q and -q, separated by a distance r is F. if one charge remains stationary while the other moves around it in a circle of radius r, then the work done is given by

A. $F \times r$

B. $F \times 2\pi r$

C. zero

D. $F / 2\pi r$

Answer: C

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6. The electric intensity on the surface of a charged conductor of area 0.5 m^2 is 200 V/m. if the electric flux is 86.6 Nm^2/C, then the angle between the normal drawn to the surface and the electric intensity is

A. 0°

B. 30°

C. 45°

D. 60°

Answer: B

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7. A point P is at a distance r from a point charge q. if at point P, the electric potential is 300 V, and the electric field intensity is 75 V/m, then the distance of P from the point charge is

A. 2 m

B. 4 m

C. 8 m

D. 10 m

Answer: B

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8. In a region, where electric field intensity is 5 N/C, 50 electric lines of force are crossing per sq. metre. The number of electric lines of force crossing perr sq. metre where electric field intensity is 20 N/C, will be

A. 50

B. 100

C. 200

D. 150

Answer: C

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9. 8 equally charged drops are combined to form a big drop. If the potential on each drop is 10 V, then the potential of the big drop will be

A. 40 V

B. 30 V

C. 25 V

D. 20 V

Answer: A

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10. A hollow insulated conducting sphere of radius 2m, is given a charge of 5 μC. What will be the electric field at the centre of the sphere?

A. $5\mu C/m^2$

B. zero

C. $10\mu C/m^2$

D. $20\mu C/m^2$

Answer: B

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11. A charged spherical conductor of radius R carries a charge Q. a point charge q is placed at an outside point at a distance x from the surface of the sphere. The force experienced by the point charge will be proportional to

A. $\frac{1}{x^2}$

B. $(R+x)^2$

C. $\frac{1}{(R+x)^2}$

D. $\frac{1}{(R-x)^2}$

Answer: C

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12. If n drops of equal size and same potential V merge into a big drop, the new potential of the big drop will be

A. $V^{n/3}$

B. $n^{1/3}V$

C. nV

D. $n^{2/3}V$

Answer: D

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13. 64 small drops of mercury each of radius r and charge q coalesce to form a big drop. The ratio of the surface density of charge of each small drop withh that of big drop is

A. $1:4$

B. $4:1$

C. $1:64$

D. $64:1$

Answer: A

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14. A hollow charged metal sphere has radius r. If the potential difference between its surface and a point at a distance $3r$ from the centre is V, then electric field intensity at a distance $3r$ is

A. $\frac{V}{2r}$

B. $\frac{V}{4r}$

C. $\frac{V}{6r}$

D. $\frac{V}{8r}$

Answer: C

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15. The surface charge density of an irregular shaped conductor is

A. zero

B. infinity

C. constant

D. different at different points

Answer: D

16. If σ is the surface charge density off a charge for a charged sphere of radius R. kept in a medium of dielectric constant K, then the electric intensity at a distance r from its centre where rgtR, is (ε_0 =permittivity of free space)

A. $\frac{\sigma r}{\varepsilon_0 K R}$

B. $\frac{\sigma R^2}{\varepsilon_0 K r^2}$

C. $\frac{\sigma R}{\varepsilon_0 K r}$

D. $\frac{\sigma r^2}{\varepsilon_0 K R^2}$

Answer: B

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17. The potential of a sphere conductor of radius 5 cm is 10 V. what is the potential at the centre of the sphere?

A. 2 V

B. 10 V

C. zero

D. 50 V

Answer: B

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18. A charge $q\mu C$ is placed at the centre of a cube of a side $0.1m$, then the electric flux diverging from each face of the cube is

A. $\frac{q \times 10^{-6}}{24\varepsilon_0}$

B. $\frac{q \times 10^{-4}}{\varepsilon_0}$

C. $\frac{q \times 10^{-6}}{6\varepsilon_0}$

D. $\frac{q \times 10^{-4}}{12\varepsilon_0}$

Answer: C

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19. Unit of electric flux is

A. $N - m/c$

B. Vm

C. C/N-m

D. V/m

Answer: B

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20. A cylinder of radius R and length l is placed in a uniform electric field E parallel to the axis of the cylinder. The total flux over the curved surface of the cylinder is

A. $\frac{\pi R^2}{E}$

B. $\frac{\pi R^2 + \pi R^2}{E}$

C. zero

D. $2\pi R^2 E$

Answer: C

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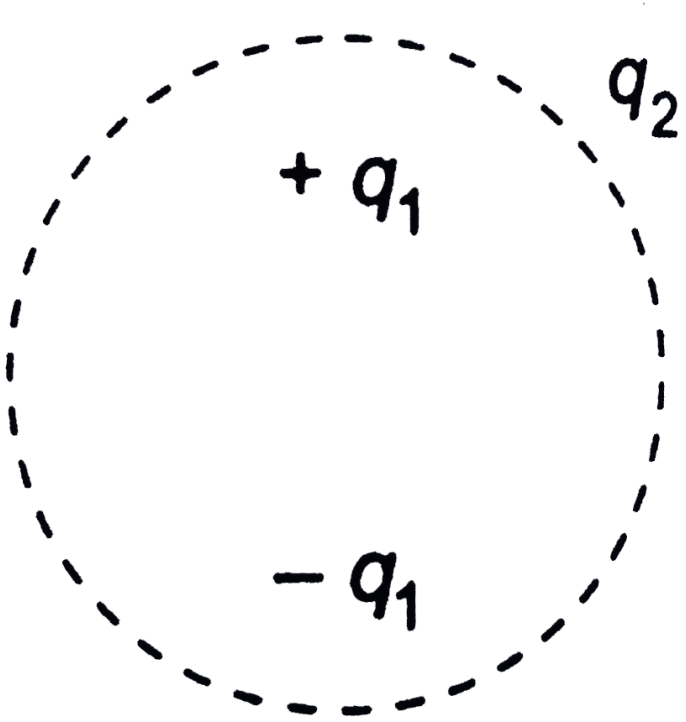
21. Consider the charge configuration and a spherical Gaussian surface as shown in the figure. When calculating the flux of the electric field over the spherical surface, the electric field will be due

to.



A. q_2

B. only the positive charges

C. all the charges

D. $+q_1$ and $-q_1$

Answer: C

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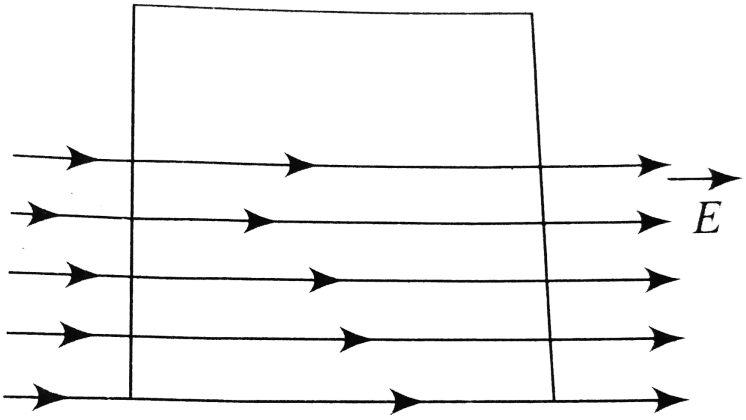
22. A square surface of side Lm is in the plane of the paper. A uniform electric field $\overrightarrow{E}(V/m)$, also in the plane of the paper, is limited only to the lower half of the square surface (see figure). The electric flux in SI units associated with the surface

is:



A. zero

B. EL^2

C. $\frac{EL^2}{(2\varepsilon_0)}$

D. $\frac{EL^2}{2}$

Answer: A

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23. An electric field given by $E = 2E_0 \overrightarrow{i} + 3E_0 \overrightarrow{j} - 5E_0 \overrightarrow{k}$ exists in a cerrtain region, where $E_0 = 100N/C$. How much flux will pass through a rectangular surface of area 0.2 m^2, placed in this region, in such away that it is parallel to Y-axis?

A. $20Nm^2/C$

B. $40Nm^2/C$

C. $60Nm^2/C$

D. $80Nm^2/C$

Answer: C

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24. An infinite line charge produce a field of $7.182 \times 10^8 NC^{-1}$ at a distance of 2 cm. The linear charge density is

A. $7.98 \times 10^{-4} C/m$

B. $9.11x10^{-4} C/m$

C. $5.04 \times 10^{-4} C/m$

D. $6.27 \times 10^{-4} C/m$

Answer: A

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25. A charge Q is situated at the corner of a cube the electric flux passed through all the six faces of the cube is :

A. $\frac{Q}{\varepsilon_0}$

B. $\frac{Q}{3\varepsilon_0}$

C. $\frac{Q}{6\varepsilon_0}$

D. $\frac{Q}{8\varepsilon_0}$

Answer: D

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26. The flux of the electric field due to charges distributed in a sphere of radius 5 cm is 10 Vm. What will be the electric flux, through a concentric sphere of radius 10 cm?

A. 20 Vm

B. 30 Vm

C. 5 Vm

D. 10 Vm

Answer: D

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27. A charge of 12 μC is kept inside a closed surface. What is the flux flowing through a portion of the surface, which subtends a solid angle of π at the point where are charge is situated?

A. $\frac{6 \times 10^{-6}}{\varepsilon_0}$ volt-m

B. $\frac{2 \times 10^{-6}}{\varepsilon_0}$ volt-m

C. $\frac{3 \times 10^{-6}}{\varepsilon_0}$ volt-m

D. $\frac{4 \times 10^{-6}}{\varepsilon_0}$ volt-m

Answer: C

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28. Five electric dipoles having charges +q and -q are placed inside a cube having each side of length l. The total electric flux coming out of the cube is given by

A. $\phi = \frac{q}{\varepsilon_0 K}$

B. $\phi = \frac{8q}{\varepsilon_0 K}$

C. $\phi = \frac{16q}{\varepsilon_0 K}$

D. $\phi = 0$

Answer: D

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29. What is the SI unit of surface intergal of electric field ?

A. V

B. N/C

C. Vm

D. C/m^2

Answer: C

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30. Find the electric field at the centre of a uniformly charged semicircular ring of radius R. Linear charge density is λ

A. $\frac{\lambda}{2\pi\varepsilon_0 a}$

B. $\frac{\lambda}{4\varepsilon_0 a}$

C. $\frac{\lambda}{2\pi\varepsilon_0 a^2}$

D. $\frac{\lambda^2}{4\pi\varepsilon_0 a}$

Answer: B

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31. A point charge produces an electric flux of $-1 \times 10^3 Nm^2/C$ to pass through a spherical gaussian surface of radius 10 cm cenred on the charge. What is the value of the point charge?

A. $7.85 \times 10^{-6} C$

B. $8.85 \times 10^9 C$

C. $-8.85 \times 10^{-9} C$

D. $4.425 \times 10^{-9} C$

Answer: C

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32. A point charge of 1.77 μC is at the centre of a cubical gaussian surface having each side 50 cm. what is the net electric flux through the surface?

A. $10^5 Nm^2 C^{-1}$

B. $1.5 \times 10^5 Nm^2 C^{-1}$

C. $2 \times 10^5 Nm^2 C^{-1}$

D. $2.5 \times 10^5 Nm^2 C^{-1}$

Answer: C

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33. The inward annd outward electric flux from a closed surface are respectively 8×10^3 and 4×10^3 units. Then the net charge inside the closed surface is

A. $-\frac{4 \times 10^3}{\varepsilon_0}$ coulomb

B. $-4 \times 10^3 \varepsilon_0$ coulomb

C. 4×10^3 coulomb

D. $\frac{4 \times 10^3}{\varepsilon_0}$ coulomb

Answer: B

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34. A positively charged infinitely long cylinder has a radius of 0.1 m and surface charge density of $8.85 \times 10^{-12} C/m^2$. What is the intensity of the electric field at a point on the surface of the cylinder, if the cylinder is kept in vacuum?

A. 0.5 V/m

B. 1 V/m

C. 1.5 V/m

D. 2 V/m

Answer: B

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35. An infinitely long uniform linear charge distribution has a charge density 4 μC/m. what is the electric field at a point at a perpendicular distance of 3.6 cm from the line? Given: $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2/C^2$

A. $10^5 V/m$

B. $2 \times 10^6 V/m$

C. $10^6 V/m$

D. $2 \times 10^5 V/m$

Answer: B

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36. A charge of q μC is placed at the centre of a cube of side 0.1 m. the electric flux diverging from each face of the cube will be

A. $\frac{q \times 10^{-6}}{\varepsilon_0}$ Vm

B. $\frac{q \times 10^{-6}}{6\varepsilon_0}$ Vm

C. $\frac{6q \times 10^{-6}}{\varepsilon_0}$ Vm

D. $\frac{q \times 10^{-4}}{(\varepsilon_0)}$ Vm

Answer: B

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37. A dipole is kept in a hollow sphere of radius r. the total electric flux leaving the spherical surface is given by

A. $\phi = \frac{q}{K\varepsilon_0}$

B. $\phi = \frac{2q}{K\varepsilon_0}$

C. $\phi = \frac{8\pi r^2 q}{\varepsilon_0}$

D. zero

Answer: D

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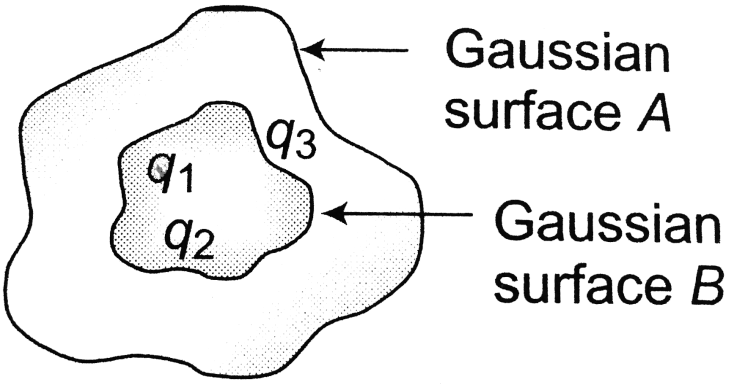
38. The electric flux for Gaussian surface A that enclose the charge particles in free space is (given $q_1 = -14nC, q_2 = 78.85nC, q_3 = -56nC$)



A. $10^3 Nm^2/C$

B. $10^3 C/Nm^2$

C. $632 \times 10^3 Nm^2/C$

D. $632 \times 10^3 C/Nm^2$

Answer: A

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39. The magnitude of the average electric field normally present in the earth's atmosphere just above the surface of the earth is about 150 N/C, directed downward. What is surface charge density

of the earth? [Assume that the earth is a conductor having uniform surface charge density.]

A. $0.53 \times 10^{-9} C/m^2$

B. $1.33 \times 10^{-9} C/m^2$

C. $2.5 \times 10^{-9} C/m^2$

D. $8.85 \times 10^{-9} C/m^2$

Answer: B

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40. An electric dipole is put in north-south direction in sphere filled with water. Which statement is correct

A. Electric flux is comingg towards the sphere

B. Electric flux is coming out of the sphere

C. Electric flux entering into the sphere and leaving the sphere have the same magnitude

D. Water does not permit the electric flux to enter into the sphere

Answer: C

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41. For an infinitely long metal cylinder, the radius is 3 mm, K=6.28 annd charge density $= 4\mu C/m^2$. What is the electric intensity (E) at a distance of 1.5 m from the axis? $\left[\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9\right]$

A. 144 N/C

B. 160 N/C

C. 288 N/C

D. 72 N/C

Answer: A

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42. The electric field intensity at point near and outside the surface of a charged conductor of any shape is E_1 the electric field intensity due to uniformly charged infinite thin plane sheet is E_2 the relation between E_1 and E_2 is

A. $2E_1 = E_2$

B. $E_1 = E_2$

C. $E_1 = 2E_2$

D. $E_1 = 4E_2$

Answer: C

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43. Three charges +5C, +7C and -4C are situated within a closed surface and charges -5C, -7C and +4C are situated outside the surface. What is the T.N.E.I. over the closed surface?

A. $-8C$

B. 0

C. $+8C$

D. $10C$

Answer: C

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44. The electric intensity at a pont near a charged conductor having a charge density σ is

A. $\frac{\sigma}{4k\varepsilon_0}$

B. $\frac{\sigma}{2k\varepsilon_0}$

C. $\frac{2\sigma}{k\varepsilon_0}$

D. $\frac{\sigma}{k\varepsilon_0}$

Answer: D

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45. Surface density of charge on a sphere of radius R in terms of electric intensity E at a distance in free space is

(ε_0 = permittivity of free space)

A. $\varepsilon_0 E\left(\frac{R}{r}\right)^2$

B. $\frac{\varepsilon_0 ER}{r^2}$

C. $\varepsilon_0\left(\frac{r}{R}\right)^2$

D. $\frac{\varepsilon_0 Er}{R^2}$

Answer: C

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46. If the electric flux entering and leaving an enclosed surface respectively are ϕ_1 and ϕ_2, the electric charge inside the surface will be

A. $(\phi_2 - \phi_1)\varepsilon_0$

B. $(\phi_2 - \phi_1)\varepsilon_0$

C. $(\phi_2 - \phi_1)/\varepsilon_0$

D. $(\phi_1 - \phi_2)/\varepsilon_0$

Answer: A

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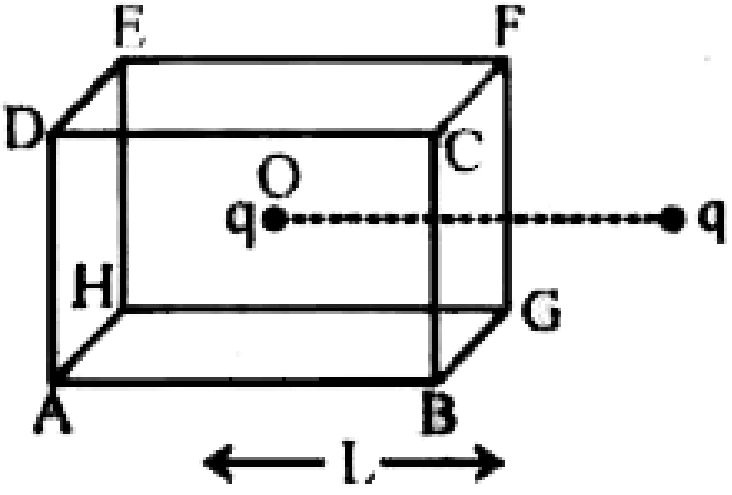
47. A charged particle q is placed at the centre O of a cube of lenngth L (ABCDEFGH). Another charge q is placed at a distance L from O. then the electric flux emerging from q at O is



A. $\frac{q}{3\pi\varepsilon_0 L}$

B. $\frac{q}{2\pi\varepsilon_0 L}$

C. $\frac{q}{\varepsilon_0}$

D. zero

Answer: C

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48. If the earth's surface is treated as a conducting surface with some charge , then the order of magnitude of the charge per unit area $\sigma \text{in} C/m^2$, so that a proton remains suspended in space near the earh's surface will be

A. $\sigma = \frac{e}{\varepsilon_0 mg} C/m^2$

B. $\sigma = \frac{\varepsilon_0 mg}{e} C/m^2$

C. $\sigma = \frac{mg}{\varepsilon_0 e} C/m^2$

D. $\sigma = \frac{\varepsilon_0 e}{mg} C/m^2$

Answer: B

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49. What is the flux through a cube of side $'a'$ if a point charge of q is at one of its corner :

A. $\frac{2q}{\varepsilon_0}$

B. $\frac{q}{8\varepsilon_0}$

C. $\frac{q}{\varepsilon_0}$

D. $\frac{q}{2\varepsilon_0} 6a^2$

Answer: B

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50. A Gaussian surface contains two charged spherical conductors -A and B, having radii of 3 mm and 2 mm respectivley. If their respective surface charge densities are $10\mu C/m^2$ and $-5\mu C/m^2$,

then the total normal electric induction over the Gaussian surface will be

A. $5.8 \times 10^{-10} C$

B. $7.8 \times 10^{-10} C$

C. $8.8 \times 10^{-10} C$

D. $3.8 \times 10^{-10} C$

Answer: C

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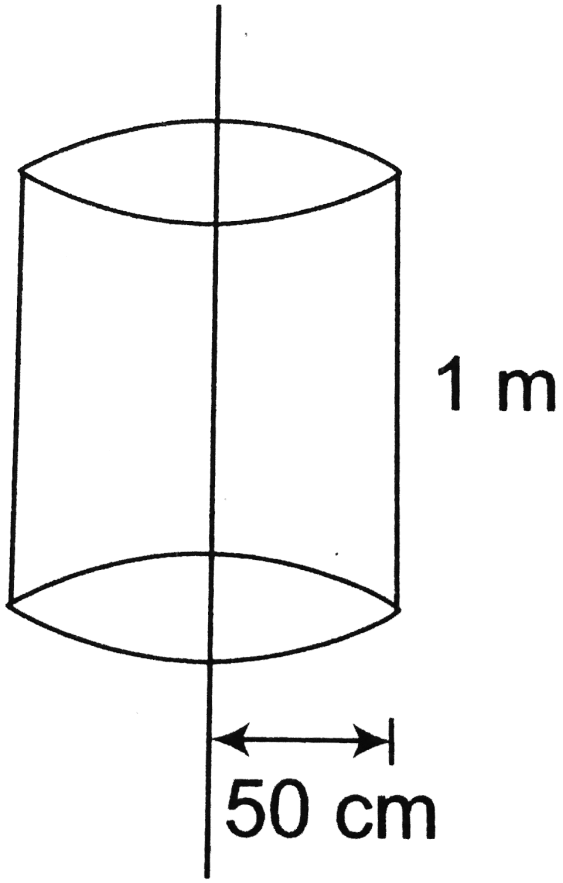
51. Electric charge is uniformly distributed along a along straight wire of radius $1mm$. The charge per centimeter length of the wire is Q coulomb. Another cyclindrical surface of radius $50cm$ and length $1m$ symmetrically enclose the wire ask shown in figure. The total electric flux passing

through the cyclindrical surface is



A. $\frac{Q}{\varepsilon_0}$

B. $\frac{100Q}{\varepsilon_0}$

C. $\frac{10Q}{(\pi\varepsilon_0)}$

D. $\frac{100Q}{(\pi\varepsilon_0)}$

Answer: B

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52. The electrostatic potential inside a charged spherical ball is given by $\phi = ar^2 + b$ where r is the distance from the centre and a, b are constants. Then the charge density inside the ball is:

A. $-24\pi a\varepsilon_0 r$

B. $-6\pi\varepsilon_0 r$

C. $-24\pi a\varepsilon_0$

D. $-6a\varepsilon_0$

Answer: D

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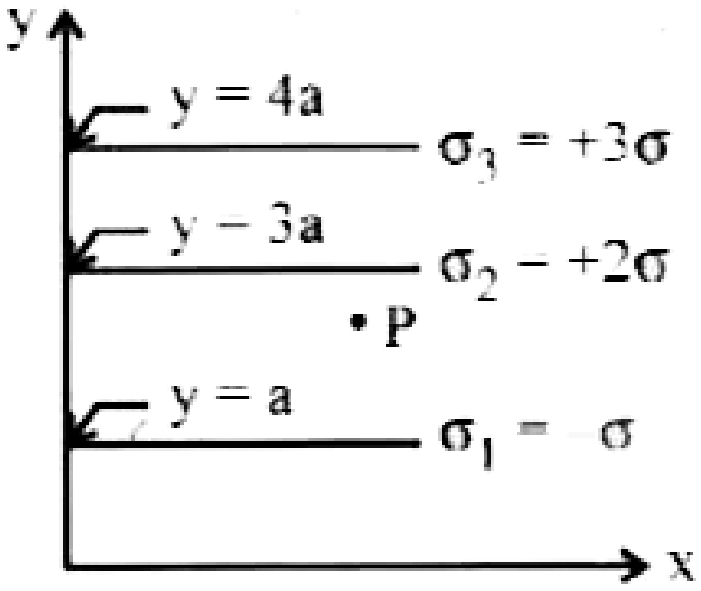
53. Three infinite long plane sheets carrying uniform charge densities $\sigma_1 = -\sigma, \sigma_2 = +2\sigma$ and $\sigma_3 = 3\sigma$ are placed parallel to the x-z plane at

$y = a, y = 3a$ and $y = 4a$ as shown in the figure.

What is the electric field at point 'P' ?



A. zero

B. $-\frac{2\sigma}{\varepsilon_0}\hat{j}$

C. $-\frac{3\sigma}{\varepsilon_0}\hat{j}$

D. $\frac{3\sigma}{\varepsilon_0}\hat{j}$

Answer: C

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54. A metal plate of area $2m^2$ is charged with $12 \times 10^{-6}C$. The surface surface density of charge is

A. $3\mu C/m^2$

B. $4\mu C/m^2$

C. $6\mu C/m^2$

D. $8\mu C/m^2$

Answer: C

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55. What is the energy stored per unit volume in vacuum, where the intensity of electric field is $10^3 V/m$? $\left(\varepsilon_0 = 8.85 \times 10^{-12} c^2/N - m^2\right)$

A. $8.85 \times 10^{-6} J/m^3$

B. $4.425 \times 10^{-6} J/m^2$

C. $4.425 \times 10^{-8} J/m^3$

D. $8.85 \times 10^{-5} J/m^3$

Answer: B

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56. A metal plate of area 0.5 m^2 is given a charge of $50\mu C$, what is the charge density ?

A. $10^{-3}C/m^2$

B. $2 \times 10^{-3}C/m^2$

C. $10^{-4}C/m^2$

D. $2 \times 10^{-4}C/m^2$

Answer: C

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57. A metal plate of surface area $2m^2$ is charged with $\sqrt{8.85\mu C}$. What is the mechanical force acting on the plate if it is kept in air ? [$\varepsilon_0 = 8.85 \times 10^{-12} C^2$]

A. 0.5 N

B. 2 N

C. 1 N

D. 1.5 N

Answer: C

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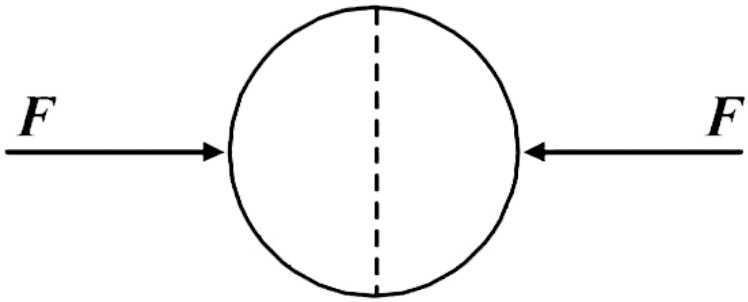
58. A uniformly charged thin spherical shell of radius R carries uniform surface charge denisty of $isgma$ per unit area. It is made of two hemispherical shells, held together by presisng them with force F(see figure). F is proportional to



A. $\frac{1}{\varepsilon_0}\sigma^2 R^2$

B. $\frac{1}{\varepsilon_0}\sigma^2 R$

C. $\frac{1}{\varepsilon_0}\frac{\sigma^2}{R}$

D. $\frac{1}{\varepsilon_0}\frac{\sigma^2}{R^2}$

Answer: A

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59. In a parallel plate capacitor, the distance between the plates is d and potential difference across the plate is V. Energy stored per unit volume between the plates of capacitor is

A. $\frac{\varepsilon_0 V^2}{d^2}$

B. $\frac{1}{2}\frac{V^2}{\varepsilon_0 d^2}$

C. $\frac{1}{2}\varepsilon_0\frac{V^2}{d^2}$

D. $\frac{Q^2}{2V^2}$

Answer: C

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60. When a condenser of capacitor C is givenn a charge Q, the P.D. across its plates is V. the diemnsional formula for QV is

A. $M^1L^1T^{-1}$

B. $M^1L^2T^{-2}$

C. $M^2L^{-2}T^2$

D. $M^1L^1T^{-2}$

Answer: B

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61. A sheet of copper is inserted in the air gap of a parallel plate capacitor, without touching any of the two plates of the capacitor. The capacitance of the capacitor is

A. maximum when the sheet is mid way between the plates

B. maximum when the sheet is just near the positive plates

C. maximum when the sheet is just near the negative plate

D. invariant for all positions of the sheet

Answer: D

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62. A condenser has a capacity of $2\mu F$ and is cahrged to a potential of 50 V. the energy stored in it is

A. 25×10erg

B. 25×10^3 erg

C. 25×10^5 erg

D. $25J$

Answer: B

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63. A condenser charged to a potential of 200 V, has the energy of 1 joule. The capacity of the condenser is

A. $25\mu F$

B. $50\mu F$

C. $75\mu F$

D. $30\mu F$

Answer: B

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64. A 100 μF capacitor is to have an energy content of 50 J to operate a flash bulb. The voltage required to charge the capacitor is

A. 1000 V

B. 2000 V

C. 500 V

D. 250 V

Answer: A

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65. A parallel plate air capacitor has plates of area 0.5 m^2 and plate separation of 2 cm. if $\varepsilon_0 = 8.8 \times 10^{-12} C^2 / N - m^2$ then the capacitance of the capacitor is

A. $1.1 \times 10^{-10} F$

B. $3.3 \times 10^{-10} F$

C. $2.2 \times 10^{-10} F$

D. $4.4 \times 10^{-10} F$

Answer: C

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66. A conductor, when given a charge of 5×10^{-3} C, acquires a potential of 500 V. the capacity of the conductor is

A. $5\mu F$

B. $10\mu F$

C. $15\mu F$

D. $20\mu F$

Answer: B

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67. A parallel plate air condenser of capacity $4\mu F$ is charged to a potential of 1000 V. the energy of the condenser is

A. 1 joule

B. 4 joule

C. 6 joule

D. 2 joule

Answer: D

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68. A parallel plate capacitor is to be prepared by using plates of the same area, of one of the dielectric given below:

Dielectric	K	d
Teflon	2	0.4 mm
Quartz	3	0.8 mm
Glass	4	1.0 mm
Mica	5	1.2 mm

Which dielectric gives the maximum capacitance?

A. Mica

B. Teflon

C. Glass

D. Quartz

Answer: B

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69. If the energy stored in a condenser of capacity 8 μF is 4 J, what is the cahrge on the condenser?

A. $2 \times 10^{-3} C$

B. $4 \times 10^{-3} C$

C. $6 \times 10^{-3} C$

D. $8 \times 10^{-3} C$

Answer: D

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70. A condenser of capacity $40\mu F$ is cahrged to a potential of 1 KV. What is the work done in raising the potential ?

A. 5 J

B. 10 J

C. 20 J

D. 30 J

Answer: C

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71. The plates of a parallel plate capacitor of capacity C_1 are moved closer together until they are half their original separation. What is the new capacitance?

A. $C_2 = C_1$

B. $C_2 = 2C_1$

C. $C_2 = \frac{C_1}{2}$

D. $C_2 = 3C$

Answer: B

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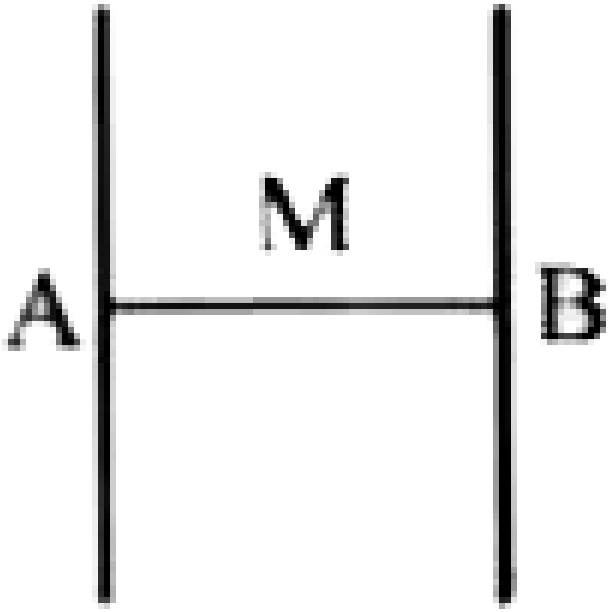
72. A parallel plate capacitor has a capacity C. if a thin metal plate (M) joins the two coatings A and B off the capacitor, its new capacitance is



A. 2 C

B. C/2

C. zero

D. infinity

Answer: D

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73. A parallel plate capcitance of $4\mu F$ is having a charge of 0.5C. What will be its capacity if the charge is increased to 1 coulomb?

A. $8\mu F$

B. $4\mu F$

C. $2\mu F$

D. $16\mu F$

Answer: B

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74. if the capacity of a spherrical conductor is 1 μF, the diameter of the conductor will be

A. $1.2 \times 10^4 m$

B. $1.8 \times 10^4 m$

C. $2.4 \times 10^4 m$

D. $3 \times 10^4 m$

Answer: B

Watch Video Solution

75. There is an air filled 1pF parallel plate capacitor. When the plate separation is doubled and the space is filled with wax, the capacitance increases to 2pF. The dielectric constant of wax is

A. 8

B. 6

C. 4

D. 2

Answer: C

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76. A condenser is charged through a P.D. of 100 volts and acquires a charge of 0.1 C. when discharged, it would release an energy

A. 1 J

B. 2 J

C. 5 J

D. 10 J

Answer: C

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77. What is the capacity of earth? (radius of the earth $= 6400Km, 4\pi\varepsilon_0 = \frac{1}{9 \times 10^9}$)

A. 71.1 μF

B. $711\mu F$

C. $7F$

D. $71F$

Answer: B

Watch Video Solution

78. In a parallel plate capacitor, the distance between the plates is d and potential difference across the plate is V. Energy stored per unit volume between the plates of capacitor is

A. $\frac{1}{2}\varepsilon_0 \frac{V^2}{x^2}$

B. $\frac{1}{2}\varepsilon_0 \frac{V^2}{x^2}$

C. $\frac{1}{2}\varepsilon_0 \frac{V}{x}$

D. $\frac{1}{2}\varepsilon_0 \frac{x^2}{V^2}$

Answer: B

Watch Video Solution

79. M and N are the plates of unequal areas of a parallel plate capacitor. Let A_1 and A_2 be the areas of M and N. let $A_1 > A_2$, M and N are connected to the +ve and -ve terminals of a battery. If Q^+ and Q^- are the charges on the plates M and N respectively, then

A. $Q^+ > Q^-$

B. $Q^+ < Q^-$

C. $Q^+ = Q^-$

D. Q^+ very large and Q^- is negligible

Answer: C

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80. A $4\mu F$ capacitor is charged to 4000 V, if the plates joined through a resistanceof $4K\omega$, then the heat produced in the resistance will be

A. 0.08 J

B. 0.16 J

C. 0.32 J

D. 0.4 J

Answer: C

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81. The potentials of the two plates of capacitor are $+10V$ and $-10V$. The charge on one of the plate is $40C$. The capacitance of the capacitor is

A. $4\mu F$

B. $2\mu F$

C. $0.5F$

D. $0.4F$

Answer: B

Watch Video Solution

82. A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting the charging battery the distance between the plates of the capacitor is increased using an isulating handle. As a result the potential difference between the plates

A. $\frac{V}{\sqrt{3}}$

B. $3V$

C. $\frac{V}{3}$

D. $\sqrt{3}V$

Answer: B

Watch Video Solution

83. The capacity of a paralel plate condenser is $12\mu F$. What is its new capacity if the separation between the plates is doubled and the area is halved?

A. $1.5\mu F$

B. $3\mu F$

C. $6\mu F$

D. $8\mu F$

Answer: B

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84. A capacitor of capacitance $20\mu F$ is cahrged to 10 V. what will be the increase in its potential energy if the potential difference is incrased from 10 V to 20 V?

A. $3 \times 10^{-4} J$

B. $3 \times 10^{-3} J$

C. $15 \times 10^{-3} J$

D. $25 \times 10^{-4} J$

Answer: B

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85. A 80 pF capacitor is charged to 15 V by connecting it to a battery. How many electrons are transferred from one plate to another?

A. 7.5×10^9

B. 6×10^9

C. 5×10^8

D. 9×10^8

Answer: A

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86. What potential difference should be applied to $2\mu F$ capacitor to get an energy of 10^{-2} joule?

A. 10 V

B. 50 V

C. 75 V

D. 100 V

Answer: D

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87. 8 drops of Hg are combined to form a single big drop. What is the ratio of the capacitance of a single small drop and that of the single big drop?

A. $1:2$

B. $1:8$

C. $8:1$

D. None of these

Answer: A

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88. If the circumference of a sphere is 2 m, then capacitance of sphere in water would be

A. $2700pF$

B. 2760 pF

C. 2780 pF

D. 2830 pF

Answer: D

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89. A 500 μF uncharged capacitor is cahrged at a steady rate of 100 μCsecond.t he potential difference across the capacitor will be 10 V after time t equal to

A. 5 sec

B. 25 sec

C. 20 sec

D. 50 sec

Answer: D

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90. The capacitance of a metallic sphere will be $1\mu F$, if its radius is nearly

A. 9 km

B. 10 m

C. 1.11 m

D. 1.11 cm

Answer: A

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91. A parallel plate capacitor having a plate separation of $2mm$ is charged by connecting it to a $300v$ supply. The energy density is

A. $0.01J/m^3$

B. $0.1J/m^2$

C. $1.0J/m^3$

D. $10J/m^3$

Answer: B

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92. A capacitor is used to store 24 watt hour of enegy at 1200 volt. What should be the capacitance of the capacitor?

A. $120mF$

B. $120\mu F$

C. $24\mu F$

D. $24mF$

Answer: A

Watch Video Solution

93. A parallel plate capacitor has an electric field of $10^5 V/m$ between the plates. If the charge on the capacitor plate is $1\mu C$, the force on each capacitor plate is

A. 0.5 N

B. 0.05 N

C. 0.005 N

D. 5 N

Answer: B

Watch Video Solution

94. Which one of the following is known as an electrical energy tank?

A. Resistor

B. Inductor

C. Capacitor

D. Transistor

Answer: C

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95. A parallel plate capacitor having a capacitance of $4\mu F$ has a charge of $1\mu F$ on its plates. If the charge on the plates is increased to $2\mu F$, then the new capacitance of the capacitor will be

A. $8\mu F$

B. $2\mu F$

C. $4\mu F$

D. $6\mu F$

Answer: C

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96. Three charges +5C, +7V and -4C are situated within a closed surface and charges -5C, -7C and +4C are situated outisde the surace what is the T.N.E.I. over the closed surface?

A. $-8C$

B. 0

C. $+8C$

D. $10C$

Answer: C

Watch Video Solution

97. The charge on a 48 μF capacitor is increased from 0.1 C to 0.5 C. the enerrgy stored in the capacitor increases by

A. 250 J

B. 2500 J

C. $2.5 \times 10^6 J$

D. $2.42 \times 10^{-6} J$

Answer: B

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98. A.P.D. of V volts is applied across the plates of a parallel plate capacitor having plate area A. if Q is the charge on its plates and K is the dielectric

constant of the medium, between the plates, then the plate separation is given by

A. $d = AK\varepsilon_0 V / Q$

B. $d = K\varepsilon_0 V / Q$

C. $d = AK\varepsilon_0 Q / V$

D. $d = K\varepsilon_0 Q / V$

Answer: A

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99. The magnitude of electric field $\vec{E}$ in the annular region of a charged cylindrical capacitor.

A. is same throughout

B. is higher near the outer cylinder than near the inner cylinder

C. varies as 1/r where r is distance from the axis

D. varies as $1/r^2$ where r is distance from the axis

Answer: C

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100. What is the capacitance of a spherical conductor with radius 1 m?

A. $10^{-6}F$

B. $10^{-3}F$

C. $1.1 \times 10^{-10}F$

D. $9 \times 10^{-9}F$

Answer: C

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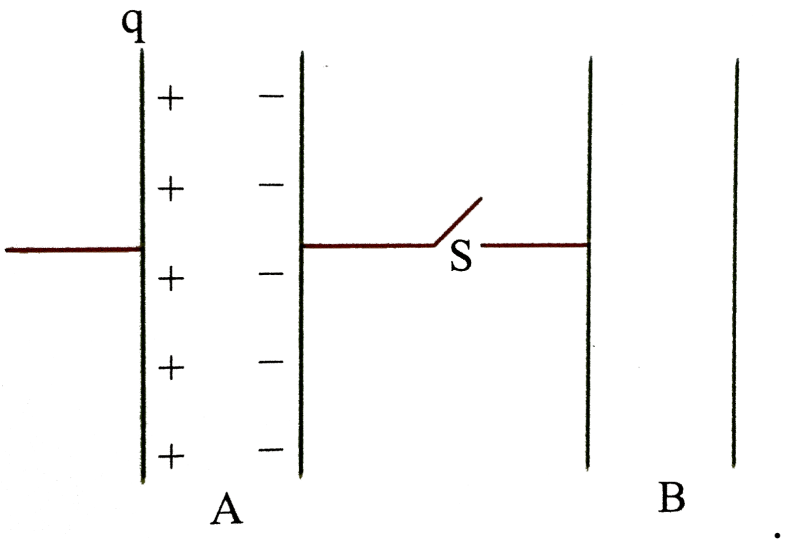
101. Consider the situation shown in the figure. The capacitor A has a charge q on it whereas B is uncharged. The charge appearing on the capacitor B a long 7 time after the switch is closed is :



A. zero

B. $\frac{q}{2}$

C. q

D. $2q$

Answer: A

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102. A capacitor is charged by connecting a battery across its plates. It stores energy U. now the battery is disconnected and another identical capacitor is connected across it. What will be the energy stored by both capacitors of the system?

A. $\frac{U}{2}$

B. $2U$

C. $\frac{3}{2}U$

D. U

Answer: A

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103. A parallel plate condenser with oil (dielectric constant 2) between the plates has capacitance C. If oil is removed, the capacitance of capacitor becomes

A. $\frac{C}{2}$

B. $\frac{C}{\sqrt{2}}$

C. $2C$

D. $\sqrt{2C}$

Answer: A

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104. The capacity of a parallel plate condenser can be increased by

A. decreasing the area of the plates

B. increasing the area of the plates

C. increasing the distance between plates

D. decreasing dielectric constant of the medium

Answer: B

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105. A 700 pF capacitor is charged by a 50 V battery. The electrostatic energy stored it is

A. $13.6 \times 10^{-9} J$

B. $17.0 \times 10^{-8} J$

C. $8.7 \times 10^{-7} J$

D. $9.5 \times 10^{-9} J$

Answer: C

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106. If the distance between the plates of parallel plate capacitor is halved and the dielectric constant of dielectric is doubled, then its capacity will

A. increase by 2 times

B. remain the sae

C. increase by 4 times

D. increase by 16 times

Answer: C

Watch Video Solution

107. A paralel plate capacitory has each plate of ara A=10 sq. cm. it is given a charge of 1 C. as one of the plates was slightly damaged it was cut annd the plate area was reduced to 5 sq. cm. the quantity of charge on each plate will

A. increase

B. decrease

C. remain constant

D. be doubled

Answer: C

108. A parallel plate capacitor has a capacitance of 60 PF, when the plates of the capacitor and separated by a distance d. if a metal plate of

thickness $t = \frac{d}{3}$ is introduced between the plates, the capacitance will be

A. 60 PF

B. 40 PF

C. 90 PF

D. 75 PF

Answer: C

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109. The work done in placing a charge of $8\mu C$ on a condenser of capacity $100\mu F$ is

A. $16 \times 10^{-5} J$

B. $32 \times 10^{-6} J$

C. $3.2 \times 10^{-4} J$

D. $16 \times 10^{-4} J$

Answer: C

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110. A capacitor is charged to a potential difference of 100 V and is then connected across a resistor. The potential difference across the capacitor decays exponentially with respect to time. After 1 sec, the P.D. between the plates of the capacitor is 80 V. what will be the potential difference between the plates after 2 sec ?

A. 32 V

B. 48 V

C. 64 V

D. 70 V

Answer: C

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111. A $40\mu F$ capacitor in a medical instrument is charged to 300 V. the energy stored in the capacitor is sent through patient's brain during a pulse of duration 2 millisecond. What is the power delivered to the brain of the putient ?

A. 500 W

B. 600 W

C. 750 W

D. 900 W

Answer: D

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112. The distance between the circular plates of a parallel plate condenser 40 mm in diameter, in order to have same capacity as a sphere of radius 1 m is

A. 0.01 mm

B. 0.1 mm

C. 1.0 mm

D. 10 mm

Answer: B

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113. Two spherical conductors each of capacity C are charged to potetnial V and $-V$. These are then conneted by means of a fine wire. The loss of energy will be

A. $\frac{1}{2}CV^2$

B. zero

C. CV^2

D. $2CV^2$

Answer: C

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114. The energy stored in a condenser of capacity 10 μF, charged to 6 kV is used to lift a body of mass of 10 gm. What is the height to 2hich the body can be raised? $\left(g = 10m/s^2\right)$

A. 180 m

B. 18 m

C. 1.8 m

D. 1800 m

Answer: D

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115. A capacitor of capacity 10 μF is charged to a potential of 10000 V and a wire is stretched by 0.2 m by a force of 5000 N. the ratio of the potential energies stored in them will be

A. 1

B. 500

C. 0.002

D. 0.0001

Answer: A

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116. A battery is used to charge a parallel plate capacitor till the potential differece between the plates becomes equal to the electromotive force of

the battery. The ratio of the energy stored in the capacitor and the work done by the battery will be

A. 1

B. $\frac{1}{2}$

C. 2

D. $\frac{1}{4}$

Answer: B

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117. A fully charged capacitor has a capacitance 'C'. It is discharged through a small coil of resistance wire embedded in a thermally insulated block of specific heat capacity 's' and mass 'm'. If the temperature of the block is raised by 'DeltaT', the potential difference 'V' across the capacitance is

A. $\sqrt{\frac{2mC\Delta T}{s}}$

B. $\frac{mC\Delta T}{s}$

C. $\sqrt{\frac{2ms\Delta T}{C}}$

D. $\frac{ms\Delta T}{C}$

Answer: C

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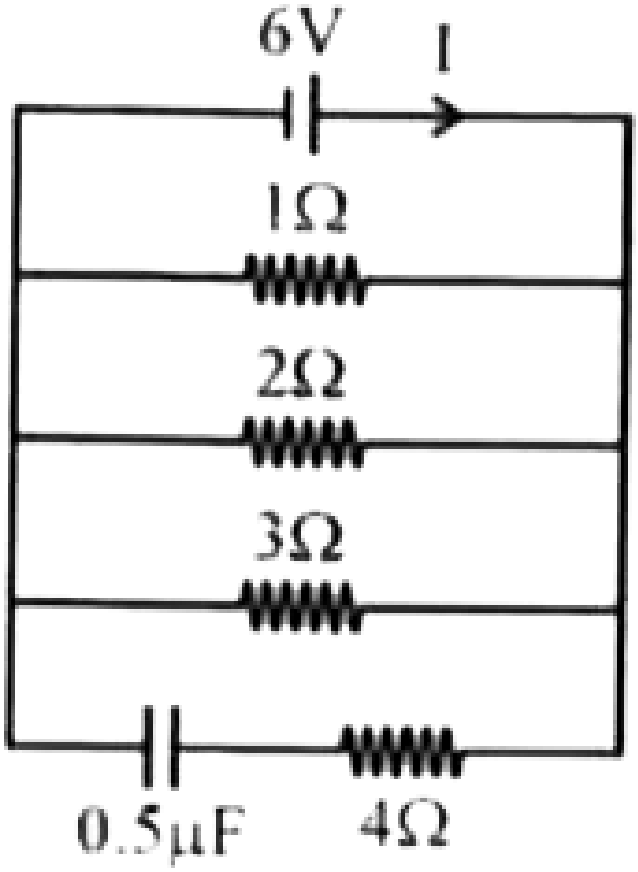
118. In the given circuit diagram, in the steady state the current through the battery and the charge on

the capacitor respectively are



A. 2 A and $3\mu C$

B. 11 A and $3\mu C$

C. $\frac{6}{11}A$ and $\frac{12}{7}\mu C$

D. zero ampere and $3\mu F$

Answer: B

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119. The capacitance of a variable capacitor cann be changed from $50\mu F$ to $400\mu F$ by turning the knob from 0° to 180° on a calibrated semicircular dial. When the knob is set at 180°, the capacitor is connected to a 100 V battery. When it is fully charged, the battery is disconnected and the knob

is brought back to 0°. what is the P.D. across the capacitor when the knob is at 0°.

A. 700 V

B. 750 V

C. 800 V

D. 850 V

Answer: C

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120. A parallel plate4 capacitor is cahrged and the charging battery is then disconnected. If the plates of the capacitor are moved further apart by means of insulation handles, then which one of the following statements is wrong?

A. The electrostatic energy stored in the capacitor increases

B. The capacitance decreases

C. the cahrge on the capacitor increases

D. The voltage across the plates increases

Answer: C

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121. Two conducting spheres of radii r_1 and r_2 having charges Q_1 and Q_2 respectively are connected to each other. There is

A. No change in the energy of the system

B. An increase in the energy of the system

C. Always a decreases in the energy of the system

D. A decrease in the energy of the system unless $Q_1R_2 = Q_2R_1$.

Answer: D

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122. If the charge on a capacitorn is increased by 2C, then the energy stored in it increases by 20 %. The original charge on the capacitor is

A. 10 C

B. 20 C

C. 30 C

D. 40 C

Answer: B

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123. The capacitance of a parallel plate capacitor with air as the medium is $3\mu F$. With the introduction of dielectric medium between the plates, the capacitance becomes $15\mu F$. What is the permittivity of the medium? $\left(\varepsilon_0 = 8.85 \times 10^{-12} C^2 / Nm^2\right)$

A. 5

B. 15

C. $0.44 \times 10^{-10} C^2 N^{-1} m^{-2}$

D. $8.854 \times 10^{-11} C^2 N^{-1} m^{-2}$

Answer: C

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124. The capacitance of a capacitor made by a thin metal foil is $2\mu F$. If the foil is filled with paperr of thickness 0.15 mm, dielectric constant of paper is 2.5 and width of the paper is 400 mm. what is the length of foil?

A. 8.5 m

B. 13 m

C. 3.4 m

D. 34 m

Answer: D

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125. A parallel plate capacitor is connected to a battery. The plates are pulled apart with uniform speed. If x is the separation between the plates,

then the rate of change of electrostatic energy of the capacitor is proportional to

A. x^{-2}

B. x

C. x^{-1}

D. x^2

Answer: A

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126. The plates of a capacitor are charged to a potential difference of 320 volt and are then connected across a resistor. The potential difference across the capacitor decays exponentially with time. After 1 sec the potential difference between the plates of the capacitor is 240 volts. what is the potential difference between the plates after 2 s?

A. 200 V

B. 180 V

C. 160 V

D. 140 V

Answer: B

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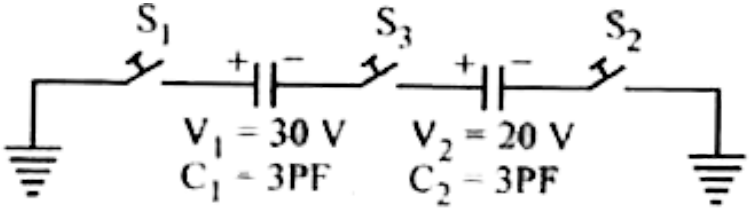
127. For the circuit shown in the figrue which one of the following statements is true?



A. With S_1 and S_2 closed $V_1 = V_2 = 0$

B. With S_1 and S_3 closed $V_1 = 30V$ and $V_2 = 20V$

C. with S_1 closed $V_1 = 15V, V_2 = 20V$

D. With S_3 closed $V_1 = V_2 - 25V$

Answer: B

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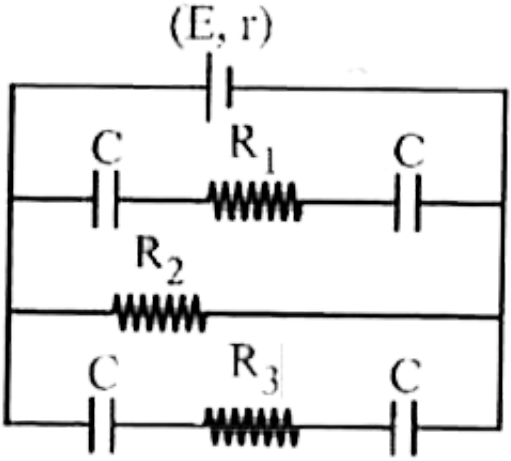
128. In the given circuit,

$E = 10V, r = 1\Omega, R_1 = 1\Omega, R_3, R_2 = 4\Omega, C = 3\mu F$

What is the magnitude of the charge on each plate

of the capacitor?



A. $18\mu C$

B. $12\mu C$

C. $6\mu C$

D. $3\mu C$

Answer: B

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129. A sheet of aluminium foil of negligible thickness is introduced between the plates of a capacitor. The capacitance of the capacitor

A. the samme

B. doubled

C. half

D. K times

Answer: A

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130. Two spherical conductors A and B of radii 1mm and 2mm are separated by a distance of 5 cm and are uniformly charged. If the spheres are connected by a conducting wire then in equilibrium condition, the ratio of the magnitude of the electric fields at the surfaces of spheres A and B is

A. $4:1$

B. $1:2$

C. $2:1$

D. $1:4$

Answer: C

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131. Force of attraction between the plates of a parallel plate capacitor is

A. $\frac{q^2}{\varepsilon_0 AK}$

B. $\frac{q^2}{2\varepsilon_0 AK}$

C. $\frac{q^2}{2\varepsilon_0 A}$

D. $\frac{q^2}{2\varepsilon_0 A^2 K}$

Answer: B

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132. A dielectric slab of thickness d is inserted in a parallel plate capacitor whose negative plate is at $x = 0$ and positive plate is at $x = 3d$. The slab is equidistant from the plates. The capacitor is given some charge. As one goes from 0 to $3d(1998)$.

A. the magnitude of the electric field remains the same

B. the direction of the electric field changes continuously

C. the electric potential increases continuously

D. the electric potential increases at first, then decreases and again increases

Answer: C

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133. A parallel plate air capacitor of capacitance C is connected to a cell of $emFV$ and then

disconnected from it. A dielectric slab of dielectric constant K, which can just fill the air gap of the capacitor, is now inserted in it. Which of the following is incorrect ?

A. The energy stored in the capacitor decreases K times

B. the change in energy stored is $\frac{1}{2}CV^2\left(\frac{1}{K}-1\right)$

C. The charge on the capacitor is not conserved

D. the potential difference between the plates decreases K times

Answer: C

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134. When a dielectric material is introduced between the plates of a charged condenser, after disconnected the battery the electric field between the plates

A. decreases

B. remains constant

C. increases

D. first increases and then decreases

Answer: A

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135. The capacitance of a parallel plate air condenser is $10\mu F$. When the space between the plates is filled with a liquid of dielectric constant K, the potential difference between the plates reduces to 1/5 of the original value. The value of the dielectric constant of the liquid is

A. 2

B. 5

C. 10

D. 8

Answer: B

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136. The capacitance of a parallel plate condenser with a separation of 4 mm between the plates is $7\mu F$. If a mica sheet (K=6) of thickness 2 mm and of the same area is introduced betwenn the plates, its capacitance will be

A. $6\mu F$

B. $9\mu F$

C. $12\mu F$

D. $15\mu F$

Answer: C

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137. The capacitance of a capacitor between$4/3$ times its original value if a dielectric slab of thickness $t = d/2$ is inserted between the plates

(d is the separation between the plates). What is the dielectric consant of the slab?

A. 2

B. 4

C. 5

D. 6

Answer: A

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138. The capacity of a parallel plate condenserr is $5mF$. When a glas plate is introduced between the plates of the condenser, its potential difference reduces to (1/8)th of the original value. The value of the dielectric constant of glass is

A. 6

B. 8

C. 4

D. 10

Answer: B

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139. The separation between the plates of a parallel plate capacitor is d and the area of each plate is A. iff a dielectric slab of thickness x and dielectric constant K is introduced between the plates, then the capacitance will be

A. $\frac{\varepsilon_0 A}{d - x\left(1 - \frac{1}{K}\right)}$

B. $\frac{\varepsilon_0 A}{d + x\left(1 - \frac{1}{K}\right)}$

C. $\frac{\varepsilon_0 A}{d + x\left(1 + \frac{1}{K}\right)}$

D. $\frac{\varepsilon_0 A}{d - x\left(1 + \frac{2}{K}\right)}$

Answer: A

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140. An air capacitor is charged to a potential of 150 V and then the charging battery is disconnected. If the space between the plates is then completely filled with a material of dielectric constant 10 , then the potential between the plates will become

A. 5 V

B. 10 V

C. 15 V

D. 20 V

Answer: C

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141. A metel plate of thickness 2 cm is introduced between the plates of a parallel plate air capacitor having a plate separation of 6 cm. what is the ratio of the capacities of the capacitor before and after introducing the metal plate?

A. $1:2$

B. $2:3$

C. $3:2$

D. $2:1$

Answer: B

142. A parallel plate capacitor with oil as a dielectric between the plates has a capacitance C. if the oil, with dielectric constannt (K=3), is

removed, then the capacitance of the capacitor will be

A. $3C$

B. $\frac{C}{\sqrt{3}}$

C. $\frac{C}{3}$

D. $\sqrt{3}C$

Answer: C

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143. The capacities of a parallel plate capacitor first with air and then on introducing oil between its plates are $50\mu F$ and $120\mu F$ respectively. The dielectric constant of oil is

A. 2

B. 4.2

C. 2.4

D. 0.48

Answer: C

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144. Two capacities plates equal and opposite charges. When the space between the plates is evacuated, the electric field between the plates is 5×10^5 v/m. when the space between the plates is filled with a dielectric, the electric field becomes 2×10^5v/m. what is the dielectric constant os the dielectric material?

A. 2

B. 3

C. 3.5

D. 2.5

Answer: D

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145. If a dielectric slab of thickness 5 mm and dielectric constant K=6 is introduced between the plates of a parallel plate air capacitor, with plate separation of 8 mm, then its capacitance is

A. 1. decreased

B. 2. unaffected

C. 3. almost halved

D. 4. almost doubled

Answer: D

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146. There is an airfilled capacitor of capacity C. when the plate separation is doubled and a dielectric is introduced between the plates, the capacitance becomes 2 C. the dielectric constant of the dielectric is

A. 2

B. 4

C. 6

D. 8

Answer: B

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147. Between the plates of a parallel plate capacitor of capacity C, two parallel plates of the same material and same area as the plates of the original capacitor are placed. If the thickness of each plate $= \frac{1}{5}$ the distance between the plates of the original capacitor, then the capacity of the new capacitor will be

A. a) $\frac{3}{5}$ C

B. b) $\frac{5}{3}$ C

C. c) $\frac{10}{3}C$

D. d) $\frac{5}{4}$C

Answer: B

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148. The terminals of a battery of emf V are connected to the two plates of a parallel plate capacitor. If the space between the plates of the

capacitor is filled with an insulator of dielectric constant K, then :

A. is less

B. is more

C. is the same

D. may be more or less depending upon the dielectric constant of the medium

Answer: B

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149. When a dielectric is introduced between the plates of a charged parallel plate capacitor, whichi one of the following will not change?

A. 1.Charge

B. 2. Potential difference

C. 3. Electric field

D. 4. Energy

Answer: A

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150. The capacitance of a capacitor becomes $\frac{7}{6}$ times its original value if a dielectric slab of thickness $t = \frac{2}{3}$ is introduced between its plates, where d is the separation between its plates, what is the dielectric constant of the slab?

A. a) $\frac{14}{11}$

B. b) $\frac{11}{7}$

C. c) $\frac{11}{14}$

D. d) $\frac{7}{11}$

Answer: A

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151. A parallel state air capacitor has capacitance of 100 μF. The plates are at a distance d apart. If a slab of thickness t $(t \leq d)$ and dielectric constant 5 is introduced between the parallel plates, then the capacitance can be

A. $50\mu F$

B. $100\mu F$

C. $200\mu F$

D. $500\mu F$

Answer: C

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152. A parallel plate air capacitor has a capacitance C. When it is half filled with a dielectric of dielectric constant 5, the percentage increase in the capacitance will be

A. 4

B. 0.666

C. 0.333

D. 200

Answer: D

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153. In a parallel plate capacitor, the separation between the plates is 3mm with air between them. Now a 1mm thick layer of a material of dielectric constant 2 is introduced between the plates due to which the capacity increases. In order to bring its capacity of the original value, the separation between the plates must be made-

A. 4.5 mm

B. 3.5 mm

C. 2.5 mm

D. 1.5 mm

Answer: B

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154. A parallel plate condenser with a dielectric of dielectric constant K between the plates has a capacity C and is charged to a potential V volt. The dielectric slab is slowly removed from between the plates and then reinserted. The net work done by the system in this process is

A. $(K-1)CV^2$

B. zero

C. $\frac{CV^2(K-1)}{K}$

D. $\frac{(K-1)CV^2}{2}$

Answer: B

Watch Video Solution

155. 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 to the previous one as

A. $V > V_0$

B. $U < U_0$

C. $Q > Q_0$

D. $E > E_0$

Answer: C

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156. The capacitance of a parallel plate capacitor with air as medium is $3\mu F$. With the introduction of a dielectric medium between the plates, the capacitance becomes $15\mu F$. What is the permittivity of the medium? $\left(\varepsilon_0 = 8.85 \times 10^{-12} C^2 / Nm^2\right)$

A. $5C^2N/m^2$

B. $15C^2N/m^2$

C. $0.44 \times 10^{-10} C^2N/m^2$

D. $8.854 \times 10^{-11} C^2N/m^2$

Answer: C

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157. Two capacitors each of value C are connected in parallel. When this combination is connected in series with an identical combination, the effective capacitance becomes:

A. 4C

B. 2C

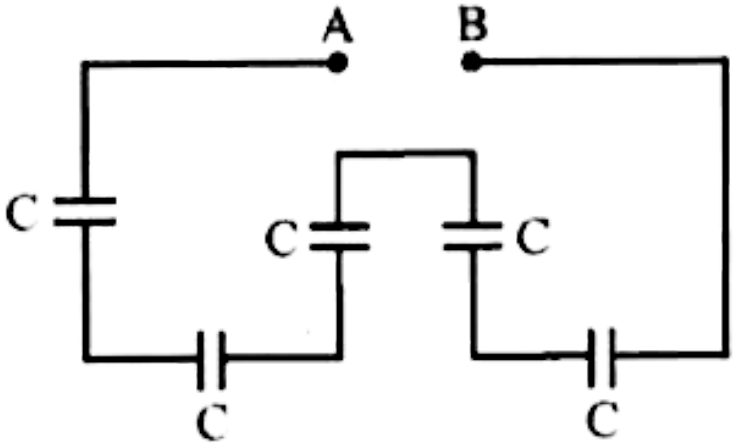
C. C/2

D. C

Answer: D

Watch Video Solution

158. Five capacitors each of capacity C are joined as shown in the following figure. If theire resultant capacity $C_R = 2\mu F$, then the capacity of each capacitor is



A. $5\mu F$

B. $20\mu F$

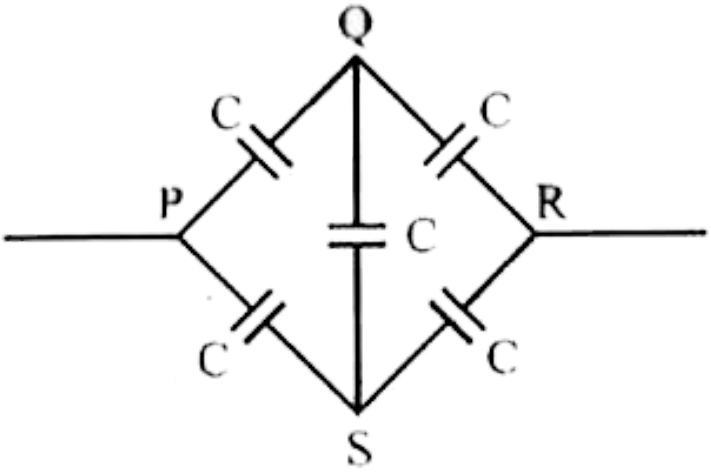
C. $10\mu F$

D. $4\mu F$

Answer: C

Watch Video Solution

159. Five identical condensers, each of capacity C are connected as shown in the figure



the equivalent capacitance between P and R is

A. C/2

B. C

C. 2C

D. 3C

Answer: B

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160. You are given three condensers, each of capacitance $30\mu F$ and a battery of emmf 200 V. they can be joined in series or in parallel. Which arrangement of the condensers will give the minimum energy?

A. All in series

B. All in parallel

C. Two in series and the third in parallel

D. Two in parallel and the third in series

Answer: A

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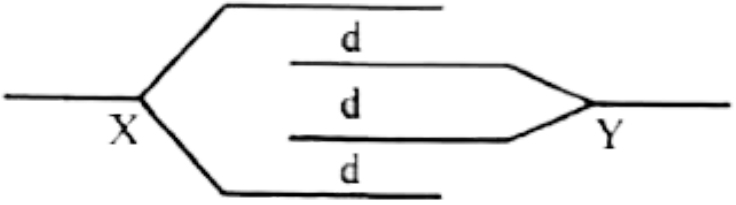
161. Four metallic plates each of area A and separted from one another by a distance d are arranged as shown in the figure. What is the capacitance between X and Y?



A. $C = \frac{\varepsilon_0 A}{d}$

B. $C = \frac{4\varepsilon_0 A}{d}$

C. $C = \frac{2\varepsilon_0 A}{d}$

D. $C = \frac{3\varepsilon_0 A}{d}$

Answer: C

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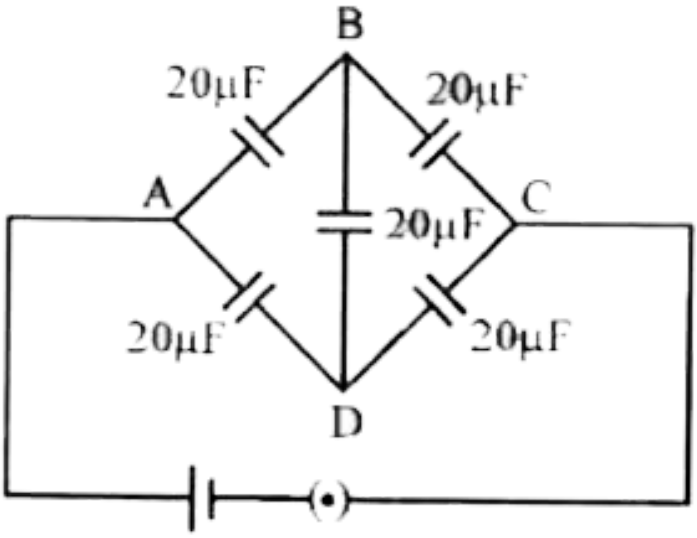
162. Five capacitors each of capacitance $20\mu F$ are joined as shown in the figure. The equivalent

capacitance between A and C is



A. $10\mu F$

B. $20\mu F$

C. $30\mu F$

D. $40\mu F$

Answer: B

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163. Two capacitors of capacitance $2\mu F$ and $4\mu F$ respectively are charged to a potential of 12 V. they are now connected to each other, with the positive plate of each joined to the negative plate of the other. The potential difference across each capacitor will be

A. 2 V

B. 3V

C. 4V

D. 6V

Answer: C

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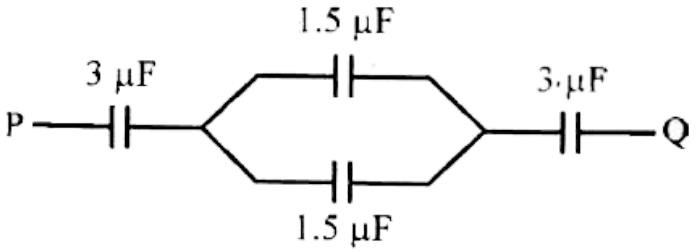
164. What is the capacitance between the points P and Q in the following combination of capacitors?



A. $9\mu F$

B. $4.5\mu F$

C. $2\mu F$

D. $1\mu F$

Answer: D

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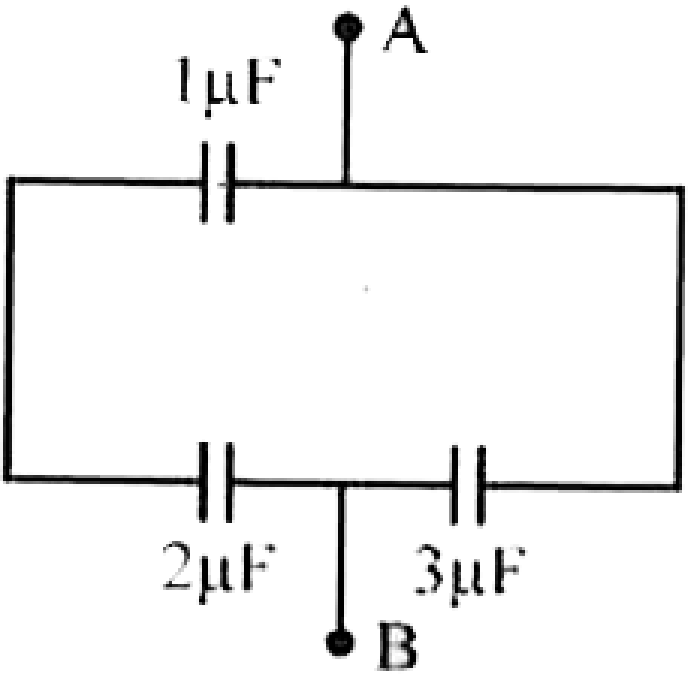
165. What is the net capacitance between the points A and B for the following arrangement of

the three capacitors?



A. $\frac{7}{3}\mu F$

B. $\frac{11}{3}\mu F$

C. $\frac{5}{3}\mu F$

D. $\frac{13}{3}\mu F$

Answer: B

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166. if two capacitors of capacities $C_1 = 4\mu F$ and $C_2 = 1\mu F$ are connected in series, the ratio of the potential drops across the capacitors C_1 and C_2 is

A. $1:4$

B. $4:1$

C. $1:2$

D. $2:1$

Answer: A

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167. Three capacitors of capacities $12\mu F, 6\mu F$ and $4\mu F$ are connected in series and a potential difference of 20 V is applied to their combination. What is the cahrge on the capacitor of $4\mu F$?

A. $20\mu C$

B. $40\mu C$

C. $30\mu C$

D. $50\mu C$

Answer: B

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168. Two capacitors of equal capacities are connected in parallel. Let C_1 bet their resultant capacity. If they are connected in series, then their resultant capacity will be

A. $4C_1$

B. $2C_1$

C. $\frac{C_1}{2}$

D. $\frac{C_1}{4}$

Answer: D

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169. A capacitor or capacitance C_1 is charge to a potential V and then connected in parallel to an uncharged capacitor of capacitance C_2. The fianl potential difference across each capacitor will be

A. $\frac{C_1 V}{C_1 + C_2}$

B. $\frac{C_2V}{C_1+C_2}$

C. $\frac{C_1+C_2}{C_1V}$

D. $\frac{C_1+C_2}{C_2V}$

Answer: A

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170. If there are n capacitors each of capacitance C in series combination connected to a V volt source, then the energy stored in each capacitor is equal to :

A. nCV^2

B. $\frac{1}{2}nCV^2$

C. $\frac{1}{4}nCV^2$

D. $\frac{1}{2n}CV^2$

Answer: D

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171. Five equal capacitors connected in series have a resultant capacity of $5\mu F$. What is their resultant capacity if they are connected in parallel?

A. $50\mu F$

B. $75\mu F$

C. $100\mu F$

D. $125\mu F$

Answer: D

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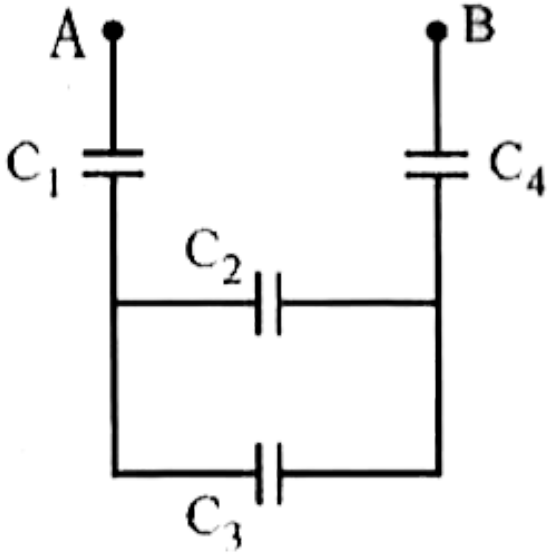
172. 4 capacitors each of capacity $2\mu F$ are joined as shown in the figure. What is the capacity

between the points A and B.



A. $\frac{1}{2}\mu F$

B. $\frac{2}{9}\mu F$

C. $\frac{4}{5}\mu F$

D. $\frac{7}{9}\mu F$

Answer: C

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173. Minimum number of capacitors of $2\mu F$ capacitance each required to obtain a capacitor of $5\mu F$ will be

A. 3

B. 4

C. 5

D. 6

Answer: B

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174. Three equal condenser joined in parallel and connected to a cell of 2 volt battery have a charge of $1.8\mu C$. What charge would they have if they are joined in series?

A. $1.2\mu C$

B. $0.5\mu C$

C. $0.2\mu C$

D. $0.1\mu C$

Answer: C

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175. Three capacitors each of capacity C are first joined in parallel and then in series. It is found that the difference in their effective capacities when joined in parallel and series respectively is $16\mu F$. What is the capacitance of each capacitor?

A. $3\mu F$

B. $4\mu F$

C. $5\mu F$

D. $6\mu F$

Answer: D

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176. Two idential capacitors are joined in parallel, charged to a potential V and then separated and then connected in series i.e. the positive plate of one is connected to negative of the other

A. 10V

B. 20V

C. 40V

D. 15V

Answer: C

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177. In which one of the following devices (machines), corona discharge is used?

A. 1.Transformer

B. 2. Cyclotron

C. 3.Van de Graaff Generator

D. 4. Ballastic Galvanometer

Answer: C

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178. A capacitor of $20\mu F$ charged upto 500 V is connected in parallel with another capacitor of $10\mu F$, which is charged upto 200 V. the common potential is

A. 200V

B. 300V

C. 400 V

D. 500 V

Answer: C

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179. A capacitor of capacitance $4\mu F$ is charged to a potential of 100 V. it is then disconnected from the battery and connected in parallel with another capacitor C_2. If their common potential is 40 volts, then the value of C_2 is

A. $2\mu F$

B. $3\mu F$

C. $5\mu F$

D. $6\mu F$

Answer: D

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180. A $5\mu F$ capacitor is placed across a 12 V battery. It is disconnected from the battery and connected across a condenser of unknown capacity. The voltage then is found to be 3V. The value of the unknownn capacity is

A. $5\mu F$

B. $10\mu F$

C. $15\mu F$

D. $20\mu F$

Answer: C

181. Van der Graafff electrostatic generator is based on

A. 1. Phenomenon of corona discharge only

B. 2. charge always resides on the outer surface of a hollow conductor

C. 3. Colomb's law

D. d. both (a) and (b)

Answer: D

182. Three condensers each of capacity C are joined first in series and then in parallel. If the capacity becomes n times in the second case, what is the value of n?

A. 12

B. 9

C. 6

D. 3

Answer: B

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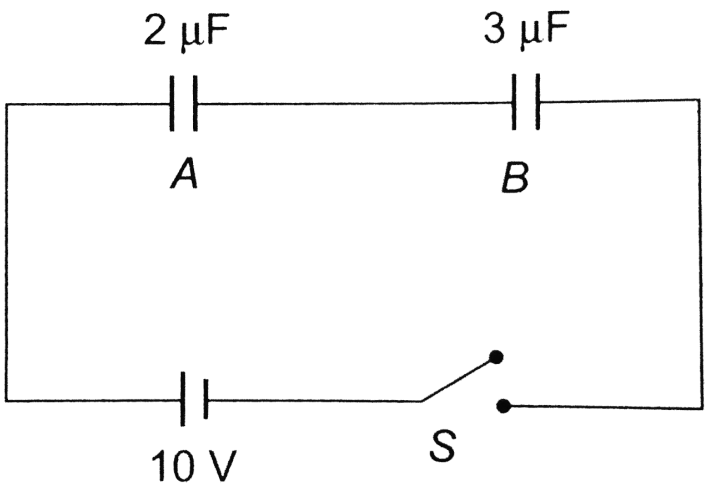
183. Two capacitors A and B are connected in series with a battery as shown in the figure. When the switch S is closed and the two capacitors get

charged fully, then



A. the ratio of electrical energies stored in A and B is 2:3

B. the potential difference across the plates of A is 6V and across the plates of B is 4V

C. the ratio of charge on A and B is 3:2

D. the potential difference across the plates of A is 4V and across the plates of B is 6V

Answer: B

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184. A $10\mu F$ capacitor is charged to a potential difference of $50V$ and is connected to another uncharged capacitor in parallel. Now the common potential difference becomes 20 volt. The capacitance of second capacitor is

A. $30\mu F$

B. $20\mu F$

C. $15\mu F$

D. $10\mu F$

Answer: C

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185. A capacitor of $20\mu F$ is charged to 500 volts and connected in parallel ith another capacitor of $10\mu F$ and charged to 200 volts. The common potential is

A. 500 V

B. 300 V

C. 400 V

D. 200 V

Answer: C

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186. Two capacitors having capacitances C_1 and C_2 are charged with 120 V and 200 V batteries respectively. When they are connected in parallel

now, it is found that the potential on each one of them is zero. Then,

A. $9C_1 = 4C_2$

B. $5C_1 = 3C_2$

C. $3C_1 = 5C_2$

D. $5C_1 = -3C_2$

Answer: C

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187. Four identical capacitors are connected such that, three capacitors are in parallel to which the fourth capacitor is connected in series. The effective capacity is $3.75\mu F$. What is the value of each capacitor?

A. $3\mu F$

B. $4\mu F$

C. $5\mu F$

D. $6\mu F$

Answer: C

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188. The combined capacity of the parallel combination of two capacitors is four times their combined capacity when connected in series. This means that

A. $2\mu F$ and $4\mu F$

B. equal

C. $1\mu F$ and $2\mu F$

D. $5\mu F$ and $10\mu F$

Answer: B

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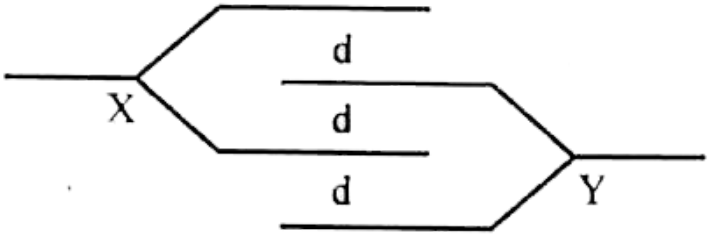
189. Four metallic plates each of surface area A and separated from one another by a distance d are arranged as shown in the figure. The capacitance between the points X and Y is



A. $\frac{4\varepsilon_0 A}{d}$

B. $\frac{3\varepsilon_0 A}{d}$

C. $\frac{2\varepsilon_0 A}{d}$

D. $\frac{\varepsilon_0 A}{2d}$

Answer: B

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190. The difference in the effective capacities of two similar capacitors when joined in series and then in parallel is $6\mu F$. The capacity of each capacitor is

A. $2\mu F$

B. $4\mu F$

C. $8\mu F$

D. $16\mu F$

Answer: B

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191. A capacitor $C_1 = 4\mu F$ is connected in series with another capaciitor $C_2 = 1\mu F$. The combination is connected across a.d.c. source of 200 V. the ratio of potential across C_2 to C_2 is

A. $2:1$

B. $4:1$

C. $8:1$

D. $16:1$

Answer: B

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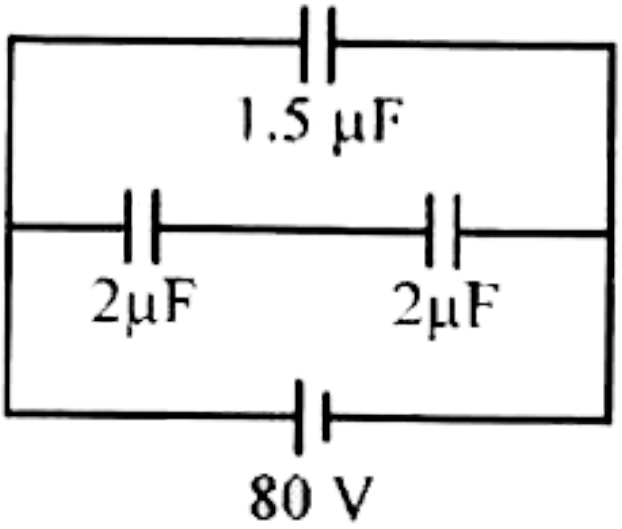
192. In the following figure, what is the cahrge on the 1.5 μF capacitor?



A. $30\mu C$

B. $120\mu C$

C. $90\mu C$

D. $60\mu C$

Answer: B

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193. Two identical capacitors are first connected in series and then in parallel. The difference between their effective capacities is $3\mu F$. The capacity of each capacitor is

A. $3\mu F$

B. $4\mu E$

C. $2\mu F$

D. $5\mu E$

Answer: C

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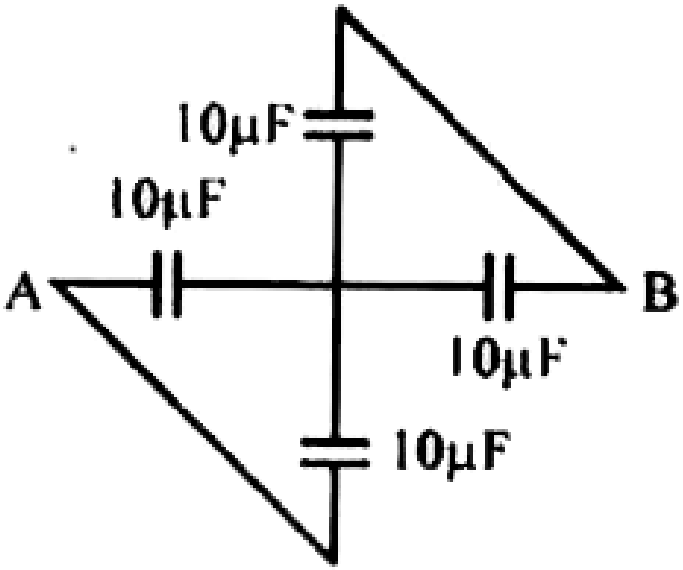
194. 4 capacitors each of capacity $10\mu F$ are connected in a circuit as shown in figure.



The effective capacitance between the points A and B is

A. $5\mu F$

B. $10\mu F$

C. $\frac{10}{3}\mu F$

D. $\frac{20}{3}\mu F$

Answer: B

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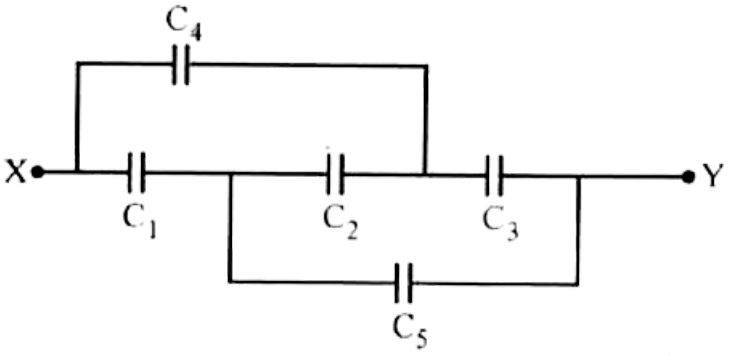
195. The effective capacitance between the points X and Y is



(all capacitor are of $4\mu F$)

A. $1\mu F$

B. $2\mu F$

C. $3\mu F$

D. $4\mu F$

Answer: D

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196. n capacitors each of capacity C are joined in parallel. If they are connected to a source of V volts, then the energy stored in the capacitor is

A. CV^2

B. $\frac{1}{2n}CV^2$

C. $\frac{1}{2}nCV^2$

D. $\frac{1}{2}\frac{n}{C}V^2$

Answer: C

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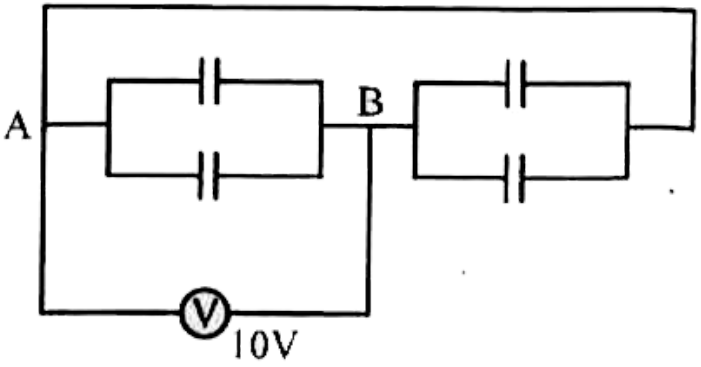
197. Four charged capacitors each of capacitannce $5\mu F$ are connected as shown in the figure. What is the charge on each capacitor if the voltmeter reads 10 V?



A. $25\mu C$

B. $40\mu C$

C. $50\mu C$

D. $60\mu C$

Answer: C

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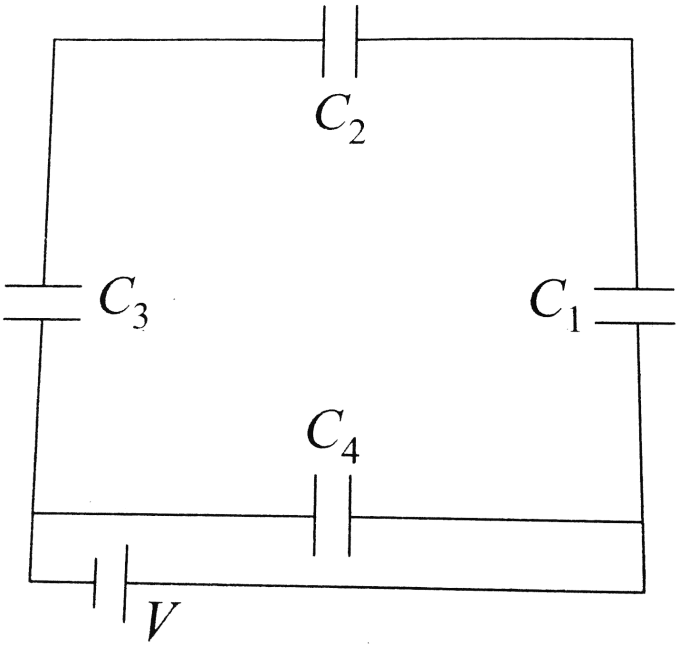
198. A network of four capacitors of capacity equal to $C_1 = C, C_2 = 2C, C_3 = 3C$ and $C_4 = 4C$ are connected to a battery as shown in the figure. The

ratio o fthe charges on C_2 an C_4 is



A. $\frac{4}{7}$

B. $\frac{3}{22}$

C. $\frac{7}{4}$

D. $\frac{22}{3}$

Answer: B

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199. Two capacitors of capacitances C_1 and C_2 are connected in parallel. If a charge q is given to the assembly, the charge gets shared. The ratio of the charge on the capacitor C_1 to the charge on C_2 is

A. $\frac{C_1}{C_2}$

B. $\frac{C_2}{C_1}$

C. C_1C_2

D. $\frac{1}{C_1C_2}$

Answer: A

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200. Two air capacitors A and B having capacities 1 μF and $4\mu F$ respectively are connected in series with a 35 V source. A medium of dielectric constant K=3 is introduced in between the plates of A. what is the change in the charge on the combined capacitor?

A. $60\mu C$

B. $32\mu C$

C. $28\mu C$

D. $16\mu C$

Answer: B

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201. n idential condenser are joined in parallel and are charged tpo potential V. Now they are separted and joined in series. Then the total energy and potential difference of the combination will be

A. Energy and potential difference remain the same

B. Energy remainsi the same and potential difference becomes nV

C. Energy increases n times and potential difference is nV

D. Energy increases n times and potential difference remains the same

Answer: B

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202. A series combination of n_1 capacitors, each of value C_1, is charged by a source of potential difference $4V$. When another parallel combination of n_2 capacitors, each of value C_2, is charged by a source of potential difference V, it has same (total) energy stored in it, as the first combination has. the value of C_2, in terms of C_1, is then

A. $\frac{2C_1}{n_1 n_2}$

B. $\frac{16C_1}{n_1 n_2}$

C. $\frac{n_1 n_2}{16C_1}$

D. $2\frac{n_2}{n_1}C_1$

Answer: B

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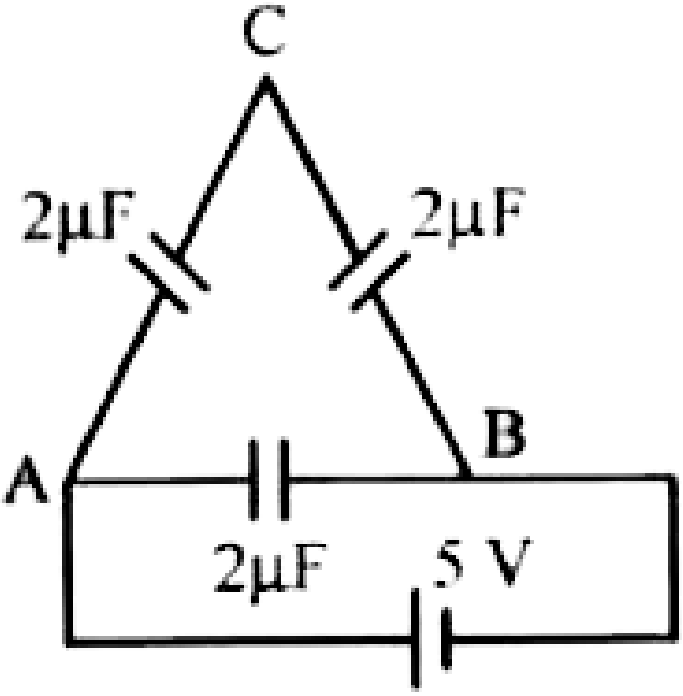
203. Three capacitors are connected in the arms of a triangle ABC as shown in the figure. A P.D of 5 V is applied between A and B. what is the voltage

between B and C?



A. $2V$

B. $1V$

C. 3V

D. 1.5V

Answer: A

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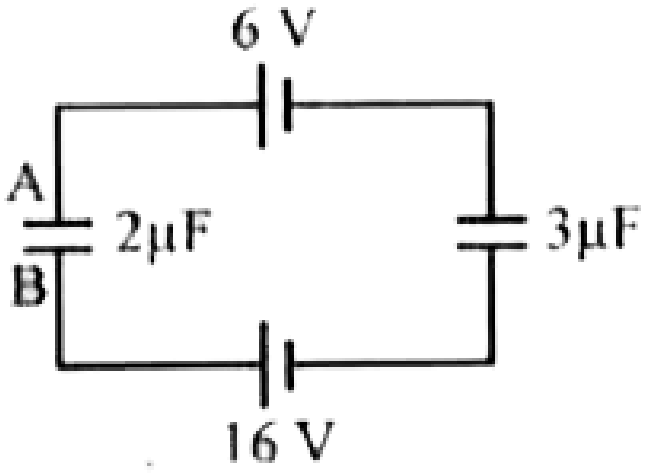
204. What is the potential difference between A and B in the following circuit?



A. 13.2 V

B. $-13.2V$

C. $-6V$

D. 6V

Answer: C

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205. Two parallel plate capacitors of capacitances C and 2C are connected in parallel and charged to a potential difference V. The battery is then disconnected and the region between the plates of the capacitor C is completely filled with a material

of dielectric constant K. The potential differences across the capacitors now becomes.....

A. $\frac{3V}{K+2}$

B. $\frac{3V}{K}$

C. $\frac{V}{K+2}$

D. $\frac{V}{K}$

Answer: A

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

A. 400 V

B. 800 V

C. 1200 V

D. 1600 V

Answer: B

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207. The following arrangement consists of four plates each of area A. the separation between the consecutive plates is d. what is the ratio of the effective capacitance between P and Q as shown in

figures (1) and (2).

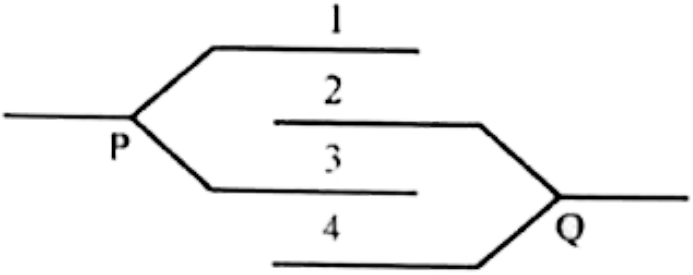

Fig. (1)

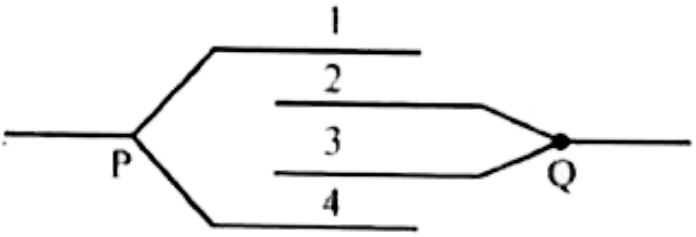

Fig. (2)

A. 1

B. $\frac{2}{3}$

C. $\frac{3}{2}$

D. $\frac{4}{3}$

Answer: C

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208. Two parallel plate capacitors of capacitances C and 2C are connected in parallel and charged to a potential difference V. The battery is then disconnected and the region between the plates of the capacitor C is completely filled with a material of dielectric constant K. The potential differences across the capacitors now becomes.....

A. $\frac{3V}{K+2}$

B. $\frac{2U}{K+2}$

C. $\frac{3U}{K+3}$

D. $\frac{U}{K+1}$

Answer: A

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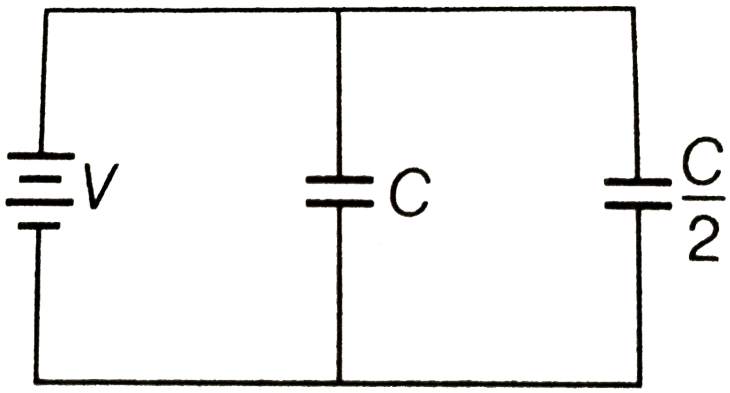
209. Two condenser, one of capacity C and the other of capacity $\frac{C}{2}$, are connected to a V volt battery, as shown in figure. The work done in

charging fully both the condensers is



A. $\frac{3}{4}CV^2$

B. $2CV^2$

C. $\frac{1}{4}CV^2$

D. $\frac{1}{2}CV^2$

Answer: A

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210. A particle of mass m and charge q is placed at rest in a uniform electric field E and then released, the kinetic energy attained by the particle after moving a distance y will be

A. qEy^2

B. qE^2y

C. qEy

D. q^2Ey

Answer: C

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211. Van de Graff generator produces

A. 1. high voltage and high current

B. 2.high voltage and low current

C. 3.low voltage and high current

D. 4. low voltage and low current

Answer: B

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212. A parallel combination of 0.1 $M\Omega$ resistor and a $10\mu F$ capacitor is connected across a 1.5 V source of negligible resistance. The time (in sec) required for the capacitor to get charged upto 0.75 V is approximately

A. $\log_2 2$

B. ∞

C. zero

D. $\log_{10} 2$

Answer: C

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213. A uniform electric field pointing in positive x-direction exists in a region. Let A be the origin, B be the point on the x-axis at $x = +1cm$ and C be the point on the y-axis at $y = +1$cm. then the potetial at the points A,B and C satisfy

a. $V_A < V_B$, b. $V_A > V_B$ c. $V_A < V_C$ d. $V_A > V_C$

A. $V_A < V_B$

B. $V_A > V_B$

C. $V_A < V_C$

D. $V_A > V_C$

Answer: B

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214. a quantity X is given by $\varepsilon_0 L\frac{\Delta V}{\Delta t}$ where $\in_0$ is the permittivity of the free space, L is a length, ΔV is a potential difference and Δt is a time interval. The dimensinal formula for X is the same as that of

A. charge

B. voltage

C. current

D. Resistance

Answer: C

Watch Video Solution

215. Two small balls having equal poistive charges Q(coulomb) on each are suspended by two insulating strings of equal length L(metre) from a hook fixed to a stand. The whole set up is taken in a satellite into space where there is no gravity (state of weightlessness). The angle between the

two strings is.....and the tenison in each string is.....newtons.

A. $180^\circ, \frac{1}{4\pi\varepsilon_0}\frac{q^2}{(2l)^2}N$

B. $90^\circ, \frac{1}{4\pi\varepsilon_0}\frac{q^2}{l^2}N$

C. $180^\circ, \frac{1}{4\pi\varepsilon_0}\frac{q^2}{2l^2}N$

D. $180^\circ, \frac{1}{4\pi\varepsilon_0}\frac{q^2}{l^2}N$

Answer: A

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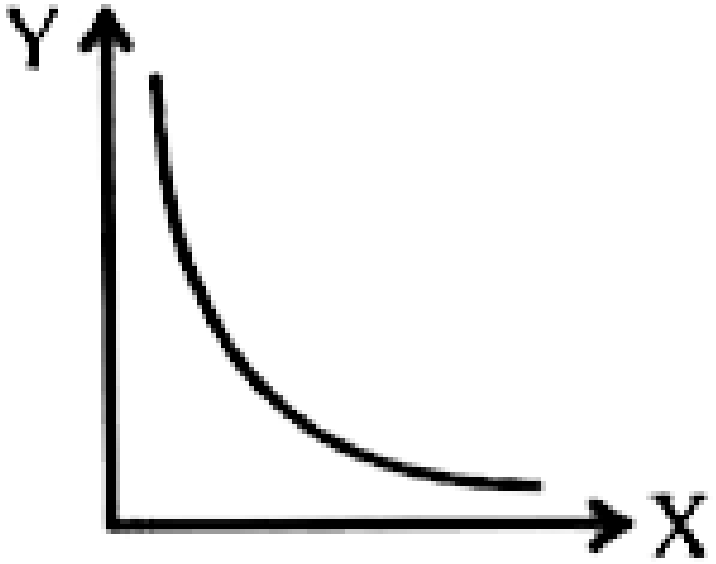
216. What physical quantities may X and Y represent ? (Y represents the first mentioned quantity)



A. Pressure v/s temperature of a given gas (constant volume)

B. Kinetic energy v/s velocity of a particle

C. Capacitance v/s charge to give a constant potential

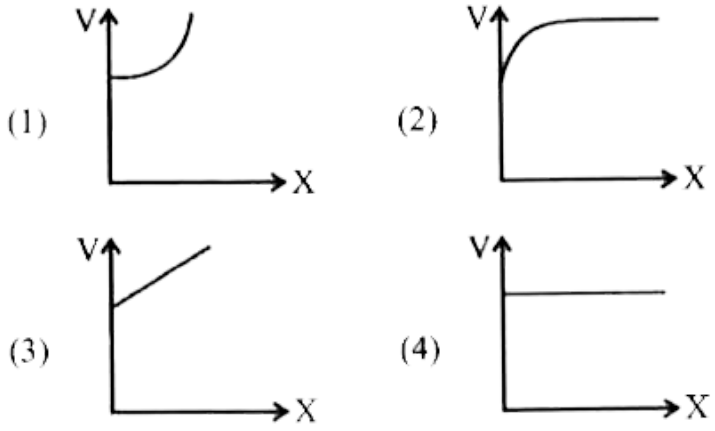
D. Potential v/s capacitance to give a constant charge

Answer: D

View Text Solution

217. Between the plates of a parallel plate capacitor a dielectric plate in introduced just to fill the

complete space between the plates. The capacitor is charged and later disconnected from the battery. The dielectric plate is then slowly drawn out of the capacitor plates. the plot of the potential difference across the plates and the length of the dielectric plate drawn out is



A. Figure 4

B. figure 3

C. figure 2

D. figure 1

Answer: C

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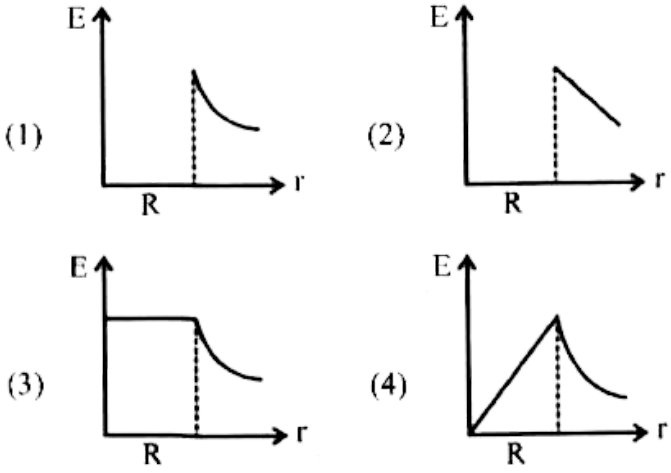
218. Which one of the following graphs represents, variation of the electric field strength E with distance r from the centre of a charged conducting

sphere ?



A. Figure 2

B. figure 3

C. Figure 4

D. Figure 1

Answer: D

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219. The electric field intensity in free space at a distance 'r' outside a charged conducting sphere of radius 'R' in terms of surface charge density σ is

A. $\frac{\sigma}{\varepsilon_0}\left[\frac{R}{r}\right]^2$

B. $\frac{\varepsilon_0}{\sigma}\left[\frac{R}{r}\right]^2$

C. $\frac{R}{r}\left[\frac{\sigma}{\varepsilon_0}\right]^2$

D. $\frac{R}{\sigma}\left[\frac{r}{\varepsilon_0}\right]^2$

Answer: A

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220. The intensity of the electric field at a pont close but outside a charged conducting cylinder is proportional to (r is the distance of the point from the axis of the cylinder)

A. $\frac{1}{r}$

B. $\frac{1}{r^2}$

C. $\frac{1}{r^3}$

D. r^3

Answer: A

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221. Two parallel plates separated by distance d are kept at potential difference V volt. A charge q of mass m enters in parallel plates with some velocity. The acceleration of the charge particle will be

A. $\frac{qV}{dm}$

B. $\frac{dm}{qV}$

C. $\frac{qm}{dV}$

D. $\frac{dV}{qm}$

Answer: A

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222. Electrostatic enegy of $3.5 \times 10^{-4} J$ is stored in a capacitor of 700 V. what is the charge on the capacitor?

A. $5\mu C$

B. $4\mu C$

C. $1\mu C$

D. $8\mu C$

Answer: C

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223. The energy density at a point in a medium of dielectric constant 6 is $26.55 \times 10^6 J/m^3$. What is the electric field intensity at that point ? $[\varepsilon_0 = 8.85 \times 10^{-12} SI$ units]

A. $2 \times 10^8 N/C$

B. $10^9 N/C$

C. $3 \times 10^9 N/C$

D. $\sqrt{10^9 N/C}$

Answer: B

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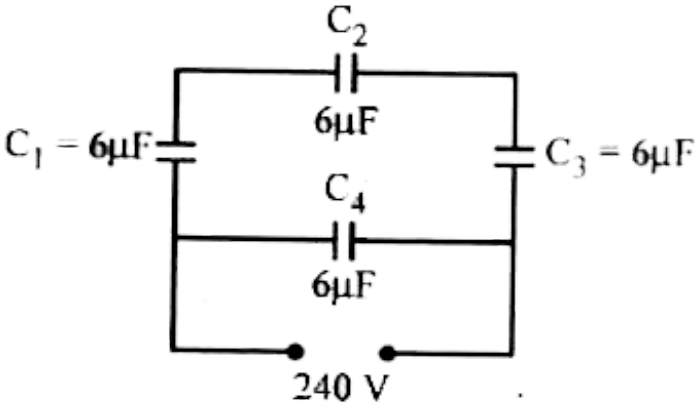
224. A network of 4 capacitors, each of $6\mu F$ is connected to a 240 V supply as shown in the figure. What are the charges on the capacitor C_2 and C_4 ?



A. 1.44 mC and 0.48 mC

B. 0.48 mC and 1.44 mC

C. 14.4 mC and 4.8 mC

D. 4.8 mC and 14.4 mC

Answer: B

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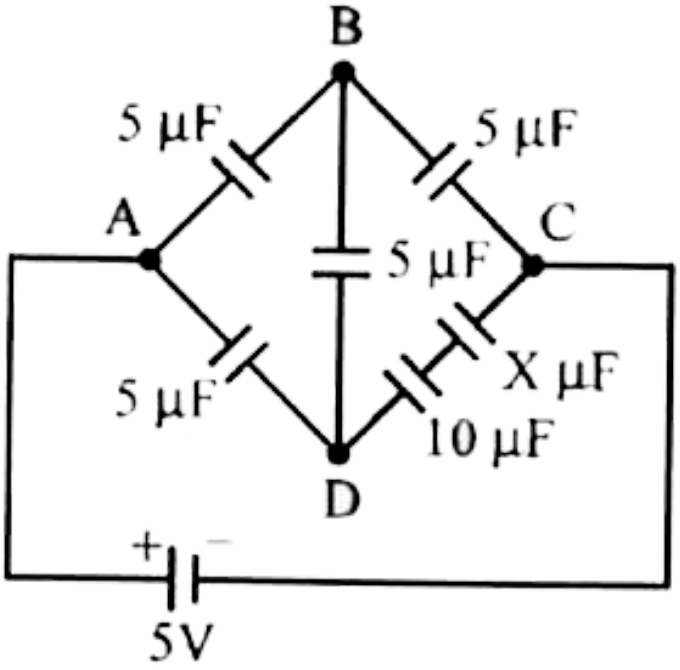
225. Six capacitors of capacities $5\mu F, 5\mu F, 5\mu F, 5\mu F, 10\mu F$ and X μF are connected in a network as shown in the figure.

What is the value of X if the network is balanced?



A. $20\mu F$

B. $15\mu F$

C. $10\mu F$

D. $5\mu F$

Answer: C

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226. Three parallel plate air capacitors are connected in parallel each capacitor has plate area $\frac{'A'}{3}$ and the separation between the plates is 'd', '2d' and '3d' respectively. The equivalaent capacity of combination is (ε_0=absolute permittivity of free space).

A. $\frac{7\varepsilon_0 A}{18d}$

B. $\frac{11\varepsilon_0 A}{18d}$

C. $\frac{13\varepsilon_0 A}{18d}$

D. $\frac{17\varepsilon_0 A}{18d}$

Answer: B

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227. Two identical parallel plate air capacitors are connected in series to a battery of emf V. If one of the capacitor is completely filled with dielectric material of constant K, then potential difference of the other capacitor will become

A. $\frac{K}{V(K+1)}$

B. $\frac{KV}{K+1}$

C. $\frac{K-1}{KV}$

D. $\frac{V}{K(K+1)}$

Answer: B

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228. The amount of work done in increasing the voltage across the plates of capacitor from 5 V to 10 V is W. The work done in increasing it from 10 V to 15 V will be

A. W

B. 0.6 W

C. 1.25 W

D. 1.67 W

Answer: D

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229. When threee capacitors of equal capacities are connected in parallel and one of the same capacity is connected in series withs its

combination . The resultant capacity is $3.75\mu F$. The capacity of each capacitor is

A. $5\mu F$

B. $6\mu F$

C. $7\mu F$

D. $8\mu F$

Answer: A

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230. Two parallel plate air capacitance of same capacity C are connected in series to a battery of emf E. Then one of the capacitors is completely filled with dielectric material of constant K. The change in the effective capacity of the series combination is

A. $\frac{C}{2}\left[\frac{K-1}{K+1}\right]$

B. $\frac{2}{C}\left[\frac{K-1}{K+1}\right]$

C. $\frac{C}{2}\left[\frac{K+1}{K-1}\right]$

D. $\frac{C}{2}\left[\frac{K-1}{K+1}\right]^2$

Answer: A

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231. A parallel plate air capacity 'C' farad, potential 'V' volt and energy 'E' joule . When the gap between the plates is completely filled with dielectric

A. both V and E increase

B. both V and E decrease

C. V decreases, E increases

D. V increases, E decreases

Answer: B

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Test Your Grasp

1. A surface $S = 10\hat{j}$ is kept in an electric field of $\overrightarrow{E} = 3\hat{i} + 5\hat{j} + 6\hat{k}$. How much electric flux will come out through the surface?

A. 30 units

B. 40 units

C. 50 units

D. 60 units

Answer: C

Watch Video Solution

2. The voltage of clouds is $4 \times 10^6 V$ with respect to ground. In a lightning strike lasting $0.1s$, a charge of 4 C is delivered to the ground. The power of the lightning strike is

A. 160 MW

B. 80 MW

C. 20 MW

D. 500 MW

Answer: A

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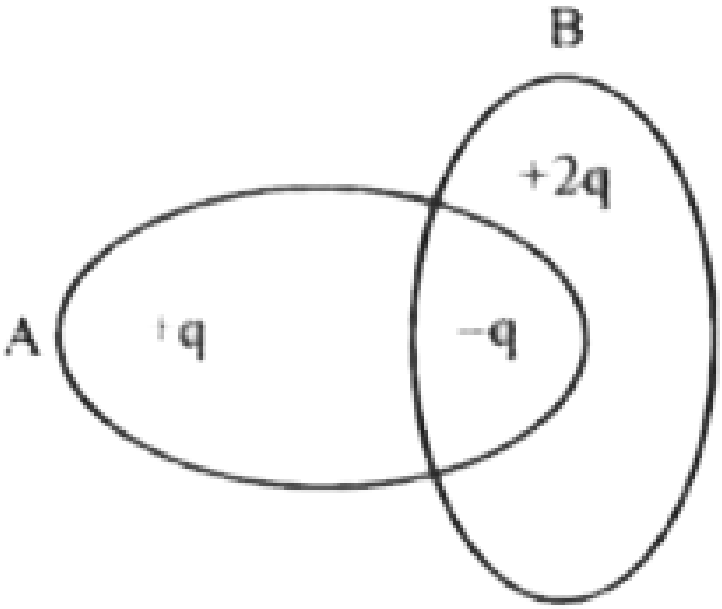
3. What is T.N.E.I. through the surface A and B?



A. (q,0)

B. (q,2q)

C. (-q,+q)

D. (0,q)

Answer: D

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4. An infinite line charge produces an electric field of $9 \times 10^4 N/C$ at a distance of 2 cm. what is the linear charge density?

A. $10^{-5} C/m$

B. $10^{-6}C/m$

C. $10^{-7}C/m$

D. $10^{-8}C/m$

Answer: C

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5. A charge Q is enclosed by a Gaussian spherical surface of radius R. If the radius is doubled, then the outward electric flux will

A. be doubled

B. increase four times

C. be reduced to halff

D. remain the same

Answer: D

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6. A capacitor of capacitance C is charged to a potential V. The flux of the electric field through a closed surface enclosing the capacitor is

A. $\frac{CV}{\varepsilon_0}$

B. $\frac{2CV}{\varepsilon_0}$

C. $\frac{CV}{2\varepsilon_0}$

D. zero

Answer: D

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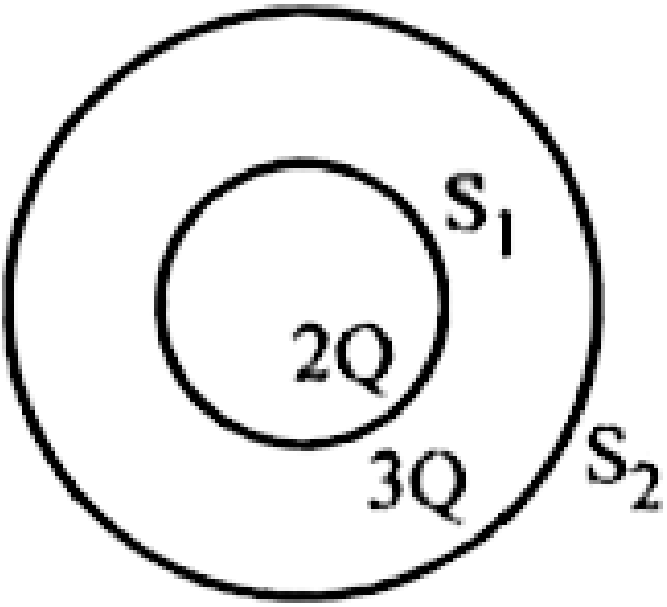
7. S_1 and S_2 are two concentric sphere enclosing charges 2Q and 3Q respectively as shown in the figure. What is the ratio of the electric flux through

S_1 and S_2?



A. $\frac{2}{3}$

B. $\frac{3}{2}$

C. $\frac{2}{5}$

D. $\frac{4}{3}$

Answer: C

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8. The electric field in a region is radially outward with magnitude $E = A\gamma_0$. The charge contained in a sphere of radius γ_0 centered at the origin is

A. $\frac{1}{4\pi\varepsilon_0} A r_0^3$

B. $4\pi\varepsilon_0 A r_0^3$

C. $\frac{4\pi\varepsilon_0 A}{r_0}$

D. $\frac{1}{4\pi\varepsilon_0} \frac{A}{r_0^3}$

Answer: B

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9. The energy density in an electric field of intensity 100 V/m is

A. $8.85 \times 10^{-8} J/m^3$

B. $4.425 \times 10^{-8} J/m^3$

C. $8.85 \times 10^{-6} J/m^3$

D. $4.425 \times 10^{-10} J/m^3$

Answer: B

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10. The potential difference between the plates of a parallel plate condenser having a capacity of $10\mu F$, is increased from 5 V to 25 V. the increase in its energy is

A. $3 \times 10^{-3} J$

B. $4 \times 10^{-3} J$

C. $5 \times 10^{-3} J$

D. $2 \times 10^{-3} J$

Answer: A

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11. Eight drops of mercury of equal radii and possessing equal charges combine to form a single big drop. The ratio of the capacitance of the big drop to the capacity of a single drop is

A. $1:1$

B. $2:1$

C. $3:1$

D. $4:1$

Answer: B

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12. A parallel plate air capacitor has a capacity of 2 pF. If the separation between its plates is doubled and a mica sheet is introduced between its plates, its capacity becomes 6 pF. What is the dielectric constant of mica?

A. 6

B. 5

C. 4

D. 3

Answer: A

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13. The earth has volume 'V' and surface area 'A'. What is the capacitance of the earth?

A. $4\pi\varepsilon_0 \frac{A}{V}$

B. $4\pi\varepsilon_0 \frac{V}{A}$

C. $12\pi\varepsilon_0 \frac{V}{A}$

D. $12\pi\varepsilon_0 \frac{A}{V}$

Answer: C

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14. The capacity of a parallel plate condenser with dielectric constant 10 is $16 \times 10^{-6} F$. If the dielectric is removed, then the new capacity will be

A. $1.6 \times 10^{-6} F$

B. $3.2 \times 10^{-6} F$

C. $0.8 \times 10^{-6} F$

D. $2 \times 10^{-6} F$

Answer: A

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15. A sheet of aluminium foil of negligible thickness is introduced between the plates of a capacitor. The capacitance of the capacitor

A. become infinite

B. increases

C. decreases

D. remain unchanged

Answer: D

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16. If C_S and C_P are the equivalent capacities of n identical condensers joined in series and in parallel respectively, then the ratio $\frac{C_P}{C_S}$ is

A. 1.n

B. 2. n^2

C. 3. $\frac{1}{n^2}$

D. 4. $\frac{n+1}{n}$

Answer: B

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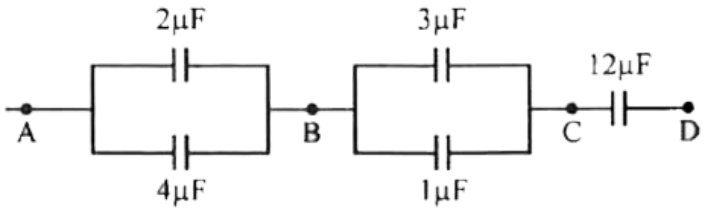
17. A network of capacitors is as shown in the diagram.



What is the equivalent capacitance between the points A and D?

A. $C = 3\mu F$

B. $C = 4\mu F$

C. $C = 2\mu F$

D. $C = 5\mu F$

Answer: C

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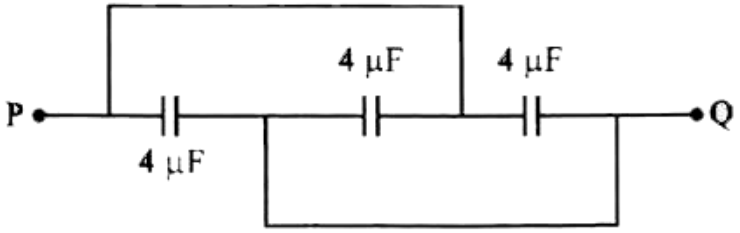
18. The equivalent capacitance between the points P and Q in the following arrangement of capacitor is



A. $4\mu F$

B. $2\mu F$

C. $\frac{4}{3}\mu F$

D. $12\mu F$

Answer: D

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19. A parallel plate capacitor is made by stacking n equally spaced plates connected alternatively. If the capacitance between any two adjacent plates is 'C' then the resultant capacitance is

A. nC

B. C

C. (n+1)C

D. (n-1)C

Answer: D

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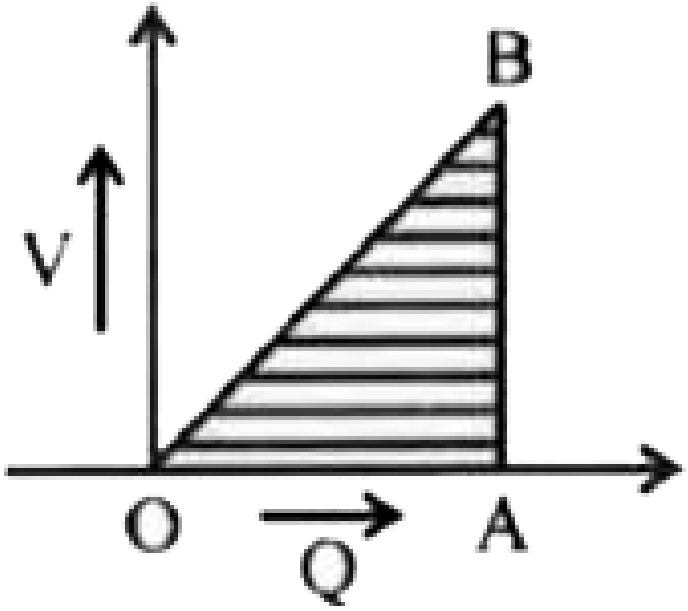
20. The graph between the voltage and charrge of a capacitor is as shown in the figure. The area of

the triangle OAB given the



A. Capacitance

B. Magnetic flux

C. Energy stored in the capacitor

D. Capacitive reactance

Answer: C

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