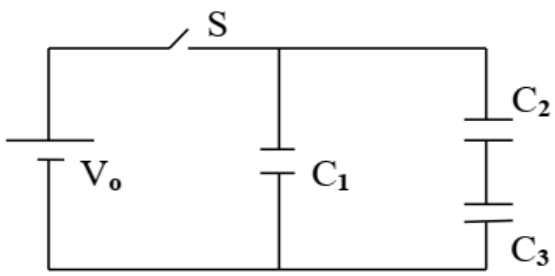
1. One of the following statements is NOT characteristics of electric field.**(UEE:2003)**
   A. An electric field is the region around a charged object where another charged object willexperience a force.
   B. Lines of electric field have a direction which moves away from negative and towards positive.
   C. The direction of electric filed is the direction of force acting on a small positive test charge.
   D. Lines of electric flux do not cross over each other.
2. A parallel plate capacitor with a plate separation d has a capacitance C in the absence of a dielectric. What is the capacitance when a slab of dielectric material of dielectric constant k and thickness 1/3 d is inserted between the plates? **(EUEE:2003)**
   A. $\frac{3k}{2k+1}k$ B. $\frac{2k+1}{3k}C$ C. $\frac{3k}{2k-1}C$ D. $\frac{2k-1}{3k}C$
3. When switch S is thrown to the left in the figure shown below, the plates of the capacitor C1 acquire a potential difference V_0. C_2 and C_3 are initially uncharged. The switch is now thrown to the right. What are the final charges q_1 on the capacitor C_1? **(EUEE: 2003)**
   A. $\left(\frac{C_1C_2+C_2C_3}{C_1C_2+C_1C_3+C_2C_3}\right)C_1V_0$
   B. $\left(\frac{C_1C_2+C_1C_3}{C_1C_2+C_1C_3+C_2C_3}\right)C_3V_0$
   C. $\left(\frac{C_1C_2+C_1C_3}{C_1C_2+C_1C_3+C_2C_3}\right)C_2V_0$
   D. $\left(\frac{C_1C_2+C_1C_3}{C_1C_2+C_1C_3+C_2C_3}\right)C_1V_0$



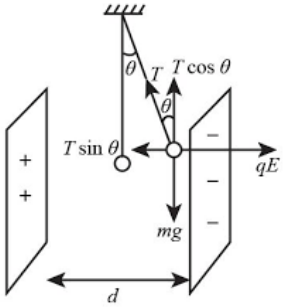
4. What is the SI unit of Electric field? **(EUEE: 2004)**
   A. Am^{-1} C. Cm
   B. Vm^{-1} D. NC^{-1}
5. An ion accelerated through a potential difference of 115 V experiences an increase in kinetic energy of $7.37\ x\ 10^{-17}J$. What is the charge on the ion? **(EUEE:2004)**
   A. 6.41 x 10^{-19} C C. 4.51 x 10^{-15} C
   B. 2.32 x 10^{-15} C D. 2 x 10^{-21} C
6. What is the magnitude of the electric force between two protons separated by 2 x 110^{-15} m? (Charge of proton is 1.6 x 10^{-19} C) **(EUEE: 2004)**
   A. 67.5N B.115N C. 57.5N D. 83.4N
7. When a potential difference of 150 V is applied to the plate of a parallel-plate capacitor, the plates carry a surface charge density of 30 n C/cm^2. What is the spacing between the plates? **(EUEE: 2004)**
   A. 2.24μm B. 5.32μm C. 12.24μm D. 4.42μm
8. A small object of mass *m* carries a *q* and is suspended by a thread between the vertical plates of a parallel-plate capacitor. The plate separation is d. If the thread makes an angle Θ with the vertical, what is the potential difference between the plates? **(EUEE: 2004)**

A. $\frac{mgdtan\theta}{Q}$

B. $\frac{mgtan\theta}{Q}$

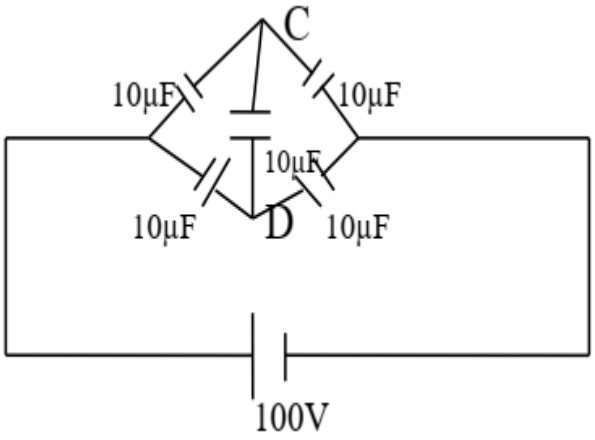
C. $\frac{mgdsin\theta}{Q}$

D. $\frac{mdsin\theta}{Q}$



9. Five capacitors 10μF capacity each is connected to A, D, and C potential of 100 volt asshown in the next figure. What is the equivalent capacitance between A and B? **(EUEE: 2004)**

A. 10μF
B. 20μF
C. 30μF
D. 60μF



10. Consider a series RC circuit for which R = 1 MΩ, C = 5μF and ε = 30 V. What is the time constant of the circuit and the maximum charge on the capacitor after the switch is closed respectively? **(EUEE:2005)**

A. 5 seconds, 150 μC
B. 7 seconds, 155 μC
C. 10 seconds, 160μC
D. 9 seconds, 135μC

11. An air-filled parallel-plate capacitor has a capacitance of 1pF.The plate separation is then doubled and a wax dielectric is inserted, completely filling the space between the plates. As aresult, the capacitance becomes 2pF. What is the dielectric constant of the wax? **(EUEE: 2005)**

A. 8 B. 4 C. 2 D. 0.5

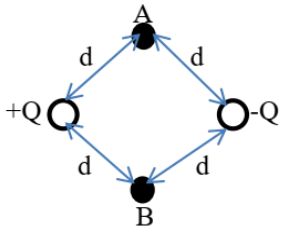
12. Points A and B are each a distance d from each of two equal and opposite charges as shown below. What will be the work required to move a negative charge q from A to B? **(EUEE: 2005)**

A. Zero

B. $\frac{qQ}{4\pi\varepsilon_0 d^2}$

C. $\frac{qQ}{4\pi\varepsilon_0 d}$

D. $\frac{qQ}{4\pi\varepsilon_0(4d^2)}$



13. What is the capacitance of a capacitor that should be connected with 2 other capacitors having capacitance of 4μF and 8μF all in series to produce an effective capacitance of 24/11μF? **(EUEE: 2005)**

A. 12μF B. 10μF C. 8μF D. 4μF

14. An electron enters a region of uniform electric field of $5x10^3 \frac{N}{C}$. What is the force on the electron? **(EUEE: 2005)**

A. $8x10^{-22}N$ B. $5.3x10^{-22}N$ C. $8x10^{-16}N$ D. $1.88x10^{22}N$

15. Which one of the following changes to parallel plate capacitor would not increase energy stored in thecapacitor at a fixed voltage across the plates? **(EUEE: 2005)**

A. Increasing the area of the plates
B. Increasing the dielectric constant
C. Decreasing the charges on the plates
D. D. increasing the distance b/n the plates

16. Moving $2.5x10^{-6}$ coulomb of charge from point A to point B in an electric field requires $6.3x10^{-4}$J of work. The potential difference between points A and B is approximately **(EUEE: 2006)**

A. 4×10^{-3} V B. 2.5×10^{-2} V C. 1.6×10^{-19} V D. 1×10^{-14} V

17. The distance between two point charges is doubled. What will happen to the force of interaction between the charges? **(EUEE: 2006)**

A. The force will be doubled.
B. The force will be reduced by half.
C. The force will be reduced by a factor of ¼.
D. The force will not be affected.

18. A capacitor made parallel plates is charged by connecting it to a battery. The distance between the plates is much less than the surface area of each plate. After fully charged if the plates are disconnected from the battery and then pulled apart a little, what will happen to the total stored energy, the electric field, and the potential difference between the plates? **(EUEE: 2006)**

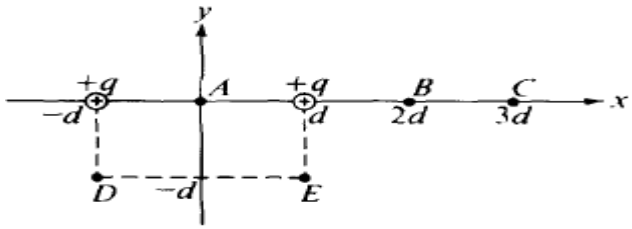
A. The electric field between the plates increases.
B. The potential difference between the plates decreases.
C. The total energy stored in the capacitor increases.
D. The electric field, the potential difference and the stored energy remain the same.

19. A small radio receiver uses a battery that delivers a constant current of 25mA for 3 hours. Calculatethe total charge delivered by the battery? **(EUEE: 2006)**

A. 1080000C B. 270000C C. 540C D. 270C

20. Two positive charges of magnitude q are each a distance d from the origin A of a coordinate systemas shown below. The magnitude of the electric field is minimum at point: **(EUEE: 2006)**

A. A. B. B C. C D. D



21. Two different capacitors of capacitance C_1 = 2μF and C_2 = 3μF are connected in series across a 120 V supply line. The charged capacitors are disconnected from the line and from each other and reconnected with terminals of like sign together. What will be the final charge on C_1 and C_2, respectively? **(EUEE: 2006)**

A. 57.6 μC and 86.4 μC
B. 115.2 μC and 127.8 μC
C. 144 μC across each
D. 288 μC across each

22. A parallel plate capacitor has a capacitance of 10μF.If the distance between the plates is doubled, keeping all other quantities constant, what is the new capacitance of the capacitor? **(EUEE: 2007)**

A. 0.2μF B. 5μF C.10μF D. 20μF

23. In a certain region of space, a uniform electric field is directed in the positive x direction. If a particle with negative charge carried from x = 20cm to x = 60cm, what can we concludeabout the electric potential and the electric potential energy of the charge-field system?**(EUEE: 2007)**

A. The electric potential at x = 20cm is larger than that at x = 60cm.
B. The electric potential at x = 20cm is the same as that at x = 60cm.
C. The electric potential energy decrease.
D. The electric potential energy increases.

24. Which one of the following statements is correct? **(EUEE:2007)**

A. The electric field strength due to two point charges of equal magnitude and the same signis zero only at one point on the line joining the two charges.
B. If a point charge of mass *m* is released from rest in a uniform electric field, it will movealong a line of force with uniform speed.
C. The variation of the strength of the electric field due to an electric dipole is inverselyproportional with the square of the distance from its center of mass.
D. An electric dipole moment ***P*** in a uniform external electric field **E** is in stableequilibrium if ***P*** and **E** are in opposite directions.

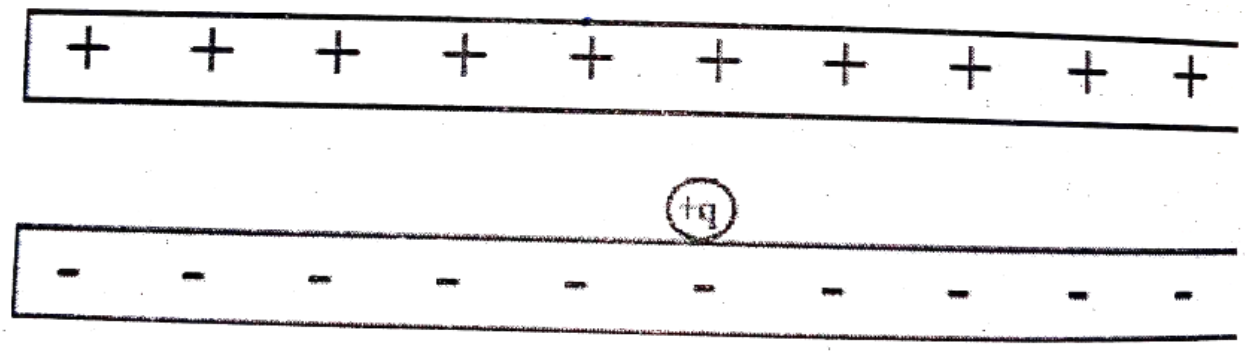
25. In the sketches below, which best describes the location of the negative charges (electrons) when a negatively charged rod is bought near but not touching the conducting sphere? **(EUEE: 2008)**

A. C B. D C. A D. B

26. What is the potential (V) at a distance of 10 m from charge of +5 C? **(EUEE: 2008)**

A. -4.45×10^{9} V B. -0.5 V C. $+4.45 \times 10^{9}$ V D. +0.5 V

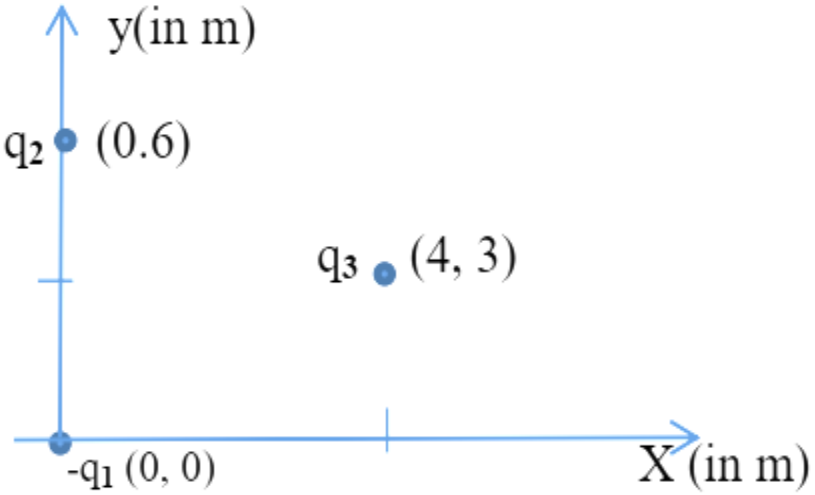
27. A positive charge of 1.0×10^{-4} C is on the negatively charge plate of a parallel plate capacitoras shown below.



If the potential (V) on the top plate is + 10,000 V and that of the bottom plate is – 10,000 V, how much work (W) is required to move charge from the bottom to the plate? **(EUEE: 2008)**

A. 2 J B. 1 J C. Zero D. 2×10^{4} J

28. A charge of $q_1 = -10 \times 10^{-9}$ C, $q_2 = +10 \times 10^{-9}$ C and $q_3 = -2.5 \times 10^{-8}$ C are placed on x-yplane as shown in the figure below. What is the electric force on q_3 by q_1 and q_2? **(EUEE: 2009)**



A. 1.08×10^{-7} N in +ve y-direction.
B. 9.00×10^{-7} N in -ve y-direction.
C. 1.42×10^{-7} N in +ve x-direction.
D. 1.42×10^{-7} N in -ve x-direction.

29. Two positive charges of magnitude 2.4×10^{-9} C and 1.6×10^{-9} C are separated in air by a distance of 2cm. how much electrostatic potential is produced by the two charges at midway between them? **(EUEE: 2009)**

A. 3.6 kV B. 0.72 kV C. 2.16 kV D. 1.44 kV

30. The capacitance of a parallel plate capacitor is 10μF. if the distance between the plates is halved, keeping all other quantities constant, and then what is the new capacitance of the capacitor? **(EUEE: 2009)**

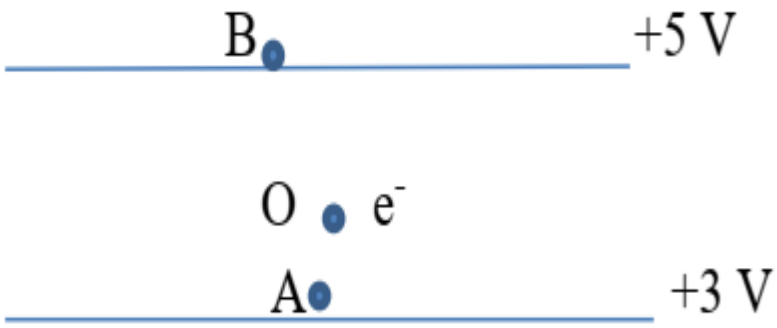
A. 0.2μF. B. 5μF C. 10μF D. 20μF

31. Suppose that three point charges are placed along a straight line and the electrostatics force exerted on the middle charge is zero. What can we conclude about the charges? **(EUEE: 2010)**

A. The signs of the three charges should be the same.
B. The middle charge should be placed at the center between the two charges.
C. The charges at the ends must have the same sign.
D. The charge at the middle and at the left end should have the same sign.

32. Two parallel plates are kept at 3 V as shown in the diagram below. If the electron is releasedat O, then which way will the electron move? **(EUEE: 2010)**

A. Towards A
B. Towards B
C. Remains at O
D. Parallel to the plates



33. A capacitor of 12μF capacitance can be fully charged after it is connected between potentialdifferences of 9 V. How much electrical energy is used in charging the capacitor? **(EUEE: 2010)**

A. 4.86×10^{-4} J B. 54×10^{-4} J C. 1×10^{-3} J D. 9.72×10^{-4} J

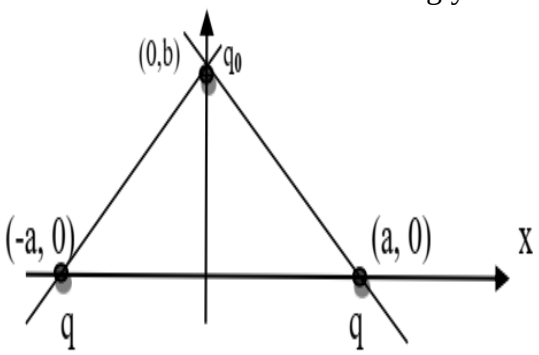
34. Two like charges of value q are fixed at $x = a$ and $x = -a$ as shown in the figure below. If a test charge q_0 is released at y = b, which path will it follow? **(EUEE: 2011)**

A. It stays at $y = b$

B. Along a line $y = -\frac{b}{a}x + b$

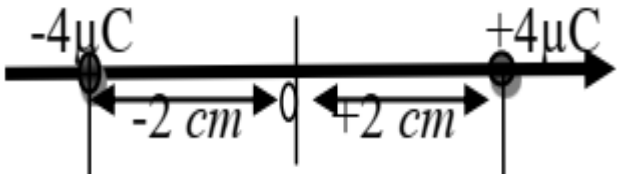
C. Along a line $y = \frac{b}{a}x + b$

D. A long y-axis



35. Two equal and opposite charges are located along x-axis at -20 *cm* and +20 *cm* as shown in the figure below. How much would be the electric potential at the origin? **(EUEE: 2011)**

A. Zero
B. 1.8 MV
C. 3.6 MV
D. 4.5 MV



36. A sheet of polythene (ε_r = 2.3) and 0.25 mm thick is to be used in a capacitor by sandwichingit between two sheets of aluminum foil. What area must the sheets have if the capacitor is to have a capacitance of 0.5 μF? **(UEE: 2011)**

A. 12 m^2 B. 6.14 m^2 C. 0.6 m^2 D. 0.12 m^2

37. When a dielectric material placed between two parallel metal plates in the presence of electric fields they enable the plates to store **(UEE: 2013/14)**

A. Much more charge at different potential difference
B. Much more charge at the same potential difference
C. The same charge at the same potential difference
D. Much less charge at different potential difference

38. A parallel plate capacitor with plate area A and plates separation d stores a charge Q when a potential difference V is kept between the plates. Then the region between the plates is completely filled with a dielectric material of dielectric constant ε_r. If E denotes the electric field between the plates, the energy density stored by the capacitor is **(EUEE: 2013/14)**

A. $u = \frac{\varepsilon_r \varepsilon_0 V^2 A}{2dE}$

B. $u = \frac{1}{2}\varepsilon_r E Q^2 V$

C. $u = \frac{\varepsilon_r \varepsilon_0 Q V^2}{Ad}$

D. $u = \frac{1}{2}\varepsilon_0 \varepsilon_r E^2$

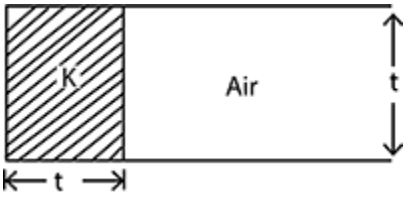
39. An electric dipole consists of a negative charge –q placed at a point with x and y coordinates (-2, 2). The dipole is placed in a uniform electric field $\vec{E}$ directed in the positive x direction. If the dipole axis makes an angle θ with the field, which of the following is true about the dipole? **(EUEE: 2014/15)**

A. It is in both translation and rotational equilibrium.
B. It travels in the direction of the electric field.
C. The field rotates the dipole in the direction of decreasing the angle θ, until the dipole becomes parallel to the field.
D. The field rotates it in the direction of increasing the angle θ, until the dipole becomes perpendicular to the field.

40. The electric potential at a distance of 2 cm from a $-1.6x10^{-9}C$ point charge is **(EUEE: 2014/15)**
    A. 4.4 V B. -720 V C. -14.4 V D. 720 V
41. One of the following statements is a correct description of the charging processes? **(EUEE: 2014/15)**
    A. When a positively charged object is momentarily brought into contact with a neutral metallic sphere, the sphere acquires a net positive charge.
    B. When a plastic rod is rubbed with wool, the two objects acquire a net charge of the same sign.
    C. During charging a neutral object by induction using a negatively charged rod, charge flows from the rod to the object.
    D. When a neutral metallic sphere is charged by induction using a negatively charged rod, the sphere acquires a net negative charge.
42. A parallel plate capacitor is charged with a battery. The battery is then disconnected, and a dielectric material is inserted between the plates of the capacitor. Which of the following is correct about the effect of the dielectric? **(EUEE: 2014/15)**
    A. The electric field between the plates and the energy stored decrease.
    B. The capacitance remains the same and the electric field between the plates increases.
    C. The potential difference between the plates remains the same and the charge increases.
    D. The charge on the plates decreases and the energy stored increases.

Additional question

43. A parallel plate capacitor with air as the dielectric has capacitance C. A slab of dielectric constant K and having the same thickness as the separation between the plates is introduced so as to fill one fourth of the capacitor as shown in the figure. The new capacitance will be:



A. $\frac{(K+3)C}{4}$ B. $\frac{(K+2)C}{4}$ C. $\frac{(K+1)C}{4}$ D. $\frac{KC}{4}$

44. The capacitance of parallel-plate capacitor is $4\mu F$. If a dielectric material of dielectric constant 16 is placed between the plates then the new capacitance will be:
    A. $\frac{1}{64}\mu F$ B. $0.25\mu F$ C. $64\mu F$ D. $40\mu F$

END