

TIPS & TRICKS

Study Centre for fundamental studies

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Unit Test:

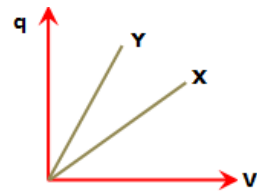
CLASS: XII

Time: 1Hr. 15 Min.

M.M.: 35

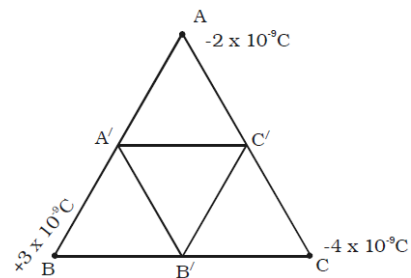
Attempt all the questions.

1. What is an equipotential surface? Write examples. Explain why the work done in moving a charge on an equipotential surface is zero? [2]
2. Derive the relation between electric intensity and electric potential due to a point charge. [2]
3. A dielectric slab of dielectric constant K is inserted between the plates of a parallel plate capacitor with battery remaining connected to it. What will be the effect on (a) capacitance (b) charge (c) potential energy stored (d) electric field between the plates? [2]
4. A $4 \mu\text{F}$ capacitor is charged by a 200 V supply. It is then disconnected from the supply, and is connected to another uncharged $2 \mu\text{F}$ capacitor. How much electrostatic energy of the first capacitor is lost in the form of heat and electromagnetic radiation? [2]
5. The graph shown in figure shows the variation of charge versus potential difference for two capacitors C_1 and C_2 . The capacitors have same plate separation, but the plate area of C_2 is double that of C_1 . Identify the graphs corresponding to C_1 & C_2 and why? [2]



6. There is an equilateral triangle with one point charge at each vertex. The charges are $-Q$, $+3Q$ and $-4Q$ respectively. The length of one side of the triangle is L . Determine an expression in simplest form for the electric potential at a point halfway between the $-Q$ and $+3Q$. [3]
7. Calculate the work done to move a charge of 6 mC from a point 2 m away to a point 0.5 m away from a point charge of 4 nC ? What is the potential difference between these points? [3]
8. Derive an expression for the energy stored in a capacitor. Show that whenever two conductors share charges by bringing them into electrical contact, there is a loss of energy. [4]
9. State the principle of parallel plate capacitor. Derive an expression for the capacitance of a parallel plate capacitor with (a) a dielectric slab (b) a metallic plate in between the plates of the capacitor. [5]

10. Three charges $-2 \times 10^{-9} \text{ C}$, $+3 \times 10^{-9} \text{ C}$, $-4 \times 10^{-9} \text{ C}$ are placed at the vertices of an equilateral triangle ABC of side 20 cm . Calculate the work done in shifting the charges A , B and C to A' , B' and C' respectively which are the mid points of the sides of the triangle. [5]



11. Three identical capacitors C_1 , C_2 and C_3 of capacitance $6 \mu\text{F}$ each are connected to a 12 V battery as shown in the figure. Find (i) charge on each capacitor (ii) equivalent capacitance of the network (iii) energy stored in the network of capacitors. [5]

