

CLASS 12 PHYSICS

[ELECTROSTATICS]

Date: 30/05/17

Marks-50

PART-A

Q1 Which physical quantity has its S.I unit (1) Cm (2) N/C

Q2 Write four Properties of Electric field line

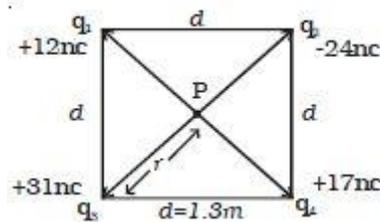
Q3 Why does the electric field inside a dielectric decrease when it is placed in an external electric field?

Q4 What is the work done in moving a 2m C point charge from corner A to corner B of a square ABCD when a 10m C charge exist at the centre of the square?

Q5 Two point charges +q and +9q are separated by a distance of 10 a. Find the point on the line joining the two charges where electric field is zero?

PART-B

Q6 Calculate the electric potential at a point P, located at the centre of the square of point charges shown in the figure

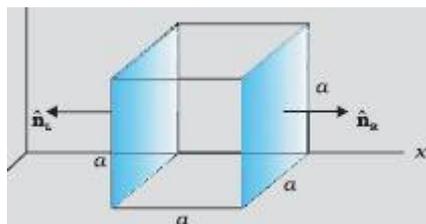


Q7 Prove that the energy stored in a parallel plate capacitor is given by $\frac{1}{2} CV^2$ and deduce then expression for energy density

Q8 A dielectric of dielectric constant 3 fills three fourth of the space between the plates of a parallel plate capacitor. What percentage of the energy is stored in the dielectric?

Q9 Three capacitors of capacitances 2 pF, 3 pF and 4 pF are connected in parallel. (a) What is the total capacitance of the combination? (b) Determine the charge on each capacitor if the combination is connected to a 100 V supply.

Q10 The electric field components in figure are $E_x = \alpha x^{1/2}$, $E_y = E_z = 0$, in which $\alpha = 800 \text{ N/C m}^{1/2}$. Calculate (a) the flux through the cube, and (b) the charge within the cube. Assume that $a = 0.1 \text{ m}$.



Q11 Two small equal and unlike charges $2 \times 10^{-8}\text{C}$ are placed at A and B at a distance of 6 cm. Calculate the force on the charge $1 \times 10^{-8}\text{C}$ placed at P, where P is 4cm on the perpendicular bisector of AB.

Q12 A free proton and a free electron are placed in a uniform field. Which of the two experience greater force and greater acceleration?

Q13 Force of attraction between two point electric charges placed at a distance d in a medium is F. What distance apart should these be kept in the same medium, so that force between them becomes F/3?

Q14 A 600pF capacitor is charged by a 200V supply. It is then disconnected from the supply and is connected to another uncharged 600 pF capacitor. How much electrostatic energy is lost in the process?

PART-C

Q15 Derive the expression for Electric field due to dipole at equatorial line

Q16 A stream of electrons travelling with speed v m/s at right angles to a uniform electric field E is deflected in a circular path of radius r. Prove that $\frac{e}{m} = \frac{v^2}{rE}$

Q17 Keeping the voltage of the charging source constant, what would be the percentage change in the energy stored in a parallel plate capacitor if the separation between its plates were to be decreased by 10%?

Q18 An air capacitor is given a charge of 2mC raising its potential to 200 V. If on inserting a dielectric medium, its potential falls to 50 V, what is the dielectric constant of the medium?

PART-D

Q19 A conducting slab of thickness 't' is introduced without touching between the plates of a parallel plate capacitor separated by a distance d ($t < d$). Derive an expression for the capacitance of a capacitor?

Q20 Derive the expression for Electric potential at a point due to an electric dipole

Q21 If all the capacitors are equal to 2pF, then calculate the equivalent capacitance of the given network between points A & B?

