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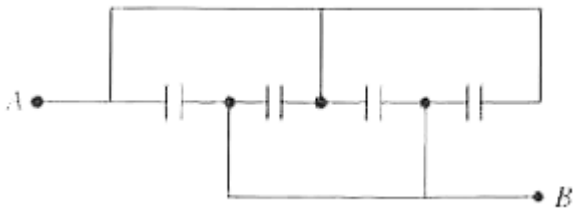
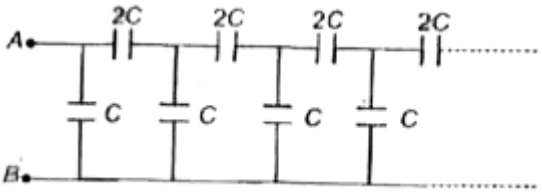
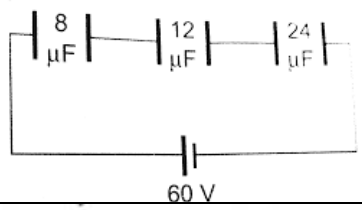
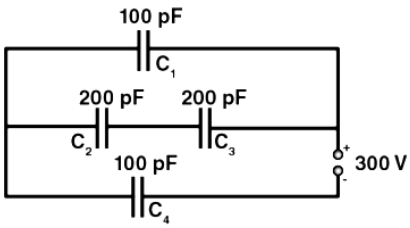
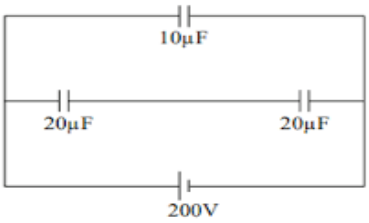
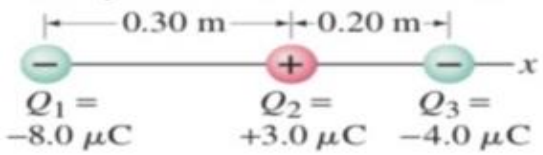
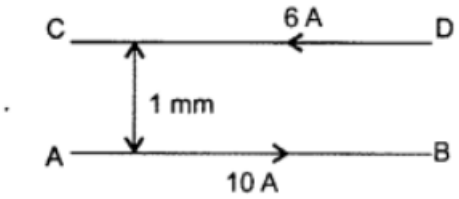
2025-2026

Subject: Physics **Std- XII** **Worksheet : C**

TOPIC : ELECTROSTATICS UNIT AND MOVING CHARGES

1.	Does the force between two-point charges change if the dielectric constant of the medium in which they are kept is increased?
2.	No two electric lines of force can intersect each other. Why?
3.	An electric dipole with dipole moment 4 x 10^{-9} Cm is aligned at 30° with direction of a uniform electric field of magnitude 5 x 10^{4} NC. Calculate the magnitude of the torque acting on the dipole.
4.	Two-point electric charges q and 2q are kept at a distance d apart from each other in air. A third charge Q is to be kept along the same line in such a way that the net force acting on q and 2q is zero. Calculate the position of charge Q in terms of q and .d .
5.	  Find theequivalent capaciance in each case.
6.	Find the potential difference and charge on each capacitor.   
7.	 Find the net force on Q_3.
8.	Two point charges 5μC and – 4 μC are separated by a distance of 1 m in air. At what point on the line joining the charges is the electric potential zero?
9.	Two charges +16μC and −9μC are placed 8 cm apart. At what point on the line joining the two charges is the electric field zero?
10	Keeping the voltage of the charging source constant, what will 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%.

11	Find the condition under which the charged particles moving with different speeds in the presence of electric and magnetic field vectors can be used to select charged particles of a particular speed.
12	A charge q of mass m is moving with a velocity of v, at right angles to a uniform magnetic field B. Deduce the expression for the radius of the circular path it describes.
13	A proton and an alpha particle having the same kinetic energy are, in turn, passed through a region of uniform magnetic field, acting normal to the plane of the paper and travel in circular paths. Deduce the ratio of the radii of the circular paths described by them
14	A circular coil of 200 turns and radius 10 cm is placed in a uniform magnetic field of 0.5 T, normal to the plane of the coil. If the current in the coil is 3.0 A, calculate the (a) total torque on the coil. (b) total force on the coil. (c) average force on each electron in the coil, due to the magnetic field. Assume the area of cross-section of the wire to be 10^{-5} m^2 and the free electron density is 10^{29}/m3.
15	Derive an expression for the magnetic field at a point on the axis of a circular coil carrying current and hence find the magnetic field at the centre of the circular coil carrying current.
16	A long straight wire of a circular cross-section of radius 'a' carries a steady current 'I'. The current is uniformly distributed across the cross-section. Apply Ampere's circuital law to calculate the magnetic field at a point V in the region for (i) r < a and (ii) r > a.
17	A wire AB is carrying a steady current of 10 A and is lying on the table. Another wire CD carrying 6 A is held directly above AB at a height of 2 mm. Find the mass per unit length of the wire CD so that it remains suspended at its position when left free. Give the direction of the current flowing in CD with respect to that in AB. [Take the value of g = 10 ms^{-2}] 
18	A uniform magnetic field **B** is set up along the positive z -axis. A particle of charge 'q' and mass 'm' moving with a velocity v enters the field at the origin in X-Z plane such that it has velocity components both along and perpendicular to the magnetic field **B**. Trace, giving reason, the trajectory followed by the particle. Find out the expression for the distance moved by the particle along the magnetic field in one rotation.
19	Draw the magnetic field lines due to a circular wire carrying current I.
20	(a) Write the expression for the force F acting on a particle of mass m and charge q moving with velocity v in a magnetic field B. Under what conditions will it move in (i) a circular path and (ii) a helical path? (b) Show that the kinetic energy of the particle moving in magnetic field remains constant.

1. (i)Observe fig . a and state the signs of Q1 and Q2.

(ii)State the point at which electric field is minimum.

(a)

(b)

2. (i)Few spherical equipotential surfaces are shown in the figure. Find

the electric field at any point X.

(ii)Find the electric field strength in reference to the figure (b).

(a)

(b)

3. (i)There are two equipotential surfaces as shown in figure. The distance between

them is r . The charge of q coulomb is taken from the surface A to B, the resultant work done will be ……

(ii) A 200 μC charge is at the centre of a square of side 10 cm. Find the work done in moving a charge of 20 μC between two diagonally opposite points on the square.

4.

(i) Find the net electric force on q1(+q).

(ii) Find the net electric field and potential at O.

5

10 Two charged spherical conductors of radii R1 and R2 when

connected by a conducting wire acquire charges q1 and q2 respectively. Find the ratio of their surface charge densities in terms of their radii.

11 Two point charges + q and -2q are placed at the vertices ‘B’ and ‘C’ of an equilateral triangle ABC of side as given in the figure. Obtain the

expression for (i) the magnitude and (ii) the direction of the resultant electric field at the vertex A due to these two charges.

8.

9. A hollow cylindrical box of length 1m and area of cross-section 25 cm2 is placed in a three dimensional coordinate system as shown in the

figure. The electric field in the region is given by

where E is in NC-1 and x is in metres. Find

(a) Net flux through the cylinder.

(b) Charge enclosed by the cylinder.

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expression for (i) the magnitude and (ii) the direction of the resultant electric field at the vertex A due to these two charges.

(a)