PM SHRI KENDRIYA VIDYALAYA BSF CAMPUS RAJOURI

SUMMER VACATION HOLIDAY HOME WORK

CLASS: XII SUBJECT: PHYSICS

1. Solve the worksheets given on chapter 1 and 2.
2. Complete written work for the experiments given below

Experiments SECTION–A

1. To determine resistivity of two / three wires by plotting a graph for potential difference versus current.
2. To find resistance of a given wire / standard resistor using metre bridge.
3. To verify the laws of combination (series) of resistances using a metre bridge.
4. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit.

Activities 1. To measure resistance, voltage (AC/DC), current (AC) and check continuity of a given circuit using multimeter.

2. To assemble the components of a given electrical circuit.

3. To draw the diagram of a given open circuit comprising at least a battery, resistor/rheostat, key, ammeter and voltmeter. Mark the components that are not connected in proper order and correct the circuit and also the circuit diagram. **Experiments SECTION-B**

1. To find the focal length of a convex lens by plotting graphs between u and v or between 1/u and 1/v.
2. To determine angle of minimum deviation for a given prism by plotting a graph between angle of incidence and angle of deviation.
3. To determine refractive index of a glass slab using a travelling microscope.
4. To draw the I-V characteristic curve for a p-n junction diode in forward and reverse bias.

Activities

1. To identify a diode, an LED, a resistor and a capacitor from a mixed collection of such items.
2. To observe diffraction of light due to a thin slit.
3. To study the nature and size of the image formed by a (i) convex lens, or (ii) concave mirror, on a screen by using a candle and a screen (for different distances of the candle from the lens/mirror).

3. Select any one Suggested Investigatory Projects from list of 8 given making use of virtual labs like PhET, Ophysics , olabs .

1. To study various factors on which the internal resistance/EMF of a cell depends.

2. To study the variations in current flowing in a circuit containing an LDR because of a variation in (a) the power of the incandescent lamp, used to 'illuminate' the LDR (keeping all the lamps at a fixed distance). (b) the distance of a incandescent lamp (of fixed power) used to 'illuminate' the LDR.

3. To find the refractive indices of (a) water (b) oil (transparent) using a plane mirror, an equiconvex lens (made from a glass of known refractive index) and an adjustable object needle.

4. To investigate the relation between the ratio of (i) output and input voltage and (ii)

number of turns in the secondary coil and primary coil of a self-designed transformer.

5. To investigate the dependence of the angle of deviation on the angle of incidence using a hollow prism filled one by one, with different transparent fluids.

6. To estimate the charge induced on each one of the two identical Styrofoam (or pith) balls suspended in a vertical plane by making use of Coulomb's law.

7. To study the factor on which the self-inductance of a coil depends by observing the effect of this coil, when put in series with a resistor/(bulb) in a circuit fed up by an A.C. source of adjustable frequency.

8. To study the earth's magnetic field using a compass needle -bar magnet by plotting magnetic field lines and tangent galvanometer.

4. Visit the webpage and play the simulations

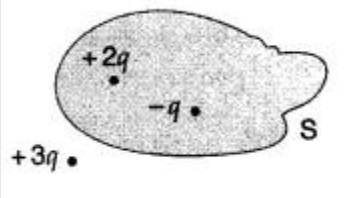
https://phet.colorado.edu/en/simulations/balloons-and-static-electricity https://phet.colorado.edu/en/simulations/john-travoltage

https://phet.colorado.edu/en/simulations/capacitor-lab-basics ,

https://phet.colorado.edu/en/simulations/charges-and-fields

WORKSHEET 1(Electric charges & fields)

1. Which orientation of an electric dipole in a uniform electric field would correspond to stable equilibrium?
2. If the radius of the Gaussian surface enclosing a charge is halved, how does the electric flux through the Gaussian surface change ?
3. A charge q is placed at the centre of the line joining two equal charges Q. Show that the system of three charges will be in equilibrium if q = – Q/4.
4. Figure shows three point charges, +2q, -q and + 3q. Two charges +2q and -q are enclosed within a surface 'S'. What is the electric flux due to this configuration through the surface 'S' (Delhi 2010)



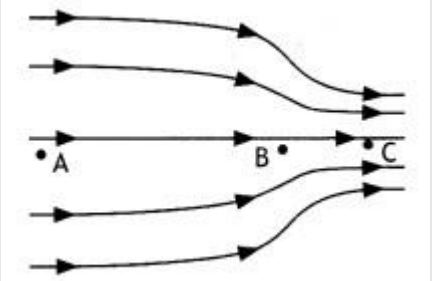
5. Why should electrostatic field be zero inside a conductor? (Delhi 2012)
6. A charge 'q' is placed at the centre of a cube of side l. What is the electric flux passing through each face of the cube? (All India 2012)
7. Two charges of magnitudes -3Q and + 2Q are located at points (a, 0) and (4a, 0) respectively. What is the electric flux due to these charges through a sphere of radius '5a' with its centre at the origin?
8. Draw a plot showing variation of electric field with distance from the centre of a solid conducting sphere of radius R, having a charge of +Q on its surface.
9. Derive an expression for the torque experienced by an electric dipole kept in a uniform electric field. (Delhi 2017)
10. Show that the electric field at the surface of a charged conductor is given by E→=(σ/ε0) n^, where σ is the surface charge density and h is a unit vector normal to the surface

in the outward direction. (All India 2010)

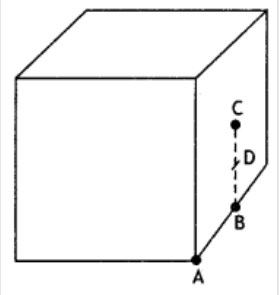
11. A thin straight infinitely long conducting wire having charge density X is enclosed by a cylindrical surface of radius r and length l, its axis coinciding with the length of the wire. Find the expression for the electric flux through the surface of the cylinder. (All India 2011)
12. Plot a graph showing the variation of coulomb force (F) versus ($1/R^2$), where r is the distance between the two charges of each pair of charges : (1μC, 2μC) and (2μC, – 3μC). Interpret the graphs obtained. (All India 2010)
13. A hollow cylindrical box of length 1m and area of cross-section 25 cm^2 is placed in a three dimensional coordinate system as shown in the figure. The electric field in the region is given by $E\rightarrow=50xi\hat{}$ where E is in NC^{-1} and x is in metres. Find

    - Net flux through the cylinder.
    - Charge enclosed by the cylinder. (Delhi 2013)

14. Two charged spherical conductors of radii R_1 and R_2 when connected by a conducting wire acquire charges q_1 and q_2 respectively. Find the ratio of their surface charge densities in terms of their radii. (Delhi 2014)
15. A charge is distributed uniformly over a ring of radius 'a'. Obtain an expression for the electric intensity E at a point on the axis of the ring. Hence show that for points at large distances from the ring, it behaves like a point charge. (Delhi 2016)
16. Draw the pattern of electric field lines, when a point charge –Q is kept near an uncharged conducting plate. (CBSE Delhi 2019)
17. In the figure given below, at which point electric field is maximum?



18. What will be the total flux through the faces of the cube (figure) with the side of length 'a' if a charge q is placed at
    (a) A: a corner of the cube. (b) B: mid-point of an edge of the cube.
    (c) C: center of the face of the cube.(d) D: mid-point of B and C. {NCERT Exemplar)



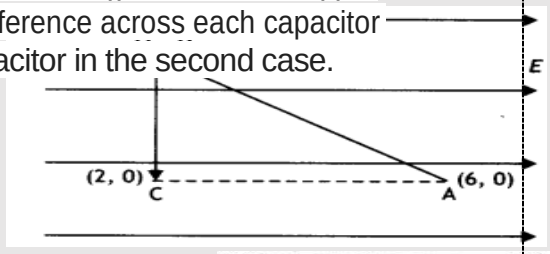
19. State Gauss's law in electrostatics. Derive an expression for the electric field due to an infinitely long straight uniformly charged wire
20. An electric dipole of dipole moment consists of point charges +q and –q separated

by a distance 2a apart. Deduce the expression for the electric field due to the dipole at a distance x from the centre of the dipole on its axial line in terms of the dipole moment . Hence show that in the limit **x >> a**, **$E = 2p/(4\pi\varepsilon_0 x^3)$.**

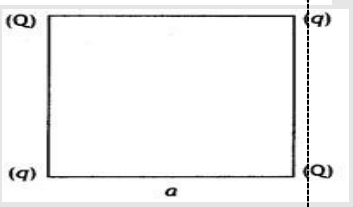
21. (a) A charge + Q is placed on a thin conducting spherical shell of rad an expression for the (b) Show that the electric field for same charge density **(σ)** is twice in case of a conducting plate or surface than in a nonconducting sheet.

WORKSHEET 2 (Electrostatic potential & Capacitance)

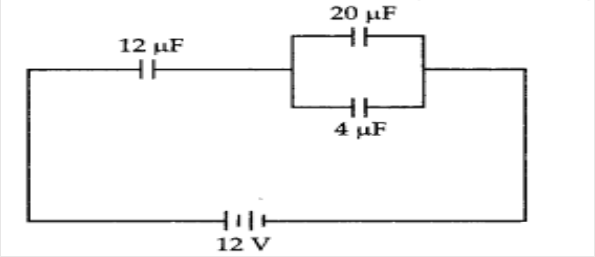
1. Draw the equipotential surfaces due to an isolated point charge. (CBSE Delhi 2019)
2. 'For any charge configuration, equipotential surface through a point is normal to the electric field'. Justify. (CBSE Delhi 2014)
3. Why is the electrostatic potential inside a charged conducting shell constant throughout the volume of the conductor? (CBSE AI 2019)
4. Does the charge given to a metallic sphere depend on whether it is hollow or solid? (CBSE Delhi 2017)
5. Draw a plot showing the variation of (i) electric field (E) and (ii) electric potential (V) with distance r due to a point charge Q. (CBSE Delhi 2012)
6. Two identical capacitors of 10 pF each are connected in turn (i) in series and (ii) in parallel across a 20 V battery. Calculate the potential difference across each capacitor in the first case and the charge acquired by each capacitor in the second case. (CBSE AI 2019)



7. A test charge 'q' is moved without acceleration from A to C along the path from A to B and then from B to C in electric field E as shown in the figure, (i) Calculate the potential difference between A and C, (ii) At which point (of the two) is the electric potential more and why? (CBSE AI 2012)



8. Four-point charges Q, q, Q., and q are placed at the corners of a square of side 'a' as shown in the figure. Find the potential energy of this system. (CBSEAI, Delhi 2018)
9. (a) Obtain the expressions for the resultant capacitance when the three capacitors C_1, C_2, and C_3 are connected (i) in parallel and then (ii) in series.
   (b) In the circuit shown in the figure, the charge on the capacitor of 4 μF is 16 μC. Calculate the energy stored in the capacitor of 12 μF capacitance. (CBSE 2019C)

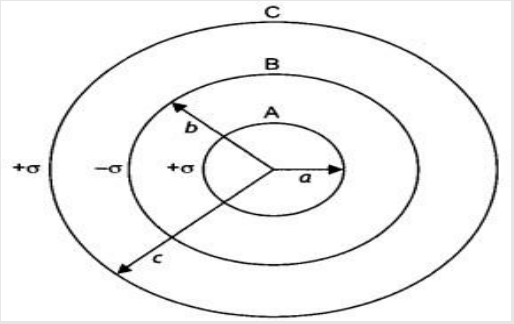


10. (i) Draw the equipotential surfaces corresponding to a uniform electric field in the z-direction. (ii) Derive an expression for the electric potential at any point along the axial line of an electric dipole. (CBSE Delhi 2019)

11. A charge Q is distributed over the surfaces of two concentric hollow spheres of radii r and R (R >> r), such that their surface charge densities are equal. Derive the expression for the potential at the common center.

Or

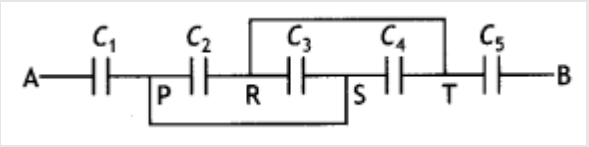
Three concentric metallic shells A, B, and C of radii a, b, and c (a <b < C) have surface charge densities +a, -a, and + o respectively as shown. Obtain the expressions for the potential of three shells A, B, and C. If shells A and C are at the same potential, obtain the relation between a, b and c. (CBSE Al 2019)



12. Electric field intensity at point B due to a point charge Q kept at point A is 24 N C^{-1} and the electric potential at point B due – to the same charge is 12 J C^{-1}. Calculate the distance AB and also the magnitude of the charge Q

13. Two identical capacitors of 12 pF each are connected in series across a 50 V battery. Calculate the electrostatic energy stored in the combination. If these were connected in parallel across the same battery, find out the value of the energy stored in this combination. (CBSE Al 2019)

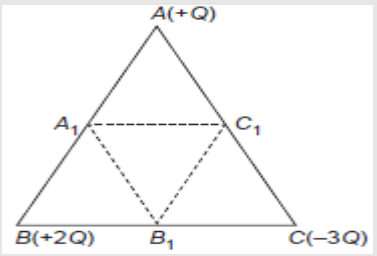
14. (a) Find equivalent capacitance between A and B in the combination given below. Each capacitor is of 2 μF capacitance.



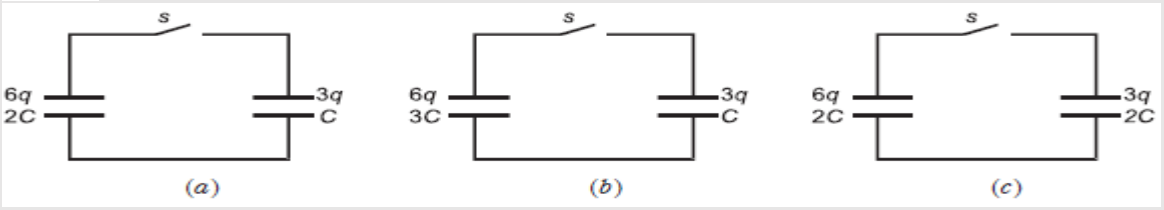
(b) If a DC source of 7 V is connected across AB, how much charge is drawn from the source and what is the energy stored in the network? (CBSE Delhi 2017)

15. Derive an expression for the potential energy of an electric dipole of dipole movement $\vec{p}$ in the electric field $\vec{E}$ (Delhi 2008)

16. Three point charges, +Q, + 2Q and –3Q are placed at the vertices of an equilateral triangle ABC of side l. If these charges are displaced to the mid-points A1, B1 and C1 respectively, find the amount of the work done in shifting the charges to the new locations.



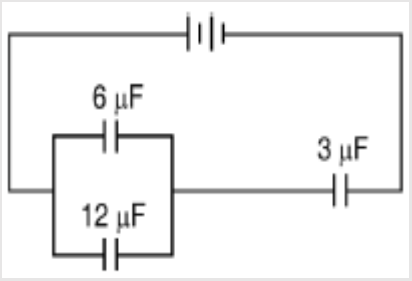
17. Figure shows three circuits, each consisting of a switch and two capacitors initially charged as indicated. After the switch has been closed, in which circuit (if any) will the charges on the left hand capacitor (i) increase, (ii) decrease and (iii) remain same?



18. (a) Derive the expression for the capacitance of a parallel plate capacitor having plate area A and plate separation d.

(b) 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.

19. In the arrangement of capacitors shown here, the energy stored in the 6 μF capacitor is E. Find the following:



(a) Energy stored in the 12 μF capacitor.

(b) Energy stored in the 3 μF capacitor.

(c) Total energy drawn from the battery.

20. Solve the question paper of monthly test April-2025

21. Solve MLL work sheet from chapter 1 and 2 (will be sent in Physics Group).

22. Solve the questions from chapter1,2 and 3 from 10 sample papers (will be sent in Physics Group).

23. Solve Competency based questions from chapter 1,2 and 3.
(i) https://drive.google.com/file/d/1jpfA5ihO6pX7z29BaZaQufVlCgJxZHbV/view
(ii) https://drive.google.com/file/d/1GPWIMjOIv_BOmBIX-cm5JGuYXbt44wQ9/view
(iii) https://drive.google.com/file/d/1HZacSYOnM_1GxGBVWVERiIn7BiKzgr4f/view

24. Makes presentation and notes for the chapters
(a) Electromagnetic waves.
(b) Semiconductor devices.

25. Solve the intext and all NCERT questions from chapters 1,2 and 3.