QB365 Student Learing Managemnet System
Exam Name: Electrostatics - Practice
Std: 12th Standard - Physics
Chapter: Electrostatics

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Questions:

Answer the following questions in detail.

1. Calculate the electric field due to a dipole on its axial line and equatorial plane.
2. Derive an expression for electrostatic potential due to an electric dipole.
3. Obtain the expression for electric field due to an infinitely long charged wire.
4. Obtain the expression for electric field due to an charged infinite plane sheet.
5. Obtain the expression for electric field due to an uniformly charged spherical shell.
6. Explain in detail the effect of a dielectric placed in a parallel plate capacitor.
7. Derive the expression for resultant capacitance, when capacitors are connected in series and in parallel.
8. Explain in detail the construction and working of a Van de Graaff generator.

Write the answer any 4 questions.Q. No.17 Compulsory.

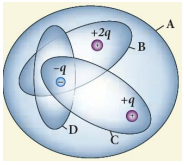
9. A parallel plate capacitor has square plates of side 5 cm and separated by a distance of 1 mm.
   (a) Calculate the capacitance of this capacitor.
   (b) If a 10 V battery is connected to the capacitor, what is the charge stored in any one of the plates? (The value of $\varepsilon_0 = 8.85 \times 10^{-12}\ Nm^2\ C^{-2}$)
10. Obtain Gauss law from Coulomb's law.
11. Obtain the expression for capacitance for a parallel plate capacitor.
12. What does superposition principle explain? Explain the principle.
13. Mention any three applications of capacitors.
14. Consider a point charge +q placed at the origin and another point charge -2q placed at a distance of 9 m from the charge +q. Determine the point between the two charges at which electric potential is zero.

Write the answer any 4 questions.Q.No 12 compulsory.

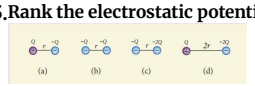
15. A sample of HCl gas is placed in a uniform electric field of magnitude $3 \times 10^4\ NC^{-1}$. The dipole moment of each HCl molecule is 3.4×10^{-30} Cm. Calculate the maximum torque experienced by each HCl molecule.
16. A water molecule has an electric dipole moment of 6.3×10^{-30} Cm. A sample contains 10^{22} water molecules, with all the dipole moments aligned parallel to the external electric field of magnitude $3 \times 10^5\ NC^{-1}$. How much work is required to rotate all the water molecules from $\theta = 0°$ to 90°?
17. What is an equipotential surface?
18. What is polarisation?
19. Define 'capacitance'. Give its unit.
20. What is corona discharge?

Multiple Choice Question

21. Which charge configuration produces a uniform electric field?
    (a) point charge (b) uniformly charged infinite line (c) uniformly charged infinite plane (d) uniformly charged spherical shell
22. An electric dipole is placed at an alignment angle of 30° with an electric field of $2 \times 10^5\ NC^{-1}$. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 1 cm is
    (a) 4 mC (b) 8 mC (c) 5 mC (d) 7 mC
23. Four Gaussian surfaces are given below with charges inside each Gaussian surface. Rank the electric flux through each Gaussian surface in increasing order.



    (a) D < C < B < A (b) A < B = C < D (c) C < A = B < D (d) D > C > B > A
24. Two identical conducting balls having positive charges q_1 and q_2 are separated by a centre to centre distance r. If they are made to touch each other and then separated to the same distance, the force between them will be _____.
    (a) less than before (b) same as before (c) more than before (d) zero
25. Rank the electrostatic potential energies for the given system of charges in increasing order



    (a) 1 = 4 < 2 < 3 (b) 2 = 4 < 3 < 1 (c) 2 = 3 < 1 < 4 (d) 3 < 1 < 2 < 4
26. Two points A and B are maintained at a potential of 7 V and -4 V respectively. The work done in moving 50 electrons from A to B is _____.
    (a) 8.80×10^{-17} J (b) -8.80×10^{-17} J (c) 4.40×10^{-17} J (d) 5.80×10^{-17} J
27. If voltage applied on a capacitor is increased from V to 2V, choose the correct conclusion.
    (a) Q remains the same, C is doubled (b) Q is doubled, C doubled (c) C remains same, Q doubled (d) Both Q and C remain same
28. A parallel plate capacitor stores a charge Q at a voltage V. Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change?
    (a) Capacitance (b) Charge (c) Voltage (d) Energy density
29. The concept of 'Field' was introduced by _____
    (a) Faraday (b) Gauss (c) Maxwell (d) None

30. Charge per unit volume is called _____

(a) Linear charge density (λ) (b) Surface charge density (σ) (c) Volume charge density (ρ) (d) Electric flux

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QUESTION BANK 365