



INDIAN SCHOOL MUSCAT

FIRST PERIODIC TEST

PHYSICS

CLASS: XII

Subject Code: 042

Time Allotted: 50 mts.

20.04.2022

Max. Marks: 20

GENERAL INSTRUCTIONS:

All questions are compulsory.

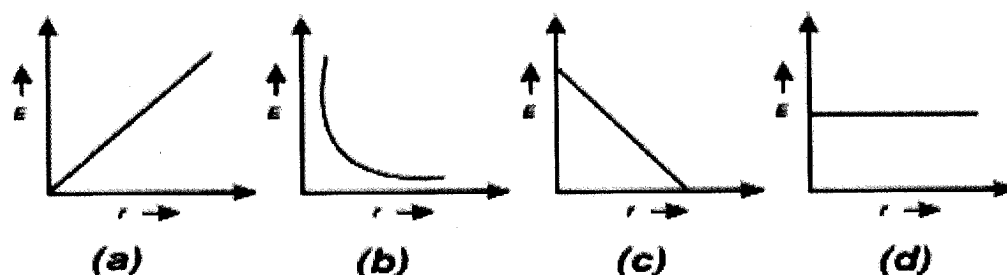
1. Define electric dipole moment. Write its S.I. unit. Is it a scalar or vector quantity? 2
2. Represent with the help of a diagram the orientation of the dipole in (i) stable, (ii) unstable equilibrium in a uniform electric field. 2
3. An electric dipole is held in a uniform electric field. Write the expression for the torque acting on it. Express it in vector form. Identify two pairs of perpendicular vectors in the expression. 2
4. (i) Draw the electric field lines of an isolated point charge Q when $Q > 0$. 3
(ii) A point charge $+Q$ is placed in the vicinity of a conducting surface. Draw the electric field lines between the surface and the charge.
5. Suppose the spheres A and B have identical size and charge on each is $4.8 \times 10^{-7} \text{C}$. They are kept 40cm apart. A third sphere of the same size but uncharged is brought in contact with first, then brought in contact with the second and finally removed from both. What is the new force of repulsion between A and B? 3
6. Derive an expression for the electric field intensity at a point on the axial line of an electric dipole of dipole moment \vec{p} and length $2a$. 3
7. Photocopiers work on the principle that 'opposites attract'. Toner is a powder that is used to create the printed text and images on paper. The powder is negatively charged, and so it is attracted to something positive – the paper. The drum, which is located in the heart of a 5

photocopier, is positively charged using static electricity. An image of the master copy is transferred onto the drum using a laser. The light parts of the image (the white areas on a piece of paper) lose their charge so become more negative, and the black areas of the image (where the text is) remain positively charged.

(i) A glass rod acquires charge by rubbing it with silk cloth. The charge on glass rod is due to

- (a) Friction (b) Conduction (c) Induction (d) Radiation

(ii) For a point charge, the graph between electric field versus distance is given by



(iii) Which physical quantity have unit Newton /coulomb?

- (a) Electric charge (b) Electric field (c) Electric force (d) Electric potential

(iv) In the process of charging, the mass of the negatively charged body

- (a) Increases (b) Decreases (c) Remains Constant (d) halved

(v) Charge on a body is integral multiple of $\pm e$. It is given by the law of

- (a) Conservation of charge (b) Conservation of mass
 (c) Conservation of energy (d) Quantization of charge

End of the Question Paper



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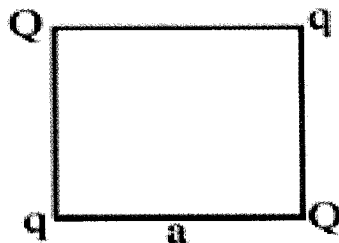
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1. (i) Why do the electric field lines never cross each other? 2
 (ii) Two point charges q_1 and q_2 are such that $q_1 q_2 < 0$. What is the nature of the force between the two charges?
2. Define electric dipole moment. Write its S.I. unit. Is it a scalar or vector quantity? 2
3. In a type of charge configuration electric field at a point due to it is 2
 (i) inversely proportional to the square of distance from the point.
 (ii) inversely proportional to the cube of distance from the point.
 Identify the type of charge configuration in each case.
4. 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 resultant electric force on a charge Q . 3



5. (i) Draw the electric field lines of an isolated point charge Q when $Q < 0$. 3

(ii) A point charge $+Q$ is placed in the vicinity of a conducting surface. Draw the electric field lines between the surface and the charge.

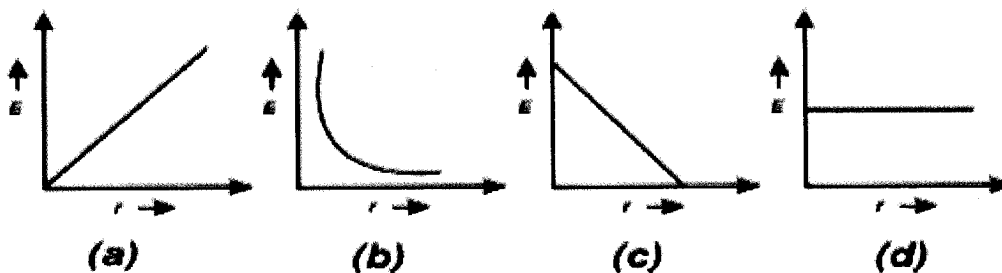
6. An electric dipole is held in a uniform electric field. Derive the expression for the torque acting on it. 3

7. Photocopiers work on the principle that 'opposites attract'. Toner is a powder that is used to create the printed text and images on paper. The powder is negatively charged, and so it is attracted to something positive – the paper. The drum, which is located in the heart of a photocopier, is positively charged using static electricity. An image of the master copy is transferred onto the drum using a laser. The light parts of the image (the white areas on a piece of paper) lose their charge so become more negative, and the black areas of the image (where the text is) remain positively charged. 5

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1. (i) Define dielectric constant of a medium. 2
(ii) Two point charges having equal charges separated by 1m distance experience a force of 8 N.
What will be the force experienced by them, if they are held in water at the same distance?
(Given $k_{water} = 80$)
2. An electric dipole is held in a uniform electric field. Write the expression for the torque acting on it. Express it in vector form. Identify two pairs of perpendicular vectors in the expression. 2
3. Represent with the help of a diagram the orientation of the dipole in (i) stable, (ii) unstable equilibrium in a uniform electric field. 2
4. Two identical charges, Q each, are kept at a distance 'r' from each other. A third charge 'q' is placed on the line joining the above two charges such that all the three charges are in equilibrium. What is the magnitude, sign and position of the charge 'q'? 3
5. (i) Draw the electric field lines of an isolated point charge Q when $Q > 0$. 3
(ii) A point charge +Q is placed in the vicinity of a conducting surface. Draw the electric field lines between the surface and the charge.

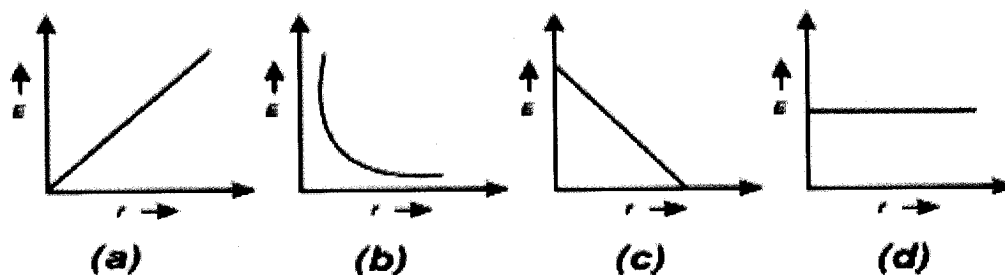
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