INDIAN SCHOOL MUSCAT
FIRST PERIODIC ASSESSMENT

PHYSICS

CLASS: XII

11.04.2019

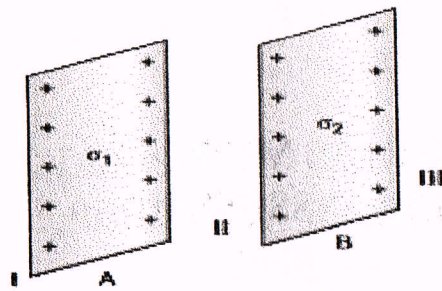Sub. Code: 042

Time Allotted: 50 mts

Max. Marks: 20

GENERAL INSTRUCTIONS:

- **All questions are compulsory.**
- **There are 11 questions in all.**
- **Question no 1 to 5 carry one mark each.**
- **Question no 6 to 18 carry two marks each.**
- **Question no 9 to 11 carry three marks each.**

$$\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2 C^{-2} \text{ N} \qquad \varepsilon_0 = 8.854 \times 10^{-12} C^2 N^{-1} m^{-2}$$

1. Define electric dipole moment. What is its SI unit? 1

2. Why do the electric field lines never cross each other? 1

3. Name the physical quantity whose S.I. unit is JC^{-1}. Is it a scalar or a vector quantity? 1

4. A hollow metal sphere of radius **5** cm is charged such that the potential on its surface is **10V**. What is the potential at the centre of the sphere? 1

5. What is the work done in moving a test charge **q** through a distance of **1** cm along the equatorial axis of an electric dipole? 1

6. Derive an expression for electric field at a point on the equatorial plane of an electric dipole of length **2a**. 2

7. The sum of two point charges is **7μC**. They repel each other with a force of **1N** when kept **30** cm apart in free space. Calculate the value of each charge. 2

8. Two point charges **q** and **-2q** are kept **d** distance apart. Find the location of the point relative to charge **q** at which potential due to this system of charges is zero. 2

9. (i) A point charge **(+Q)** is kept in the vicinity of uncharged conducting plate. Sketch electric field lines between the charge and the plate. 3

    (ii) Two infinitely large plane thin parallel sheets having surface charge densities σ_1 and σ_2 ($\sigma_1 > \sigma_2$) are shown in the figure. Write the magnitudes and directions of the net fields in the regions marked **II** and **III**.

10. An electric dipole of dipole moment $\vec{p}$ is placed in uniform electric field $\vec{E}$. Obtain the expression for the torque $\vec{\tau}$ experienced by the dipole. Identify two pairs of perpendicular vectors in the expression.

    3

11. (i) Why the potential inside a hollow spherical charged conductor is constant and has the same value as on its surface?

(ii) Draw three equipotential surfaces corresponding to a field that uniformly increases in magnitude but remains constant along Z- direction. How are these surfaces different from that of a constant electric field along Z- direction?

    3

End of the Question Paper

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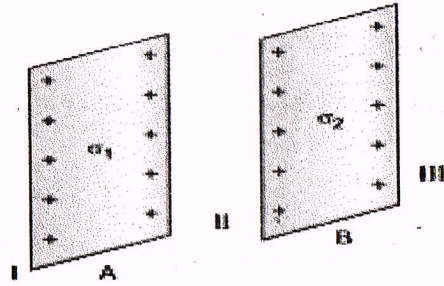11.04.2019   Max. Marks: 20

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1. Define the term electric flux. Write its S.I. unit.   1

2. An electrostatic field line cannot be discontinuous. Why?   1

3. Define electric potential. Is it a scalar or a vector quantity?   1

4. What is the work done in moving a test charge **q** through a distance of **1** cm along the   1
    equatorial axis of an electric dipole?

5. A hollow metal sphere of radius **5** cm is charged such that the potential on its surface is **10V**. 1
    What is the potential at the centre of the sphere?

6. The sum of two point charges is **7µC**. They repel each other with a force of **1N** when kept **30** 2
    cm apart in free space. Calculate the value of each charge.

7. Two point charges **q** and **-2q** are kept **d** distance apart. Find the location of the point relative   2
    to charge **q** at which potential due to this system of charges is zero.

8. Derive an expression for electric field at a point distant r from the centre of dipole on the   2
    axial line of an electric dipole of length **2a**.

9. (i) Why the potential inside a hollow spherical charged conductor is constant and has the   3
    same value as on its surface?

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End of the Question Paper

C

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3. A hollow metal sphere of radius **5** cm is charged such that the potential on its surface is **10V**. What is the potential at the centre of the sphere?   1

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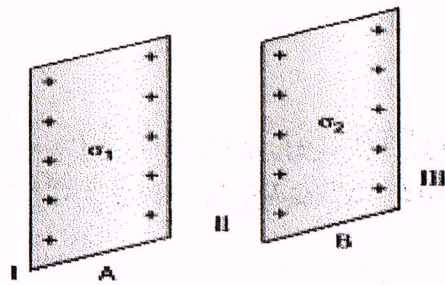
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