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HOLISTIC DEVELOPMENT

# REVISION PRACTICE ASSIGNMENT (RPA)

## SUBJECT- PHYSICS

**SESSION-2020-21**

## CLASSX-XII ELECTROSTATIS CHAPTER-01

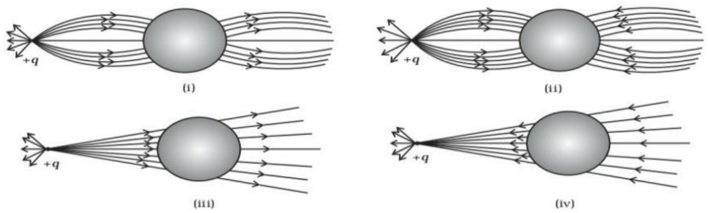
## TOPIC: - ELECTRIC CHRGES AND FIELDS

**SECTION :- I. OBJECTIVE :- MCQ 1X10 = 10**

**1. A point positive charge is brought near an isolated conducting sphere as shown in the figure the electric field is best given by**

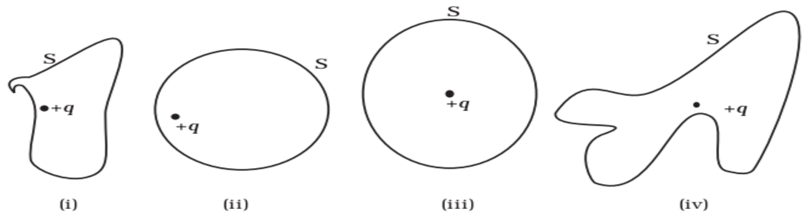
**(a) Fig (I)** **(b) Fig (II)**

**(c) Fig (III)** **(d) Fig (IV)**




**2. The electric flux to the surface**

**(a) in (iv) is largest**
**(b) in (iii) is least**
**(c) in (ii) is same as in (iii) but is smaller than (iv)**
**(d) is the same for all the figures**




**3.**

Five charges $q_1$, $q_2$, $q_3$, $q_4$, and $q_5$ are fixed at their positions as shown in Fig. 1.4. $S$ is a Gaussian surface. The Gauss's law is given by

$$\oint_S \mathbf{E}.d\mathbf{s} = \frac{q}{\varepsilon_0}$$

Which of the following statements is correct?

(a) **E** on the LHS of the above equation will have a contribution from $q_1$, $q_5$ and $q_3$ while $q$ on the RHS will have a contribution from $q_2$ and $q_4$ only.

(b) **E** on the LHS of the above equation will have a contribution from all charges while $q$ on the RHS will have a contribution from $q_2$ and $q_4$ only.

(c) **E** on the LHS of the above equation will have a contribution from all charges while $q$ on the RHS will have a contribution from $q_1$, $q_3$ and $q_5$ only.

(d) Both **E** on the LHS and $q$ on the RHS will have contributions from $q_2$ and $q_4$ only.

Gaussian Surface

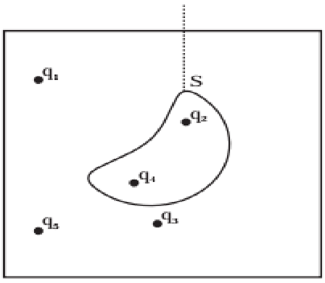



Fig. 1.4

**4. a hemisphere is uniformly charged positively the electric field at a point on a diameter away from the centre is directed**

**(a) perpendicular to the diameter.**

**(b) parallel to the diameter.**

**(c). at an angle tilted towards the diameter.**

**(d) at an angle tilted away from the diameter**

**5.**

If $\oint_S \mathbf{E}.d\mathbf{S} = 0$ over a surface, then

(a) the electric field inside the surface and on it is zero.

(b) the electric field inside the surface is necessarily uniform.

(c) the number of flux lines entering the surface must be equal to the number of flux lines leaving it.

(d) all charges must necessarily be outside the surface.

**6.**

The Electric field at a point is

(a) always continuous.

(b) continuous if there is no charge at that point.

(c) discontinuous only if there is a negative charge at that point.

(d) discontinuous if there is a charge at that point..

**7.**

If there were only one type of charge in the universe, then

(a) $\oint_S \mathbf{E}.d\mathbf{S} \neq 0$ on any surface.

(b) $\oint_S \mathbf{E}.d\mathbf{S} = 0$ if the charge is outside the surface.

(c) $\oint_S \mathbf{E}.d\mathbf{S}$ could not be defined.

(d) $\oint_S \mathbf{E}.d\mathbf{S} = \frac{q}{\varepsilon_0}$ if charges of magnitude $q$ were inside the surface.

**8.**

Consider a region inside which there are various types of charges but the total charge is zero. At points outside the region

(a) the electric field is necessarily zero.

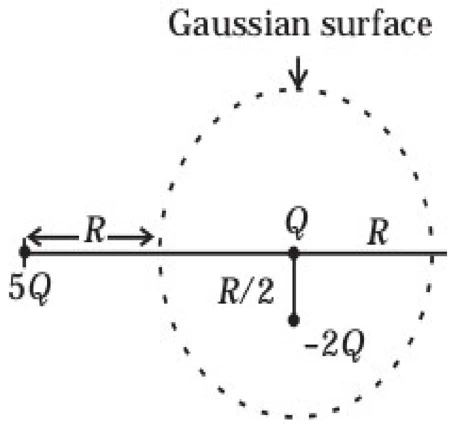
(b) the electric field is due to the dipole moment of the charge distribution only.

(c) the dominant electric field is $\propto \frac{1}{r^3}$, for large $r$, where $r$ is the distance from a origin in this region.

(d) the work done to move a charged particle along a closed path, away from the region, will be zero.

**9.**

**Refer to the arrangement of charges in the figure below and a Gaussian surface of radius R with capital Q at the centre then.**




Choose the correct Option from the followings :-

(a) total flux through the surface of the sphere is $\frac{-Q}{\varepsilon_0}$.

(b) field on the surface of the sphere is $\frac{-Q}{4\pi\varepsilon_0 R^2}$.

(c) flux through the surface of sphere due to $5Q$ is zero.

(d) field on the surface of sphere due to $-2Q$ is same everywhere.

**10.**

A positive charge Q is uniformly distributed along a circular ring of radius $R$. A small test charge $q$ is placed at the centre of the ring (Fig. 1.7). Then

(a) If $q > 0$ and is displaced away from the centre in the plane of the ring, it will be pushed back towards the centre.

(b) If $q < 0$ and is displaced away from the centre in the plane of the ring, it will never return to the centre and will continue moving till it hits the ring.

(c) If $q < 0$, it will perform SHM for small displacement along the axis.

(d) $q$ at the centre of the ring is in an unstable equilibrium within the plane of the ring for $q > 0$.

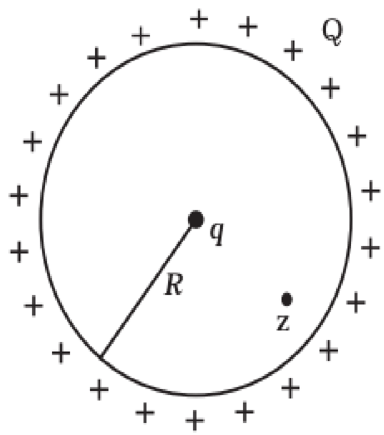


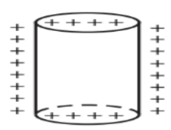

Fig. 1.7

**SECTION :- ll. Answer the following questions :- 2 X 5 = 10**

**11. An arbitrary surface encloses a dipole. What is the electric flux through this surface ?**

**12. If the total charge enclosed by a surface is zero, does it imply that the electric field everywhere on the surface is zero? Conversely, if the electric field everywhere on a surface is zero, does it imply that net charge inside is zero.**

**13. Sketch the electric field lines for a uniformly charged hollow cylinder shown below :-**



**14.**

Five charges, $q$ each are placed at the corners of a regular pentagon of side '$a$' (Fig. 1.12).

(a) (i) What will be the electric field at O, the centre of the pentagon?

(ii) What will be the electric field at O if the charge from one of the corners (say A) is removed?

(iii) What will be the electric field at O if the charge $q$ at A is replaced by $-q$?

(b) How would your answer to (a) be affected if pentagon is replaced by n-sided regular polygon with charge $q$ at each of its corners?

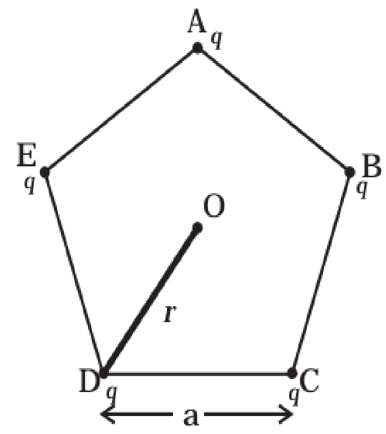



Fig. 1.12

**15.**

Two charges $-q$ each are fixed separated by distance $2d$. A third charge $q$ of mass $m$ placed at the mid-point is displaced slightly by $x$ ($x \ll d$) perpendicular to the line joining the two fixed charged as shown in Fig. 1.14. Show that $q$ will perform simple harmonic oscillation of time period.

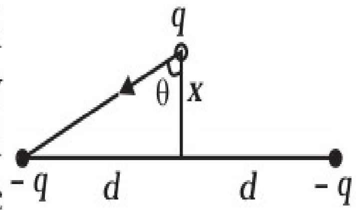



Fig. 1.14

$$T = \left[\frac{8\pi^3\varepsilon_0 m d^3}{q^2}\right]^{1/2}$$